THE GLOBAL ECONOMY:
FINANCIAL, MONETARY, TRADE
AND KNOWLEDGE ASYMMETRIES

THE GLOBAL ECONOMY: FINANCIAL, MONETARY, TRADE AND KNOWLEDGE ASYMMETRIES

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STUDIES IN ECONOMIC TRANSFORMATION AND PUBLIC POLICY

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Acknowledgments and Dedication

We Athenians, in our own persons, take our decisions on policy or submit them to proper discussions: for we do not think that there is an incompatibility between words and deeds; the worst thing is to rush into action before the consequences have been properly debated.

Thucydides (460-400 B.C.)
Pericles' Funeral Oration

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Foreword

Robert Parkinson
Dean, School of Business Administration
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The School of Business Administration of Loyola University Chicago was delighted to host the highly successful sixth biennial international conference of the Athenian Policy Forum on THE GLOBAL ECONOMY: FINANCIAL, LEGAL AND TECHNOLOGICAL ASYMMETRIES, during August 16-17, 2002. About seventy economists attended this conference and made presentations on a broad variety of topics emphasizing the differences that exist between developed and emerging economies.

Scholars who participated in this conference were encouraged to revise their papers and submit them for publication. The editors of this volume, Professors Marc Hayford, A.G. Malliaris and Mary Malliaris, all of the School of Business Administration, Loyola University Chicago, have selected the best twenty papers for inclusion in the present volume on the basis of referee reports.

The present volume highlights numerous asymmetries that arise in economic policy. While in economic theorizing the researcher abstracts from certain complexities to focus on cause and effect of economic changes, the policy maker takes such analytical results and studies how they are modified in different economic circumstances. This volume offers numerous illustrations of how certain results that are valid in some economic environments are not valid in others. For example, some exchange rate variability may cause stock market volatility in India but a similar exchange rate variability may not affect the U.S. stock market as much. Exports may play a greater role for certain Asian economies but not for certain European ones. Some countries are very successful in attracting foreign direct investments, such as China, but others such as the Balkans are not.

While each article offers useful insights in the existing asymmetries between nations and economic environments, the book as a whole is an important contribution to the field of economic policy because it addresses complexities that may arise in the implementation of economic policies. This book is a significant and timely contribution both to current policy debates and economic theorizing about globalization.

Introduction

Marc Hayford, A.G. Malliaris and Mary Malliaris
Loyola University Chicago

The Global Economy: Financial, Monetary, Trade and Knowledge Asymmetries is a collection of 20 essays prepared by Research Fellows and Associates of the **Athenian Policy Forum.** The contributions of this volume were selected from among 45 papers initially presented at the Sixth Biennial International Conference in Chicago, August 16-17, 2002. At the end of this Conference, authors were encouraged to submit their papers for possible publication. Each submitted paper was carefully reviewed by appropriate referees and the authors were encouraged to revise their papers according to the referees' reports and resubmit them. This book is the final product of this process.

The volume is divided into four parts, each presenting a group of articles addressing a specific dimension of asymmetries. The concept of asymmetries was introduced into economics in the early 1970s by Nobel Laureates Joseph Stiglitz, George Akerlof and Michael Spence who replaced the then standard assumption of equally informed agents by the assumption that some agents know more while others know less. They coined the term "asymmetrically informed" agents to describe dissimilar information between economic agents. The **Athenian Policy Forum** has extended this notion of asymmetries to many aspects of economics, such as trade, monetary policies, financial institutions, growth, investment, public policy, competitiveness and others to highlight the differences, dissimilarities and nonuniformities that may exist between two economies.

The section on **financial asymmetries** includes five contributions. Sima Motamen-Samadian describes the financial crisis of Argentina during 2001 that has once again raised the question of the economic role of an exchange rate regime. Some blame the Currency Board for Argentina's loss of international competitiveness, while others suggest the external shocks and the excessive public sector debt responsible for the crisis. In assessing the role of the Currency Board in the crisis, this chapter highlights some of the important features of Argentina' trade relationships, and the asymmetries between the government's fiscal and foreign exchange policies that adversely affected the stability of the economy. The author shows that the Currency Board could not have dramatically altered the trade balance and the country's ability to generate the necessary foreign exchange revenue to cover the external debt, and further confirms that under the condition of external shocks, the government's fiscal policy and the Currency Board's foreign exchange policy may have caused major financial asymmetries that destabilized the economy.

Banerjee, Batavia and Nandakumar present evidence from India on the relationship between exchange rate variability and stock market volatility. We may recall that the analytic work on the effects of exchange rate variability has been almost exclusively devoted to the developments at the macroeconomic level. Thus the literature is voluminous on the impact of increased exchange rate variability on the volume of trade, an issue on which the crowded field stands yet divided. Currently, the debate is most intense on the determinants of exchange rate variability, with new countries poised to enter the European Monetary Union (EMU) having apprehensions on this score. But *some* attention has been also paid recently to the impact of exchange rate variability on economic variables and instabilities at what could be termed a more 'micro' level. The present study is in this vein, and looks at the effects of increased foreign exchange instability on stock market valuation and volatility in the context of India.

The third paper in this volume by Ibolya Mile reviews the early transition period from a centrally planned to a market oriented economy for the Czech Republic, Hungary, and Poland. These countries have eliminated barriers to current account transactions and have gradually moved on to the far-reaching liberalization of capital account transactions in line with the requirements of OECD membership. Underdeveloped financial markets in these countries, however, make them still vulnerable to short term capital flows. Additionally, their current account balances have been negative. This brings the threat of currency crisis or at least a speculative pressure on the currency, if current account deficits or foreign debt policy or both become unsustainable. The author shows that the Czech Republic was relatively stable with the exception of May 1997, when a crisis forced the authorities to give up the exchange rate peg. Hungary was successful in preventing a serious crisis by introducing the crawling band regime in 1995. After several corrections in its exchange rate regime, Poland freed its exchange rates in April 2000 as response to turbulence at the end of 1999.

The entry into the World Trade Organization will bring effective competition for the Chinese banking industry. Mine Cinar, Anita Tang and Junkuo Zhang describe the history of the Chinese banking system, and examine the present status of the non-performing loans (NPLs) of the largest banks. They study the initial conditions under the privatization process and investigate its implications, given asymmetric information. Causes of the asymmetries in the Chinese banking system are due to opaqueness and NPLs of state banks. The latter are generated by state policies and through financial repression. They conclude by suggesting that the system needs an institutional infrastructure on credit collection and on bankruptcy laws as well as a consensus on maintenance of hard budget constraints by the state and state-owned enterprises.

The last paper in this section by Mary Malliaris and Steven Malliaris searches for evidence that the US market is influenced by other international markets in an amount significant enough to give us daily clues about the direction the market will move. The target US market chosen is the Nasdaq. The international markets

selected for inputs into the model include Australia, Japan, and Hong Kong. This study uses one of the most popular data mining techniques, the decision tree. The authors find that the decision tree forecasts work significantly better on days when the Nasdaq was Up than it did on Down days. The forecasts on Up days are correct about sixty-five percent of the time. The influence of the Nasdaq on the markets in Australia, Japan and Hong Kong is also examined.

The second section is devoted to **asymmetries in monetary policies**. The notion of electronic money replacing physical cash for small-value payments and for international transactions via the Internet evokes considerable interest among economists and the general public alike. This paper by Bernd Kempa assesses the potential implications of a widespread adoption of electronic money on money markets and monetary policy. It is argued that the emergence of electronic money is unlikely to destabilize money markets. However, by affecting the transmission channels of monetary policy, electronic money is bound to weaken the effectiveness of various monetary policy instruments.

While economic theory suggests that domestic monetary expansions raise domestic output, the effect of foreign monetary expansions is ambiguous and depends on the expenditure-switching and income-absorbing effects. Professor Karras uses quarterly data from 1980-2000 for the EU, Japan, and the U.S. to obtain two results. First, domestic money has a positive and statistically significant effect on domestic output in all three economies, although its strength varies. Second, in terms of the transmission of foreign money-supply shocks on domestic output, the strongest link exists between Japan and the EU; the U.S. is also linked with Japan, but more weakly, while the EU and the U.S. appear to be orthogonal. Finally, the evidence on symmetry is mixed.

Noemi Levy-Orlik argues that investment requires financing that can be created by banks and necessitates a funding process to attain economic stability. The most significant debate within this line of reasoning involves central bank reserves and interest rate determinants. In this paper, the horizontalist and structuralist views are contrasted with the evolution of the Mexican financial system and the author obtains certain interesting results. First, the interest rate behavior of the Mexican economy does not conform to any of the prevailing theories due to the institutional character of the Mexican financial system. The central bank cannot act fully as a lender of last resort and the monetary policy objective of exchange rate stability imposes important restrictions on interest rate movements and the handling of central bank reserves. Second, bank loan rates are highly elastic to the central bank rate while deposit rate elasticity is lower, leading to greater banking margins.

Donald L Sparks investigates the dilemma faced by the states of Southern Africa: while the region already sustains a successful and long-running monetary union, the Common Monetary Area, the region's leading economic integration organization, the Southern African Development Community is opposed to joining the union. However, the Common Market for East and Southern Africa, a less successful, but rival economic organization, favors a monetary union.

Should SADC join CMA? The conclusion of this paper is that the necessary convergence criteria for a viable monetary union appear to be lacking. Until and unless there is more convergence, the chances for a successful monetary union are low. Equally important, until SADC countries produce a more diverse set of goods and services that will allow increased trade with each other, reaching the goal of a monetary union remains unlikely, and even unnecessary. Finally, there is a lack of political will at present to institute such a union.

Girón and Correa study the monetary and financial fragility of emerging markets with emphasis on Latin America and Mexico. Emerging markets have been characterized by economic expansion, with intensified competition. The behavior of capital flows in several emerging economies, far from representing net resources with which to finance local economic activity, has resulted in a net outflow of funds from these economies. The relationship between financial deregulation and banking crises has created the conditions for financial fragility with rates of productivity and employment growth declining. Deregulation and successive financial crises have weakened local currencies as well as the financial and monetary structures that sustained the conditions that previously allowed productive capacities to expand and their economies to grow.

The economic conditions of Mexico are further studied by Adrián de León Arias in the third section of this book on **economic and trade asymmetries.** The author applies the most recent methodology for explaining economic growth differences across countries as the result of several macro variables such as education, legal system, institutions, the role of government and others. Education and infrastructure have been considered relevant in explaining productivity growth differences in Mexican urban manufacturing. In this article, the author evaluates whether there is a significant change in the relevance of these variables under trade liberalization. In particular, the hypothesis investigated is that trade liberalization would promote productivity growth in the northern cities as a result of the dynamic effect of trade, since these cities are close to the U.S. market for Mexican manufacturing. In contrast to that hypothesis, the paper argues that urban manufacturing close to the U.S. did not show a better performance than the rest of the cities as expected and that accumulated growth factors, such as education and infrastructure are still relevant in explaining productivity growth across urban manufacturing in Mexico.

John Francis uses a two-country, two-sector new geography model where workers are imperfectly monitored to examine the relationship between falling trade costs and unemployment. It is shown that as trade costs fall over time the world naturally falls into an industrialized core and an agricultural periphery. Globalization has a positive effect on employment in the core in both the short and long term. It is shown that countries with lower rates of job separation are more likely to end up in the core.

Gabriel Mendoza Pichardo studies the evolution of economic growth and the financial behavior of a sample of forty-eight non-financial Mexican enterprises from 1990 to 2000. Special emphasis is given on the evolution of their capital structure and foreign sales and debt. The financial statements of these enterprises, quoted in

the Mexican Stock Exchange (Bolsa Mexicana de Valores), are used to construct several economic and financial ratios. The aim is to track the enterprises' structural change during a particularly turbulent period in the Mexican economy and to determine the role of foreign financing.

Uncovered operations against currency risk are frequent in emerging countries. In case of a change in the investors' expectations, banking crises of liquidity can occur. Despite much research about currency crises, the liquidity and currency risks of the banking system have not played an essential role in the current "second generation" model of currency crises. Moreover, the exit from a fixed exchange rate regime always occurs in a turbulent period, never in a favorable period. In her paper, Christelle Puibasset tries to fill these two deficiencies using the Obstfeld model. The author shows under what conditions an emerging country, during a favorable period, could exit from a fixed exchange rate regime with lower costs than those that would be incurred in the case of self-fulfilling currency crisis. The contribution of this paper is twofold. First, the banking system is explicitly introduced in the model. Second, the banking crisis is linked with the currency crisis.

Why would one expect the formation of the free-trade agreement between Canada and the United States and the subsequent expansion to include Mexico in NAFTA to affect productivity in Canada or the level of potential output? Professors Brox and Munim attempt to answer this question. The authors revise estimates of real Canadian potential output and the real GDP gap by applying a method of directly estimating the actual and potential factor utilization rates. The effects of developments since the formation of NAFTA are directly considered. The empirical results indicate that capital utilization varies slightly more than does labor over the cycle and that the real GDP gap has closed somewhat since the formation of NAFTA, but that this result may be due to a slowing of the rate of potential growth resulting from a reduced rate of capital formation since 1994.

The last paper in this section by Professors Pournarakis and Varsakelis investigates economic development in the Balkans. In recent years the process of international production of affiliate firms has undergone dramatic changes both quantitatively and structurally. This paper addresses the issue of uneven distribution of Foreign Direst Investments (FDI) in the European transition economies and concentrates on explaining the reasons why the region of the Balkans lags behind the rest of Europe in the attraction of multi-national enterprises. The issue is approached first, in an indirect way, by bringing into the picture the high concentration of FDIs within the European Union as well as the prevailing trends on FDI inflow in the rest of the Central European countries. The second part of the paper points to the asymmetries in the Central European region that explain the slow capital inflow in the Balkans and attempts to show that development integration of the region is a *sine qua non* for the region to attract foreign investment.

The fourth and final section presents **knowledge asymmetries**. Explosive demand for both quantity and quality of electricity power heralds a fundamental change in global consumer markets for power generation and distribution. Developed

nations typically enjoy readily available power. Much of the rest of the world does not. Power requirements of contemporary commerce and regional asymmetries in power infrastructures must be considered by organizations that conduct operations on multi-national or global scales. Frederick Kaefer and George S. Nezlek consider the forces of power demand, the extent to which adequate power may not be universally available, and present an analytical framework for analyzing the implications of global asymmetries in power infrastructures.

Another example of asymmetric information is access to Internet content. Today, the Internet contains information on every topic imaginable. This information on the Internet also includes material that is considered by some to be obscene and indecent. Indecent material is available in different formats on Internet, such as short animated movies, sound files and stories. Fahad Al-Hajri, Nrupang Shah, Faruk Guder and Nenad Jukic study the regulation of indecent material on the Internet as one of the more controversial topics facing lawmakers and technology providers around the globe. There have been many attempts in some countries to prevent the availability of such material on the Internet. The attempts to limit the availability of indecent materials on the Internet include Internet blocking/filtering, legislation, and Internet rating systems. Their paper examines Internet use in Oman and restrictions applied for indecent materials on the Internet in Oman. The findings reveal a variety of opinions and practices in the Omani population regarding this issue.

The advent of Pension Capitalism has raised issues of governance and accountability that until very recently, remained of peripheral interest to economists and public policy makers. Then came the collapse and bankruptcy of several mega national and international American corporations mostly in the telecommunications industry. The most dramatic featured the Enron Corporation, the largest bankruptcy in the history of the U.S., which resulted in the loss of pension savings and investments of thousands of employees. It suddenly made reform of corporate governance the central concern of public policy makers and financial market regulators during 2002. Professor Eaton assesses the prospects for fundamental reform in the U.S. and elsewhere.

The American financial markets have always prided themselves on their transparency and the consistency of the financial statements produced under rigorous accounting standards. Enron and its aftermath demonstrated that there is an asymmetry between the rhetoric and the reality. The final article in this volume is by Professor Charles Murdock who explores how Enron's "edge of the precipice" use, or rather misuse, of special purpose entities made a mockery of financial reporting. It also suggests that, at least in part, these scandals were driven by the short-term mentality fostered by overuse of stock options that changed the risk alignment between shareholders and managers.

In conclusion, the twenty essays in this volume offer both insightful analysis and practical information that can be used both by academics and policy makers to better understand the complexities of the global economy.

FINANCIAL ASYMMETRIES

Can We Blame the Currency Board For All Argentina's Problems?

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Abstract. The financial crisis of 2001in Argentina has once again raised the question of the role of exchange rate regime in an economy. Some blame the Currency Board for Argentina's loss of international competitiveness, while others consider the external shocks and the excessive public sector debt responsible for the crisis. In assessing the role of the Currency Board in the crisis, this chapter highlights some of the important features of Argentina' trade relationships, and the asymmetries between the government's fiscal and foreign exchange policies that adversely affected the stability of the economy.

1. Introduction

The severity of the recent crisis in Argentina has caught many observers by surprise. After all following the introduction of the Currency Board in 1991, Argentina appeared to enjoy a sustained period of low inflation, and a higher than average GDP growth rate among a number of Latin American countries. The recent crisis has once again generated a heated debate around the costs and benefits of a fixed exchange rate regime such as a Currency Board. Among the observers, some have placed the blame firmly on the Currency Board for causing the overvaluation of the peso, loss of international competitiveness and the economic recession. See Perry and Serven (2002), Carrera (2002), Grandes & Reisen (2002), Calvo, Izquierdo and Talvi (2002), Roubini, N. (2001). Others such as Schuler (2002) and Torre and Schmukler (2002), however, highlighted the excessive level of bond financed public sector deficits that went unnoticed under the Currency Board, and the inefficiency of the taxation system that could not generate sufficient income for the local and central government to cover their debt.

The objective of the present study is a) to show that the Currency Board could not have dramatically altered the trade balance and the country's ability to generate the necessary foreign exchange revenue to cover the external debt, and b) to show that under the condition of external shocks, the government's fiscal policy and the Currency Board's foreign exchange policy might have asymmetrical impact on the stability of the economy.

To this end, section two assesses the arguments around the overvaluation of the Peso. Section three examines the problems associated with fiscal policies, and their implications for the well functioning of the Currency Board. Section four highlights some important points regarding the conduct of the banking sector and finally section five concludes the chapter and summarises the limitations of the

Currency Board.

2. The Impact Of Currency Board On Trade Balance And Argentina's Ability To Earn Foreign Exchange

A number of analysts blamed the Currency Board for the overvaluation of the Peso and the loss of competitiveness in Argentina. It is argued that after the Russian crisis in 1999, the fall in capital flows into emerging markets also affected Argentina and led to a drop in investments and capital inflows. According to the data reported by the Ministry of Economy (2002), during 1999, gross fixed capital formation dropped by 12.6 percent. Despite the fall in capital inflows, fixed exchange rate between the peso and the dollar resulted in overvaluation of the peso and a fall in exports. Later in the same year, Argentina's largest trade partner Brazil, devalued its currency and in turn exerted more pressure on Argentina's trade balance.

According to Perry and Servèn (2002), the Brazilian devaluation further accentuated the overvaluation of the peso. Based on their calculations, during 1999 the peso was overvalued by 20 percent, of which 11 percent was caused by depreciation of the Brazilian Real. The above trend continued in 2001 with further depreciation of the real, this time causing about 14 percent of the peso overvaluation. Perry and Serven (2002) argued that pegging of the peso to the dollar was not a correct move when trade with the USA accounts for only about 11 percent of Argentina's trade. Schuler (2002) on the other hand disputed the validity of claims about the overvaluation of the peso and argued that had the researchers used the producer prices and a different base year in their estimations, they would have found a different set of results. Based on March 1991 producer prices, Schuler (2002) found that while the peso's overvaluation peaked at 15 percent in mid 1996, it fell below 2 percent between 1996 to February 1999, which was well below the figures reported by the others. Further, his estimations showed that between December 2000 to December 2001 the Peso was in fact under-valued rather than over valued. It is important to point out that while the external shocks had caused a fall in foreign investment and a drop in gross fixed capital formation, the external borrowing of the government and banks compensated for the fall in other sources of capital inflow, and kept the capital and financial account of the balance of payments in surplus.

The point to note here is that the overvaluation of the peso, irrespective of it being caused by fixed exchange rate and fall in capital inflows or devaluation of other currencies, is important only if it adversely affects the country's trade balance and her ability to earn foreign exchange. Therefore, it is important first to identify Argentina's main trade partners and examine the composition of her imports and exports.

Studies of Argentina's main trade relations in 2001 shows that her most important trade partners were Mercosur, NAFTA, and EU.   As can be seen from Table 1, the proportion of goods and services that Argentina imports from the NAFTA and EU are much larger than the proportion of goods and services that she exports to those regions of her total imports and exports respectively. Note also that

Table 1: *Exports and Imports, percentage distribution by main countries and regions of destination and origin*

Country of Destination	Exports	Country of Origin	Imports
Total	100	Total	100
MERCOSUR	**28**	**MERCOSUR**	**29.1**
Of which Brazil	23	Of which Brazil	26
NAFTA	**13.6**	**NAFTA**	**21.7**
USA	11	USA	18
EU	**17.3**	**EU**	**22.6**

Source: Table 2 of Institute Nacional De estadistica Y Censos, Vol. 6 No. 1, May 2002

while the combined imports from the NAFTA and EU account for 44.3 percent of Argentina's total imports, the imports from Mercosur account for only 29.1 percent of her total imports. Similarly while 30.9 percent of Argentina's exports go to the NAFTA and EU only 28 percent of her exports go to Mercosur.

The above differences in ratios of imports and exports from each region are very important when one considers the composition of Argentina's exports and imports. According to the data reported by the Argentine Economic Program Ministry of Economy and the National Institute of Statistics and Census (INDEC) in July 2002 throughout the years 1992 to 2001, between 60-70 percent of Argentina's total imports were made up of capital and intermediate goods and parts and accessories, that have a low price elasticity of demand. At the same time, between 30 and 40 percent of Argentina's exports are made up of agricultural and primary products (including fuels and energy), that also have a low price elasticity of demand. The remaining 70-60 percent of her exports are made up of manufactured agricultural and industrial products that tend to have a higher price elasticity of demand. Moreover, while the majority of capital and intermediate goods are imported from the EU and the NAFTA, most of Argentina's exports of agricultural and primary products are destined to the EU and NAFTA. In other words both her exports and imports from the EU and NAFTA have a low price elasticity of demand. Therefore, had the peso devalued vis-à-vis the dollar, Argentina's costs of imports from both NAFTA and EU would have considerably increased without much extra income coming from exports. In other words, the Marshall-Lerner condition does not seem to be satisfied in the case of trade with the NAFTA and the EU and devaluation would not have helped her trade balance with those regions.

In the case of Mercosur, however, while most of Argentina's exports to that region are made up of manufacturing products and services, most of her imports are primary products and services. In this respect, Argentina and Mercosur countries appear to produce somewhat substitute products that tend to have a higher price elasticity of demand, and hence more sensitive to currency overvaluation or

undervaluation. Thus, while a devaluation of the peso could have somewhat improved Argentina's trade balance with Mercasur, it could not have helped much in the case of the NAFTA and the EU. Moreover, a devaluation of the peso could not have dramatically changed Argentina's overall balance of trade as a greater share of Argentina's total trade is with the NAFTA and the EU compared with the Mercosur.

Moreover, considering that most capital goods are imported from the NAFTA and the EU, and that over 30 percent of them are used by the manufacturing sector, it is clear that any devaluation of the peso would have raised the costs of imports and dealt a sever blow on the industry. Despite all that, some might still argue that had it not been for the Currency Board, Argentina could have devalued its currency earlier, and would have been able to increase its overall exports earnings. But here again it is important to examine the balance of payments data more carefully. Table 2 shows that throughout the years of the Currency Board, Argentina was experiencing a current account deficit that was compensated by a large surplus in the capital and financial accounts. The trade and current account deficit in the earlier part of the 1990's was largely caused by the rise in domestic demand for imports due to improved economic condition and the fall in exports of livestock due to the foot and mouth disease among sheep in Argentina and the Mad Caw disease in Europe that reduced the demand for beef.

After reaching a peak in 1998, the trade deficit began to decline in the following years, due to economic down turn in Argentina that reduced the demand for imports.

Another important point to note is that while trade balance accounted for around 70 percent of the current account in the earlier part of 1990s, its share of current account distinctly dropped to 20 percent in 2000. That was mainly due to interest payments on debts that became more important in determining the level of current account balance. As it can be seen from Table 3, interest payments as a proportion of trade deficit increased from 60 percent of trade balance in 1994 to 714 percent in 2000 and 347 percent in 2001. In other words, it was the interest payments on debts that were putting greater pressure on the country rather than the overvalued peso. Clearly had the peso devalued earlier, the burden of interest payments would have increased too, adding further pressure on the economy.

It is also important to draw attentions to the significant surplus in the capital and financial accounts of the balance of payments that was covering the current account deficits of the 1990s. The fact that Argentina managed to enjoy a high rate of growth in the early 1990s was to a large extent due to the growing capital inflows that entered the country. In this respect, the Currency Board and its ability to reduce the rate of inflation and stabilize the economy was clearly an important factor. But it should be noted that the main reason for the surplus in capital and financial accounts was government and banks borrowing in the form of foreign currency bonds and securities. In this respect, the full capital account liberalization that was introduced along with the establishment of the Currency Board enabled the government and banks to borrow externally without any restriction. But one might ask why did the

Table 2: *Estimates for the Balance of Payments[1] (In millions of US$)*

	1994	1995	1996	1997	1998	1999	2000	2001
Current Account	-11,157	-5,211	-6,873	-12,333	-14,624	-11,898	-8,864	-4,429
Merchandise	-4,139	2,357	1,760	-2,123	-3,097	-795	2,558	7,507
Services	-3,786	-3,458	-3,582	-4,449	-4,516	-4,104	-4,288	-4,021
Trade balance[2]	-7,925	-1,101	-1,822	-6,572	-7,613	-4,898	-1,730	3,486
TB/CA* (%)	71	21	27	53	52	41	20	-79
Incomes	-3,694	-4,662	-5,496	-6,215	-7,409	-7,395	-7,370	-8,095
Invest. Income	-3,705	-4,672	-5,504	-6,210	-7,402	-7,403	-7,374	-8,096
Interest	-1,789	-2,526	-3,385	-4,211	-5,107	-5,855	-5,864	-7,264
Earned	2,986	3,848	3,966	4,616	5,240	5,474	6,487	4,822
Paid	4,775	6,374	7,351	8,827	10,347	11,329	12,351	12,086
Interest payment/ TB*(%)	-60	-579	-403	-134	-136	-231	-714	347
Earned	462	528	462	859	868	664	1,012	818
Paid	2,378	2,674	2,581	2,858	3,163	2,212	2,521	1,651
Current trans.	462	552	445	453	398	396	235	180
Capital and Fin. Acc.	12,742	7,223	12,380	16,816	18,415	14,183	9,650	-4,127
Capital Acc.	18	14	51	94	73	86	87	107
Financial Account	12,724	7,209	12,329	16,722	18,342	14,097	9,563	-4,234
Banking Sector	2,000	4,691	-197	-910	3,506	1,329	67	11,500
BCRA (2)	444	1,922	1,003	-586	-512	-1,033	762	10,743
Other fin.Instit.	1,556	2,769	-1,200	-324	4,018	2,362	-695	757
Non-Fin. Pub. Sec	4,058	5,840	9,032	8,172	9,362	10,845	8,123	-3,487
National Govt.	4,431	6,310	8,763	6,815	9,526	10,068	7,279	-3,161
Local Govt.	190	394	733	1,733	149	1,364	1,276	27
Com. & others	-563	-864	-464	-376	-313	-586	-433	-353
Non-Fin. Private Sector	6,667	-3,322	3,494	9,460	5,474	1,923	1,373	-12,247
Changes in Int. Res.	682	-102	3882	3273	3,438	1,201	-439	-12,083
BCRA´s Res.	561	-69	3782	3062	3,442	1,093	-424	-12,005
Adjustments	-121	33	-100	-211	4	-108	15	79

Source: Table A5.1 of the Ministry of Economy based on INDEC data National Bureau of International Accounts, July 2002. 1. Provisional data. 2. Author's own calculation

Currency Board not set a limit compatible with its international reserves on the extent of the government and banks external borrowing? Clearly it should have been apparent that the large amounts of interest payments on borrowings could not have been maintained for long, and their growth were endangering the very existence of the Currency Board and stability of the economy. The large amount of borrowing that peaked at over 145 billions US dollars in 2002 clearly had an asymmetrical impact on the ability of the Currency Board in maintaining the value of currency. Indeed, the capital account surplus was drastically reversed later when a large number of depositors who suspected the collapse of the Currency Board, and tried to move their funds out of the country. Within a short period of time financial accounts of balance of payments dropped from over US$9.5 billion surplus in 2001 to over US$4 billion deficit in 2002.

3. Asymmetries Between The Fiscal And Foreign Exchange Policies

A number of observers blamed the growing public sector debt for the recent financial crisis. No doubt the government's inability to pay its debt service and the lenders refusal to extend any further loans were among the most important factors that ultimately led to the collapse of the Currency Board.

The questions that have to be addressed, however, are:

1.   Why did the public sector's debt grow so much? Was it because:
     a.   the Currency Board had left the government with no option but fiscal policy to deal with external shocks?
     b.   inappropriate fiscal policies that did not succeed in reducing the budget deficit?
     c.   the inefficiency of the taxation system that was not able to collect the much needed government revenues?
     d.   the mismanagement of the public expenditure, and the corruption within the public sector that resulted in abuse of public expenditure?
2.   Why did the multilateral agencies continue to lend to Argentina for so long? Had their earlier assistance created a kind of Moral Hazard?
3.   Why did the Currency Board allow the economy to become so exposed to external borrowing?

A close examination of the data sheds some light on the above questions. As it can be seen from Table 4, government's budget balances dropped from a surplus of 2.73 billion pesos in 1993 to a deficit of 8.71 billion pesos in 2001. It is important to point out also that while under the convertibility law the central bank was restrained from financing budget deficit the government had introduced a comprehensive set of structural change that included privatization of public sector enterprises, a reduction in public employment and tax and social security reforms. Therefore, the overall surplus of 1993 was primarily due to the large number of privatization programmes that took place in the early 1990s along with the launch of the Currency Board. But the fiscal deficits that developed in following years were partly caused by the rise in

current expenditures to cope with external shocks, partly due to mismanagement of public funds and partly by the rise in interest payments on external debt. Indeed comparison of interest payments on domestic and external debt in Table 4 shows that despite the fact that the government was not earning much foreign currency most of the budget was financed by external borrowing. It is important to point out that when one compares the amount of interest payments on external debt and the trade balances it is evident that even at its best years Argentina's trade balance would not have been sufficient to cover the costs of interest payments. Table 4 also shows that during the presidential election campaign in 1998 and 1999, the current expenditures increased by nearly 3 billions pesos which was clearly very difficult to finance through trade in goods and services. It is true that under the Currency Board the central bank was restrained from financing budget deficit, and to finance its expenditure the government had to either cover its expenses by current revenue through taxation or through borrowing. But it was the significant rise in foreign borrowing that ultimately caused the crisis. In other words, had the government relied more on domestic borrowing rather than external borrowing, the extent of crisis would have been far less.

In January 2000, the government of President De la Rúa introduced a number of new tax laws to raise the government's tax revenue. The new rules, though initially increased government's revenue from 38.62 billion pesos in 1999 to 40.67 billion pesos in 2000, soon backfired and led to rise in the level of tax evasion. By 2001 government's tax revenue dropped to 37.1 billion pesos that was even lower than the 1997 level. See Table 3.

From Table 3 it is also evident that a large portion of public sector debt was financed through foreign borrowing in the form of either bond issues or short term loans from multilateral agencies. The government also borrowed some amounts from private banks and bilateral agencies, though at a smaller scale. As can be seen from Table 4, while the size of public sector's debt to bilateral agencies dropped from 10,162 million pesos in 1996 to 4,477 million pesos in December 2001, its debt to multilateral agencies rose from 16,367 million pesos in December 1996 to 32,362 million pesos in December 2001, (based on the one to one exchange rate between the peso and the dollar, the amounts stated in the peso were the same as the amounts stated in the dollars). All that point to a rise in the risk of moral hazard as the lenders continued lending to a borrower (Argentina) that was clearly not earning sufficient foreign exchange to repay its debt. In the case of debt to private banks, though it rose by four times from 1,452 million pesos in 1996 to 5,029 pesos in 1999, it began to fall from 1999 onwards when the government tried to use the short term borrowing from the multilateral agencies and long term borrowing through bond issues to repay its debt to private banks. By mid 2001, the government debt to private banks had dropped to 2.78 billion pesos which was only about 2.11 percent of its total debt. Nevertheless, as the largest single borrower of banks, the government's failure to repay its debt to domestic bank was probably among the most important factors that created the public's panic and banks' inability to repay the deposits of depositors.

Table 3: *Public Finance - Non Financial public sector- Cash Basis*
     (In Billions of Pesos)

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Current Revenue	50.0	50.27	49.03	46.92	54.64	56.21	55.67	56.16	51.13
- Taxes	29.00	31.61	31.03	33.17	38.35	40.36	38.62	40.67	37.16
Current Exp.	44.24	47.47	48.44	49.36	55.85	57.03	60.04	60.45	57.39
Interest on Domestic Debt	0.36	0.23	0.19	0.14	0.24	0.21	0.22	0.15	0.07
Interest on External Debt	2.55	2.91	3.89	4.46	5.49	6.44	8.00	9.50	10.10
Total Income	50.72	51.07	50.29	47.66	55.37	56.72	58.45	56.57	51.31
Total Expenses	47.99	51.36	51.66	52.93	59.65	60.79	63.22	63.36	60.03
Overall Surplus	2.73	-0.28	-1,37	-5.26	-4.27	-4.07	-4.76	-6.79	-8.71

Source: Data collected from Table A6.1, based on Secretariat of the Treasury. Ministry of Economy, July 2002.

Table 4: *Total Public Sector Debt By Instrument And Type Of Term*
     (In Millions of Pesos)

End of:	12-96	12-97	12-98	12-99	12-00	03-01	06-01	09-01	12-01
Bilateral	10.16	8.10	7.45	5..92	4.56	4.75	4.65	4.83	4.48
Multilateral	16.36	16.79	19.12	20.31	21.76	24.03	24.84	33.14	32.36
Other Creditors	0.28	0.73	0.62	0.64	1.04	1.02	1.45	1.49	1.54
Private banks	1.45	1.42	3.64	5.03	2,.61	2.30	2.78	2.76	2.01
Govt Bonds & Securities	68.84	74.05	78.21	85.80	93.07	90.30	94.64	95.79	55.08
In dom. currency	8.16	9.50	7.80	6.39	4.41	3.24	2.28	2.27	1.51
In foreign currency	60.67	64.55	70.41	79.41	88.66	87.06	92.35	93.52	53.55
Medium And Long-Term Transactions	97.10	101.10	109.06	117.70	122.91	122,41	128.38	138.01	137.71
S-Term Trans.			3.29	4.17	5.11	4.99	3.76	3.24	6.75
Total Debt	97.10	101.10	112.35	121.87	128.02	127.40	132.14	141.25	144.45

Source: Table A6.11 of the data provided by the Ministry of Economy, July 2002.

Between December 1996 to September 2001, the government borrowed around US$27 billion directly from the domestic and foreign institutions by issuing

domestic and foreign currency bonds and securities. As can be seen from Table 4, while the level of domestic currency bonds was very small compared with the foreign currency bonds and kept falling, the amount of foreign currency bonds increased by nearly US$33 billion between 1996 to 2001. The above trend also gives an idea of the mismatch between the currency of liability and assets of the government that was the biggest borrower in the country. In other words, while a very large proportion of the government's liabilities were in dollars, its revenue was mostly earned in pesos. Therefore, the slightest hint of government's inability to repay its debt had enormous implications for the banks that had lent to the government, even though their share of lending was much smaller than the other lenders. It also raises some questions about the strength of risk assessment of the multilateral agencies that clearly misjudged the ability of Argentine government to repay its debt, and continued lending to her.

The significant increase in external public debt of the government is a clear indication of the asymmetry between the objectives of the Currency Board and the behaviour of the government. Currency boards in principle are responsible to protect the value of a country's currency and enhance economic stability. Therefore, in order to prevent the possibility of currency devaluation, they should be able to control the level of public's external borrowing. Yet in the case of Argentina, the Currency Board did not seem to have prevented the government from external borrowing. This is particularly apparent from Table 5 that shows the growth of public sector debt service as a proportion of GDP. The above ratio rose from 1.85 percent in 1993 to 5.33 percent in 2001. It is also important to note that by 2001, the ratio of public debt service to GDP was nearly half that of the exports sector of GDP that accounted for 11 percent of GDP, implying that nearly half of the foreign exchanges that were earned through exports were absorbed by public sector debt services.

The next question that has to be addressed is why did the public sector debt grow so much? No doubt the economic recession that had started in 1998, forced the government to take some measures to help the economy to cope with external shocks. Consequently public expenditure rose from over 55 billion pesos in 1997 to over 61 billion pesos in 1999. It is also true that under a Currency Board the only policy tool that remains available to a government is fiscal policy. But it is equally important for the government not to undermine the ability of the Currency Board to maintain the value of the currency, and hence refrain from exposure to external debt and excessive borrowing in general. This was clearly not observed in the case of Argentina, where the government's external debt increased by over 14 billion dollars within a short period of time between the end of 1999 and the third quarter of 2001. It might be argued that in 1999 the government was considering it more important to pull the economy out of the recession than to be concerned with long term effects of borrowing. Moreover, the government was hoping to be able to raise more tax revenue once the economy was out of a recession. But by spending well beyond its means, the government was merely postponing the emergence of the crisis.

Table 5: *Consolidated Public Expenditure by purpose, 1993-2001*
(In millions of pesos of 2000)

Year	Operation of the State		Public Expenditure		Economic Services		Public Debt Services		Total	
		% of GDP		% of GDP		% of GDP		% of GDP		% of GDP
1993	15,460	6.15	50,881	20.25	8,556	3.41	4,644	1.85	79,541	31.66
1994	16,846	6.31	55,955	20.96	7,345	2.75	4,681	1.75	84,827	31.77
1995	15,867	6.26	53,698	21.17	7,172	2.83	5,682	2.24	82,419	32.50
1996	15,425	5.88	52,677	20.06	6,324	2.41	5,799	2.21	80,226	30.56
1997	15,994	5.68	55,646	19.76	6,321	2.24	7,529	2.67	85,490	30.35
1998	17,331	5.96	58,110	19.98	6,850	2.35	7,830	2.69	90,121	30.98
1999 (*)	19,119	6.76	61,024	21.57	6,212	2.20	10,124	3.58	96,479	34.10
2000 (*)	17,713	6.34	59,480	21.29	5,205	1.86	11,950	4.28	94,349	33.76
2001(*)	17,059	6.35	58,654	21.83	4,838	1.80	14,323	5.33	94,874	35.32

Source: Table A6.4 of the Ministry of Economy based on the Bureau of Consolidated Social Expenditure - Secretariat of Economic Policy, July 2002
(*) Preliminary figures

The rise in public expenditure was not only due to government's efforts to deal with external shocks, but also due to the relaxed spending at the end of president Menem's administration when he was campaigning for a third term of office in 1998. This is evident from the rise in expenditure on operation of the state that sharply increased by over three billion pesos between 1997 to 1999, and in particular in 1998. Both public expenditure and expenditure on operation of state dropped in 2000 once the presidential election was over. The combination of the above spending, cost the country nearly three billion pesos in the form of interest payments over three years and much greater public debt that continues to burden the economy. No doubt the false sense of economic stability that was created by the Currency Board had overshadowed the problems that were developing unnoticed, and to a large extent led to overestimation of the government's ability to repay its debt. Had the peso devalued earlier, the lenders would not have lent to the government as much as they did, and the government would not have been able to borrow so much. But the important point to note is that the Currency Board did not have the power to determine the level of government's external public borrowing. The recent Argentine experience, however, clearly shows that the countries that adopt a currency board might need to set a limit on the level of public debt, and public borrowing as a proportion of GDP, similar to the limits that are set by the European Monetary System. Such limits would discourage the authorities from excessive borrowing, but should also provide some provisions for exceptional cases of external shocks. Some might argue that imposing such a limit is not appropriate under a fixed exchange rate regime. In

particular in view of the past experiences of fixed exchange rate and great depression and the recent controversies around the merits and usefulness of fiscal restrictions among the EMU members. But the point to note is that in the absence of such a limit, the possibility of unlimited external borrowing might endanger the very survival of the currency board.

4. Conduct Of The Banking Sector And The Role Of The Currency Board
One of the factors that played an important role in the financial crisis of Argentina was a mismatch between the currency of liabilities and assets of financial institutions and a mismatch between the currency of income and expenditure of banks' borrowers.

An examination of the currency of assets and liabilities of financial institutions might not immediately reveal such a mismatch. According to the data reported by the Ministry of Economy (2002), the total foreign currency loans that were extended to both private and public sector in 2001 amounted to over US$51 billion. The above loans comprised the bulk of foreign currency assets of financial sector.

The same sources also show that the combined dollar deposits of banks in 2001 were around US$50 billion. Thus it seems that foreign currency assets and liabilities of financial institutions matched fairly closely. The same applies more or less in the case of peso assets and liabilities of banks. The problem in the case of foreign currency assets was that in a number of cases banks had extended foreign currency loans to non-traded private sector and the government that were not earning their income in foreign currency. Hence any devaluation of peso would have adversely affected their ability to repay their foreign currency debt. It was in that respect that there was a mismatch between the foreign currency assets and liabilities of the private and public sector and hence banks' exposure to the possibility of default of its non-traded sector borrowers.

It is important to point out here that with the introduction of the Convertibility of Law the central bank was no longer acting as the lender of last resort. Moreover, in order not to promote moral hazard among banks it ceased to offer any assistance to failing banks. The objective was to encourage banks to exercise greater prudence on their own activity and keep a better portfolio of loans. This trend had been particularly adhered after the tequila effect where some banks failed in their activity and the central bank did not come to their rescue. Nevertheless, the government continued to remain banks' biggest borrower and clearly without due concern about the extent of foreign currency liability of the government and its general ability to repay its loan.

The questions that have to be addressed here are: 1) was there a sound spread of risks among banks' assets? and 2) was there any maturity mismatch between the foreign currency loans and assets of banks? The answer to question one is a clear no, as nearly a quarter of banks' assets were concentrated in the form of loans to one borrower, namely the public sector that was finding it increasingly difficult to repay

its debt in particular in 2000 and 2001. Such a poor spread of asset risks raises a question about the quality of risk assessment of banks that continued extending more and more loans to public sector and the logic or motivation behind their decision. With respect to the second question, a quick examination of maturity of assets and liabilities might suggest that there was not a serious maturity mismatch. More than 2/3 of banks' liabilities in 2001 were kept in the form of foreign currency deposits, of which more than 80 percent were kept in time deposit accounts. The problem with time deposits is that they can become instant demand deposits once expectations about the possibility of bank failure begin to rise. In other words, even when deposits are kept in the form of time deposits, depositors are ready to forgo the higher interest rate if they begin to doubt the ability of banks to repay their deposits. In such cases, the implicit risk premium of depositors rises well above the nominal interest rate that any bank can pay. Hence a clear mismatch of maturity emerges between the assets and liabilities of banks and a classic scenario of bank run develops.

Therefore, the answer to the second question is that the Argentinean banking sector was well exposed to the risk of a mismatch between the maturity of its assets and liabilities. That is because most of the foreign currency assets of banks were in the form of short to medium term foreign currency loans to the public sector that was increasingly demonstrating signs of inability to repay its debt. During 2001 the government was mostly relying on short term borrowing from the multilateral agencies to repay its debt service. That was at the time when external lenders were becoming increasingly reluctant to extend any further loan or aids for that matter. Once the IMF and IDB began to pull the plug, the government found itself unable to repay its debt service and loan to domestic banks, and once the public found out about it the panic began. Thus, it was not so much the mismatch in the size or maturity of foreign currency assets and liabilities of banks according to banks' books that put them in difficulty. It was mostly the combination of composition of banks' assets that included a high concentration of loans to a single borrower, and the mismatch between the income and expenditure of the borrowers that caused the problem.

The panic began when those close to the government realised that the multilateral agencies were becoming increasingly reluctant to lend any more loan, and the Economy Minster Mr. Cavallo introduced a subsidy on exports and Tariff on imports, i.e. de-facto peso devaluation for the traded sector that signalled the possibility of change of exchange rate regime. Later on in March Mr. Cavallo announced the need for some amendments to the rule of the Convertibility Law, and change of peg to a basket of currencies that included half Euro and half dollar once the exchange rate between the two reached parity. The above announcement significantly increased the expectation of forthcoming peso devaluation and created a panic among the depositors. It was the public's rush to first convert their peso deposits to the dollar deposit, and then later to withdraw their dollar deposits that pushed the banks to the brink of collapse and forced the government to announce the "corralito" (deposit freeze), and ultimately the Pesification of stock of financial

contracts. The latter action, no doubt had the most adverse impact on public's confidence in financial institutions, though might have helped the government to some extent in reducing the value of her debt to domestic banks. Here the question is why did the Currency Board fail to limit the foreign currency loans that financial sectors were extending to the government and other non-traded sector? In particular where they knew the extent of government's external borrowing and the fact that US$26 billion international reserve of the central bank was well below the foreign currency liabilities of the banking sector. The failure of the Currency Board to provide a sound supervision to the banking sector, ultimately led to the substantial loss of reserves, the disastrous Pesification of banks' assets and liabilities, total loss of credibility of the banking sector, significant depreciation of the peso by 300 percent, and the collapse of the Currency Board itself.

5. Conclusion

The present chapter has demonstrated that, contrary to the common view that overvaluation of the peso was responsible for the loss of Argentina's competitiveness, a devaluation of the peso could not have helped the country's economy much. That is partly due to the specific pattern of Argentina's trade with the NAFTA and EU, and low elasticity of the goods that she imports and exports to those regions. Moreover, with the export sector accounting for around 11% of GDP, and the external debt amounting to more than 51% of GDP in 2000, there was no way a devaluation of the peso could have increased the exports earning enough to cover the external debt. Therefore, the Currency Board should not be blamed directly for the crisis. The study has highlighted, however, that the excessive borrowing by the government and the external shocks were the main causes of the crisis. Moreover, it points out the need for greater flexibility in terms of monetary policy on the part of the Currency Board at times of sever external shocks, and the importance of greater control over the level of foreign currency lending by banks, external borrowing by the government and supervision of banks.

References

Calvo A. G., A. Izquierdo and E. Talvi (2002), Sudden Stops, the Real Exchange Rate Exchange Rate and Fiscal Sustainability: Argentina's Lessons, Inter-American Development Research Department, www.iadb.org/res/pdf/Macro_Crisis.pdf

Carrera J. (2002) Hard Peg and Monetary Unions. Main Lessons from the Argentine Experience, 150.108.69.10/public/m-union/ abstracts/Carrerapaper.pdf

Grandes M. and H. Reisen (2002), "Hard Peg versus Soft float, A Tale of Two Latin American Countries", Feb.2002. www.oecd.org/pdf/M00029000/M00029269.

Perry G. and L. Serven (2002), "The anatomy of a multiple crisis: Why was Argentina Special and what can we learn from it", The World Bank. www.nber.org/crisis/argentina_bg.html - 5k

Roubini, N. (2001), Should Argentina Dollarize or Float? The Pros and Cons of Alternative Exchange Rate regimes and their Implications for Domestic and Foreign Debt restructuring/Reduction, www.bradynet.com/bbs/argentina/100122-0.html - 14k

Torre A. and S. L. Schmukler (2002), "Argentina's Financial Crisis: Floating Money, Sinking Banking", Latin American and the Caribbean Region, and the development Research Group, World Bank. www.nber.org/~confer/2002/argentina02/schmukler.pdf

Schuler K. (2002), Fixing Argentina, http:/www.dollarization.org

Official Publications
Argentina at a glance 9/13/01
www.worldbank.org/data/countrydata/aag/arg_aag.pdf
The Argentine Economic Program Ministry of Economy
www.mecon.gov.ar/basehome/comunicados_prensa/ economic_program.pdf
The World Economic Outlook (WEO) Database December 2001
http://www.imf.org/external/pubs/ft/weo/2001/03/data/index.htm

Exchange Rate Variability and Stock Market Volatility: Evidence From India

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Abstract. Financial liberalization has sometimes led to increased financial instability, notably to greater exchange rate variability, as short-run capital flows are unshackled in emerging markets. The impact of increased exchange rate variability on stock market valuation and price volatility is studied in the case of India, distinguishing between internationally competitive firms and purely domestic market-oriented companies. Other influences on stock prices, stemming from contagion effects and from the general economic environment are also modeled. As presumed, increased exchange rate variability is seen to affect – positively – the stock market index for the international firms only, though not having a significant effect on it's volatility. Surprisingly, the stock price index for the purely domestic firms is seen to be subject to contagion effects, underlying the fact that Indian bourses are becoming truly integrated with global markets.

1. Introduction

The analytical work on the effects of exchange rate variability has been almost exclusively devoted to the developments at the macro, aggregate level. Thus the literature is voluminous on the impact of increased exchange rate variability on the volume of trade, an issue on which the crowded field stands yet divided. Currently the debate is most intense on the determinants of exchange rate variability, with countries poised to enter the European Monetary Union (EMU) having apprehensions on this score. But *some* attention has been also paid recently to the impact of exchange rate variability on economic variables and instability at what could be termed a more 'micro' level. The present study is in this vein, and looks at the effects of increased foreign exchange instability on stock market valuation and volatility in the context of India, a large developing country.

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2. The Background of the Study

As already alluded to in the introductory section above, the literature on the effects of exchange rate volatility hardly throws up a concurrence of views. This is true even for the work on the *determinants* of exchange rate variability, so that there is no consensus on whether new entrants to the EMU are likely to face increased volatility in the foreign exchange market.

Khalid (1998) and de Grauwe and de Bellefroid (1989)[1] document much of the results obtained over the years using time series as well as cross-section studies of the effects of increased variability in exchange rates. The results of cross-section studies seem to be quite dependent on the countries chosen. This may reflect the fact that possibilities of increased gains or losses in the wake of higher exchange rate volatility may differ between countries. Increased exchange rate variability means higher risk of losses, but also offers the lure of higher gains so that in some cases the volume of exports and trade may respond positively. Also, the results are seen to depend on whether low frequency (annual) or higher frequency (monthly) foreign exchange data is used: firms may not base their export – and investment – decisions on short-run disturbances in the foreign exchange markets.

The results described in the foregoing discussion seem to imply that foreign exchange market volatility affects only the competitive sector consisting of firms active in the international market place. After all, it is only such firms that have foreign exchange exposure as conventionally defined, with the variability of operating income – or earning from assets – dependent on the variability in exchange rates.

Foreign exchange exposure is usually represented as

$$DV = (beta) * DS$$

where DV is the change in operating or asset-based income and DS is the change in the exchange rate, 'beta' being the foreign exchange exposure.

The *variability* of income is, in turn, represented by

$$Var (DV) = (beta\ squared) * Var (DS),$$

so that the higher exchange rate volatility leads to increased risk concerning the income stream.

Hence it may seem reasonable to conclude that exchange rate variability will affect the operating income – and thus the market valuation – of internationally oriented firms only. But this need not be the case when one takes into consideration the policies of the central bank. With a sharply depreciating home currency, the bank authorities may find it prudent to counter this trend, which will spell out a fall in bond and stock prices for the *domestically* oriented firms. Thus firms with no international exposure may also be affected by developments in the foreign exchange market, though the effects may run counter to those experienced by international

firms – which may be riding on the crest of the buoyancy in exports following the depreciation.

In the case of developing countries where interest rate policy is not usually formulated targeting the exchange rate, the stock market indicators of firms with solely domestic activities may well be unaffected by exchange rate variability. But this remains to be empirically tested: work in this area is scanty, and confined to the highly industrialized countries, to the case of the United States, to be more specific. Bartov, Bodnar and Kaul (1995) have studied the impact on stock market valuation and volatility of U.S firms of increased exchange rate volatility, and find that it is only the international firms that are affected [2].

Undoubtedly, it is meaningless to pursue work of this nature in the case of developing countries still saddled with wide-ranging controls on trade as well as capital flows. But the present study chooses to focus on India, which has left behind a record of a closed, import-substituting, FDI (Foreign Direct Investment)-hostile regime, lowering barriers on all fronts. The exchange rate regime is now a managed float, in contrast to the dollar-dominated basket peg that existed until a few years ago. This has naturally led to more volatility of the exchange rate, and an investigation of the wider effects arising from such financial instability seems warranted.

This paper focuses on the impacts of stock market valuation and volatility, using firm-level information that enables a distinction between internationally oriented firms and purely domestic ones.

In the next section, an overview of developments in the Indian stock market in the era of financial reforms is given, as a prelude to the empirical work that follows. Section 4 lays down the model (the equations) to be estimated. Section 5 describes the empirical results, and there is a concluding section 6 that ties up the threads.

3. The Indian Stock Market in the Era of Financial Reforms

Indian stock markets have experienced an unprecedented growth pattern during the years of financial liberalization in the country. They had remained stagnant in the earlier regime with no room for play in an economy dominated by state-directed credit and extensive controls. The reform of the regulatory framework was begun in the 1980s, but picked up momentum only in the 1990s, allowing free pricing of new issues and access by registered foreign institutional investors. The growth of the stock market was, in fact, treated as a pressing need and pushed forth by the policy-makers, who had awakened to the reality that liquidity in the expanding economy was minimal under the prevailing controls on banks which left private investors with no alternatives.

The results of these steps are impressive: market capitalization (value of listed shares to GDP) reached 59% by 1997, and the investor population shot up to 40 million - from just over a million in 1980 - by 1993. By late 1990s, the average daily trading volume in the Bombay stock exchange had reached that noted in the London

stock exchange. There was also a very sharp increase in investment by foreign institutional investors during the 1990s, as noted by Biswal and Kamaiah (2001).

3.1 Financial Liberalization And Stock Market Volatility: A Positive Effect?

Against this background of vastly increased stock market activity, a couple of pertinent questions can be raised regarding the effects of this process. One, as has been articulated already, reads as follows: have the reforms led to increased fluctuation of stock market prices? The next question is then more or less given: what has been the effects of the reforms and the expansion of the stock markets on the real economy?

Available evidence indicates clearly that stock market volatility has increased through the 1980s and the 1990s[3]. But then can this increase be attributed to the reform process? An improved legal and regulatory environment, and increased transparency of functions can be expected to reduce excess speculation and price volatility. But it is often the case in developing countries that even as financial liberalization is being driven through, prudential norms lag behind, and this has been true in the case of India, where some very large stock market scams have occurred in recent years. Also, the liberalization process has involved opening up of the frontiers to capital flows, with portfolio flows surging ahead concomitant with direct investment inflows. This has given rise to a problem of external sector management (encompassing currency relations and net capital flows) as described in Joshi and Little (1996). Though the exchange rate was not allowed to fluctuate severely, such an increase in financial instability can be expected to have an impact on expected future income streams and hence on stock prices.

It is a moot point whether the expansion in stock market activity has had a significant impact on the real economy. Singh (1998) is of the opinion that the stock market has been more of a by-stander as far as the effects on real growth are concerned, with no perceptible influence on capital formation and productivity. But the fact remains that private firms, including the family-owned ones, took en masse to the new stock market alternative to raise capital, given the long-standing credit squeeze which was inevitable under the priority-lending (for weaker sectors) norms that the banks had to adhere to. While we do not seek to resolve this issue - of the impact on real growth - in this paper, the link between the real economy and the stock market is indeed addressed in a fashion. Output changes do affect expectations of future income streams, which should also therefore affect stock valuations. To capture this link, some macroeconomic variables such as changes in industrial production and money supply are tested as determinants of stock price volatility[4]. The estimated models will now be presented in the next section.

4. Models for Estimation

The equation linking stock market valuations of firms with exchange rate volatility is represented as

$$SPV = a + b*EI + c* IIP + d* M + e*CPI + f*SP500 \qquad (1)$$

where SPV is the percent change of the composite stock market index for export firms and domestically confined firms alternately, obtained as an average monthly figure from daily data. EI is the exchange rate change index, calculated as percentage changes, and obtained as a average monthly figure from daily data. Some other macro variables affecting the stock market valuations are also included. IIP is the percentage change in the industrial production index from month to month, 'M' is the monthly percentage change in the money supply, and CPI is the monthly inflation rate calculated from the daily Consumer Price Index data. SP500 is the monthly percent change of the Standard and Poor 500 Index, which is included as a proxy to allow for influences from abroad. The period of estimation is from 1995 to 1999, the post-1992 phase, which is the time when the rupee exchange rate was allowed fairly free play. The results are not expected to be symmetrical across internationally oriented and domestically confined firms, but it is of interest to see if there is *any* repercussion at all on the non-traded sector at all of instability in the exchange rate.

The next equation relates stock price *volatility* (SDSPV), estimated as the monthly standard deviation of changes in the stock market index (using daily data to calculated the standard deviations) -for international and domestic firms alternately- to exchange rate instability, calculated as the monthly standard deviation of the exchange rate (SDEI). SP500SD is the monthly standard deviation of the SP500 index calculated from daily data.

$$SDSPV = a + b* SDEI + c* IIP + d* M. + e*CPI + f*SP500SD \qquad (2)$$

5. Empirical Results

The estimated equations for the relationships set out in the previous section are presented in Tables 1 and 2. The regressions have been run for the period 1995-96 to 1999-2000 using monthly data. Table 1contains results using the GDR stock index that is used to represent a composite stock market index for export firms or those firms with predominantly international orientation. An explanation of the GDR stock index and the Sensex is provided in the appendix. Results using the BSE sensitivity index (Sensex), which is considered to be a proxy for a composite stock market index for firms with activities limited to the large domestic market, are represented in Table 2.

It may be noted that, in general, the R^2 values are noted to be quite low for the regressions in these two tables; often less than 0.2. Clearly movements in stock market prices are too complex to be forecasted using macroeconomics instability variables. However it would still be worthwhile to investigate if any of the important economic activity or instability variables turn out to be a significant determinant of stock prices volatility, and the t statistics provide an indication of such a relationship. In these tables, the t statistics are entered within parenthesis of the respective independent variables coefficients with a single asterisk indicating significance at the 10% confidence level, and a double asterisk indicating that at the 5% level.

In Table 1, equations 1a through 1e were run using average monthly percentage changes of the GDR Index (as the dependent variable), and equations 1f through 1j used the volatility (monthly standard deviation of the GDR index). The determinants were specified in a similar fashion.

The equations in the table are all variants of the basic specification of equations (1) and (2) in section 4. The interest rate on government bonds (three months treasury bill) was also tried out without obtaining any significant results. In addition, average monthly changes in the SP500 Index (SP500) and the SP500 Index volatility (SP500SD) were also used to factor in the influences from the stock market abroad.

Of the variables representing economic activity or impulses from macroeconomic environment, only the rate of inflation (CPI) and the percent changes in the SP500 Index were found to have significant effect on the percent changes of the composite stock market index for export firms as seen from 1a, 1b, 1c, 1d, and 1e. Money supply and the IIP variable were found not to be significant. Inflation had a positive effect and the SP500 Index a negative effect, both significant at the 5% confidence level. Exchange rate change has a positive effect, all these effects being significant at the 10% confidence level.

When the stock price volatility (calculated as the monthly standard deviation of the daily data) was used as a dependent variable, only the money supply had a negative effect and was significant at the 5% level (equations 1f through 1j). The other variables, exchange rate volatility, IIP, SP500 volatility and the inflation rate were not significant.

These results are not obvious and need some interpretation. The positive influence on stock price changes and stability from increased exchange rate changes and variability (in all equations from 1a through 1k, significant at the 5% and 10% levels) is not an unexpected result with increased foreign exchange changes and risk affecting the valuation of firms with foreign exchange exposure. The significant negative impact of the SP500 Index (measured in percent changes) on the percent changes composite stock market for export firms is not surprising. The negative relation of the returns (percentage changes) of western markets with that of emerging markets is what attracts the funds to emerging markets or developing countries. Pension funds and other types of capital that flow across the global capital markets usually move towards those where the returns are negatively correlated. Interestingly, inflation is seen to have a positive influence on stock price changes. A possible explanation for this effect is that a rise in the inflation rate gives rise to expectations of an impending depreciation that would increase the valuation of export firms. There may also be a substitution effect; higher inflation may decrease domestic firms' valuations and may cause funds to shift from the domestic firms to the export oriented ones.

The negative sign of the money supply coefficient when the stock market index volatility was used as a dependent variable is more difficult to explain. A possible interpretation is that increases in the money supply tends to depress the

interest rates, and increases the expectation of inflation, which constrains the inflow of funds from foreign institutional investors, and thus moderating the upward surge of the stock prices of competitive firms targeted by these investors.

The determinants of stock price volatility of domestic firms are not the same to those of the internationally competitive firms as can be seen from cursory glance through Table 2. In this table, the first four equations, 2a to 2d, are estimated using percentage changes and the remaining use volatility indices for the dependent variable (monthly standard deviation). There is a high degree of autocorrelation in equations 2a and 2c; the Durbin Watson statistic is about 0.2, and thus the t values for the estimated coefficients may not be appropriate. Equation 2b re-estimates equation 2a using generalized least squares to correct for autocorrelation, and similarly equation 2d re-estimates equation 2c.

The only significant determinant of the domestic stock market index variability is, surprisingly enough volatility of the SP500 Index. For the composite stock market index for the domestic firms this variable comes out positive and significant at the 5% level (see equations 2e to 2h). It is interesting to note that impulses from important stock markets abroad seem to influence even valuation of domestic firms, perhaps through the expectations formation process. Thus Indian bourses seem to be integrating with the foreign markets. The exchange rate volatility variable is not significant, even at lower than the 10% level.

6. Conclusions

This study has focused on the effects of exchange rate volatility on stock market volatility of Indian firms disaggregated according to the sphere of their activity as domestic and international firms. In all these analyses, the influence of other possible determinants were also considered to see if as postured sometimes, the market is a bystander as far as real economic development is concerned.

As expected, increased foreign exchange changes and risk affects the valuation of firms with foreign exchange exposure. The significant negative impact of the SP500 Index is not surprising. The negative relation of the returns (percentage changes) of western markets with that of emerging markets is what attracts the funds to emerging markets or developing countries. Pension funds and other types of capital that flow across the global capital markets usually move towards those where the returns are negatively correlated. Interestingly, inflation is seen to have a positive influence on stock price changes. A possible explanation for this effect is that a rise in the inflation rate gives rise to expectations of an impending depreciation that would increase the valuation of export firms. There may also be a substitution effect; higher inflation may decrease domestic firms' valuations and may cause funds to shift from the domestic firms to the export oriented ones.

The negative sign of the money supply coefficient when the stock market index volatility was used as a dependent variable is more difficult to explain. A possible interpretation is that increase in the money supply tends to depress the

Table –1

GDR Index is Dependent Variable

Eq	Depend. Variable	EI	SDEI	IIP	M	SP500	SP500SD	CPI	Constant	R²	DW
1a	SPV	0.2 (1.98**)		0.0011 (0.14)	-0.069 (-1.14)	-0.77 (-2.36**)		0.11 (2.00**)	0.064 (0.58)	0.24	2.25
1b	SPV	0.21 (2.05**)		0.0037 (-0.05)	(-0.087) (-1.41)	-0.82 (-2.43**)			0.17 (-1.65*)	0.18	2.16
1c	SPV	0.2 (2.00**)			-0.067 (-1.15)	-0.78 (-2.6**)		0.11 (2.02**)	0.063 (0.57)	0.24	2.24
1d	SPV	0.19 (1.9*)				-0.82 (-2.51**)		0.12 (2.23**)	-0.026 (-0.33)	0.22	2.18
1e	SPV	0.21 (2.08**)			-0.086 (-1.46)				0.17 (1.67*)	0.18	2.16
1f	SDSPV		16.18 (1.62)	0.24 (0.96)	-5.09 (-2.54**)		5.63 (1.1)	1.88 (0.98)	32.17 (6.97**)	0.18	2.10
1g	SD SPV		17.71 (1. 8*)	0.22 (-0.92)	-5.43 (-2.75**)		6.08 (-1.19)		33.2 (5.87**)	0.16	2.10
1h	SDSPV		16.14 (1.62)		-4.67 (-2.39**)		5.35 (1.05)	1.81 (0.95)	32.02 (5.37**)	0.17	2.10
1i	SDSPV		17.62 (1.79*)		-5.01 (-2.61**)		5.79 (1.14)		33.02 (5.63**)	0.15	2.10
1j	SDSPV		13.35 (1.3)				4.53 (5.32**)	2.65 (1.36)	26.65 (4.64**)	0.08	2.06

Table –2

BSESENSEX is the Dependent Variable

Eq	Depend Variable	EI	SDEI	IIP	M	CPI	SP500	SP500SD	Constant	R^2	DW
2a	SPV	0.34 (1.72*)		0.011 (0.73)	-0.14 (-1.14)	0.011 (0.098)	0.24 (0.37)		-0.3 (-1.36)	0.07	0.22
2b	SPV	0.045 (0.93)		-0.0017 (-0.54)	-0.036 (-0.24)	-0.13 (-0.35)	0.00017 (0.0011)		0.079 (0.17)	0.90	1.52
2c	SPV	0.32 (1.67*)			-0.11 (-1.03)		0.15 (0.24)		-0.31 (-1.61)	0.062	0.19
2d	SPV	0.048 (1.02)			-0.042 (-1.57)		0.021 (0.14)		0.073 (0.16)	0.90	1.52
2e	SDSPV		0.00043 (0.0013)	-0.0017 (-0.23)	0.051 (0.78)	0.066 (1.08)		0.34 (2.07**)	1.14 (5. 91**)	0.11	1.55
2f	SDSPV		0.00068 (0.0021)		0.048 (0.76)	0.67 (1.09)		0.34 (0.21**)	1.14 (5. 97**)	0.11	1.55
2g	SDSPV		0.029 (0.092)			0.058 (0.097)		0.35 (2.17**)	1.19 (6.78**)	0.10	1.49
2h	SDSPV		0.055 (0.17)		0.35 (0.56)			0.36 (2.21**)	1.17 (6.25**)	0.09	1.56

interest rates, and increase the expectation of inflation, which constrains the inflow of funds from foreign institutional investors, and thus moderating the upward surge of the stock prices of competitive firms targeted by these investors. There is also the possibility that the lower interest rates may induce a substitution effect of moving funds away from the export oriented firms to the domestic ones.

The determinants of stock price volatility of domestic firms are not the same as those of the internationally competitive firms. The only significant determinant of the domestic stock market index variability is, surprisingly enough volatility of the SP500 Index. For the composite stock market index volatility of the domestic firms, this variable comes out positive and significant. It is interesting to note that impulses from important stock markets abroad appear to influence the domestic firms valuation, perhaps through the expectations formation process. Thus Indian bourses seem to be integrating with the foreign markets. The exchange rate volatility variable is not significant, even at lower than the 10% level. In India, where interest rate policy is not usually formulated targeting the exchange rate, the stock market indicators of firms with solely domestic activities are thus unaffected by exchange rate variability.

Notes

See, for instance Bergstrom, 1999, Martin, 1997, and Batavia et al, 2002.
1.   See also, in this regard, Levi, M.D, 1994 and Amihud, Y., 1994.
2.   See for instance, volatility charts from the Bombay Stock Exchange.
3.   See Schewert, G.W, 1989.

References

Amihud, Y., and R.M. Levich (1994), editors, Exchange Rates and Corporate Performance, New York University Press, N.Y.

Amihud, Y., (1994), "Exchange Rates and the Valuation of Equity Shares", in Amihud, Y and R. M. Levich, chapter 4, pp 49-59 (above)

Bartov, E. Bodnar, G.M. and Kaul, A (1995), Exchange Rate Variability and the Riskiness of the U.S. Multinational Firms: Evidence from the Breakdown of the Bretton Woods System; NBER , Working Paper No. 5323, October, Cambridge, MA.

Batavia, B. Nandakumar, P. and Wagué, C. (2002); "Exchange Rate Variability, Trade Volumes, and the European Union", *International Journal of Applied Economics and Econometrics,*(Forthcoming).

Bergström, V. (1999), "Därför har Sverige bytt stabiliseringspolitisk regim"- "Why Sweden has changed its stabilisation policy regime", The 140th anniversary of the establishment of Norrbärk Sparbank, Sweden.

Biswal, P.C. and B. Kamaiah, 2001, "Stock Market Development In India: Is There Any Trend Break?", *Economic and Political Weekly*, January 27, 2001, pp 377-384.

De Grauwe, P. and de Bellefroid, B.(1989), "Long-Run Exchange Rate Variability

and International Trade", in Arndt, S.W. and Richardson, J.D. (eds.), *Real Financial Linkages*, MIT Press Cambridge, MA.

Joshi, Vijay and I.M.D. Little, (1996*), India's Economic Reforms, 1991-2001, Oxford: Clarendon Press.*

Khalid (1998); Exchange Rate Variability and EU Trade; Final Report to the Commission of the EU, November.

Levi, M.D., "Exchange Rates And Valuation Of Firms", in Amihud, Y and R. M. Levich, chapter 3, pp 37-48 (above)

Martin, Philippe (1997), "The Exchange Rate Policy of the Euro: A matter of Size?", CEPII *, Document de Travail* no. 97-06, CEPII, Paris.

Schewert, G.W, 1989, "Why does stock market volatility change over time?" *Journal Of Finance*, 44, pp 1115-53

Singh, A, 1998, "Liberalization of the Stock Market, and the Market for Corporate Control: A Bridge Too Far for the Indian Economy?" in I. Ahluwalia and I.M.D. Little (eds.), (1998), *India's Economic Reforms and Development: Essays for Manmohan Singh*, Oxford University Press

Appendix. Explanation Of The BSE Sensex and GDR Stock Index

The Sensex Index   The Bombay Stock Exchange, started compiling and publishing the index number of equity prices from 2nd January, 1986. Base Period: The base period of BSE-SENSEX is 1978-79. Base Value**:** The base value of BSE-SENSEX is 100 points.

Method of Compilation: BSE SENSEX is a "Market Capitalization-Weighted" index of 30 stocks representing a sample of large, well established and financially sound companies. BSE-SENSEX is calculated using a "Market Capitalization-Weighted" methodology. As per this methodology, the level of index at any point of time reflects the total market value of 30 component stocks relative to a base period. (The market capitalization of a company is determined by multiplying the price of its stock by the number of shares issued by the company). A single indexed number is used to represent the results of this calculation in order to make the value easier to work with and track over time. It is much easier to graph a chart based on indexed values than one based on actual values.

The actual total market value of the stocks in the Index during the base period has been set equal to an indexed value of 100, this is often indicated by the notation 1978-79=100. The formula used to calculate the Index is fairly straightforward. However, the calculation of the adjustments to the Index (commonly called Index maintenance) is more complex.

The calculation of BSE-SENSEX involves dividing the total market capitalization of 30 companies in the Index by a number called the Index Divisor. The Divisor is the only link to the original base period value of the BSE-SENSEX. It keeps the Index comparable over time and is the adjustment point for all Index maintenance adjustments. During market hours, prices of the index scrips, at which

latest trades are executed, are used by the trading system to calculate BSE-SENSEX every 15 seconds and disseminated, all-over the country through BOLT terminals in real time.

Global Depositary Receipts (GDR) Index   Integration of capital markets of the world began two decades ago and has accelerated dramatically over the past few years. Depositary Receipts are an important element in the process of market integration and have become very popular with issuers over the years. They permit investors to acquire and trade in foreign securities and give the issuing company access to major international markets. In the 1990's, the compounded annual growth rate of Depositary Receipt trading and dollar-trading volume globally has been 30% and 22% respectively. In addition, an estimated 1.50 billion Depositary Receipt's valued at $20-25 billion are traded on an average in the Over-The-Counter Exchange and European markets every year.

India's Depositary Receipt Program   India has the distinction of having the largest number of GDR issues (Rule 144A/Reg S) by any country. The first issue was by Reliance Industries ($ 150 mill) in May 1992. Since then, the depositary receipt concept developed considerably in India with a total of 60 Indian companies raising over US$ 6.5 billion.

Origins of the Skindia GDR Index   Indian GDRs traded on international bourses are governed by parameters specific to the market in which they are traded, making their prices unique. To capture their movement and performance, it is necessary to develop reliable market indicators that can be used as a tool by investors for measuring their portfolio returns vis-à-vis market returns. In response to this need, Skindia Finance pioneered a GDR index, which became popularly known as the ' Skindia GDR Index '.

The base of the Skindia GDR Index is April 15, 1994 with the index set consisting of 22 actively traded GDRs. The Index, a market value weighted index (total number of GDRs issued multiplied by GDR price), is one of the most popular GDR Indices worldwide. It is used as a standard at the Institute of International Finance (IIF) in Washington and is quoted in all the leading newspapers such as Times of India, Business Standard, Economic Times, Financial Express, Observer, Indian Express, India Inc (New Jersey, US), etc. It also appears daily on the Bloomberg, Knight Ridder, Press Trust of India (PTI) and DART.

The Skindia GDR Index was first modified in April 1995. It was not reviewed in the subsequent year as few companies had tapped the GDR market. However, economic reforms and liberalisation of the financial sector have brought momentous changes to the capital markets, making it necessary to construct an index that is in tune with these changes.

Base period of the index: The base date of Skindia GDR Index is Jan 02, 1995 and the base value is set at 1000. Weightings of the index set are based on the total market capitalisation (domestic equity + GDR equity) of the company and not

its GDR capitalisation alone.

Table 1. *Securities In The Skindia GDR Index*

Name of Company	Market Capitalisation on Sept 30th 1999 (Rs.Crores)[*]	Weightage
Bajaj Auto	5,402.43	3.23%
BSES Ltd	2,527.26	1.51%
E. I. Hotels	1,210.28	0.72%
Finolex Cables	964.704	0.58%
Grasim (1st)	3,630.12	2.17%
Guj Ambuja	3,626.03	2.17%
Hindalco (1st)	6,639.18	3.97%
ICICI (ADR)	5,432.24	3.24%
Indian Hotels	1,917.37	1.15%
Infosys	23,608.24	14.10%
IPCL	3,301.34	1.97%
ITC	20,173.11	12.05%
L & T (1st)	9,111.78	5.44%
Mah & Mah	3,607.68	2.15%
MTNL	11,484.90	6.86%
Pentafour Software	2,396.34	1.43%
Ranbaxy Labs	12,424.55	7.42%
Reliance	22,083.17	13.19%
State Bank of India	11,486.20	6.86%
Telco (1st)	6,908.12	4.13%
VSNL	9,500.00	5.67%
Total Market Cap.	167,434.38	100.00%

[*]1Crore=10 million

Source of the appendix: The Bombay Stock Exchange official website www.bseindia.com and the GDR Index, http://www:indiainfoline.com and http://www.skindia.com/finance/gdrindx.htm

Pressure On The Exchange Rate: Experiences Of The Czech Republic, Hungary And Poland

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Abstract. The present paper summarizes the experiences which three Central European countries, the Czech Republic, Hungary, and Poland have made with different exchange rate regimes in the near past. The investigation of the countries' exchange rate systems is carried out by the calculation of a pressure index. The results are that the Czech Republic was relatively tranquil with exception of May 1997, when a crisis forced the authorities to give up the exchange rate peg. Hungary seems successful in preventing a serious crisis through introducing the crawling band regime in 1995. After undergone several corrections in its exchange rate regime, Poland freed its exchange rates in April 2000 as response to turbulences at the end of 1999.

1. Introduction

In the early transition period from a centrally planned to a market oriented economy, the Czech Republic, Hungary, and Poland eliminated barriers to current account transactions and have gradually moved on to far-reaching liberalization of capital account transactions in line with the requirements of OECD membership since then. Underdeveloped financial markets in these countries, however, make them still vulnerable to short term capital flows. Additionally, their current account balances have been throughout negative. This bears the threat of currency crisis or at least a speculative pressure on the currency, if current account deficits or foreign debt policy or both become unsustainable. This is a crucial point for the monetary authorities with respect to their credibility to be able to hold on to their courses. Monetary and exchange rate policy can play an important role in this.

A lot of research has been done in economic literature on the investigation of the credibility of exchange rate announcements, focusing on regimes with a restriction on exchange rate fluctuations by the central bank. Empirical analysis on the expectations for the exchange rate to remain within a declared interval can easily be carried out on the basis of forward exchange rates. Assuming that the interest parity criterion holds, futures contracts provide information about the expectations of the participants on the foreign exchange market. According to theoretical considerations, if the market is efficient and investors form rational expectations, the forward rate contains all available information and there is no further opportunity to earn an unusual profit by arbitrage. The forward rate can then be used as an estimate for the future exchange rate.

However, empirical investigations in industrialized countries deliver little

evidence for the suitability of forward rates for the analysis. Possible explanations for the large size of prediction errors in the forward rate were summarized and combined by Frenkel/Levich (1975). The results show that covered interest parity holds if there are no transaction costs, risk premia or capital market imperfections. Transaction costs and less than infinite elasticity of demand and supply on foreign exchange markets lead to a neutral band around the traditional interest parity band within which points can be interpreted as equilibrium points where there is no profitable arbitrage. Frankel (1980) stresses that the rejection of the hypothesis of market efficiency means the necessity to find an alternative predictor which performs consistently lower errors than the forward rate.

Now, it is clear that the first step to investigate the credibility of an exchange rate announcement must be a proof of the assumption of validity of the interest parity, which is obviously not the case for the Central and Eastern European countries. Interest rates include a risk premium term and high transaction costs resulting from imperfection of markets. Therefore, the forward rate is not suitable to illustrate expectations about the future exchange rate. The unsuitability of the forward rates as an estimate for the future exchange rate implies that if forward rates fall out of a projected interval, this cannot be explained merely by expectations for an unscheduled devaluation of the currency.

Svensson (1991) offers an alternative to forward rates and applies interest rate differentials, which embody the expectations about re- or devaluations in the future to test the credibility of exchange rate bands. The interest rate differential is a substitute for the forward rate with simpler accessibility. Again, this method relies on the validity of the interest parity. However, in case of imperfect capital mobility as we can observe in the Central and Eastern European countries[1] the interest rate differential cannot deliver appropriate information about the exchange rate expectations. Holding Central European assets offers yields which exceed the foreign interest rates by far more than the exchange rate change that should be supposed according to monetary authorities' announcements. The reason for this lies in the appearance of a risk premium additionally to the expected change in the exchange rate.[2] Unfortunately, the two dimensions cannot be observed separately for empirical testing. Although, data about the emission of foreign currency debt could have served as a proxy for the country risk. The spread between the offered yield on a countries' foreign currency debt and the London Interbank Offered Rate (LIBOR) excludes an exchange rate risk premium and could therefore be a good measure for the country risk. On the other hand, emissions occur in irregular intervals, in different quantities and maturities so that the spread reflects also liquidity aspects.

The lesson we can draw from the above considerations is that we have to find another method to make an assessment about the credibility of exchange rate announcements in Central and Eastern European countries. The present paper applies a simple testing method for investigation of speculative pressure against the currency combining interest rate, exchange rate and international reserves variations leaning on Eichengreen/Rose/Wyplosz (1994). They propose a weighted average

whereas the decision about the fixing of the weights is crucial for the results of the calculation. This question will also be reviewed below. The credibility of the exchange rate announcement can be discussed through an exploration of speculative pressure on the exchange rate.

The composition of the present study is as follows. In chapter 2 of the paper, methodological issues about the composition of the pressure index will be discussed. Chapter 3 gives an overview of the exchange rate policy strategies in the Czech Republic, Hungary and Poland in the first part. In the second part of the chapter, index values will be calculated for the countries of the sample. The last chapter of the paper makes a conclusion over the observations.

2. Methodological Issues

The credibility of the commitment and ability of the central bank to keep the exchange rate within the announced band is difficult to measure in absence of perfect capital mobility on which econometric testing methods rely so far. However, a simple test can be made by the investigation of speculative pressure against the currency. If the exchange rate determination is not credible, agents on financial markets will make transactions according to their expectations on the basis of a future exchange rate which is different from the fixed or announced rate. In case the current exchange rate does not correspond to the situation on the foreign exchange market, agents on the market will make transactions which lead to a corresponding adjustment of the exchange rate. This can be repelled by the central bank via direct interventions to settle excess demand or supply on foreign exchange markets. By this, the international reserves of the central bank will change.[3] Another alternative can be the variation of the domestic interest rates in order to take indirect influence on the demand for the domestic currency via redirecting international capital flows. The activities of the central bank to defend the exchange rate of the domestic currency can be observed by increased volatility of the international reserves or domestic interest rates. Otherwise the nominal exchange rate has to be changed corresponding to the market situation resulting in an increased volatility of this variable.

Combining these three possibilities in case of a speculative pressure on the exchange rate of the domestic currency, a pressure index can be composed to detect these processes, which enables us to make a conclusion about the credibility of the stability of an economy and its currency. Eichengreen/Rose/Wyplosz (1994) suggested a method to detect a pressure on the exchange rate which uses the alternatives for monetary authorities to handle the pressure and create an index based on the changes of the key variables. Thus, the index is composed of the relative changes of the exchange rates, the relative changes of the interest rate differentials and the relative changes of international reserves and is calculated as a weighted average of these three values.[4] Weights must be used, because conditional volatilities of the variables are not equal. An un-weighted average may be driven by variations of one variable, for example the reserves changes, and may therefore deliver biased

results. Eichengreen/Rose/Wyplosz (1995) claim that the literature does not give a guide to the determination of the weights.

Nonetheless, this is one of the most crucial points of the calculus, because the results are not robust to this decision. The major requirement for the choice of weights is that the index value should not vary predominantly with the variations of one of the figures. The weights should be determined in a way that they balance the variations in the figures.[5] Therefore, they have to be reciprocal to them. It is also important that the choice of the weights happens in a non-arbitrary manner and is applicable for several countries in the same way. For example, we can use the arithmetic average of observations which is applied as an estimate for the mean value of a sample. This would mean that the weights are reciprocal to the average rate of change in the variables. Another possibility of determining the weights used to calculate the pressure index can be the volatility defined by the standard deviations.

The main shortcoming of the method is its ad hoc character with respect to the determination of the weights for the calculation of the average of interest rate (I), exchange rate (E) and reserves (R) changes. The results and implications about the timing of speculative pressure on the exchange rate depend heavily on the way the pressure index is calculated. An un-weighted average of the variables is driven by interest rate changes in the Czech Republic and Poland while in Hungary both interest rate changes and international reserves play a dominant role. All three have in common that actual exchange rate changes have very weak influence on the index. The application of the mean values of the variables as weights results in the dominance of the interest rate changes. Using standard deviations as weights causes the least volatility in the index values for all three countries of the sample. This is also the index which meets the requirement that it does not vary predominantly with the variations of one of the key variables. All figures have about the same strength in influencing variations of the index values for all three sample countries. Therefore, the calculation of the exchange market pressure index (EMP) based on standard deviations seems to be the most suitable expressed by equation (1) which presents a simplified and standardized version of the index which was supposed by Eichengreen/Rose/Wyplosz (1994)[6]:

(1) $EMP = \alpha \Delta e - \beta \Delta r + \gamma \Delta \left(i - i^* \right)$

with

$$\alpha = \frac{\dfrac{1}{S(\Delta e)}}{\dfrac{1}{S(\Delta e)} + \dfrac{1}{S(\Delta r)} + \dfrac{1}{S\left(\Delta\left(i - i^*\right)\right)}} \quad \text{and} \quad \beta = \frac{\dfrac{1}{S(\Delta r)}}{\dfrac{1}{S(\Delta e)} + \dfrac{1}{S(\Delta r)} + \dfrac{1}{S\left(\Delta\left(i - i^*\right)\right)}}$$

$$\text{and } \gamma = \frac{\dfrac{1}{S\left(\Delta\left(i - i^*\right)\right)}}{\dfrac{1}{S(\Delta e)} + \dfrac{1}{S(\Delta r)} + \dfrac{1}{S\left(\Delta\left(i - i^*\right)\right)}} \qquad \text{and} \qquad \alpha, \beta, \gamma > 0$$

where lower-case characters indicate log values and an asterisk means the reference country.

As the speculative attack on the currency can be met by the monetary authorities through increasing the interest rate, devaluing the currency, that is, increasing the exchange rate, and by interventions which lead to a decrease of the international reserves, the sign of the reserves changes must be altered so that a positive change indicates an intervention in order to support the exchange rate. By doing this, all measures to handle a crisis lead to an increase in the value of the index. The mean of the pressure index should be zero if the economic policy is sustainable. This indicates that interventions and corrections are balanced on the whole and the central bank does not have to carry out drastic measures.

As suggested by Eichengreen/Rose/Wyplosz (1994) an exchange market crisis is characterized by a pressure index which is at least two standard deviations above the mean. If we observe high values in close proximity to each other, that is, within two quarters to each side, they are counted together, so that they will indicate one single crisis. Expressing the index according to the above consideration in terms of the standard deviation from the mean, the value 0 means that the pressure index equals to the mean. The value 1 indicates that the pressure index equals to the mean plus standard deviation which shows that the observed variables were merely subject to normal fluctuations. The critical value is 2. Figures above this value indicate a pressure to devalue the domestic currency vis-à-vis the reference currency. No guidance is provided about whether a speculation on the currency to revalue can be identified by negative values of the index which would mean that the interest rate was reduced in order to stop capital inflow, foreign exchange was purchased by the central bank or the exchange rate appreciated in order to settle excess demand for the domestic currency. But analogously, figures below –2 can be interpreted as a revaluation pressure, that is, market forces appreciate the economic performance of the country and corrections are needed in order not to jeopardize monetary targets.

3. Exchange Rate Policy And Empirical Results
3.1. Exchange Rate Policy Strategies

The alternatives for an exchange rate strategy range from the total abandonment of monetary autonomy via implementation of a currency board, where the domestic money base is covered to 100 percent by a stable foreign currency (e.g. the Euro), or more the replacement of the domestic currency by a stable foreign currency over a simple peg of the exchange rate to different degrees of flexibility, which on extreme means allowing for free fluctuation of the exchange rate as formed on the foreign exchange market. It is difficult to choose among them the optimum strategy which

serves for the balance between two targets: Control over inflation calls for exchange rate rigidity while the maintenance of international competitiveness requires more flexibility. On the other hand, flexibility can lead to strong volatility or misalignments of the exchange rate and regression of foreign trade activities while revaluation of the currency can help lowering inflation rates.

The individual strategies of the Central and Eastern European countries illustrate this dilemma. We can find an example within the region nearly for all alternatives. Table 1 demonstrates that the three countries which are included in the analysis have also followed different paths in exchange rate policy, albeit they all started the transition period with a peg and went over to more flexibility later. Poland was the first to stop with this practice and has moved gradually to a free float. The country broke up with the peg to the US Dollar in 1991 and introduced a crawling peg with decreasing rate of crawl. The crawl remained but a relatively wide fluctuation band was established in 1995. This band was further widened from ±7 to ±15 percent until a free float was allowed for in April 2000. Hungary held on to the

Table 1. Exchange rate systems in the Czech Republic, Hungary, and Poland

Country	Period	Regime	Anchor currency
Czech Republic	12/90-05/97 05/97	Peg (± 7.5%) Managed Float	DEM (65%) + USD (35%)
Hungary	-03/95	Adjustable Peg	Trade-weighted basket (until 12/91) USD (50%) + ECU/DEM (50%) (until 05/94)
	03/95-04/01	Crawling Band (1.9-0.2% monthly, ± 2.25%)	USD (30%) + ECU/DEM/EUR (70%)
	05/01-09/01	Crawling Band (0.2% monthly, ± 15%)	EUR (since 01/00)
	10/01-	Peg (± 15%) (ERM II shadow)	
Poland	01/90-10/91 10/91-05/95	Peg Crawling Peg (1.8-1.2% monthly)*	USD (-05/91) USD (45%) + DEM (35%) + GBP (10%) + FRF (5%) + CHF (5%) (until 12/98)
	05/95-04/00	Crawling Band (1.2-0.3% monthly; ± 7-15%)	USD (45%) + EUR (55%)
	04/00-	Free Float	

* Additional exchange rate adjustments by: -12% (02/92), -8% (08/93), +6% (02/95)

peg until 1995. However, the exchange rate had to be adjusted several times and a crisis was feared. In March 1995, the crawling band was introduced as a main pillar of a stabilization program. The rate of crawl was reduced gradually while the fluctuation band remained at a narrow ±2.25 percent until May 2001. Since October 2001, a shadowing of the ERM II has been followed. The Czech Republic kept up

the longest with the peg of the central parity to a currency basket composed of the Deutsche Mark (65 percent) and the US Dollar (35 percent) allowing for fluctuations around the parity by ± 7.5 percent. This strategy was given up after a currency crisis in May 1997. The country has followed a managed float since then.

3.2. Empirical Results

Indexes were calculated for the three countries exploiting monthly data from the International Financial Statistics of the International Monetary Fund. Data about international reserves include only the line 'Total Reserves minus Gold' (line **1**l.d). Both reserves and exchange rates are measured at the end of period. The reference country is the United States, because official Dollar rates are readily available in the statistics (line **ae**). Interest differentials are, therefore, calculated against US treasury bill rates (line **60c**). For the Czech Republic, no treasury bill rates have been reported, therefore, refinancing rates (line **60a**) have been applied. The start of the observation period is different for the countries for data availability reasons. For Hungary, the period starts in January 1990. No data is available for the Czech Republic before January 1993 when the separation of the Czech and Slovak Federal Republic (CSFR) entered into force. Interest rate data for Poland were not available before January 1992. The end of the observation period is December 2001 for Poland and Hungary and October 2001 for the Czech Republic.

Table 2. presents the mean values and the standard deviations in the relative changes of the variables. The results demonstrate that the usage of weights is justified by the different volatilities of the variables for each country. It is remarkable, that the mean values of changes in international reserves are for all three countries significantly positive which proves the accumulation of reserves over the entire period.

In the Czech Republic, the mean values of the variables show that even after introducing a float, the exchange rate was managed via interventions in order to keep it stable. The main instrument of interventions must have been the interest rate policy. This can be suspected regarding the very high volatility of this variable. However, the correlation between relative changes of interest rate differentials and exchange rates is by an order of magnitude weaker than in the other countries of the sample.

In Hungary, the mean of exchange rate changes is significantly positive showing the devaluation trend over the period of investigation. The volatility of this variable is relatively low and was reduced during the crawling band regime supporting predictability. The main instrument of interventions must have been direct selling or purchase of foreign exchange. The volatility of interest rates is nearly as high as that of the international reserves, but this must result from the sharp increase of yields prior to the reduction leaning on the inflation rates. It is true that the central bank endeavored to serve the disinflation target by keeping the interest rates high in order to offer positive yields in real terms. Mean interest rate changes are not significantly different from zero. Nevertheless, it is striking that the

correlation   **Table 2.** *Mean values and standard deviations of relative changes*
Czech Republic

Variable	Mean	Standard deviation
Exchange rates (Δe)	*0.00249* (--)	0.035265
Interest rate differential (Δ(i-i*))	*-0.01077* (--)	0.225647
International reserves (Δr)	0.03262 (0.05)	0.088101

Hungary

Variable	Mean	Standard deviation
Exchange rates (Δe)	0.01046 (0.05)	0.024841
Interest rate differential (Δ(i-i*))	*-0.00622* (--)	0.081246
International reserves (Δr)	0.01616 (0.05)	0.085606

Poland

Variable	Mean	Standard deviation
Exchange rates (Δe)	0.01045 (0.05)	0.028408
Interest rate differential (Δ(i-i*))	0.01255 (0.05)	0.061709
International reserves (Δr)	0.01708 (0.05)	0.044582

Significance levels in brackets. * denotes the reference country.
Source: International Monetary Fund; own calculations

between relative changes of the exchange rates and the interest rate differentials is positive against the intuition of economic theory.

In Poland, the currency followed a devaluation trend, but the exchange rates perform relatively low volatility compared to the interest rates and the international reserves. The role of interest rate changes in influencing the foreign exchange market seems to be stronger than direct interventions according to standard deviations of these variables especially during the operation of the crawling band.

Figure 3 shows the deviations of the pressure indexes (EMP) from their mean in terms of their standard deviation for simplicity in recognizing the events. The arithmetic averages of the indexes are not significantly different from zero in Poland and Hungary, therefore, the calculations rely on mean values equal to 0. In the Czech Republic, a devaluation pressure over the whole period can be seen by the

Figure 3. *Deviations of the pressure indexes from their means in terms of standard*
deviation
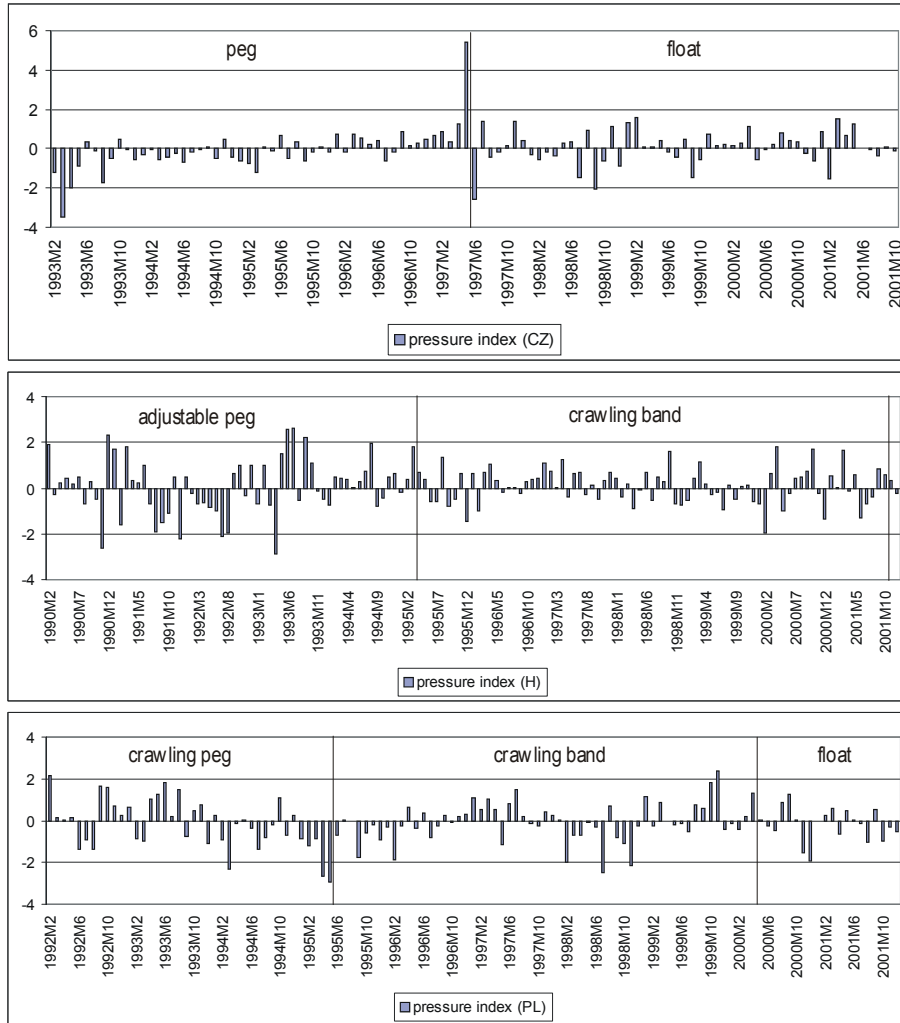
Source: International Monetary Fund; own calculations

significantly positive mean value of the index.

The Czech Republic started with undervaluation of the Koruna which can be seen on the revaluation pressure at the beginning of 1993. This was used up by real appreciation due to inflation differentials to trading partners and lead to current account deficits, because there was no adjustment of the central parity. In 1996, the current account deficit reached 8.2 percent of GDP. The country had to give up

pegging the exchange rate in May 1997. Astonishingly, the foreign exchange market seems to be surprised by the crisis, which can only be seen by a huge increase in the domestic interest rates. Before this, interest rates and international reserves were relatively stable. Since then the exchange rate have been floated, however, the exchange rate remained stable due to direct and indirect interventions on the foreign exchange market. The current account figures improved substantially since 1997. The crisis in May 1997 ended the relative tranquility around the Czech Koruna but there was no sign for a crisis again. The period after this time is characterized by an inflation target for monetary policy. This may explain the active interest rate policy and interest volatility. Therefore, it should not be strictly interpreted as a negative development.

The stabilization program and the new exchange rate regime, which was introduced in Hungary in 1995 obviously prevented a threatening twin crisis, which was feared because of current account deficits about 9 percent of GDP for two years and high budget deficits, and managed to gain the confidence of the market agents by improving the stability and predictability of exchange rates. The pressure index detects turbulences during the adjustable peg, which can be seen in high amplitudes in both (de- and revaluation) directions[7], but the figures show a smoothing impact of the shift to the crawling band regime. Although, starting in August 1998, the Russian crisis affected the Hungarian financial markets relatively strong compared to the two other countries, the index does not signal a hopelessly serious contagion by the crisis which forced the National Bank of Hungary to substantial interventions on the weak edge of the band in October 1998. This event led to panic reactions, especially in Hungary. Required risk premium lifted the interest rates for 3-months maturity by 4-5 percentage points to 20-21 percent.[8] Nonetheless, the figures of the pressure index underpin the statements of Hungarian monetary authorities that the crawling band system could be operated without noteworthy pressure on the exchange rate to devalue to rates outside the announced band or increase the rate of crawl. The turbulences in 2000 and 2001 may stem from disputes and speculations about a change in the exchange rate system which emerged, on the one hand, from the obvious exhaustion of the disinflation progress experienced in the previous years, and from the revaluation pressure stemming from capital inflows on the other. The widening of the band and introducing of an inflation target seems to improve the situation, however, it is too early to make a statement. What is obvious, Hungary is less successful in fighting inflation than the Czech Republic and Poland.

Unfortunately, because of lacking data on interest rates, no indexes could be calculated for the period of exchange rate peg in Poland. During the period of investigation, there was pressure on the exchange rate and there seems to be no difference between the crawling peg and the crawling band in this respect. Nevertheless, the situation did not go up in a crisis until late 1999. In this year, the current account deficit increased suddenly to 7.4 percent of GDP. As a consequence of the troubles, the Polish monetary authorities decided to free the exchange rate and introduce an inflation target. Regarding the fact, that in Poland, the index detects

revaluation pressure during the crawling peg and band, it may not be surprising that the Polish Zloty revalued since the introduction of the float in spite of current account deficits which, however, are decreasing again. The Polish example shows that increasing flexibility of the exchange rate may stabilize the foreign exchange market. The float seems to work without troubles.

4. Conclusion

The present paper analyzed the foreign exchange markets of three European accession candidate countries over the last decade. The investigation is based on the detection of pressures on the exchange rate, which indicate a loss of credibility. This method does not rely on the validity of the interest rate parity and can be used over different exchange rate regimes. While individual strategies are differing in the three Central European countries under investigation, the direction shows towards increasing the (theoretical) exchange rate flexibility in all of them. Nevertheless, a closer look delivers a different picture.

        The results show that only the Czech Republic experienced a serious crisis in May 1997. This was solved by permitting the exchange rate of the Koruna to adjust, but actually the exchange rate remained stable since then. Hungary changed the exchange rate regime after serious tensions appeared and prevented a crisis. Actually, the peg, which was adjustable, meant more exchange rate flexibility than the crawling band regime. Increasing the fluctuation bandwidth in May 2001 gave room for revaluation of the Forint. Poland moved gradually to more flexibility of the exchange rate seemingly in order to allow for revaluation of the Zloty in spite of devaluation of the central parity and circumvent unscheduled corrections of the central parity like during the crawling peg.

Notes
1. It is well known that the are still restrictions imposed on capital movements in the CEEC so that capital mobility cannot be described as perfect and the same is true for capital markets.
2 The nominal interest rate includes also a compensation for domestic inflation, that is, central banks in the CEEC try to keep interest rates high in order to provide positive real interest rates and encourage domestic savings. Foreign investors, however, take only the exchange rate changes into consideration. [See also Nuti (1996).]
3. At this point, we have to add that changes in international reserves do not always provide sufficient information about foreign exchange interventions. Yet still, variations can be observed.
4. Bayoumi/Eichengreen (1998) constructed a pressure index using information on exchange rate volatility and interventions in order to capture the magnitude of shocks to the foreign market.
5. Eichengreen/Rose/Wyplosz (1994, 1995, 1996) declare to use weights so as to equalize the volatilities of the three components, but do not give any further

information about the calculus.

6. The authors suggest the application of changes in relative reserves vis-à-vis the reference country. This makes sense if there is a possibility of interventions by the reference country's central bank which is definitely not given in the present investigation.

7. This sentence should not mislead the reader to the conclusion that there was any revaluation pressure on the Hungarian currency during the adjustable peg. The index merely shows that after the Forint was actually devalued the interest rate fell as a consequence of lowered devaluation expectations.

8. See also Szapáry/Darvas (1999).

References

Bayoumi, Tamim, and Eichengreen, Barry, "Exchange rate volatility and intervention: implications of the theory of optimum currency areas", Journal of International Economics **45**, 2:191-209, August 1998.

Eichengreen, Barry, Rose, Andrew K., and Wyplosz, Charles, "Speculative Attacks on Pegged Exchange Rates: An Empirical Exploration with Special Reference to the European Monetary System", Discussion Paper No. 1060, Centre for Economic Policy Research, November 1994.

Eichengreen, Barry, Rose, Andrew K., and Wyplosz, Charles, "Exchange market mayhem: the antecedents and aftermath of speculative attacks", Economic Policy **10**, 21:249-296, October 1995.

Eichengreen, Barry, Rose, Andrew K., and Wyplosz, Charles, "Contagious Currency Crises: first tests, Scandinavian Journal of Economics **84**, 4: 463-484, December 1996.

Frankel, Jeffrey A., "Test of Rational Expectations in the Forward Exchange Market", Southern Economic Journal **46**, 4:1083-1101, October 1980.

Frenkel, Jacob A., and Levich, Richard M., "Covered Interest Arbitrage: Unexploited Profits?", Journal of Political Economy **83**, 2:325-338, February 1975.

Nuti, Mario, "Inflation, interest and exchange rates in the transition", The Economics of Transition **4,** 1:137-158, 1996.

Svensson, Lars E.O., "The simplest test of target zone credibility", Centre for Economic Policy Research Discussion Paper No. 493, Centre for Economic Policy Research, January 1991.

Szapáry, György, and Darvas, Zsolt, "A nemzetközi pénzügyi válságok tovaterjedése különböző árfolyamrendszerekben" ("The spread of international financial crises under various exchange-rate systems"), Közgazdasági Szemle (Economic Review) **XLVI**, 11:945-968, November 1999.

Asymmetric Information And Privatization In The Chinese Banking Industry

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Abstract: Entry into the World Trade Organization will bring effective competition for the Chinese banking industry. We describe the history of the Chinese banking system, and examine the present status of the largest banks, especially their non-performing loans (NPLs). We follow by modeling the initial conditions under the privatization process and investigate its implications, given asymmetric information. Cause of the asymmetries in the Chinese banking system are due to opaqueness and NPLs of state banks. The latter are generated by state policies and through financial repression. We suggest that the system needs an institutional infrastructure on credit collection, on bankruptcy laws as well as a consensus on maintenance of hard budget constraints by the state and state-owned enterprises.

1. Introduction

Entry into the World Trade Organization has many implications for the Chinese industries, and especially for the Chinese banking industry [1]. There will be effective competition in the financial markets when all the geographical and other limitations that now bound foreign banks in China will slowly be removed. With entry, foreign banks will be allowed to carry out business in foreign currency with their international clients and one year later, with their domestic clients [2]. Within two years, they will also be allowed to conduct wholesale business in local currency, the Renminbi, and within five years, they will be capable of doing retail business with the Chinese population (Wong and Wong, 2001). Current competition within the banking industry is incapable of preparing the Chinese banks for the international competition they will be facing in the future within the WTO.

In our paper, we first describe the history of the Chinese banking system, and examine the present status of the largest banks. We follow by modeling the initial conditions under the privatization process and investigate its implications,

given the asymmetric information on behalf of investors.   We conclude with policy recommendations.

2. History and the Present Status of the Chinese Banking System
2.1. History of the Chinese Banking System

In 1978, China went through a banking reform. In the next five years, the People's Bank of China (PBOC), which was both a central bank and the only commercial bank, was split into the commercial part, and then formally became the country's Central Bank. The four specialized banks split from PBOC to handle commercial business are the Agricultural Bank of China (ABC), the China Construction Bank (CCB), the Bank of China (BOC) and the Industrial and Commercial Bank of China (ICBC).

These four specialized banks had distinct roles to play within each of the sectors they represented (rural agriculture, construction, foreign exchange, urban commercial/industrial, respectively) and they were policy implementers of the government plans. The clearly defined roles limited competition between the banks until 1985. Even though regulation approving competition between them were established in 1985, competition did not start until 1994 when the banks stopped being the policy arms of the government and became commercial banks. Policy execution were then transferred to three other banks: China Development Bank (CDB) (medium and long-term lending in construction and infrastructure), Export-Import Bank of China (XIB) (trade of capital goods), and Agricultural Development Bank of China (ADBC). Since the latter group lacked branch banking, the separation between the commercial banks and the policy banks had not been well defined in actual practice (Wong and Wong, 2001, p. 21).

Since then, more commercial banks have been established, such as the Bank of Communications (BOCOM), Shenzhen Development Bank, China Merchants Bank, Guangdong Development Bank, China Everbright Bank, China Minsheng Banking Corporation, Hua Xia Bank, Pudong Development Bank, CITIC Industrial bank, Fuijin Industrial Bank, Hainan Development Bank (closed in 1998 due to illiquidity), China Investment Bank (merged with China Everbright Bank due to illiquidity), Yantai Housing Saving Bank and Bengbu Housing Saving Bank (Wong and Wong, 2001). Most of these banks are state-owned banks and some are mutual banks of former cooperatives, along with 90 other local credit cooperatives known as the city commercial banks. Hence, we can sum up the present situation in Chinese banking industry as one of four wholly state-owned commercial banks (Big Four), 10 joint-equity commercial banks (after consolidation) and 90 city commercial banks.

Beside the formal sector banking system, a large amount of informal banks and financial institutions have been formed by individuals in Guangdong, and other regions. The Chinese government shut down on these 'illegal banks' in 2001. Sixty Guangdong lenders in 2001-2002 in the Pearl River Delta region which were run as normal banks were closed.   These banks employed about 250 people and had accumulated savings deposits equivalent to US$7.1 million. These banks gave better

market rates for the foreign exchange conversions than the state-owned banks and were charged with funding offshore gambling visits for investors (O'Neill, 2002). Since the law and regulatory framework for private financial institutes were lacking, serious financial frauds and risks arose from the operation of these institutions. What the government should have done was to improve their regulatory framework, but they failed to do so and instead, in most cases, they just shut down those problematic private financial firms.

2.2. Deposit and Loan Concentration and Profitability in Chinese Banks
Table 1 reports the concentration ratios of assets, deposits and loans of the four largest banks in China – the Big Four, between 1994 and 1998.

Table 1*: 4-Bank Concentration of Assets, Deposits and Loans (%)*

YEAR	ASSETS	DEPOSITS	LOANS
1994	93.04	90.14	93.24
1998	84.93	84.26	88.51

Source: Wong and Wong (2001), p. 23.

Given the official statistics which exclude informal banking transactions volume, the Big Four still have large concentration ratios (over 80 %), and would be considered highly oligopolistic. The high concentration of assets, deposits and loans in these banks are the results of governments' involvement. First, PBOC's policy in controlling interest rates ruled out price competition in the deposit and loan markets. Second, these banks are under pressure from both central and provincial authorities to make loans to favored sectors enterprises under 'directed credit leading' (Wong and Wong, 2001). The Big Four still account for 80% of the market shares, more than 70% of the deposits, loans and banking outlets and almost 60% of the profits (Xinhua, 2002).

Table 2 reports the overall concentration of bank profits of the four largest profit-makers – BOC, BOCOM, ICBC and the CCB, between 1994 and 1998.

Table 2*: 4-Bank Concentration of Profits (%)*

YEAR	BOC	BOCOM	ICBC	CCB	OVERALL RATIO
1994	41.70	17.60	14.66	9.68	83.64
1998	16.74	16.40	12.69	9.51	55.34

Source: Wong and Wong (2001), p. 25.

Of the four largest profit-makers in the Chinese banks, three are from the Big Four while BOCOM is a joint-equity commercial bank. From Table 2, it is evident that they are losing their profitability over time, from 83.64% in 1994 down to 55.34% in 1998; and BOC's profitability declined from 1994's 41.7% to 1998's 16.74%, contributing significantly to the overall ratio. This decline is an indicator of their inefficiency.

The controlled interest rate policy and explicit guarantees by the central government for deposits placed with the Big Four provided them with abundance deposits (Wong and Wong, 2001). This kept them afloat to grant loans to state-owned enterprises (SOEs). SOEs provide 40% of jobs in urban areas, 57% of pension funds, and three quarters of urban housing. Medical institutions that belong to SOEs serve one-fifth of China's total population (Tong, 1999). Such Chinese experience offers an alternative public policy to traditional economic literature that finds financial repression dampens the growth of the financial sector, an important element for economic development. For the Chinese economy under reform, maintaining macroeconomic stability is perhaps even more important than improving the efficiency of the financial sector (Li, 2001). More will be said on financial repression in the next sections.

2.3. Non-Performing Loans (NPLs)

Maintaining such macroeconomic stability comes with a price. Since the state banks were directed to write loans to SOEs, usually with poor financial viability, their non-performing loan (NPLs) started to increase, which will be a large burden on the state budget deficit with time. In 1998, the central government issued a special bond of US$33 billion and injected capital to the Big Four (Ikeya, 1999). In 1999, it authorized the establishment of four asset management companies (AMCs) to acquire NPLs from the Big Four. The pairings are: Cinda Asset Management Company with CCB, China Great Wall Asset Management Company with ABC, Oriental Asset Management Company with BOC, and China Huarong Asset Management Corporation with ICBC. Furthermore, in order to regulate loans, a five-classification loan structure (pass, special mention, substandard, doubtful and loss) was standardized to help banks give more credit-worthy loans (Wong and Wong, 2001, p. 36).

The four AMCs are established to help clean up the balance sheets of the Big Four so as to remove their competitive disadvantages as a result of policy lending before the end of 1995 (Ikeya, 1999; Wong and Wong, 2001). PBOC Governor Dai Xianglong suggested that the AMCs could create a virtuous circle of benefits for the state banks as well as state enterprises. He has stated "the separation of part of the non-performing assets from the balance sheets of the state commercial banks will not only improve the balance sheets of the state commercial banks, but also will reduce the debt service of the state enterprises," (Harding, 2000).

The scheme is that the AMCs, with an operational period of 10 years, buy NPLs from their respective wholly state-owned commercial banks at cost in exchange for the same amount of bonds issued by the AMCs. This means that NPLs on Big Four's balance sheets are replaced by bonds issued by the AMCs, which are expected to be guaranteed by the government (Ikeya, 1999). As indicated in Table 3, the AMCs have so far taken close to 1.4 trillion Reminbi (US$167 billion) from the Big Four's books (Tang, 2002). Analysts estimated that would help cut the NPL ratio by 10-20 points (Business Times, 2002).

Table 3*: NPLs purchased from Big Four by AMCs (US$ in Billion)*

BIG FOUR	BOC	ABC	ICBC	CCB
AMCs	Oriental	Great Wall	Huarong	Cinda
NPLs PURCHASED (US$)	31.71	42.17	49.72	42.68

Source: Data from the Development Research Center, 2001.
Note: The amount of NPLs taken over by the four AMCs from the Big Four totaled
US$166.28 billion (RMB 1,363.5 billion).

While many people are speculating in the percentage of NPLs to be recovered under the AMCs' management (Ikeya, 1999; Tang, 2002), others are more concerned about the NPLs still remaining in the books of the Big Four. According to a statement made by PBOC Governor Dai Xianglong in January 1998, the ratios of problem to total loans for the Big Four combined as of end of 1997 totaled to 25-26% for all problem loans (Ikeya, 1999). In January this year, he said that the combined NPL ratio of the Big Four stood at 25.37% in 2001, down 3.1 percentage points from 2000. In March, he admitted in public the first time that bad loans of big state banks were higher than official estimates and could be up to 30% of their total lending (Business Times, 2002). Foreign analysts estimated that the figure can be as high as 35-50% (Ikeya, 2001; Business Times, 2002).

Table 4: *Ratio of NPLs on the books of the Big Four (%) Even After the Establishment of AMC in 1999*

YEAR	1999	2000	2001	2002
NPL ratio	25.00	28.47	25.37	30.00

Source: Data from the Development Research Center, 2001.

Beside the US$33 billion capital injection to the Big Four, the establishment of the AMCs to take over US$167 billion of their NPLs, and the introduction of a five-classification loan structure to standardize guidelines to grant loans, disciplinary actions were taken against those who were thought to have caused bad loans to increase.   In September of 2001, Beijing penalized 1,240 bankers in the Big Four who failed "to reach a reduction target on NPLs." The Central Bank pointed out that these bankers' penalties were directly linked to the irregularities they committed, such as illegal lending to enterprises. PBOC Governor Dai was determined to attain the NPLs reduction target (Reuters, 2001).

There are at least two different views on how China should handle its NPL issue which sparkled heavy debates in both the World Economic Forum in Beijing and in the annual meeting of the Asian Development Bank in Shanghai held this year (ChinaBiz, May 2002). ChinaBiz reported in the Asian Development Bank annual meeting in May that Liu Ligang and Masaru Yoshitomi, from the Asian Development Bank Institute in Tokyo, asserted that China should approach the NPL issue with "one big bang." They mentioned that the current strategy to lower bad loans led to risk-adverse lending and would result in limiting the country's economic

development.   As another view, Fang Xinghai of the Shanghai Stock Exchange maintained that China's current financial situation would not tolerate it to take care of the NPL problem in one goal but its economic expansion would allow it to "grow out" of the problem over the years (2002).

Guidelines published on PBOC's official website stated that provisions for bad loans should be completed by at least 2005 when China fully opens its banking sector to foreign investors (Chung, 2002). At the end of 2001, the four AMCs had sold US$15 billion of bad loans, about 9% of the total, to foreign and domestic buyers. A consortium led by Morgan Stanley bought 1.31 billion US$ assets for 9 percent of its book value (at US$ 120+ million purchase price) in the first auction conducted by the state firm Huarong in November 29, 2001, with the provision that they share future profits, once the consortium makes a stipulated 'preferred return' (of about 20-25 percent) on their initial investment in 24 months (Kynge, 2003). The recovery rate for the state ranged from 7-35% (Tang, 2002). Table 5 reports the recovery rate for each of the AMCs as of end of year 2001.

Table 5: *Recovery Rate in NPL Sales (%) as of end of Year 2001*

AMCs	Oriental	Great Wall	Huarong	Cinda
2001	24.2	7.0	32.5	35.0

Source: Data from Tang (2002).

Last October, Standard & Poor's announced that it would expect a 20% recovery rate in China's bad loans (Slater, 2001). As quoted in an article in Financial Times on May 24, 2001, Mr. Yang Kaisheng, President of Huarong said "if we can't sell the bad loans, we will take some losses but it will actually be the state [the Ministry of Finance] that pays for them" (Kynge, 2001).

An International Finance Corporation SPI disclosure on September 17, 2001 estimated that US$440 billion of NPLs are cumulated in the Chinese banking system, equivalent to 42% of its 2000 GDP.   Table 6 indicates the cost of restructuring financial sectors and NPLs in eight different countries.

Table 6: *Costs of restructuring financial sectors and NPLs*

COUNTRY	YEARS	FISCAL COSTS (% of GDP)	PEAK IN NPLS (%)
Argentina	1980-82	13-55	9
Brazil	1994-96	4-10	9
Columbia	1982-87	5-6	25
Indonesia	1997-	45	64
Malaysia	1997-	12	24
Mexico	1994-95	12-15	11
South Korea	1997-	15	19
United States	1984-91	5-7	4

Source: Green (2002), p. 11.

2.4. Competition From Outside And Within

In June 2002, CCB and ABC formed an alliance to expand their customer base and service scope to better position themselves to compete in the market (Luo, 2002). Since a big portion of the Big Four's NPLs are shifted to the AMCs, they are now engaging to execute tighter control in their credit systems and over profitability, and they also face challenges by domestic and foreign banks that develop their activities in the market.

As pointed out in Wong and Wong, when nominal interest rates paid by banks are identical, depositors choose banks with stronger fundamentals and better services (2001, p. 26). The Big Four gained a majority of the deposit base because depositors believed that through the government's guarantee, these banks provided more protection than other domestic banks and financial institutions (Wong and Wong, 2001, p. 26). Also services that foreign banks could offer were highly controlled, leaving depositors little choice but to bank with the Big Four.

Under the WTO schedule, Chinese banking industry is slowly opening up to foreign players. Foreign banks will be allowed to offer Renminbi business to local corporate clients within two years of China's WTO entry, and to conduct full domestic currency operations five years after the accession (China Daily, 2002). The pressure from foreign banks are already highly evidenced. Luo noted that Citibank NA and HSBC Holdings Plc, for example, are gradually gaining wider access to China's US$964 billion of household savings. At the end of 2001, combined deposits at these two banks was at US$508 million, and loans at US$366 million, representing some 30% of China's savings and 27% of its total loans advanced respectively. In 2001, foreign banks opened 214 representative offices, 190 operational outlets and 31 of them were allowed to conduct Renminbi business, with high concentration in Shanghai, Shenzhen, Beijing and Guangzhou (Xinhua, 2002). In January 2003, Citibank won Chinese government approval to buy a 8.26% stake of the Shangai Pudong Development Bank for US $112 million dollars, eventually leading to promoting credit cards through its 272 branches in 30 cities (Kynge, 2003).

Businesses in joint-equity commercial banks are also expanding. Their assets grew the fastest in 2001, reaching a combined total of US$291 billion, up 28% year-on-year (Xinhua, 2002). The report also pointed out that the total assets of joint-equity commercial banks, city commercial banks, and urban credit cooperatives at the end of 2001 was US$414.2 billion (up 23.66% year-on-year), deposits at US$322 billion (up 28.7% year-on-year), loans provided at US$213.6 billion (up 28.68% year-on-year); their profits was at US$1.58 billion in 2001, a US$141.8 million increase over the previous year.

The position of SOEs as the major job providers is also being challenged. While they are laying off workers, private companies are increasing the size of their workforce. At the end of 2001, private companies employed 36.6 million people (ChinaBiz, June 2002). Data of the Ministry of Labor and Social Security showed that China's private companies provided 2.5 million new jobs in 2001, accounted for

a third of the 7.89 million total increase in urban employment to 239.4 million (ChinaBiz, June 2002).

The Big Four were not accustomed to lending to non-SOEs, and private companies have so far not been favored in lending even though they are more credit-worthy. Foreign banks, on the other hand, are more familiar to deal with loans in this category; the WTO schedule is providing them with more flexibility to target private clients. We have yet to see whether the Big Four will move fast enough to capture some of these activities and reverse the decline in their share of the profits, we have yet to see.

As asserted by the Xinhua (June 12, 2002), the basic banking pattern in China takes the state-owned commercial banks as the mainstay, the joint-stock commercial banks as the growth engines, and that local commercial banks and foreign banks will co-exist. How much will the pie grow and how big a portion from the Big Four will be taken and divided among the other players depends on the different strategies designed and implemented by the players. To increase competitiveness, Chinese banks are focusing their attention in the capital market and are going public. Bank of China, the largest foreign exchange institution and one of the Big Four, won approval from the listing committee of the Hong Kong Stock Exchange to sell some of its stocks in an initial public offering (CNN.com, 2002). Besides listing BOC, Beijing plans to eventually list the other three of the Big Four to improve their positions to compete with other foreign banks after China fully opens its financial sector (Beckerling, Chu and Chang, 2002). The lesson learned from Argentina's restructuring its banking industry may offer China some directions: post-privatization banks show improvements in their loan-portfolio quality and efficiency to generate income while those that stayed in the public sector did not demonstrate the same performance gained by privatized banks (Wong and Wong, 2001, p. 39).

3. Financial Repression, Non-performing Loans in the Banking Sector

Previous section examined the stability of the Chinese financial sector, given that there has been financial repression in the system. Financial repression is defined as a policy regime that creates a difference between the actual rate and the nominal rate of return on financial assets, such that investors have no incentives to hold financial assets (Fry, 1982). Li (2001) maintains that the Chinese government sustained a mild financial repression by the monopoly of state banks to avoid business cycles and to control the growth of aggregate demand.

"In addition, by keeping interest rates on deposits low, state banks can boost their profits, which are an important source of government revenue. Low deposit rates also enable the state banks to offer cheap credit to sinking state enterprises that otherwise would require much higher direct budgetary subsidies…. Indeed, the consequences of mild financial repression worked out as intended….First, state banks have attracted a rapidly increasing rate of deposits;…the deposit growth rate has outpaced that of the gross domestic

product….Second, the central government has obtained a large amount of quasi-fiscal revenue form the financial sector, which has compensated   Beijing's diminishing share of fiscal revenue in the GDP. …Overall, during the reform era, inflation has not gone out of control in China" " (p. 78). Li points out that the costs of financial repression are also large because of the inefficiency it creates and stops the flow of bank credit into productive investment channels and creates microeconomic inefficiency in the financial sector.   "…nonperforming loans ... are consequences of financial repression. Under financial repression, state banks obtain cheap deposits and lend them cheaply to poor-performing state enterprises that often fail to pay back the loans….To beat the trap of financial repression, it is necessary to break up the five largest state banks. They are already among the top 50 banks in the world in terms of assets."(Li, p. 85).   As mentioned in our early discussion, to address NPL problem, China has depended on two different policies. One is the recapitalization of the state banks and the second is decrease the proportion of NPLs.

Table 7 gives an international comparison of China's largest state banks in terms of assets, capital, profits, non-performing loans to total loans and the total assets to GDP ratios.

Table 7: *International Comparison of China's Largest State Banks, 1999*

Bank	Assets (A)		Cap. / A		Profit /Ave. Cap.		NPLs/ total loans	A/ GDP	GDP Basis
	USD $ Mil.	Asset World Rank	%	World Rank	%	World Rank	%	%	Country**
ICBC	427	18	5.13	672	2.3	883	--	43.13	**China**
BOC	316	28	4.83	719+	3.5	850	14.86	27.50	**China, Hong Kong**
CCB	265	38	4.96	700	7.0	743	--	26.82	**China**
ABC	244	45	6.67	480	-1.0	918	--	24.65	**China**
BC	58	120	4.82	721	11.4	602	--	5.90	**China**
Deutsche Bank	844	1	2.06	988	24.5	227	1.44	5.55	Germany, USA, Japan
Citi group	717	2	6.65	483	35.6	61	1.40	4.72	USA, Japan, Germany
BNP Paribus	702	3	2.84	958	32.9	85	6.30	4.83	France, USA, Japan
Bank of Tokyo-Mitsu Bishi	678	4	3.84	870	15.0	490	4.84	4.47	Japan, USA, Germany
Bank of America	632	5	6.04	558	32.6	88	0.85	4.16	USA, Japan, Germany
UBS	614	6	3.01	946	28.3	145	--	4.59	Switzerland USA, Japan

HSBC	569	7	5.01	689	28.0	152	4.00	3.93	UK,USA, Japan
Fuji Bank	531	8	4.26	811	11.9	587	4.37	3.66	Japan, USA, France
Sumitomo Bank	508	9	4.10	832	10.4	636	6.70	3.34	Japan, USA, Germany
HypoVerein sbank	505	10	2.91	953	5.5	797	2.40	3.33	Germany, USA, Japan
Da-Ichi Kangyo	472	11	4.98	696	7.9	718	--	3.10	Japan, USA, Germany
Norinchu kin Bank	470	12	3.15	938	7.6	731	6.25	3.09	Japan, USA, Germany
ABN Amro Bank	460	13	3.87	867	26.0	194	--	4.12	Netherlands USA, Germany
Credit Suisse	452	14	3.91	862	25.0	217	--	2.97	Switzerland USA, Japan
Sakura Bank	443	15	5.20	662	5.2	808	--	2.92	Japan, USA, Germany

Source; From Li (2001), p, 86.
Note: ICBC=Industrial and Commercial bank of China
BOC= Bank of China
CCB= China Construction Bank
ABC=Agricultural Bank of China
BC=Bank of Communications
**=GDP is the sum of the countries in which the bank operates. The number in the asset columns have been rounded off to the nearest million.

   Table 7 shows that the Big 4 are 'too big to fail' with large asset/GDP ratios and large NPLs (Table 4) and low profit to capital ratios. Bloated assets as well as the strong oligopolistic positions result in large assets/GDP ratios, therefore giving them 'soft' budget constraints with solid state backing. The sustainability of such macro policies is questionable over the long run. Li (2001) argues that the solution to the problem will come with breaking up the larger banks into smaller more efficient units. However, he states that two preconditions to the breakup are, first, fiscal reform by the government where reliance on the banks profits are eradicated and, second, where SOE deficits are solved.
   Observations in both the developed and developing/transitional economies have shown that the solutions to such problems lead to privatization processes, as is now the case with BOC. Ways and means of privatization are beyond the scope of this study. However, we can now examine the case of (extent and the amount) of NPLS as an asymmetric information problem in privatization in the next section.

4. Model: Adverse Information Costs and Asymmetries in Information in the Privatization. Does Asymmetric Information Matter?

The amount of financial repression and the extent of the NPLs are already public information available to the international investment community.   If there is a privatization process of the Big Four, how do the bidders and sellers behave with respect to the fundamental value of these assets? First of all, one would expect to see large initial bid/ask spreads due to asymmetry of information. An asymmetry of information arises when the stock specialists are going to face investors who have an informational advantage. Copeland and Galai (1983), Glosten (1987) and Easley and O'hara (1987) have discussed the relation of the spread with the information content of heterogeneous traders. The basic model of Glosten-Milgrom (1985) uses a single piece of new information to show that this will be absorbed by both sides of the market participants and in a one period model, the spread will automatically tends toward zero. George, et. al (1991) estimate the components of bid-ask spreads, and Petersen, Fralkowski (1994) study posted versus actual spreads. Abhyankar (1995), Abhyankar et. al (1997) examine bid-ask spreads and volatility in the London Stock Exchange and McInish, Wood (1992) and Chan, et. al. (1995) study it for the NYSE and CBOE.

We use the basic Glosten-Milgron model to show that, even with asymmetric information, privatized Chinese Banks' share prices will converge towards liquidation value equilibrium as long as the net asset values are positive. The exact formulation of the model is drawn from Gourieroux and Jasiak (2002). Let the transactions be exogenous and evenly spaced in the model. Let the latent future value of the bank assets in question, called the fundamental value or the liquidation value, be denoted as price in the future, as (P^F_{t+1}).   Let there be a common knowledge pool of the balance sheets of the bank to all investors and the State at present (B_t). However, given the experience of other privatizations of state banks and the fundamental value outcomes, let the market investors be more informed than the market makers (or the State, or the Privatization office) and let them observe the additional fact that the state banks are being used to subsidize the state economic enterprises and employment.   Why do the investors have this additional information?   One reason is the past accumulated experience in the international community over other privatization processes, and the other is that investors are risk averse and have vested interest in finding the fundamental or liquidation value of investments to protect their returns on the portfolios. Let this extra information signal or asymmetry be (C_{t+1}). The investors will use this extra piece of information to adjust the liquidation value of the asset. By altering their buy or sell orders, they will reveal this information also to the market maker (or the State) which will then also update its beliefs about the value of the fundamentals of the firm. For the sake of simplicity, we will assume the risk-free interest rate, r, to be zero.

The asymmetry in this case will lead to divergent future valuations of the firm. Based on the common pool of information B, the valuation will be based on

the expected value of liquidation value conditional on the information pool of B, one set of price predictions will be

Prediction 1 $=$ $E [(P^F_{t+1}) / B_t]$ [1]

Investors with the extra information advantage on NPLs and future financial repression will base their valuation on the expected value of liquidation value, conditional on the information pool of B and the extra future information C,

Prediction 2 $=$ $E [(P^F_{t+1}) / (B_t, C_{t+1}]$ [2]

Given the asymmetry and (the size of the asymmetry which will be discussed later) equilibrium for bid and ask prices will then depend on how the investors and State behave and on the type of joint conditional distribution of valuations and asymmetric information . Let us assume the following:

A. 1: Assume the conditional joint distribution of $(P^F_{t+1} , C_{t+1}) / B_t$ is Gaussian ,
with mean $(x_{1,t} , x_{2,t})'$ and variance-covariance matrix of

$$\Sigma = \begin{bmatrix} \sigma_{11,t} & \sigma_{12,t} \\ \sigma_{21,t} & \sigma_{22,t} \end{bmatrix}$$

A. 2: Assume the average investor uses the liquidation value of investments and has an exponential utility function with absolute risk aversion by a factor of (A).
Investor has resources/wealth of (w) at the beginning of the period and can buy or sell the shares of the privatized firms or can stay out the market. The investor will buy if the expected liquidation value is high, sell if it is low. Otherwise, investor stays out of the market.   The final decision will rest on the comparison of expected utilities of buying versus selling. If the expected utility of buying is greater than the expected utility of selling, then the investor is a buyer, otherwise a seller. If the two expected utilities are equal, then the investor stays out of the market. Let Price (ask) and Price(bid) be the ask and the bid prices at the beginning of the privatization market game.
Assuming an exponential utility function, then the expected utility of buying shares for the (ith) investor is

$E [- e^{-[A(w_i - Price^{Ask} + P^F_{t+1}) / (B_t, C_{t+1})]}]$ [3]

which equals to
$-e^{-[A(w_i - Price^{Ask})} e^{-[A(E(P^F_{t+1} / B_t, C_{t+1}] + (A^2 / 2)(Var(P^F_{t+1} / B_t, C_{t+1})}$

The expected utility of selling shares is

$$E\left[\,-\,e^{\,-\,[\,A\,(w_i\,+\,Price^{bid}\,-\,P^F_{t+1}\,)\,/\,(B_t,C_{t+1})\,]}\,\right] \qquad\qquad [4]$$

which is

$$-\,e^{\,-\,[\,A\,(w_i\,+\,Price^{bid})}\,e^{\,-\,[\,A\,(E(P^F_{t+1}/\,B_t,C_{t+1}]\,+\,(a^2\,/\,2\,)(\,Var\,(P^F_{t+1})\,/\,(B_t,C_{t+1})\,]}\,)$$

Substituting the conditional moments of the Gaussian distribution, where the expected value of the future liquidation value, given common information and asymmetric information (i.e., $(E(P^F_{t+1}/\,B_t,C_{t+1})$), is

$$E\,(P^F_{t+1}/\,B_t,\,C_{t+1})\,=\,(m_{1t}\,-\,(\sigma_{12}/\,\sigma_{22}\,)\,m_{2t}\,)\,+\,(\sigma_{12}/\,\sigma_{22}\,)\,C_{t+1} \qquad [5]$$

Let

$$K(1)=\,(m_{1t}\,-\,(\sigma_{12}/\,\sigma_{22}\,)\,m_{2t}\,)$$

And

$$K(2)=\,(\sigma_{12}/\,\sigma_{22}\,)$$

Then the mean can be expressed as

$$K(1)+K(2)\,C_{t+1}$$

And the variance is

$$Var\,(P^F_{t+1}/\,B_t,\,C_{t+1})\,=\,\sigma_{11,\,t}\,-\,(\sigma^2_{12,\,t}/\,\sigma_{22,\,t}\,)=K(3); \qquad [6]$$

We substitute the moments of the distribution (equations 5 and 6) into 3 and 4 and take the expected value of the resulting equation. If we denote the investment wealth of the investor as 1 (and uniform across all investors) for simplicity and then take the derivative of the equation with respect to the risk aversion factor A and set it equal to zero, we get the following decision making rules for the investor:

When
$$K(1)+K(2)\,C_{t+1}>Price^{Ask}\,+\,(A^2\,/\,2\,)\,(K(3)),$$

the investor will still buy the shares. If the future expected value of the investment is high enough, then the order will be placed. If it is low, the shares will be sold, i.e.,

$$K(1)+K(2)\,C_{t+1}<Price^{Bid}\,-\,(A^2\,/\,2\,)\,(K(3)).$$

For the decision process then,
Price^{Ask} + $(A^2 / 2)(K(3))$ > Price^{Bid} - $(A^2 / 2)(K(3))$,

Or
Price^{Ask} $\geq$ Price^{Bid} .

Since this will always hold at the initial price offerings of the privatization process, asymmetric information on the side of the investors with respect to the State will still result in a robust market for privatized shares. Note that if in the initial privatization, IPO is priced 'too low' (as was the case in the dot.com shares during the speculative stock market period in 1999), the market forces will still have a bidding process, where equilibrium is restored, as long as the fundamental value of the firm is greater than zero. In the case of the Chinese Big Four banks, we know the asset values are large (see Table 7). The question is the estimate of the size of the financial asymmetry, C_{t+1} (i.e., future stream of liabilities stemming from financial repression). Then the discounted value of net assets versus the discounted potential future growth have to be compared. The size of the adjustment due to asymmetric information will be very important in the discovery of the liquidation value of the underlying bank.

5. Conclusions

In the privatization of state assets, asymmetries in information due to future liabilities create problems if the future liabilities reduce the net asset value to zero or negative values. Asymmetric information and adverse selection due to quality uncertainty have been well discussed in the literature since Akerlof (1970). We examined the conditions under which the market (buyers and sellers) disappears under adverse information costs. The model here had the investors with the informational advantage. Yet the model can also be restructured where the seller (state) has the information advantages. In the case of China, adverse information could be on the side of the buyers and the state may have the informational advantage. This paper only examined a single source of asymmetry, but in reality, there are many asymmetric information shocks to any market system over time.

The cause of the asymmetries in the Chinese banking system are due to opaqueness and NPLs of state banks. The reduction of NPLs depends chiefly on the reform of the state owned enterprises and the banks themselves, so as to prohibit the creation of new NPLs. To solve the NPL problem, China must first stop creating new non-performing loans through implementing the relevant legal framework and its enforcement, as well as reforming the banks and the SOEs. Second, it has to resolve the old NPLs through debt-equity swaps, selling them at a discount, and the AMCs. With respect to controlling NPLs, powers of the banking system in China were limited since the commercial legal structure was not developed and bankruptcies and foreclosures still work against the creditors. There have been serious efforts to

increase the powers and initiatives of the banks to control the NPLs in the recent years. The negative cash flow of SOEs was the result of state's transfer payments and have income redistributional effects. In the past, SOEs had   many social responsibilities which should been directly done by the government. Losses at that time were mainly because of the government's shifting of its responsibilities. But during the past three or four years, we saw a remarkable increase in Chinese SOEs' profits. Though the government sees this change as a result of its effort of the SOE reform, some economists believe the change is mainly a result of transfer payments (such as interest subsidy, debt-equity programs, etc.) The bloated asset structure and the NPLs of the Big Four are of immediate concerns to the Chinese state. The system needs an institutional infrastructure on credit collection, on bankruptcy laws as well as a consensus on maintenance of hard budget constraints. In this century, not-for-profit organizations no longer stand for 'for-loss' institutions. There are other macro policies that provide macroeconomic and price stability. The Big Four banks need not be used as financial repression instruments.

Notes
1. We would like to acknowledge the help of Kotsil Pak for her help in research and we would also like to thank Rebecca Sedam of Loyola University Chicago Libraries for her meticulous search for Chinese and English references for this work. All errors remain ours.
2. As of June 2002, foreign-funded financial institutions that have gained approval to conduct foreign-currency business with domestic clients in China are as follows: domestic-Xiamen International Bank (joint venture, 75% owned by mainly Fujian government firms), foreign- the Asian Development Bank (10%), Japan's Shinsei Bank (10%), and US-backed Sino Finance Group (5%) (Sito, 2002).

References
Abhyankar, A. (1995), "Return and Volatility Dynamics in the FTSE 100 Stock Index and Stock Index Futures Markets" , Journal of Futures Markets, V. 15, pp. 457-488.
Abhyankar, A., D. Ghosh, E. Levin, and R. Limmack (1997),"Bid-Ask Spreads, Trading Volume and Volatility: Intra-Day Evidence From the London Stock Exchange", Journal of Business, Finance and Accounting, V. 24, pp, 344-362.
Akerlof, G. A. (1970), "The Market for "Lemons": Quality Uncertainty and the Market Mechanism", The Quarterly Journal of Economics, V. 84, pp. 488-500.
 "Bank of China listing gets green light", CNN.com, June 21, 2002.
 "Banks Face Transition after WTO", China Daily, May 8, 2002.
www.china.org.cn/english/investment/32171.htm
Beckerling, L., C. Chu and T. Chang (2002). "Bank of China to Seek July Listing Approval", South China Morning Post, June 18, 2002.

"Beijing Punishes 1,240 bankers – Targets on Bad-loan Cut Missed", Reuters, September 18, 2001.

Chan, K., Y. Chung and H. Johnson (1995), "The Intraday behavior of Bid-Ask Spreads for the NYSE Stocks and CBOE Options", Journal of Financial and Quantitative Analysis, V. 30, pp. 329-346.

Chung, O. (2002), "Banks under Orders to Scrap Bad Debts", HKiMail, June 14, 2002.

http://www.hk-imail.com/inews/public/article_v.cfm?articleid=32411&intcatid=2

Copeland, T. and D. Galai (1983), "Information Effects and the Bid-Ask Spread", Journal of Finance, V. 38, pp. 1457-1469.

Dai, Chairman of People' Bank of China, press interview, March, 2001.

"Dai: China banks' NPLs higher than official estimates", Business Times Online Edition, March 28, 2002.
        http://www2.fba.nus.edu.sg/chinaupdates/Research%20&%20commentary/Industry/Dai%20China%20banks'%20NPLs%20higher%20than%20official%20estimates%20-%20March%2028,%202002.htm

Easley, D. and M. O'Hara (1987), "Price, Trade Size and Information in Securities Markets", Journal of Financial Economics, V. 19, pp. 69-91.

Fry, M. J. (1982), "Models of Financially Repressed Developing Economies", World Development, V. 10, 9, pp. 731-750.

George, T., G. Kaul and M. Nilamendran (1991), "Estimation of Bid-Ask Spreads and Its Components", Review of Financial Studies, V. 4, pp. 623-656.

Glosten, L. (1987),   "Components of the Bid-Ask Spread and the Statistical properties of Transaction Prices", Journal of Finance, V. 42, pp. 1293-1308.

Glosten, L.   and P. Milgrom (1985), "Bid-Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders",   Journal of Financial Economics, V. 14, pp. 71-100.

Gourieroux, C. and J. Jasiak, (2001), Financial Econometrics, Princeton University Press, Princeton, New Jersey.

Green, S. (2002), "China: The Coming Market in Financial Services", Sitrends.org, May 2, 2002.
        http://www.sitrends.org/reports/statistic.asp?REPORT_ID=40&PAGE

Harding, J. (2000) , "A Clean-up Operation with Chinese Characteristics", Financial Times Survey, FT.com.,
        http://specials.ft.com/ln/ftsurveys/country/sc79ca.htm

"Huarong   Asset   Management   Corporation – SPI",   International   Finance Corporation, SPI disclosed: September 17, 2001.
        http://wbln0018.worldbank.org/IFCExt/spiwebsite1.nsf/f451ebbe34a9a8ca85256a550073ff10/d252a22d9c4a986785256aca006fc899?OpenDocument

Ikeya, M. (1999), "Chinese Banking System – Impact of Asset Management Companies", R&I Asian Focus, October 20, 1999,
        http://www.r-i.co.jp/eng/release/nr_asia/asia991020.pdf

Ikeya, M. (2001), "Chinese NPLs – A Struggle Against Chaos", R&I Asian Focus,

October 24, 2001 http://www.r-i.co.jp/eng/release/nr_asia/asia011024.pdf

Kynge, J. (2001), "Against All Odds: China may Struggle to Sell Distressed Assets", Financial Times, May 24, 2001.

Kynge, J. (2003), "Citibank Wins Go-ahead for China Deal", Financial Times, January 2, 2003.

Li, D. D., (2001), "Beating the Trap of Financial Repression in China", Cato Journal, V. 21, 1, pp. 77-90.

Luo, J. (2002), "China Construction, Agricultural Bank Form Broad Alliance", Bloomberg.com/asia, June 13, 2002.
http://quote.bloomberg.com/fgcgi.cgi?mnu=news&ptitle=North%20Asia%20News&tp=topfinancial&T=as_storypage99.ht&s=APQf6SBTaQ2hpbmEg

McInish, T. and R. Wood, (1992), "An Analysis of Intra-Day Patterns in Bid/Ask Spread for NYSE Stocks", Journal of Finance, V. 47, pp. 753-764.

O'Neill, M. "Beijing Shut 60 Guangdong Lenders as Crackdown Widens", 2/28/2002, South China Morning Post.

Petersen, M. and D. Fralkowski (1994), "Posted Versus Effective Spreads", Journal of Financial Economics, V. 35, pp. 269-292.

"Private Companies Drive up Employment", ChinaBiz, June 12, 2002.

Sito, P. (2002), "Bank Claims Forex First in Mainland", South China Morning Post, March 9, 2002.

Slater, D. (2001), "Morgan Stanley in Biggest yet International NPL Deal with China Huarong", FinanceAsia.com, December 6, 2001.
http://www.omm.com/webdata/content/newsevents/npl_deal.pdf

"Solve NPL-problem with big bang – academics", ChinaBiz, May 9, 2002.

Tang, T. (2002), "China sells off bad loans on road to reform", World Business, f2 network, January 15, 2002.
http://www.theage.com.au/business/2002/01/15/FFXG3015FWC.html

Tong, D., 1999, The Heart of the Economic Reform: China's Banking Reform and State Enterprise Restructuring, Dissertation, RAND Graduate School.

Wong, Y. C. R. and M. L. S. Wong (2001), "Competition in China's Domestic Banking Industry", Cato Journal, V. 21, 1, pp. 19-41.

Xinhua Economic News , "Basic Pattern of Commercial Banking in China Unlikely to Change", , June 12, 2002. Document ID FG20020612880000047.
http://library.northernlight.com/FG20020612880000047.html?cb=0&dx=1006&sc=0#doc

Forecasting Daily Market Direction: A Data Mining Case Using the Nasdaq

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Abstract. This study looks for evidence that the US market is influenced by other international markets in an amount significant enough to give us daily clues about the direction the market will move. The target US market chosen was the Nasdaq. The international markets selected for inputs into the model include Australia, Japan, and Hong Kong. This study uses one of the most popular data mining techniques, the decision tree. The decision tree forecasts work significantly better on days when the Nasdaq was Up than it did on Down days. The directional forecasts on Up days are correct about two-thirds of the time.

1. Introduction

Studies on international market co-movement have shown differing results over the years. Hilliard (1979) studied ten world exchanges, including Tokyo, Sydney, and New York, and concluded that inter-continental prices did not seem to be closely related. Darbar and Deb (1994) studied four markets, Canada, Japan, UK, and US, for 1989 through 1992. Their conclusion was that prices are not cointegrated. Specifically, they state that "the Japanese and U.S.A. stock markets have episodes of significant correlation, but have zero permanent correlation." Dwyer (1998) looked at monthly data for 31 years from stock indices for the US, UK, Japan and Germany and concluded that there was no evidence that the levels of the indices are related.

In contrast, Fischer and Palasvirta (1990) studied twenty-three market indices from around the world and discovered a statistically significant level of interdependence, with the US index prices leading other countries. Ribeiro and Veronesi (2002) found that correlations of international market returns increase during bad times. Brooks, Forbes, and Mody (2003) found that "financial comovement has increased in the 1990s", though "real comovements are neither especially strong nor on an obviously upward trend". For an general list of studies on international linkages over the last twenty years, including lead-lag relationships, see Capelle and Raymond (2002).

Over time, however, many studies are finding two results. The first is that correlations between international markets fluctuate significantly over the years, and the second is that the US indices lead other markets.

This study uses data mining to look for evidence that the US market is influenced by other international markets in an amount significant enough to give us daily clues about the direction the market will move. In other words, we look for evidence that the US market is led by other markets to some degree. Thus the target market for forecasting in this study is a US market. The target US market chosen was the Nasdaq. The international markets selected for inputs into the model include the markets of Australia, Japan, and Hong Kong. Each of these markets has opened and closed on a given day before the Nasdaq has opened, and the Nasdaq is closed before any of these markets open for the next day, thus restricting the analysis to net change in price and eliminating possible extraneous predictive effects that could be caused by comovement amongst simultaneously open markets. This approach also allows a directional forecast to be made before the Nasdaq has begun trading on a given day, eliminating effects of news happening while this market is open. This study also limits the scope to a daily effect from these three Eastern markets. No lags of information are included. The focus is restricted simply to daily information from three markets that have opened and closed for the day while the Nasdaq was closed for the night.

2. Data

Daily closing price data was collected from Yahoo!Finance for each of four markets: Nasdaq Composite (IXIC), Australia All Ordinaries (AORD), Hong Kong Hang Seng (HSI), and Japan Nikkei 225 (N225). The data downloaded began in January, 1998 and continued through December, 2002. Daily data from Australia, Japan, and Hong Kong was used as inputs to forecast the Nasdaq direction on the same day.

This daily closing price data was used to form calculated fields for each market consisting of percent change in closing price (market close today minus market close yesterday divided by market close yesterday), direction of market change (Down if today minus yesterday was less than zero, Up otherwise), and the number of nights a market was closed locally (today's date minus date market was last open). These fields were labeled as chgC, Dir, and Days, respectively. These three fields were calculated for each of the input markets and were labeled for Australia, Japan and Hong Kong, respectively, as AchgC, ADir, ADays, JchgC, JDir, JDays, HKchgC, HKDir, and HKDays. Days and Dir were also calculated for the Nasdaq and labeled as NDays, and NDir.

The inclusion of a variable tracking the number of days (ADays, JDays, HKDays, and NDays) since the particular market was last open is based on the findings of Malliaris and Salchenberger (2002). Any artificial intelligence system must have enough information to be able to mimic the decisions that might be made by an actual human in the same situation. The amount of time elapsed since the last trading day is a strong psychological influence, since the passage of time permits information to settle into one's consciousness, while simultaneously raising anxiety about trading opportunities that cannot be implemented while the market remains closed—effects which are not otherwise discernable from price movements.

The variables Dir and ChgC both track market movement, but in different ways. ChgC records the exact percentage of market change and is a real number. Dir is a symbolic field that indicates only gross movement, that is, was the market Up or Down. By including both of these measurements on each market, we can isolate the affects of both simple direction and magnitude.

After each calculated field was computed in Microsoft Excel, the data from each individual market was exported to Microsoft Access as a table. One table was constructed for each market. Date was used as the key in each table. A query was then run using all data from each table. This query then selected only those rows from each table for which a corresponding date existed in each table. Thus, if any one of the four markets was closed on a given day, that day did not come up in the query.

The query results were then exported to Excel where it was divided up into year-long segments, 1998 through 2002.   Each individual year was saved as a text file for importing into SPSS.

In addition to the variables from Australia, Japan and Hong Kong already mentioned as inputs, NDays was also used as an input, and NDir was the target or forecasted variable. A sample row of values for one day is shown in Table 1.

Table 1. *Variable Values In One Example Row Of Data.*

Not Used	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Output
Date	ADir	AchgC	ADays	JDir	JchgC	JDays	HKDir	HKchgC	HKDays	NDays	NDir
4/7/1998	Down	-.029	1	Up	1.738	1	Down	-0.03	4	1	Down

Since prior studies have found that the correlations between market changes are not significant, prior to construction of the decision trees, correlation coefficients were calculated on the change in closing price for all markets for each year. If the coefficients are high, we could expect the decision tree to gain a lot of insights from the data. These coefficients are shown in Table 2. As can be seen, the correlations between the Nasdaq and the selected Eastern markets are neither high nor stable. They would appear to indicate that not much information can be gained from the closing prices of these markets concerning the direction the Nasdaq moved that day. They show variation over years within each of the markets and variation from year to year. The market most highly correlated in one year may be the lowest in the following year. For example, in 1998 HSI had the highest correlation with the Nasdaq, while in 1999, it had the lowest.

Table 2. *Correlations Between Nasdaq And Other Market Daily Closing Prices Changes.*

Year	AORD	J225	HSI
1998	.14	.16	.25
1999	.13	.05	.01
2000	.08	.03	.14
2001	.19	.18	.21
2002	.06	.13	.09

These numbers support the findings mentioned in the Introduction that correlations vary widely over the years and are not stable within markets.

Following the creation of the yearly data sets, each set was read into the SPSS data mining package Clementine and attached to a type node to specify the level of data for each field. All Dir fields were symbolic, all ChgC fields were real, and all Days fields were integer. The data was now ready to be analyzed.

3. Methodology

This study uses one of the most popular data mining techniques, the decision tree. Rather than specifying the variables to be used before running a decision tree algorithm, this data mining techniques derives the tree from the data it analyzes (Hand, 2001). It uses only the variables that influence the path development. A decision tree is driven by one category-type output variable. Before the tree begins, all rows of data are in one group. When the tree algorithm ends, each final group will have rows containing only one value of the output variable. At each step of the tree development, all unused input variables are checked by the algorithm and the one selected is that whose values can be used to divide the data into groups with minimal variation on the output variable within groups and maximum variation between groups (Groth, 1998). Thus, the tree is built from the root to the end nodes by recursively splitting the rows at a node into two or more parts, each leading to another node (Berry and Linoff, 2000). Each node is more similar in values of the output variable than the previous node.

Each group becomes a new node in the tree. The process repeats, with a new variable picked at each node until either all variables have been used in the path, or no variable remaining contributes to the reduction of variation within the group. A rule is generated for each path from the root of the tree to each end node. These rules give insight into the thinking followed by a trader since they specify the order in which a decision is made and the variables that contribute to that decision.

The package used in this study was Clementine by SPSS. Clementine uses a decision tree algorithm known as C5.0. The C5.0 algorithm only includes variables in each path that impact the decision. It also generates a rule for each path that explicitly displays the reasoning used for the splits in the path. For details of the process, see the Clementine User Guide (1998).

When the Clementine training of the tree is completed, Clementine

generates a trained model. This model contains all the final rules that were uncovered during the construction of the tree. New data not used for training can then be run through the trained model to generate a forecasted value for the output variable. These values can then be compared to the actual value that occurred on that day to see how well the model holds up on new data.

The output variable in this study was NDir, the direction of the Nasdaq on a single day. It was category-type data with two possible values, Up or Down. The input variables included direction, change in closing, and number of nights the market was closed for each of the three Eastern markets, Australia, Japan, and Hong Kong. Also used as an input was the number of nights the Nasdaq was closed. The decision tree can therefore be said to approximate the initial assumptions of a day-trader, in effect considering only that information which would have become available overnight and using it to make an overall prediction of the day's movement.

One decision tree was developed for each year of input data, that is, years 1998 through 2001, for a total of four trees. Each row of input data over all years contained only information from one day. Each of the four trained decision tree models generated a set of rules. Data from the year immediately following was run through the appropriate trained model to generate a set of daily direction forecasts for the Nasdaq. That is, the model trained on 1998 data was used to generate the forecasts for all days in 1999, the model trained on 1999 data was used to forecast all days in 2000, and so on. The output for each year was divided into days where the Nasdaq had actually been Up and those days where the actual Nasdaq movement was Down.

Figure 1 contains a screen print of one of the Clementine models. Two data nodes are shown. The upper data node is used to read in the training set, the lower data node reads in the validation set (ie, the following year). Each data node is connected to a type node where the kind of data and the inputs and output are specified. For training, the type node then connected to a C5.0 decision tree node. After training, a generated model node was created. For validation, the generated model node was connected to the validation set type node. This was then attached to a table where the results of the forecasts could be displayed. This process was carried out for each year of input data.

The forecasts were then compared to the actual directions that had occurred. Because market relationships change over time, a row of data from the validation set may satisfy each condition in the trained rule-set but may have a different value for NDir than the one the rule would predict. The number of times each forecast of direction agreed and disagreed with the directions that the Nasdaq had moved were tallied. Generated rule sets were inspected.

Figure 1. *Clementine Screen Print Of The C5.0 Modeling Process.*
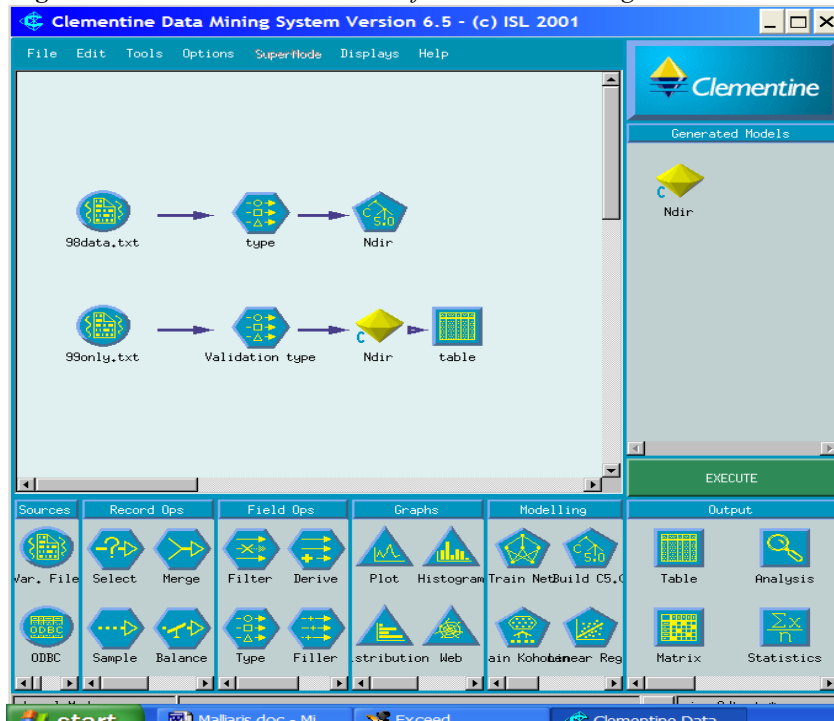
4. Results

Rules sets were generated as an output for each of the four trained models. These rule sets break the entire set of data rows into groups based on the input variable values. Each group of rows represents one branch in the decision tree and all rows in that branch have the same final value on the forecasted variable, NDir, in the training set. The rules are easily interpretable. An average of twenty rules were generated for each year. Examples of one Up and one Down rule for each year are shown below in Table 3.

Looking, for example, at the Up rule for 1998, we see that three variables were used in constructing this branch of the decision tree. At the first split, a group was formed whose values on the percent change in closing price for the market in Japan was between -1.678 and -0.963. This group was then split on the number of nights the Australian market had been closed. The only rows included were ones where the Australian market had been closed only overnight, that is, number of nights closed equaled one. The final split was based on the direction the Australian market had moved. Only rows were included where the Australian market movement that day had been Up. The statement of the rule is then followed by two numbers. The first gives the number of times the "If" conditions were found in the

training set. In other words, it tells us how many rows from the training set were used to generate each branch of the decision tree. The second number gives the probability or confidence that the direction will be the specified one given that the "If" conditions are met. In this rule, the conditions appeared eight times. There is a confidence of 0.9 that the direction will be Up when these conditions occur.

Table 3. *Trained Model Rule Examples, 1 Per Year for Up and Down*

Training Year	Rule for Down	Rule for Up
1998	If JchgC <= -1.678 And HKDir = Up Then NDir = Down (6, 0.88)	If JchgC > -1.678 And JchgC <= -0.963 And Adays <= 1 And ADir = Up Then NDir = Up (8, 0.9)
1999	If JchgC <=-.0935 And HKDir = Up And AchgC <= 1.272 And Adays <=2 And ADir = Up Then NDir = Down (4, 0.83)	If AchgC > 1.272 Then NDir = Up (11, 0.923)
2000	If HKDir = Down And NDays <= 2 And AchgC > -0.108 And Adir = Down Then NDir = Down (7, 0.89)	If JchgC > -1.013 And Jchg C <= -0.605 And HKDir = Up And NDays <=2 Then NDir = Up (6, 0.88)
2001	If HKchgC > -1.284 And JchgC <= -0.438 And HKDir = Down And NDays <= 1 And Adir = Up Then NDir = Down (8, 0.90)	If JchgC > -0.864 And NDays <= 1 And AchgC <= -0.795 Then NDir = Up (5, 0.857)

Some rules are more complex and some are simple. Because a decision tree is built on data patterns which have occurred in the training set, we can use them to gain insight into trading actions. The rules put words to complicated responses from traders who often are unable to explain the complex reasoning behind their positions.

The percentage of correct daily direction forecasts of the Nasdaq for each of the yearly models is shown in Table 4. This data displays the percentage correct of each year in the corresponding validation set. As can be seen from Table 4, the decision tree forecasts work significantly better on days when the Nasdaq was Up

Table 4. *Percent of Correct Direction Forecasts*

Training Year	Forecasting Year	Correct Down	Correct Up
1998	1999	37.93	75.20
1999	2000	46.15	68.57
2000	2001	43.81	69.52
2001	2002	42.74	66.34

than on Down days. Other than the training year 1998, the percent of correct Down day forecasts was in the forty percent range. The Up day forecasts ranged from 66 to 75 percent correct.

Witnessing such results, especially in the context of previous studies on the topic of market interrelationships, naturally raises the question: is the observed leading effect a pure one, or are we in fact seeing the effect of Nasdaq leading both these Pacific Rim markets and itself—a situation which would lead to a correlation between markets that have no causal impact in the direction under consideration. In order to better understand this dynamic, decision trees were built to forecast movement of each of our leading markets based on the movement seen in the Nasdaq. That is, inputs of NchgC, NDays, and NDir on day t were used to forecast market direction in the Pacific Rim on day t+1. The results are below in Table 5.

Table 5. *Using Nasdaq to Forecast Australia, Japan, and Hong Kong.*

Training Year	Forecasting Year	Japan Down	Japan Up	Aust. Down	Aust. Up	HK Down	HK Up
1998	1999	46.94	64.91	54.46	72.07	68.42	56.41
1999	2000	87.40	37.89	80.77	45.76	78.95	43.52
2000	2001	57.89	60.42	40.00	83.48	62.28	65.63
2001	2002	94.02	29.70	72.58	69.15	64.80	59.14

Important to notice is the lack of consistency in the results shown in this table.   While some years and markets provide uniformly better than random forecasting independent of direction (for example, HK in 1998/99, 2000/01 and 2001/02), other years and markets (especially Japan) give unreliable results from the standpoint of consistency, even as they predict some particular aspect of market performance extraordinarily well.

5. Conclusions

The above results imply a generally positive outlook. Where previous experiments have found little correlation between the movements of Pacific Rim markets and the subsequent changes in American markets, the use of data mining techniques has shown that in some cases, even very crude information can be used to make reasonable predictions about future performance.   Not only is this information available, but the rules constraining its application are reasonably consistent over time: after training, the model performed reasonably and at a sustained level over a

full year's period.

Performance was especially good on days when the Nasdaq was up, with the decision tree making a correct forecast of direction on approximately seven out of ten days. On days in which the Nasdaq was down, however, performance was worse than chance, giving a correct forecast on only about four of ten days. The very encouraging results found on Up days imply that the information needed to make a reasonable prediction is present; perhaps with a more comprehensive set of data, additional rules to tighten the forecasting of Down days can be developed.

Also interesting is the complexity of the rules. As might be expected from the low correlations between market movements, we often find that an Down forecast for the Nasdaq is predicted when input markets are up by certain amounts, rather than the intuitive opposite. In addition, some rules incorporate constraints on multiple markets, or multiple constraints on the same market. In other words, predictive ability is sometimes realized when forecasts are based on the movements of multiple leading markets, or on multiple aspects of the same market, rather than on a single input.

Separating market movement into direction and change, rather than considering only the single numerical value representing said market movement, simulates the separation of this knowledge into two pieces of information: one, whether the market was up or down; and two, how much the market moved. This produces more favorable results, and very many of the decision rules refer explicitly to the direction of some market's movement, ignoring the magnitude of the change. Many rules also refer to the number of days since the market was last open, confirming the hypothesis that this is a worthwhile piece of information when formulating trading strategies.

At present, this model is not meant to be used as a predictive tool for playing the market successfully. Most strongly, it is a signal that there is ample information to be found where none has been located before, in the movements of markets that were once seen as purely lagging their counterpart American markets. Results are not enough to conclude a causal effect between the movements of the chosen Pacific Rim markets and the Nasdaq, but at the very least, with predictions correct at twenty percentage points above chance on Up days, there exists an undeniable relationship—though quite possibly, only that of a common source driving movements of all of the above markets. The argument that this common source is the Nasdaq itself—an argument which would imply that there are in fact no true leading effects shown in this paper—is made less plausible by the results in Table 5; significantly more reliable predictive ability in the inverse direction is not shown. Nonetheless, there is a good deal that remains to be done. Results, while significantly above chance in some cases, might stand to benefit from further study. Some suggestions for direction of future study in this area are addressed next.

6. Future Research Directions

This was a very limited study. Only three Pacific Rim markets were considered.

Even if we wish to restrict ourselves to markets which have opened and closed during the time a given target market is closed, there are many markets, both developed and emerging, that could be used as inputs into the decision tree. In addition, lags could be incorporated, as well as volatilities of the markets and other related variables. Thus, to summarize, additional information could be derived from other markets, from other days within the same markets, or from more specific information about the particular movements within a day; analysis of the information could be refined by application of a variety of data mining methods, especially cluster analysis. Cluster analysis is a preprocessing technique applied prior to using a decision tree. Its purpose is to extract groups of days with similar behavior. Use of cluster analysis can subdivide the data set into more uniform segments, so that particular decision rules can be tailored to more accurately predict the interrelationships within a given subset.

References

Berry, Michael, and Gordon Linoff, 2000, "Mastering Data Mining", Wiley.

Brooks, Robin, Kristin Forbes, and Ashoka Mody, 2003, "How Strong are Global Linkages?", www.imf.org/external/np/res/seminars/ 2003/global/pdf/over.pdf www.imf.org/external/np/res/seminars/ 2003/global/pdf/brook.pdf

Capelle-Blancard, B. and Helene Raymond, 2002, "Do International Stock Markets Linkages Change Across Bulls and Bears?",   http://www.crereg.univ-rennes1.fr/seminaire-pages%20interieures/documents%20presentes %20en%20seminaires/CapelleRaymond1.pdf

"Clementine User Guide, Version 5", 1998, Integral Solutions Limited.

Darbar, S. and P. Deb, 1994, "Co-movements in International Equity Markets", Working Paper, Indiana University-Purdue University, Indianapolis.

Dwyer, G. and R. Hafer, 1988, "Are National Stock Markets Linked?", Federal Reserve Bank of St. Louis Report, November/December.

Fischer, K. and A. Palasvirta, 1990, "High Road to a Global Marketplace: The International Transmission of Stock Market Fluctuations", *The Financial Review*, Vol. 25, No. 3, August.

Groth, R., 1998, *Data Mining,* Prentice Hall.

Hand, David, Heikki Mannila, and Padhraic Smyth, , 2001, *Principles of Data Mining*, MIT Press.

Hilliard, J. 1979, "The Relationship Between Equity Indices on World Exchanges", *The Journal of Finance",* Vol XXXIV, No. 1, March.

Malliaris, M. and L. Salchenberger, 2002, "Using Neural Networks to Discover Patterns in International Equity Markets: A Case Study" in *Neural Networks in Business: Techniques and Applications*, Smith and Gupta, eds., Idea Group Publishing.

Ribeiro, Ruy and Pietro Veronest, 2002, "The Excess Comovement of International Stock Markets in Bad Times", November, home.uchicago.edu/~rmribeir/cross.pdf

MONETARY POLICIES
AND THEIR ASYMMETRIES

Money In An Electronic Money World

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Abstract. The notion of electronic money replacing physical cash for small-value payments and for international transactions via the Internet evokes considerable interest among economists and the general public alike. This paper assesses the potential implications of a widespread adoption of electronic money on money markets and monetary policy. It is argued that the emergence of electronic money is unlikely to destabilize money markets. However, by affecting the transmission channels of monetary policy, electronic money is bound to weaken the effectiveness of various monetary policy instruments.

1. Introduction

The recent development of electronic money schemes (e-money) in many countries around the world is viewed in some quarters as a genuine threat to the very existence of central bank money. Various studies on this subject arrive at starkly diverging conclusions as to the relevance of this threat, ranging from the benign view that e-money and modern payments technologies in general have little impact on currency usage [Freedman (2000), Goodhart (2000), Woodford (2000)] to the extreme scenario of the imminent disappearance of currency from circulation [Dowd (1998), Friedman (1999), King (1999)].

The purpose of this paper is to assess the possible implications of e-money for the stability of money markets and the conduct of monetary policy, with particular attention focused on the question of whether e-money in fact constitutes a threat to the existence of money as we know it. The plan of the paper is as follows: Section 2 defines the concept of electronic money and its potential to function as a generally accepted means of payment. Section 3 compares the state of regulation of e-money in an international context. As some countries allow for private non-bank emissions of e-money, a brief summary of the insights of the literature on free banking monetary regimes is provided in Section 4. These insights are then utilized in Sections 5 and 6 to come up with an assessment of the possible consequences of electronic money for the stability of money markets and monetary policy, respectively. The major results are summarized in a concluding section.

2. Definition And Manifestations Of Electronic Money

E-money can be defined as monetary value electronically stored on a technical device representing a claim against the issuer and not against the payer [Drehmann, Goodhart and Krueger (2002)]. A legal definition of electronic money is contained in Article 1 of the European Parliament and Council Directive 2000/46/EC, stating that "electronic money shall mean monetary value as represented by a claim on the

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issuer which is: (i) stored on an electronic device; (ii) issued on receipt of funds of an amount not less in value than the monetary value issued; (iii) accepted as means of payment by undertakings other than the issuer". The distinguishing feature of electronic money as opposed to other electronic access products for conventional payment services, such as credit cards or online banking, is that they do not necessarily involve a bank account. Moreover, and in contrast to single-purpose prepaid card schemes such as telephone cards, which are accepted as payment only by their issuers, e-money functions as a multi-purpose means of payment. Finally, unlike credit cards, e-money can provide anonymity to varying degrees, with full anonymity a distinct possibility in the face of the rapid advance of electronic cryptography [European Central Bank 2000)].

E-money comes in the form of card-based schemes or network-based schemes. Network-based schemes, often referred to as digital cash, require specialized software installed on a PC to store monetary value to be used for transactions via telecommunications networks such as the internet. These schemes therefore have the potential to substitute for the use of credit cards in such transactions. In the case of card-based e-money, sometimes also referred to as electronic purses, the prepaid value is usually stored on a smart card, a microprocessor chip embedded in a plastic card. Such electronic purses are designed to rival banknotes and coins by facilitating small-value face-to-face retail payments.

The emergence of e-money was made possible by simultaneous advances in cryptography and smart card technology [Boehle (2001)]. Smart cards were first used in the 1980s as prepaid cards for phone and transport services and subsequently developed into payment devices accepted by third parties. This process was pioneered by NTT in the late 1980s and the Danish Danmont in 1992 [Godschalk and Krueger (2000)]. Currently a huge number of competing electronic purse schemes coexist which are yet not mutually compatible. For example, the Belgian-Swiss Proton-concept, the German GeldKarte or Mondex currently all use different platforms.

Proton is a Belgian-Swiss concept based on a microprocessor card and is designed to substitute for cash for small-value transactions. It is a monocurrency system which can be loaded with a maximum monetary value of a few hundred euros. Its major use is for vending machines, car parks, ticket machines, payphones and public transport. To make a payment, money is transferred offline from the Proton card to the retailer's terminal or vending machine. The retailers can then transfer the money into their bank accounts. As of February 2001, a daily average of over 150,000 purchase transactions were made using Proton in Belgium, with an average amount of €3.74 [Bank for International Settlements (2001)]. In Switzerland, merchants pay 0.7% of the transferred amount plus a nominal fee of CHF 0.01-0.02 per transaction. The Proton technology is currently being adopted by other countries. This venture, termed Proton World, aims to establish a global standard and infrastructure for electronic purses.

The German GeldKarte is a prepaid rechargeable electronic purse, usable

for a variety of small-value payment operations. The card can be loaded from the cardholder's bank account by means of online authorization using a PIN or in exchange for cash. The GeldKarte is usually embedded in a regular bank customer card. Payment takes place offline without the use of a PIN, and the value received is transferred to a recording centre for settlement. The price for cards for consumers is approximately €5 p.a. with an unloading fee of 0.3% of turnover.

Mondex, controlled by MasterCard, is an open platform capable of simultaneously operating multiple applications. The system is similar in structure and organization to traditional cash systems. There is a single issuer called the „originator" who issues e-money to members who then conduct purchases with it. Purse-to-purse transactions without going through a clearing system are possible but subject to national operational rules. The card can be loaded through automated teller machines, over the phone or the internet.

Two projects have recently been launched to improve the interoperability of e-money systems within the euro area. These are PACE (Purse Application for Cross-border use in Euro) using miniCASH in Luxembourg, GeldKarte in Germany and Moneo in France, and Ducato covering schemes in Belgium, France, the Netherlands and Spain.

E-money cannot usually be used repeatedly but has to be forwarded to the issuer for redemption after a single use (*closed circulation*). However, depending on the evolution of its security features, reusable e-money (*open circulation*) may become more popular in future. With open circulation, e-money can be used much like banknotes and coins, which allow for a number of transactions to be carried out without the involvement of the issuer. Currently, purse-to-purse transferability of value without the involvement of the issuer is not available in most schemes with the notable exception of the Mondex system operational in France, Hong Kong and the United Kingdom.

Card-based e-money schemes have been introduced relatively successfully in a number of countries such as Austria, Belgium, Denmark, Finland, Germany, Hong Kong, Italy, the Netherlands, Portugal, Singapore, Spain, Sweden and Switzerland, and are currently piloted in several other countries, among them Australia, Canada, France, Japan, the United Kingdom and the United States. Most of these schemes are backed by a major credit card company such as Visa or MasterCard.

In comparison to card-based schemes, network-based schemes were so far not very successful. Systems like eCash in Austria, Finland, Germany and Switzerland, CyberCoin in Germany or BarclayCoin in Great Britain have all discontinued their operation due to a lack of demand. A few other systems are operational in countries such as Australia, Austria, Colombia, Italy, the United Kingdom and the United States.[1] Despite their poor performance in the past, network-based schemes should not be written off too early as new versions are becoming ever more simple to install and use. Today some schemes such as the British Magex and CopyLock can already be combined with e-banking and

copyright management functions, making them much more attractive to adopt than previous systems.

So far the volume of transactions in most of the existing e-money schemes remains small. The average value of transactions is substantially below $10 throughout all countries monitored by the BIS [Bank for International Settlements (2002), p.172]. Moreover, the relative importance of card-based e-money schemes as a percentage of the total volume of cashless transactions is below 1% for all countries monitored by the ECB, except for Belgium and Luxembourg, where the corresponding shares are 3.6% and 6.3%, respectively [European Central Bank (2002), p. 23].[2]

The negligible role that e-money currently plays as a transactions medium in most economies contrasts starkly with the considerable interest received from regulators, academics and the media alike [Drehmann, Goodhart and Krueger (2002)]. Much of the attention seems to derive from the fact that the usefulness of money as a medium of exchange is strongly influenced by the number of other people also accepting and using it. Such network effects and the general inertia with which new payment media are accepted are often viewed as being responsible for the slow start of e-money [Craig (1999), van Hove (1999)]. Once a critical mass is achieved, so the argument goes, these schemes may quickly become the preferred payment medium. Such a development may seem desirable as long as it constitutes an improvement in payment technology. However, some of the card-based schemes such as Mondex and many of the network-based schemes can be operated like individual cash systems without ever requiring a clearing process within the traditional banking system using central bank money. In these systems, the e-money in circulation can be used repeatedly for transactions by simply transferring the amounts from the debtor's e-money account to the creditor's e-money account stored on card-based microchips or on the hard discs of their PCs. In fact, the monetary value embedded in these schemes may not even be denominated in traditional currency units such as $, € or ¥, but could be expressed in some alternative, yet to be defined units. In such a scenario, central bank money could theoretically use its usefulness as a medium of exchange and be driven completely out of circulation. Of course, for such a scenario to emerge, a number of prerequisites would have to be met. For one, there has to be a critical mass of users willing to acquire a particular brand of e-money, and maybe more importantly, the issuer of this money has to also make a credible commitment not to unduly tax the holders of the money through overissue. These conditions are unlikely to be met by any of the existing e-money schemes. Nevertheless, some governments and central banks have reacted to the potential threat to the demand for central bank money by introducing regulation with respect to the operation of e-money schemes. The attention now turns to the extent of such regulation in various countries.

3. Regulation of Electronic Money Instruments

The emergence of e-money schemes raises the issue of legal regulation to protect

individual users as well as the payment system as a whole. Most central banks monitor e-money developments, and the central banks in Belgium, Finland, France, Lithuania, the Netherlands, Singapore, Spain, Sweden and Thailand have extended their oversight function to include e-money as well. In the European Union, the issuance of e-money is restricted to banks and a new class of credit institutions called electronic money institutions. The regulation is laid down in the European Parliament and Council Directives 2000/46/EC and 2000/28/EC on the taking up, pursuit and prudential supervision of the business of electronic money institutions and the taking up and pursuit of the business of credit institutions, respectively.[3] In other countries such as Mexico, Singapore and Taiwan, e-money can only be issued by banks, whereas in Canada, Malaysia and the U.S. there are no restrictions on the type of issuer [Bank for International Settlements (2001)]. However, there is currently no regulation anywhere in dealing with cross-border usage of electronic money [Deutsche Bundesbank (1999)].

If non-banks are allowed to issue fiduciary e-monies and these should happen to eventually catch on with the public, the resulting system would resemble the free banking monetary regimes that prevailed in a number of countries in the 18th and 19th centuries. The literature on these historical monetary regimes offers a number of useful insights into questions of the stability of the financial system which are convenient to use as points of reference in the subsequent discussion on the stability of the money supply and the effectiveness of monetary policy in a world dominated by electronic money. The next section briefly reviews that literature.

4. Free Banking Monetary Regimes
This school has a long tradition following the experience of the free banking eras in Scotland in the 18th and 19th centuries as well as in Canada and the United States in the 19th century. The roots of the free banking thought go back to Adam Smith [Checkland (1975)] and have been revived by Rockoff (1974), Rolnick and Weber (1983) and White (1984).

The free banking school assumes that banknotes and deposits issued by private banks are redeemable into a common base money which could be a precious metal or some kind of exogenous fiat money. Private issuers of money choose the units of their private monies at par with the base money. In the absence of minimum reserve requirements, money creation in a free banking world is restricted by the prudential reserve demand by each individual bank to meet redemption demands by customers as well as its potential interbank clearing obligations. As with a central bank in a system of fixed exchange rates, an overexpansion of the money supply is avoided by the obligation to redeem own currency into the base money. If any bank tried to individually expand its money supply over and above the level of demand for its own currency, the excess money supply would flow back to the issuing bank leading to a loss of base money reserves of this particular bank. If all banks tried to simultaneously increase their money supplies, the price level of the economy would adjust thus raising the level of nominal money demands. As a consequence, the

increased nominal redemption demands of the public limit the amount of money supplied by the banking system by requiring the latter to hold an ever higher amount of base money at the given par exchange rate [Selgin (1987)].

In a free banking system the supply of money always adjusts to meet the level of money demand. While this stabilizes the money market, the system lacks a mechanism to deal with a sudden loss of confidence in the banking system inducing large-scale redemption demands of bank money for base money. With fractional reserve holdings a run on the banking system may then threaten the entire payment system.[4] However, the historical experience with free banking systems does not point towards major problems with bank runs. In fact, many of these systems developed privately organized clearing houses that provided both supervision of member banks as well as a limited lender of last resort function.[5]

5. Electronic Money And Money Markets

Even if e-money becomes widely adopted as a means of payment, government-issued currency will most likely keep its role as a unit of account and probably also as a medium of exchange for the foreseeable future. As long as e-money is redeemable one-for-one into traditional currency, the former is comparable with checking accounts at banks or credit limits provided by credit card companies. Insofar as e-money is merely viewed as an alternative way of holding liquidity, the overall demand for money in the economy is thus unlikely to be much affected unless the velocity of circulation of e-money is substantially different from that of currency. A similar reasoning applies to the money supply and the money multiplier. As long as agents view e-money as just another manifestation of currency, no effect would result on the non-bank public's currency to deposit holdings. The reduction in reserves held by banks would roughly be matched by reserves then held by the issuers of e-monies. Overall, no dramatic effect on the overall money supply and the money multiplier would thus result from the introduction of e-money.

Overissue of any individual e-money is no more of a problem as overissue of demand deposits through banks using traditional money. The reason is that any attempt to overissue by individual suppliers of e-money is forestalled as any excess supply of these monies will quickly be returned to the issuers. Selgin (1988) provides evidence that even historical unregulated banking systems were characterized by short issue-redemption lags of a only a few days. This lag is likely to be even shorter for e-money schemes. Moreover, any concerted effort of overissue would be hampered by the increasing volume of redemption demands given an exogenous quantity of base money. Finally, the likelihood of financial crises can be reduced by a lender of last resort provision extended to privately issued e-monies. In an unregulated system with competing e-monies, central banks may be unwilling to provide these services. However, private clearinghouses could step in here [Gorton and Mullineaux (1987)]. In fact, private clearing mechanisms like the CHIPS[6] network and other privately maintained interbank netting systems are already used along with the systems provided by central banks [Friedman (1999)].

6. Monetary Policy Implications Of Electronic Money

In assessing the implications of e-money for the conduct of monetary policy, it is important to distinguish between the demand for money in general and the demand for central bank money in particular. It has been argued in the previous section that the demand for money in general, i.e. the demand for the sum of central bank money and e-money, is unlikely to be dramatically affected by the widespread adoption of e-monies as a means of payment.

The demand for central bank money arises from its roles as a medium of payment for private agents and as reserve medium by commercial banks for obligatory minimum reserve requirements or voluntary working balances for redemption and interbank settlements. In a realistic scenario, the advent of e-money may reduce and ultimately even eliminate the medium-of-payment function of money, but banks will still demand central bank money in the form of working balances, even where reserve requirements do not exist or are not binding.[7] Moreover, governments may continue to require taxes to be paid in the form of central bank money [Goodhart (1998)]. Given the size of the government role in modern economies, the latter may generate a substantial demand for government-issued money.[8] As all these elements of money demand are plausibly proportional to the money value of transactions in the economy, aggregate money demand is likely to continue to be a function of output even if it is no longer used as a transactions medium. However, with the tax-payment purpose of money demand replacing the transactions motive, demand for central bank money may be prone to increased seasonal volatility and may become less interest elastic. If e-monies become close substitutes for central bank money in agents' portfolios, the demand for government-issued currency may be further destabilized due to currency substitution within and across private portfolios. This may contribute to lowering the informational content of central bank money as an indicator of monetary policy [Krueger (1999)].

These destabilizing effects on the demand for central bank money may complicate the conduct of monetary policy, but will not render it inoperative. In practice, the operating targets of central banks are price variables in the form of short-term interest rates rather than the quantity of money as such. The destabilization of the demand for central bank money should then be without consequence for the effectiveness of monetary policy as long as the central bank continues to be able to influence a short-term interest rate [Woodford (2000)]. However, the more e-money replaces traditional money the lower will be the revenues accruing to national central banks through seigniorage. In the extreme this may threaten the economic independence of central banks from their governments [Groeneveld and Visser (1997)]. Even in a less extreme scenario, any major reduction in the demand for central bank money entails a shortening of the central bank balance sheet. This reduces the volume of potential refinancing operations with the central bank and impairs the leverage of the central bank to conduct open market operations and interventions in the foreign exchange markets. In addition to this

balance-sheet effect, the ability of central banks to influence the exchange rate will be further impeded as e-monies will increasingly take on an international character. The fact that e-money can be denominated in multiple currencies, domestic and foreign, may induce agents to hold a more diversified e-money portfolio possibly consisting of a number of the major world currencies.[9] Thus it may well happen that agents around the world will hold some of their currency in U.S.\$ to facilitate international transactions. The ease with which currency substitution in private portfolios will become possible in a world of e-monies will then impair the effectiveness of monetary policy, particularly with respect to sterilized foreign exchange market operations.

7. Conclusion

Whether or not e-money is bound to replace traditional notes and coins as the preferred medium of exchange is still rather speculative. The use of e-money is so far restricted to small-value payments and its overall quantitative importance is negligible in most countries. However, the potential of these media may easily be underestimated. I have argued that convertibility of e-monies into a government-issued base money and denomination of these monies in traditional currency units like \$, € or ¥ is a necessary condition to generate trust into and demand for these media. The money supply will not become unstable nor will money markets in general be destabilized if some safeguards are taken to prevent overissue of private e-monies. The continued existence of a government-controlled base money and the stipulation of par acceptance of private monies into this base money should be sufficient to prevent an unchecked expansion of the overall money supply. At the same time, the occurrence of financial crises due to a sudden loss of confidence in the solvency of individual issuing institutions and ultimately in the entire financial system cannot be ruled out. If e-money becomes widely adopted as a means of payment, some governmental control of issuing institutions seems indispensable to safeguard the financial system.

The impact of a widespread adoption of e-money on monetary policy are somewhat less sanguine. Not only may the demand for central bank money be destabilized, but a widespread adoption of e-money would also shorten the central bank balance sheet. As a consequence, the potential for refinancing and open market operations as well as the volume of potential foreign exchange market interventions are cut back, rendering these instruments of monetary policy less effective. While such a development will require central banks to rethink their monetary policy toolbox, a scenario like the one sketched here will certainly not materialize overnight, so that central banks around the world can adjust to the structural changes which may occur in the transition to an electronic money world.

Notes

1. A detailed account of the experience with various schemes in individual countries is contained in Bank for International Settlements (2001).

2. A major exception is Singapore where the share of card-based e-money exceeds 30% of the volume of all cashless transactions [Bank for International Settlements (2002), p. 181]. In Singapore, e-money is exclusively issued by the government, and the Board of Commissioners of Currency intends to make e-money legal tender by the year 2008 [Kok (2002)].

3. Directive 2000/46/EC defines electronic money institutions as "an undertaking or any other legal person" which "issues means of payment in the form of electronic money".

4. Such bank runs have been viewed by some authors as the inevitable consequence of an unregulated banking system requiring the existence of central banks as lenders of last resort [Bordo (1990)] or some kind of deposit insurance by the government [Diamond and Dybvig (1983)].

5. See e.g. the collection of articles in Dowd (1992).

6. Clearing House Interbank Payments System

7. Of course, central banks could also impose reserve requirements directly on e-monies or issue e-money themselves, either competitively or monopolistically [Freedman (2000)]. However, imposing such legal restrictions could reduce the incentives in the private sector to innovate e-money products [Bank for International Settlements (1996)]. The development of these products would then take place in nations with a lesser degree of regulation and the difficulty of controlling foreign digital money products could make these monies eventually emerge in the home country [Berentsen (1998)].

8. The grey and black markets also thrive on traditional money [Rogoff (1998)]. It is hard to imagine that e-money would take over this function unless it becomes possible to guarantee complete anonymity of e-money payments.

9. Electronic purses can already individually carry several currencies at the same time.

References

Bank for International Settlements (1996), *Implications for Central Banks of the Development of Digital Money*, Basle.

Bank for International Settlements (2001), *Survey of Electronic Money Developments*, Basle.

Bank for International Settlements (2002), *Red Book*, Basle.

Berentsen, A. (1998), Monetary policy implications of digital money, *Kyklos* 51, 89-117.

Boehle, K. (2001), The potential of server-based internet payment systems: An attempt to assess the future of internet payments, *ePSO Background Paper* No. 3

Bordo, M. D. (1990), The lender of last resort: Alternative views and historical experience, Federal Reserve Bank of Richmond *Economic Review*, January/February, Richmond, 18-29.

Checkland, S. G. (1975), Adam Smith and the bankers, in A. S. Skinner and T.

Wilson, (eds.), *Essays on Adam Smith*, Oxford: Oxford University Press, 504-523.

Craig, B. (1999), Resisting electronic payment systems: Burning down the house, Federal Reserve Bank of Cleveland *Economic Commentary*, July.

Deutsche Bundesbank (1999), Recent developments in electronic money, *Monthly Report* June, Frankfurt.

Diamond, D. W. and P. H. Dybvig (1983), Bank runs, deposit insurance, and liquidity, *Journal of Political Economy* 91, 401-419.

Dowd, K. (1992), *The Experience of Free Banking*, London.

Dowd, K. (1998), Monetary policy in the 21st century: An impossible task? *Cato Journal* 17(3).

Drehmann, M., C. Goodhart and M. Krueger (2002), The challenges facing currency usage: Will the traditional transaction medium be able to resist competition from the new technologies? *Economic Policy* 34, 195-218.

European Central Bank (2000), Issues arising from the emergence of electronic money, *ECB Monthly Bulletin* November, Frankfurt, 49-60.

European Central Bank (2002), *Blue Book*, Frankfurt.

Freedman, C. (2000), Monetary policy implementation: Past, present and future – will electronic money lead to the eventual demise of central banking? *International Finance* 3, 211-227.

Friedman, B. M. (1999), The future of monetary policy: The central bank as an army with only a signal corps? *International Finance* 2, 321-338.

Godschalk, H. and M. Krueger (2000), Why e-money still fails – chances of e-money within a competitive payment instrument market.
http://www.paysys.de/aktuell1.htm#e-money

Goodhart, C. (1998), The two concepts of money: Implications for the analysis of optimal currency areas, European Journal of Political Economy 14, 407-432.

Goodhart, C. (2000), Can central banking survive the IT revolution? International Finance 3, 189-209.

Gorton, G. and D. J. Mullineaux (1987), The joint production of confidence: Endogenous regulation and nineteenth century commercial-bank clearinghouses, Journal of Money, Credit, and Banking 19, 457-468.

Groeneveld, J. M. and A. Visser (1997), Seigniorage, electronic money and financial independence of central banks, BNL Quarterly Review 200, 69-88.

King, M. (1999), Challenges for monetary policy: New and old, Bank of England *Quarterly Bulletin* 39, 397-415.

Kok, L. S. (2002), Singapore electronic legal tender (SELT) – a proposed concept, in Organisation for Economic Development and Cooperation (ed.), The Future of Money, Paris, 147-155.

Krueger, M. (1999), Monetary policy implications of digital money: A comment, Kyklos 52, 259-262.

Rockoff, H. (1974), The free banking era: A re-examination, Journal of Money, Credit, and Banking 6, 141-167.

Rogoff, K. (1998), Blessing or curse? Foreign and underground demand for euro notes, Economic Policy 26, 261-290.

Rolnick, A. J. and W. E. Weber (1983), New evidence on the free banking era, American Economic Review 73, 1080-1091.

Selgin, G. A. (1987), The stability and efficiency of money supply under free banking, Journal of Institutional and Theoretical Economics 143, 435-456.

Selgin, G. A. (1988), The Theory of Free Banking: Money Supply under Competitive Note Issue, Totowa, N.J.: Rowman and Littlefield.

Van Hove, L. (1999), Electronic money and the network externalities theory: Lessons for real life, Netnomics 1, 137-171.

White, L. H. (1984), Free Banking in Britain: Theory, Experience, and Debate, 1800-1845, London: Institute of Economic Affairs.

Woodford, M. (2000), Monetary policy in a world without money, International Finance 3, 229-260.

Asymmetries In The International Transmission Of Monetary Policy: Evidence From The EU, Japan, And The U.S.

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Abstract. While economic theory suggests that domestic monetary expansions raise domestic output, the effect of foreign monetary expansions is ambiguous and depends on the expenditure-switching and income-absorbing effects. Using quarterly data from 1980-2000 for the EU, Japan, and the U.S., the results support the following conclusions: (i) Domestic money has a positive and statistically significant effect on domestic output in all three economies, although its strength varies. (ii) In terms of the transmission of foreign money-supply shocks on domestic output, the strongest link exists between Japan and the EU; the U.S. is also linked with Japan, but more weakly, while the EU and the U.S. appear to be orthogonal. (iii) The evidence on symmetry is mixed.

1. Introduction

Economic theory predicts that domestic monetary expansions raise domestic output (at least temporarily), while monetary contractions have the opposite effect. A vast empirical literature has tested these predictions using a wide variety of different methodologies and data sets.[1]

For an open economy, however, there is the additional consideration of how domestic output is affected by foreign monetary policies, as well as how domestic monetary policy will affect foreign output. This issue, always of interest in international economics, has gained greatly in urgency and importance because of the high (and growing) integration and interdependence of national economies.

The theoretical predictions here are ambiguous because monetary theory has identified two effects that point in opposite directions. The two effects, in very similar forms, are predicted by the Mundell-Fleming model, its Mundell-Fleming-Dornbusch extension (Dornbusch, 1980), and a more recent intertemporal optimizing model (Obstfeld and Rogoff, 1996).

To illustrate, consider the effects of a foreign monetary expansion on the level of domestic economic activity. The resulting appreciation of the domestic currency will reduce domestic output because of the expenditure-switching effect. At the same time however, the foreign monetary expansion will stimulate foreign income which will tend to increase domestic output because of the income-absorption effect. The net effect, which theoretically depends on the values of the model's structural parameters, is

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therefore ambiguous and has to be estimated empirically.[2] Moreover, the theory predicts that these effects are symmetric: the effects of a domestic monetary expansion on foreign income are qualitatively similar to those of a foreign monetary expansion on domestic income.[3]

The purpose of the present paper is to examine whether the theoretical effects discussed above can be detected empirically. Quarterly data from the 1980:1-2000:4 period for the three largest economies, the EU, Japan, and the U.S., are used to (i) estimate the output effects of domestic and foreign monetary policies, (ii) investigate whether these are symmetric, and (iii) empirically resolve the theoretical ambiguity of the expenditure-switching and income-absorption effects. A number of different specifications and estimation methods support the following results. Domestic money supply has a positive and statistically significant effect on domestic output in all three economies, although the strength of this effect varies widely (it is the smallest in the EU and the largest in Japan). In terms of the transmission of foreign money-supply shocks on domestic output, the strongest link exists between Japan and the EU – the U.S. is also linked with Japan, but more weakly, while the EU and the U.S. appear to be orthogonal.

The remainder of the paper is organized as follows. Section 2 discusses the empirical methodology and the data sources and definitions. Section 3 presents the empirical findings for a number of specifications. Section 4 discusses the implications for monetary policy and symmetry of the transmission mechanisms, and concludes.

2. Empirical Methodology And Data

We start with the simplest possible specification, estimating an equation for output growth for each of the three economies:

$$\Delta y_t^j = a^j + \sum_{i=1}^{Q} b_i^j \Delta y_{t-i}^j + \sum_{i=0}^{R} c_i^j \Delta oil_{t-i}$$

$$+ \sum_{i=0}^{S} \left(d_i^{EU \to j} \Delta m_{t-i}^{EU} + d_i^{JP \to j} \Delta m_{t-i}^{JP} + d_i^{US \to j} \Delta m_{t-i}^{US} \right) + u_t^j , \qquad (1)$$

where j indexes over economies ($j = EU, JP, US$) and t over time, Δy is the output growth rate, Δoil is the growth rate of oil prices, Δm is the money growth rate; the a's, b's, c's, and d's are coefficients; and the u's are the error terms. Equation (1) can be thought of as a reduced-form output equation and oil prices have been included as a proxy for aggregate supply shocks.[4]

The next specification allows only monetary-policy *shocks* to influence output. First, a money supply process is specified for each economy:

$$\Delta m_t^j = f^j + \sum_{i=1}^{K} g_i^j \Delta m_{t-i}^j + \sum_{i=1}^{L} h_i^j \Delta y_{t-i}^j + v_t^j, \tag{2}$$

where once again j indexes over the three economies and t over time; the f's, g's, and h's are coefficients; and the v's are the money-supply shocks. The output equation then is respecified as

$$\Delta y_t^j = a^j + \sum_{i=1}^{Q} b_i^j \Delta y_{t-i}^j + \sum_{i=0}^{R} c_i^j \Delta oil_{t-i}$$

$$+ \sum_{i=0}^{S} \left(d_i^{EU \to j} v_{t-i}^{EU} + d_i^{JP \to j} v_{t-i}^{JP} + d_i^{US \to j} v_{t-i}^{US} \right) + e_t^j, \tag{3}$$

for $j = EU, JP, US$.

The simplest way to proceed now is to implement the two-step OLS procedure used by Barro (1977, 1978) in his study of the effects of anticipated and unanticipated money shocks: in the first step, equation (2) is estimated for each of the three economies and the residuals are recovered; in the second step these estimated shocks are used to estimate equation (3), again for each of the three economies.

An alternative – and econometrically more efficient, though operationally more complex – estimation approach is to estimate (2) and (3) simultaneously, either with Non-Linear Least Squares (NLLS), as proposed by Mishkin (1982, 1983, who also showed that Barro's method may bias the results), or by multivariate Maximum Likelihood (ML), as in Cover (1992) and Karras (1996, 1999). Note that this entails the estimation of three systems of four equations each, since economy j's system ($j = EU$, JP, US) must include all three versions of equation (2), one for each of the three economies, together with equation (3) for economy j. More specifically, the log-likelihood function for the jth system is specified as

$$L\left(\underline{a}^j, \underline{b}^j, \underline{c}^j, \underline{d}^j, f^j, g^j, \underline{h}^j\right) = -0.5 \ln|\Sigma|$$

$$- 0.5 \left[\left(\underline{v}^{EU'}, \underline{v}^{JP'}, \underline{v}^{US'}, \underline{e}^j \right) \Sigma^{-1} \left(\underline{v}^{EU'}, \underline{v}^{JP'}, \underline{v}^{US'}, \underline{e}^{j'} \right)' \right],$$

where $\underline{a}$, $\underline{b}$, $\underline{c}$, d, f, g, and $\underline{h}$ are vectors containing the a, b, c, d, f, g, and h parameters, respectively; $\underline{v}^{EU}$, $\underline{v}^{JP}$, $\underline{v}^{US}$, and $\underline{e}^j$ are vectors containing the error terms as defined in (2) and (3); and

$$\Sigma = \begin{bmatrix} \sigma_{11} & \sigma_{12} & \sigma_{13} & \sigma_{14} \\ \sigma_{12} & \sigma_{22} & \sigma_{23} & \sigma_{24} \\ \sigma_{13} & \sigma_{23} & \sigma_{33} & \sigma_{34} \\ \sigma_{14} & \sigma_{24} & \sigma_{34} & \sigma_{44} \end{bmatrix}$$

is the variance-covariance matrix of $\underline{v}^{EU}$, $\underline{v}^{JP}$, $\underline{v}^{US}$, and $\underline{e}^{j}$.[5]

For the purposes of the present study, of course, the coefficients of the greatest interest are the d's. To be consistent with the theoretical predictions outline above, the estimated $d^{j \rightarrow j}$'s (i.e., the $d^{EU \rightarrow EU}$'s, the $d^{JP \rightarrow JP}$'s, and the $d^{US \rightarrow US}$'s) should be overall positive, capturing the effect of domestic money on domestic output. However, the estimated $d^{j \rightarrow k}$'s, for $j \neq k$, can be positive (if the income-absorption effect is stronger), negative (if the expenditure-switching effect dominates), or zero (if the two effects cancel each other out). All data are quarterly covering the period 1980:1 to 2000:4. All series except oil prices are obtained from the OECD's Statistical Compendium on CD-ROM and are seasonally adjusted at the source. Specifically, output is measured (i) for the EU by GDP in constant prices (and constant PPPs, in US$) for the 15 members of the European Union (series E157108S1), (ii) for Japan by GDP at constant prices (series JPN1108S1), and (iii) for the U.S. by GDP in chained constant prices (series USA1108S1). Money is measured (i) for the EU by aggregate M1 for the euro zone (series OL6003DSA), (ii) for Japan by the M2+CD aggregate (series 466017DSA), and (iii) for the U.S. by the M2 money supply (series 426011DSA). Oil prices are from the IMF's International Financial Statistics on CD-ROM, measured by the world spot price in US$ per barrel (series code 00176AAZZF).

The Appendix provides summary statistics for output and money growth rates for the three economies, as well as the growth rate of oil price. Over 1980-2000, average real GDP growth was the highest in the U.S. with an annual rate of 3.11%, and the lowest in the EU at 2.11%. The Japanese average real growth rate over the same period was 2.71%. Average money growth rates ranged from 5.81% in Japan and the U.S. to 7.31% for the EU money aggregate.

3. Empirical Results

3.1 Single-Equation Estimation

Table 1 reports the three estimated versions (j = EU, JP, and US) of equation (1). In all reported specifications the autoregressive and oil lag lengths in (1) have been selected so that $Q = 1$ and $R = S = 4$. Starting with the EU model reported in the first column of Table 1, we find that the estimated $d^{EU \rightarrow EU}$'s are jointly statistically significant (F = 3.766), and their sum is positive (0.350) and also statistically significant, demonstrating the influence of EU money on EU output. Japanese money growth rates are also jointly significant in the EU equation (F = 2.657), but the sum of the estimated $d^{JP \rightarrow EU}$'s is not statistically different than zero. The $d^{US \rightarrow EU}$ parameters are neither jointly statistically significant (F = 0.863) nor add up to a statistically significant sum.

The second column of Table 1 estimates equation (1) for Japan. Similar to the EU model, the estimated $d^{JP \to JP}$'s are jointly statistically significant (F = 5.723), and their sum is positive (0.730) and statistically significant, capturing the effects of Japanese money growth on Japanese output growth. Note that contrary to popular belief, changes in the money supply in Japan have a very strong effect on domestic output. However, the estimated $d^{EU \to JP}$'s and $d^{US \to JP}$'s are not jointly statistically significant, and their sums (the point estimates of which are both negative) are not statistically different from zero.

The U.S. specification of equation (1) is reported in the final column of Table 1. The sum of the estimated $d^{US \to US}$'s is positive, but very small (0.076), and statistical significance is generally disappointing. This is also true for the $d^{EU \to US}$'s and $d^{JP \to US}$'s, with the sole exception of the sum of the $d^{JP \to US}$'s which is negative (-0.251) and significant at the 5% level, suggesting that monetary expansions in Japan retard U.S. output growth.

Table 2 repeats the exercise of Table 1, but for the 2nd-step estimation of Equation (3) with OLS, as described above. The basic difference is that the estimated d's are now capturing the output effects of money-supply shocks, rather than of the raw money growth rates. While many of its point estimates are qualitatively similar to those of Table 1 (the $d^{j \to j}$'s are all positive, the sums of the $d^{EU \to JP}$'s and $d^{US \to JP}$'s are negative), Table 2 is more disappointing in terms of statistical significance and estimation precision.

Recapping the results of single-equation estimation of equations (1) and (3), the sums of the estimated $d^{j \to j}$'s are all positive, as expected, while only the $d^{EU \to EU}$'s and the $d^{JP \to JP}$'s are statistically significantly so. With respect to the cross-country effects, the $d^{j \to k}$'s, for $j \neq k$, are generally very small and statistically insignificant, so that Tables 1 and 2 offer no evidence that output growth in any of these three economies is appreciably affected by monetary policy in any of the other ones.

3.2. Joint ML Estimation

Table 3 reports the results of jointly estimating the systems of equations (2) and (3) with multivariate Maximum Likelihood, as described in section 2. It becomes readily apparent that, as econometric theory suggests, the main benefit of joint estimation is enhanced efficiency relative to the simpler approaches followed in Tables 1 and 2.

Beginning with the first column of Table 3, which reports the EU system results, the results are sharper and more precisely estimated. Just like before, the estimated $d^{EU \to EU}$'s are jointly statistically significant ($\chi^2 = 30.86$), and their sum is positive (0.407) and also decidedly statistically significant, leaving no doubts about the effects of EU money-supply shocks on EU output. Japanese money-supply shocks are also jointly significant in the EU system ($\chi^2 = 135.7$), and the sum of the estimated $d^{JP \to EU}$'s is now large (1.027) and highly statistically significant ($\chi^2 = 11.24$). This means that Japanese money-supply shocks tend to raise EU output growth, and that their cumulative effect is larger than that of the EU's own monetary expansions of the same size. U.S. money shocks, however, have no significant effect for EU output: the $d^{US \to EU}$ parameters are

not jointly statistically significant, and their sum is positive but very small and statistically not different than zero.

The second column of Table 3 estimates the four-equation system for Japan. It is clear that the domestic effects of Japanese monetary policy are not just positive, as expected, but also quite strong: the estimated $d^{JP \to JP}$'s are jointly highly statistically significant ($\chi^2 = 60.11$), and their positive sum (2.876) is the largest estimated in this study and surely statistically significant. This strengthens our earlier finding that, despite the widely held consensus, Japanese monetary policy is very potent towards domestic output. The EU-JP interaction observed in the last paragraph is also demonstrated here, but with the opposite sign: the $d^{EU \to JP}$ coefficients are jointly statistically significant ($\chi^2 = 27.05$), but their sum (-0.057) is negative and, while not very large in absolute value, it is statistically significant. EU monetary expansions, therefore, have a small but significant negative effect on Japanese output growth. Once again, however, U.S. money shocks, while jointly significant at the 5% level ($\chi^2 = 11.97$), have a negative sum (-0.39) that is not negligible but statistically not different than zero.

The U.S. system's parameters are reported in the last column of Table 3. Unlike the inconclusive evidence of Tables 1 and 2, the estimates of the $d^{US \to US}$'s are now jointly statistically significant ($\chi^2 = 17.66$), and have a large positive sum (0.799) which is also highly statistically significant: joint estimation has no difficulty uncovering the domestic output effects of U.S. money-supply shocks. EU and Japanese monetary policies, on the other hand, seem to have little or no effect on U.S. output. The estimated $d^{EU \to US}$'s are not jointly statistically significant and their sum is statistically not different than zero, while the $d^{JP \to US}$' parameters are jointly statistically significant ($\chi^2 = 50.89$) but their sum is not.

Summarizing the findings of Table 3, one is left with no doubt that domestic monetary policies have powerful domestic output effects in all three economies, although not of the same magnitude (these effects are shown to be strongest in Japan and weakest in the EU). Regarding the effects of foreign monetary policies on domestic output, the only link that can be definitely made is the EU-Japan one – but even there there is an asymmetry: Japanese money-supply shocks have a positive effect on EU output, while EU money shocks affect Japanese output negatively. The monetary transmission from and to the U.S. is much less precisely estimated, although this is not necessarily surprising given that the U.S. is the least open (in terms of total trade as a fraction of GDP) of the three economies.

Finally, while Table 3 offers convincing evidence on the domestic effects of monetary policies and their transmission across the three economies, it does not capture the dynamics inherent in the estimated equations. To do so, and in order to gain a better appreciation of the magnitudes and the asymmetries of the processes involved, Figure 1 simulates the responses of output growth in the EU, Japan, and the U.S. to positive money-supply shocks in each of the three economies. The estimates used for these "impulse response functions," are those obtained from the ML estimation.

The top panel of Figure 1 shows that EU output is actually more responsive to a

Japanese monetary expansion than to an EU one of the same size: the effect of a Japanese expansion is felt immediately and stays high for four quarters, while that of a domestic expansion has the familiar (from VAR studies) humped shape that peaks after three quarters. Relative to the EU and Japanese money, U.S. money has a very muted effect.

The middle panel of Figure 1 plots the simulated responses of Japanese output. The domestic response again has the usual humped shape, now peaking a quarter after the shock. Compared to the effects of the domestic money, those of the EU and U.S. monetary policies look quite modest but, as reported in Table 3, both are actually statistically significant.

The responses of U.S. output are shown in the bottom panel of Figure 1. The effects of a domestic money-supply shock are felt quickly and last for four or five quarters. The U.S. output responses to EU and Japanese monetary policies follow very similar patterns for the first year or so, but only the Japanese (which are much higher) are statistically significant.

4. Conclusions

This paper has examined the effects of domestic and foreign monetary policy for three open economies, the EU, Japan, and the U.S. Two closely related issues are at stake. First, the effects of a domestic monetary expansion are theoretically supposed to include a (most likely temporary) increase in domestic output. Qualitatively, at least, this is very similar to the result obtained for a closed economy, although the mechanisms at work will be richer including foreign-exchange and balance-of-payments adjustments.

Second, the effects of a foreign monetary expansion on domestic output are theoretically ambiguous because of the existence of two effects which work in opposite directions: (i) the expenditure-switching effect, driven by a real domestic currency appreciation, tends to reduce domestic output, while (ii) the income-absorption effect, driven by an improvement in the domestic trade balance, stimulates domestic output. The net effect obviously depends on which of the two effects is stronger, an empirical question.

The paper's objective was to test these relationships and investigate whether they can be detected empirically and the degree to which they are characterized by symmetry. Using quarterly data from the 1980-2000 period for the EU, Japan, and the U.S., the empirical results can be summarized as follows.

First, consistent with the standard predictions of monetary theory, an increase in the domestic money supply is shown to have a positive and statistically significant effect on domestic output in all three economies. The magnitude of this effect, however, varies widely. It is found to be the smallest in the EU and (contrary to the commonly held view that Japanese monetary policy is ineffective) the largest in Japan

Second, the transmission of foreign money-supply shocks on domestic output is far from uniform. The strongest link exists between Japan and the EU. Money-supply shocks originating in the EU have a statistically significant effect on Japanese output, while Japanese monetary policy actually has a bigger effect on EU output than the EU

money shocks themselves. The U.S. is also linked with Japan, but more weakly. Both the effects of Japanese money-supply shocks on U.S. output and those of the U.S. money-supply shocks on Japanese output are statistically significant, though modest in magnitude. Finally, the EU and the U.S. appear to be orthogonal: neither the effects of EU money on U.S. output nor the effects of U.S. money on EU output are sizable or statistically significant.

Regarding symmetry, the evidence is mixed. On the one hand, grouping pairs of countries in terms of how strongly foreign monetary policy is transmitted to the domestic economy produces very similar rankings: the two strongest are EU money to Japanese output and Japanese money to EU output, while the two weakest are EU money to U.S. output and U.S. money to EU output. This is supportive of symmetric mechanisms. On the other hand, evidence of asymmetry is also apparent. For example, Japanese monetary expansions raise EU output, while EU monetary expansions have an overall negative effect on Japanese growth. Another example is the difference between the effects of U.S. monetary policy on Japanese output and the effects of Japanese monetary policy on U.S. output: they are both positive overall, but the latter's size is significantly more substantial than the former's.

Notes

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1. See Christiano, Eichenbaum, and Evans (1999) for a recent contribution and extensive literature survey.

2. For evidence on this international transmission, see Bryant et al. (1988) who compare simulations by more than 10 empirical macroeconometric models, the survey of Dornbusch andGiovannini (1990), Taylor (1993, especially chapter 5) for a number of applications in several countries, and Kim (2001).

3. There is another type of symmetry implied by the theory: that the output effects of monetary exp ansions and monetary contractions are the same (in absolute value). In fact, there is evidence that the output effects of monetary policy are asymmetric in this sense, so that monetary contractions are more effective than expansions. See Cover (1995) and Karras (1999).

4. Equation (1), as well as equation (3) below, generalizes for estimation purposes the following Areduced-form@ equation from Obstfeld and Rogoff (1996, chapter 10, equation (74)):

$$y = \frac{\alpha + 2n\beta + \gamma}{\alpha + 2}m + \frac{2(1-n)\beta}{\alpha + 2}m^*,$$

where n corresponds to the size of the domestic economy, and α, β, and γ are constants that depend on the rate of time preference and the price elasticity of demand for each of the model=s monopolistically provided goods.

5. Initial values for the estimated parameters (coefficients and variances) are obtained from the step-one OLS regressions (the initial values for the covariances $\sigma12$, $\sigma13$, $\sigma14$,

σ23, σ24, and σ34 are set at zero), and the function is maximized with the BFGS method, a variant of the Davidon-Fletcher-Powell algorithm).

References

Barro, Robert, J. "Unanticipated Money Growth and Unemployment in the United States." *American Economic Review*, 67, 1977, 101-115.

Barro, Robert, J. "Unanticipated Money, Output, and the Price Level in the United States." *Journal of Political Economy*, 86, 1978, 549-580.

Bryant, Ralph, Dale Henderson, Gerald Holtham, Peter Hooper, and Steven Symansky. *Empirical Macroeconomics for Interdependent Economies*, Washington D.C.: Brookings Institution, 1988.

Christiano, Lawrence J, Martin Eichenbaum, and Charles L. Evans. "Monetary Policy Shocks: What Have We Learned and to What End?" in J.B.Taylor and M. Woodford (eds.) *Handbook of Macroeconomics*, Vol.1A, North Holland, 1999.

Cover, James Peery. "Asymmetric Effects of Positive and Negative Money-Supply Shocks." *Quarterly Journal of Economics*, CVII, 1992, 1261-1282.

Dornbusch, Rudiger. *Open Economy Macroeconomics*, Basic Books, 1980.

Dornbusch, Rudiger and Alberto Giovannini, "Monetary Policy in the Open Economy," In B.M.Friedman and F.H.Hahn (eds.) *Handbook of Monetary Economics*, New York: North Holland, 1990.

Karras, Georgios. "Openness and the Effects of Monetary Policy." *Journal of International Money and Finance*, 18, 1999, 13-26.

Karras, Georgios. "Are the Effects of Monetary Policy Asymmetric? Evidence from a Panel of European Countries." *Oxford Bulletin of Economics and Statistics*, 58, 1996, 267-278.

Kim, Soyoung. "International Transmission of U.S. Monetary Policy Shocks: Evidence from VAR's." *Journal of Monetary Economics*, 48, 2001, 339-372.

Mishkin, Frederic S. "Does Anticipated Policy Matter? An Econometric Investigation." Journal of Political Economy, 90, 1982, 22-51.

Mishkin, Frederic S. *A Rational Expectations Approach to Macroeconometrics*, University of Chicago Press, 1983.

Obstfeld, Maurice and Kenneth Rogoff. *Foundations of International Macroeconomics*, MIT Press, 1996.

Taylor, John B. *Macroeconomic Policy in a World Economy*. Norton, New York, 1993.

Table 1: Equation (1)

	Dependent variable: Real Output growth in:		
	$j = $ EU	$j = $ JP	$j = $ US
1. EU Money Growth			
F-stat for H_0: $d_i^{EU \to j} = 0$, $\forall i$	3.766** [0.005]	1.607 [0.173]	1.188 [0.326]
$\Sigma_i (d_i^{EU \to j})$	0.350*	-0.362	0.402
T-stat for H_0: $\Sigma_i (d_i^{EU \to j}) = 0$	2.596 [0.012]	-1.385 [0.171]	1.857 [0.069]
2. JP Money Growth			
F-stat for H_0: $d_i^{JP \to j} = 0$, $\forall i$	2.657* [0.032]	5.723** [0.000]	1.799 [0.128]
$\Sigma_i (d_i^{JP \to j})$	0.107	0.730**	-0.251*
T-stat for H_0: $\Sigma_i (d_i^{JP \to j}) = 0$	1.527 [0.133]	4.646 [0.000]	-2.225* [0.030]
3. US Money Growth			
F-stat for H_0: $d_i^{US \to j} = 0$, $\forall i$	0.863 [0.512]	0.819 [0.542]	0.357 [0.875]
$\Sigma_i (d_i^{US \to j})$	-0.167	-0.133	0.076
T-stat for H_0: $\Sigma_i (d_i^{US \to j}) = 0$	-1.631 [0.109]	-0.657 [0.514]	0.466 [0.643]

Notes: Estimated significance levels in square brackets **:significant at 1%, *:significant at 5%.

Table 2: 2nd-step OLS estimation of Equation (3)

	Dependent variable: Real Output growth in:		
	j = EU	j = JP	j = US
1. EU Money shocks			
F-stat for H_0: $d_i^{EU \to j} = 0$, $\forall i$	2.077 [0.083]	0.968 [0.446]	1.012 [0.420]
$\Sigma_i (d_i^{EU \to j})$	0.155	-0.220	0.056
T-stat for H_0: $\Sigma_i (d_i^{EU \to j}) = 0$	0.967 [0.338]	-0.610 [0.544]	0.300 [0.766]
2. JP Money shocks			
F-stat for H_0: $d_i^{JP \to j} = 0$, $\forall i$	2.020 [0.091]	1.888 [0.112]	1.139 [0.352]
$\Sigma_i (d_i^{JP \to j})$	0.780*	1.630*	0.150
T-stat for H_0: $\Sigma_i (d_i^{JP \to j}) = 0$	2.239 [0.029]	2.183 [0.034]	0.384 [0.702]
3. US Money shocks			
F-stat for H_0: $d_i^{US \to j} = 0$, $\forall i$	0.129 [0.985]	0.646 [0.666]	1.346 [0.260]
$\Sigma_i (d_i^{US \to j})$	0.052	-0.081	0.548
T-stat for H_0: $\Sigma_i (d_i^{US \to j}) = 0$	0.197 [0.844]	-0.137 [0.891]	1.752 [0.086]

Notes: Estimated significance levels in square brackets **:significant at 1%, *:significant at 5%.

Table 3: ML Joint Estimation of Equations (2) & (3)

	Dependent variable: Real Output growth in:		
	j = EU	j = JP	j = US
1. EU Money shocks			
$\chi^2(5)$-stat for $H_0: d_i^{EU \to j} = 0, \forall i$	30.864** [0.000]	27.046** [0.000]	10.986 [0.052]
$\Sigma_i (d_i^{EU \to j})$	0.407**	-0.057**	0.126
$\chi^2(1)$-stat for $H_0: \Sigma_i (d_i^{EU \to j}) = 0$	10.845 [0.001]	7.449 [0.006]	0.379 [0.583]
2. JP Money shocks			
$\chi^2(5)$-stat for $H_0: d_i^{JP \to j} = 0, \forall i$	135.715** [0.000]	60.111** [0.000]	50.889** [0.000]
$\Sigma_i (d_i^{JP \to j})$	1.027**	2.867**	0.411
$\chi^2(1)$-stat for $H_0: \Sigma_i (d_i^{JP \to j}) = 0$	11.239 [0.001]	35.806 [0.000]	1.444 [0.230]
3. US Money shocks			
$\chi^2(5)$-stat for $H_0: d_i^{US \to j} = 0, \forall i$	2.855 [0.722]	11.967* [0.035]	17.661** [0.003]
$\Sigma_i (d_i^{US \to j})$	0.024	-0.390	0.799**
$\chi^2(1)$-stat for $H_0: \Sigma_i (d_i^{US \to j}) = 0$	0.018 [0.892]	1.183 [0.277]	14.995 [0.000]

Notes: Estimated significance levels in square brackets **:significant at 1%, *:significant at 5%.

Appendix

<u>Oil Price Growth</u>

Sample Mean	2.739%
Standard Error of Sample Mean	6.180

	EU	JP	US
<u>Output Growth</u>			
Sample Mean	2.114%	2.706%	3.107%
Standard Error of Sample Mean	0.216	0.409	0.345
<u>Money Growth</u>			
Sample Mean	7.312%	5.809%	5.806%
Standard Error of Sample Mean	0.413	0.411	0.399

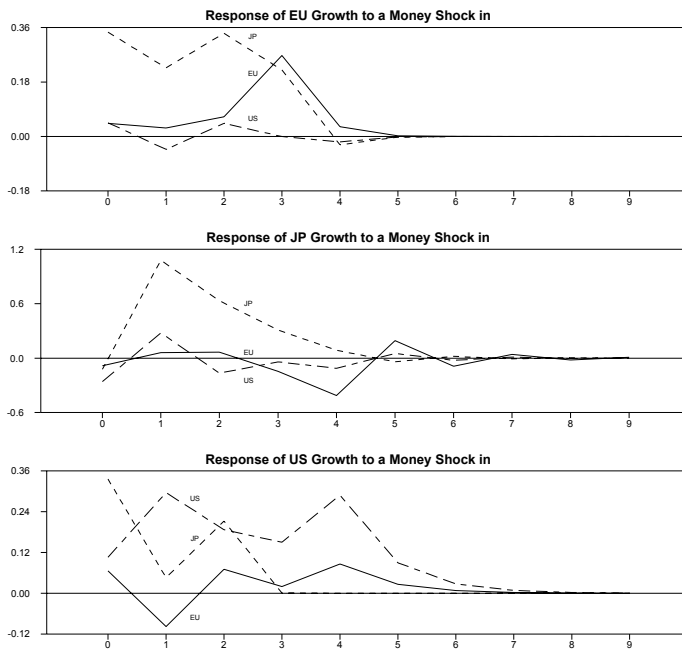Notes: See section 2 for the definitions of the series and data sources.

Figure 1

Endogenous Money, Finance And Interest Rate In The Mexican Financial System[1]

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Abstract. In this paper it is argued that investment requires finance that can be created by banks and necessitates a funding process to attain economic stability. The most significant debate within this line of reasoning involves central bank reserves and interest rate determinants. In order to unravel this discussion, the horizontalist and structuralist views are confronted with the evolution of the Mexican financial system and we encountered striking results. Firstly, the interest rate behaviour of the Mexican economy doesn't conform to any of the prevailing theories due to the institutional character of the Mexican financial system. The central bank can't act fully as a lender of last resort and the monetary policy objective of exchange rate stability imposes important restrictions on interest rate movements and the handling of central bank reserves. Secondly, bank loan rates are highly elastic to the central bank rate while deposit rate elasticity is lower, leading to greater banking margins.

1. Introduction

There is an ongoing discussion on growth finance that can be summarized in the prior savings and ex-ante finance theory out of which have emerged varied and even antagonistic monetary-policy proposals for stimulating investment growth.

In this paper we want to discuss the post-Keynesian versions, which are based on the ex-ante finance theory. It is generally agreed that investment is the motor of accumulation, and that bank credit (finance) is what permits investments decisions to materialise. Also it is widely accepted that banks can meet loan demand that creates deposits and reserves. The disagreement lies over the manner in which reserves are supplied by the central banks and their costs.

One school of thought, the horizontalists, suggests that money supply is completely elastic, determined by the central bank interest rate, which affects the entire interest rate structure. The other version, that of the structuralists, argues that reserves are not completely elastic and interest rate is endogenous to the system, highlighting the evolution of financial institutions and its effect on the supply of central bank reserves. Furthermore, the liquidity preference of commercial banks has an important influence on the interest rate structure and the volume of credit.

Our hypothesis, following Keynes's discussion on investment finance, is that the central bank and the financial organization settings determine short and long-term interest rates as well as the composition of bank reserves, and that the determinants of both variables have changed over time due to the evolution of financial organizations. This will be illustrated by considering Mexico's postwar

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financial system.

In particular, we shall argue that with the onset of the period of deregulation and globalization, the availability of Mexican central bank reserves has been highly volatile due to the high composition of short-term foreign currency debts that restrict finance for the productive sector and increase bank loan mark-up. In this context, the central bank's adoption of a loose version of last resort facilities and liability management have failed to provide complete liquidity, led to higher bank margins, and limited credit availability.

In order to develop our ideas, we have divided this paper into six sections. Following this initial introduction, our second section discusses the determinants of finance, focusing on Keynes's finance and funding mechanisms, stressing that interest rate and credit availability are the main investment determinants. The third takes up the horizontalists' and stucturalists' views on the determination of interest rates and bank reserves; the fourth part discusses the main institutional modifications made to the Mexican financial system in terms of finance and reserves; the fifth section is devoted to the analyses of interest rate movements in the Mexican financial system. We offer our conclusions in the sixth and final section.

2. Keynes's Investment Determinates And Financial Settings

Keynes (1936) argues that investment finance is a twofold process. Banks supply short-term finance if internal returns –measured by the marginal efficiency of capital, MEC- are higher than the cost of borrowing (interest rate). Alternatively or concurrently, long-term finance (i.e. share issuance to finance investment outlets) is provided by capital markets if the present value of investment returns (demand price) is higher than the replacement costs of fixed assets (supply price).

In order to explain the differences between these two types of finance, Keynes resorts to the Anglo-Saxon system, a particular financial organisation dominant in England and the United States during his period, where banks are pivotal institutions that create short-termed financial resources for economic growth through bank money creation while capital markets' main function is to provide long-term finance or funding (Keynes, 1937).

The main characteristic of short-term finance is its independence from savings since banks can increase liquidity by running down their reserves that must then be neutralised through long-term finance, which recollects the higher level of saving originated by investment spending. This mechanism solves the maturity mismatching problem of investment profits and debts.

According to Keynes (1937), credit creation is merely an accounting transaction that does not absorb or deplete resources and which central banks need to guarantee higher liquidity—especially in the transitional period from a lower to a higher rate of economic activity—without raising interest rates or else economic growth can be halted (Keynes 1937). The central point of this mechanism is that the interest rate structure must be constant during the process of higher liquidity so that unintended savings will be transformed into financial savings.

The Anglo-Saxon system did not spread worldwide. In fact, with the exception of England and the United States, the dominant financial system in almost all developed and developing countries was bank based. This system was based on capital movement regulation where banks were the key institutions and capital markets did not develop or were very weak. Hence finance and funding were issued by the banking system along with "compensatory" mechanisms that imposed varying degrees of state economic intervention.

Different bank based financial organisations developed. The German universal bank system was ruled by a framework that linked the financial sector to the productive sector and assigned to the banking sector the role of providing short- and long-term finance, thus performing the money creation and intermediation functions.

In the late developing countries, capital flows were directed to the productive sector through active industrial policies along with price regulation (e.g., interest and exchange rates) and credit allocation. The funding process was assured by state intervention through various monetary and financial policies that took the form of capital controls, tax collection polices, etc.

The bank-based system solved the maturity-mismatching problem directly through banks' long-term deposits or indirectly through state intervention policies, which if they failed created fiscal and external current account deficits along with inflationary processes in the productive sector.

The evolution of the financial system resulting from the demise of Bretton Woods modified the financial settings described above. The bank-based system was dismantled and the market-based system was modified. Although the latter dominated in the new globalised and deregulated financial system, it detached from investment finance, especially in developing countries, while concentrating in speculative activities (Eatwell-Taylor, 2000).

It can be seen from the above discussion that interest rates and the replenishment of bank reserves play an important role in investment finance, topics that will be dealt with in the next section.

3. Structuralists *versus* Horizontalists

There is an ongoing discussion of how interest rate is determined and its influence on banks' reserve supply and credit availability. Basing themselves on Minsky's financial instability hypothesis (FIH), structuralists suggest that external finance in investment expenditure generates a process of endogenous pro-cyclical instability through changes in financial portfolios[3].

FIH proposes that bank credits (corporate loans) modify the investment supply price by raising the bank-lending rate, which reflects lender liquidity preference. In Dow's words, credit expansion "will add further upward pressure to the mark up of the base rate" (1996, p.76).

Bank lending rates (r_l) are determined by central bank rates (base rate) or the average cost of funds (deposit rates) and the liquidity preference of commercial

banks (mark up). In equilibrium, the deposit rates are equal to the returns paid on bonds plus administrative costs. Hence, (r_l) depends on the relation between interest bearing and non-interest bearing deposits held by banks, and the relation between lending and deposits (L/D) and the mark up. Studart (1995) formalizes this proposition

$$r_l = (1 + m)\, D/L\; rd\; ;\quad m > 0;\; \text{or} \qquad\qquad (1)$$
$$r_l = (1 + m)\, (rd/(1 - \tau\text{-}\, \alpha)^4 \qquad\qquad\qquad (1.1)$$

A greater volume of bank loans can be achieved without depleting reserves by selling liquid assets, but if voluntary reserves fall by too much (i.e $\alpha \cong 0$), banks would have to bid for additional reserves and the deposit rate (rd) must rise if liquidity preference remains unchanged. Thus, the ability of banks to expand credit is elastic if they have enough liquid deposits and/or assets available ($\alpha > 0$ or $\alpha > \tau$), but as banks approach their full capacity ($\alpha \cong 0$, or $\alpha \cong \tau$), their loan supply becomes vertical. For banks to expand further the supply of loans, the lending rate at the margin must be raised to cover the costs of bidding for additional reserves, adopting a money supply with an upward slope.

Hence the interest rate on loans is an endogenous variable set by the central bank and the banking sector (determined by the cost of additional reserves and moral hazard).

Horizontalists reject this view. They argue that the rate of interest is an exogenous variable defined by the central bank and that it is independent of the economic cycle. They propose a money supply schedule with a horizontal slope. This means that the banking sector is a price taker and that the central bank (price setter) provides the reserves required by commercial banks at the going price. Horizontalists disregard the liquidity preference theory proposed by Keynes and developed by Minsky through changes in investments prices.

Rochon (1999) emphasises that the central bank interest rate affects the interest rate structure with minimal interference from the commercial banking sector. In this view, the "emphasis is placed on non-price bank imposed constraints" (ibid, p.172). Thus, neither higher corporate levels of financial leveraging nor limited liquidity in bank loan portfolios pressure short or long term lending interest rates. Uncertainty is not expressed through price modifications. Kaldor notes that once interest rates are imposed, the central bank supplies all reserves demanded by the banking sector[5], and the interest structure remains unchanged.

The above argument does not mean that central banks are free to impose any interest rate they desire, but rather must opt for one consistent "with world markets"; they are restricted by "current economic conditions" and "monetary authorities will change the rate of interest whenever they deem it necessary" (Rochon, 1999, p. 159-160). The discussion over exogenous or endogenous interest rates generates a further debate over banking sector behaviour in terms of credit issuance. Horizontalists argue that the creditworthiness "of the project and the character of the borrower"

(ibid, p. 171) are key to explaining that credit demand can be rejected with no price changes. In this context, the interest rate structure needn't vary along with the cycle, and the loan mark-up will depend on the central bank funding rate and other factors that are independent of the economic cycle.

Along this same line, Wolfson (1996) proposes a credit rationing theory based on uncertainty that asymmetrically impacts lender and borrower risk. This means that even if "borrowers and lenders have the same risk preference and the same information (or lack thereof), but they evaluate information differently (they have asymmetric expectations) … some projects deemed safe by the borrowers will be judged too risky by the lender (450/451). He adds "Un "unsatisfied fringe of borrowers" will be subject to credit rationing" (p. 452).

Thus, Wolfson offers an alternative explanation for loan mark-up. According to him, every loan rate depends on the reference rate plus a spread that varies according to the degree of risk the banker attaches to the debtor and which is independent of the economic cycle.

Structuralists reject these ideas. Minsky and Dow & Dow suppose that central banks are unwilling to provide an unlimited amount of reserves at a given interest rate. Hence commercial banks will curtail their loan supply and/or raise interest rates. They assert that as credit volume widens during a boom period, credit risk increases, thereby raising lending rates, including a higher mark-up, and influencing long-term interest rates determined in the capital market.

Consequently, all theories accept that some borrower demand will go unfulfilled, but they differ when it comes to the mechanism to deal with unsatisfied fringe borrowers.

However, from the seventies onwards the financial system experienced important changes, especially on the liability side of bank balance sheets; (the previous changes only affected the asset side). Under this new institutional setting, banks enjoyed almost unrestricted room for money creation potential and began to set up strategies to seek lending outlets rather than merely filling all reasonable loan requests (Chick, 1986, p. 198), thus outgrowing the discussion between horizontalists and structuralists in terms of bank liquidity provisions. The main problem that remains to be explained, especially in terms of developing countries, is the effect of external currency liabilities within a financial system that doesn't have an external currency lender of last resort. Before concentrating on that issue, we shall analyse the evolution of the Mexican financial system.

4. Mexican Financial System Evolution

We shall confine our analysis of the Mexican financial system to 1960 onwards due to difficulties imposed by the civil war that took place in the first decades of the 20th century and because the financial system only developed in the post war period.

From the fifties to the seventies, the import substitution industrialisation (ISI) model prevailed in Mexico, characterised by a high degree of government economic intervention, a highly regulated banking sector, a weak capital market with capital

movement controls in the international money market, which meant a fixed exchange rate structure. The Mexican financial system organised its institutions around a bank-based system with a wide range of "compensatory" mechanisms.

In the sixties, the private sector accounted for most (66%) of investment expenditures although the public sector represented an important (34%) share (Levy, 2001, chapter 6), and since private investment projects were capital low intensive, the credit participation of banks was minimal (Brother and Solis, 1967).

With the deepening of the ISI model in the seventies, public investment spending increased (it represented 42.2% of total investment spending). More than half of bank credits (in terms of flows) were directed to the public sector (54%) and credit issuance of public banks increased[6], representing 57% of the total credit supply. The central bank also financed directly both government spending and commercial banks through the credit-box policy that guaranteed credit availability to strategic productive sectors and low income families

Interest rates were determined exogenously by the central bank and imposed caps on the interest rate paid on bank deposits, thereby restricting movement in the interest structure. The inter-bank market[7] was essential to covering commercial bank liquidity shortfalls and was backed by public banks[8], which resorted to the international money market to satisfy the reserves required by the banking system as a whole.

Since other monetary tools weren't available (rediscount window) or were of limited use (rediscount operations and central bank auctions), inter-banking was key to sustaining financial system stability. Public credit played an important role in this market because their credits weren't subjected to legal reserve requirements, and for commercial banks these liabilities were free of legal reserve requirement[9].

We should also mention that the central bank intervened in the money market through auctions that provided system liquidity at a given interest rate. However, these kinds of interventions were rare and were conducted at the central bank's discretion.

During the seventies, the composition of international lending changed from public credits between governments at fixed rates to international private-bank short-term credits at variable interest rates, which were initially low. Once international interest rates rose (1979), banks were unable to fulfill their financial commitments, and Latin America as a whole was faced with the external debt crisis. Bank fragility in Mexico reached historical levels in 1982[10].

To sum up, during this period the bulk of credit demand proceeded from the public sector and was financed by the banking system (especially public banks) and by the central bank. Thus, investment expansion was linked to higher money supply levels, which were supposed to be neutralized by legal reserve requirements. However, in the period of heightened liquidity growth, the legal reserve requirement was lowered, not raised[11], which led to a general disruption of the economic system.

The institutional financial organisations of the ISI period were characterised by having an inter-banking market and wide acceptance of private means of

payment, which was supposed to create a framework where causality would go from reserves to lending and deposits, operating the bank deposit multiplier.

However, these years also witnessed the broad version of the central bank as last resort lender[12], which meant that monetary or government authorities would provide banks with all the liquidity necessary to avoid bankruptcies. With this modification, causality went from lending demand to lending supply, deposits and reserves. Thus, reserves became highly elastic (Chick 1986) and banks would fulfil all loan demand deemed trustworthy.

The 1982 Latin American financial and economic crisis developed due to income multiplier leakages and external financial commitment at variable interest rates. The higher liquidity created by growing bank credits was accompanied by bank desintermediation; thereby unintended savings were not transformed into financial flows, sparking off an inflationary process along with fiscal and external current account deficits.

In the late seventies and the eighties, the banking sector underwent a deep deregulation process that eliminated the legal reserve requirement, "compensatory" mechanisms were lifted and, most notably, credits were detached from public-sector spending and investment expenditures. Another important feature of this period was the adoption of a flexible exchange rate structure. The bank-based system was replaced by a market-based system whose main features were the development of the money market, which became an important liquidity source, and the deregulation of interest rates, which was completed by 1988.

In the first years of the nineties, the productive sector regained access to credit issued by the banking sector, which funded its operations in the inter-banking market and especially in the national and international money markets[13]. The central bank served as a lender of last resort in its broadest version.

It should be highlighted that international flows were available under different forms. Short-term credits from external private banks (the predominant form of credit in the seventies) were complemented by investment portfolio inflows largely attracted by public bonds -TESOBONOS-) that were highly linked to exchange rate stability. Thus, government bond issues (and prices) were determined according to foreign currency requirements so as to assure exchange rate stability and thus control inflationary pressures.

The deregulatory period differed from its regulatory predecessor mainly in that the central bank's capacity as lender of last resort was significantly curtailed as the balances of monetary aggregates and financial institutions (banks and non-banks) had a higher proportion of external currency liability for which the Mexican central bank could not act as lender of last resort. In addition, external capital inflows were markedly short term and detached from productive links.

The financial crisis proved to be more sustained and profound, the central bank employed no means to deter capital inflows or outflows. Bank credits were subjected to rapid expansions and sudden disruptions, and they weren't linked to productive investment finance.

The 1995 crisis open a new period in the Mexican financial system that shares common features with the preceding one, the main difference being in terms of policy instruments. In the 1995 a zero average legal reserve requirement[14] was imposed and the financial system was put in "short" or "long" [15] to affect the interest rate structure.

Between 1995-1997, liquidity shortages were imposed to put order in the money market and reduce inflationary pressures. Once inflation was brought under control (1997), interest rates were applied to internal fringe credit in order to attain specific short- and medium-term inflation targets. Thus money aggregates accommodated to inflation targets through sliding interest rates for margin reserves (See Martinez, Sanchez and Werner, 2001).

Another important difference of these years was the reduced importance of external capital inflows and its new composition. Greater importance was given to inflows based on commercial trends and foreign direct investment.

Securitization and liability management practices were initiated during the later years of the eighties and given priority from 1994 onwards to limit foreign exchange uncertainty. In fact, in the last fifteen years commercial bank liability side experienced high variability in securities and derivatives operations. This means that the Mexican financial system did not reach the latter stage of developed financial markets. Steps toward establishing a derivatives market got underway as late as 1997 with trading beginning as recently as 1999. Although liability management didn't undermine monetary policy, the commercial banking sector could resort to alternative operations, enabling them to reduce in absolute terms commercial bank credits and increase acquisitions of government and central-bank bonds while engaging in off-balance operations[16] that rendered higher yields.

Throughout the adjustment of the Mexican financial system that began in 1995, the commercial bank rescue schemes and the banking internationalization process, commercial bank credits to the productive sector almost disappeared. This meant that banks imposed a credit rationing policy irrespective of the economic cycle.

It can be concluded that during the regulated period, financial sector liquidity was more stable and the central bank was able to better perform its role of lender of last resort. Once the financial system was deregulated and globalisation dominated the international market, bank reserves became inelastic when external capital outflows took place despite higher liquidity provisions. The money supply curve adopted various slopes: It become became horizontal at times of net external capital inflows predominated and turned vertical when the tide turned and capital outflows predominated.

5. Interest Rate Structure In The Mexican Financial System

In this section we argue that interest rate determination in the Mexican financial system can be divided in two main periods. During the regulatory period (ISI model) interest rates were set by the central bank based on external interest rates movements

and, as Rochon points out, it was a politically determined variable. The banking sector was a price taker and didn't change the interest structure. (See Aportela, Ardavin y Cruz, 2001.) The restrictions on capital mobility in the international financial market explain much of this outcome.

The deregulatory period, characterized by high capital mobility, the strengthening of the money market and the development of the capital market (which remained very shallow and thin) undercut the ability of monetary authorities to control monetary aggregates (Schwartz, 1998) and interest rates became a central variable in monetary policy. The distinctive feature of this period has been the extent to which the central bank has been limited as lender of last resort by the high proportion of foreign currency financial commitments that switched from long-term government credit to short-term private credit, and then to short-term portfolio investment and asset transfer to external debtors.

In the first years of the 1990s, treasury bills became important instruments to attract external capital flows, while in the latter years of this decade they were used to restrict internal liquidity. In this context, public bonds became highly influential in the interest rate structure.

In neither phase of the 1990s could monetary policy achieve its objective. External capital inflows converted to government bonds appreciated the exchange rate, thereby lowering inflation and interest rates. After a while, the increased external currency liabilities led to a weakening of the currency, external capital demanded higher interest rates until capital flows were reversed, thus depreciating the exchange rate, pushing inflation and nominal interest rates higher, and sparking a deep financial and economic crisis.

In the second phase, when public bond issues reduced internal liquidity due to a shortfall in external capital inflows, interest rates went up and Mexico's currency weakened, thereby reducing economic growth.

The exchange rate depreciation had strong inflationary effects, thus, nominal interest rates reflects inflation and they tend to be positively related to the exchange rate and not inversely related as interest parity theory postulates.

The higher interest rates levels have led to wider margins for the banking sector. We can see from graph 1 that net interest margins have expanded steadily since 1988, after interest rates on deposits were liberalized. The loan interest rate/loan deposit rate ratio (Lr/Fr) trend shows three stages. A stable trend between 1978 and 1987, although the Mexican currency was highly undervalued and inflation rates were extremely high. In the second period (1988/1997), the loan-deposit margin doubled due to interest rate deregulation and high exchange risk. In the third period, from 1998 to 2001, the spread trebled (the loan rate averaged 2.8 times deposit rates) owing partly to the extent of banking sector bankruptcies and the maintenance of exchange rate stability policies.

The oligopolistic structure of the banking sector allows these increasing margins to be perpetuated. The banking structure, highly concentrated, can modify the loan and deposit rates. In the Mexican financial system there is a high elasticity

Graph 1
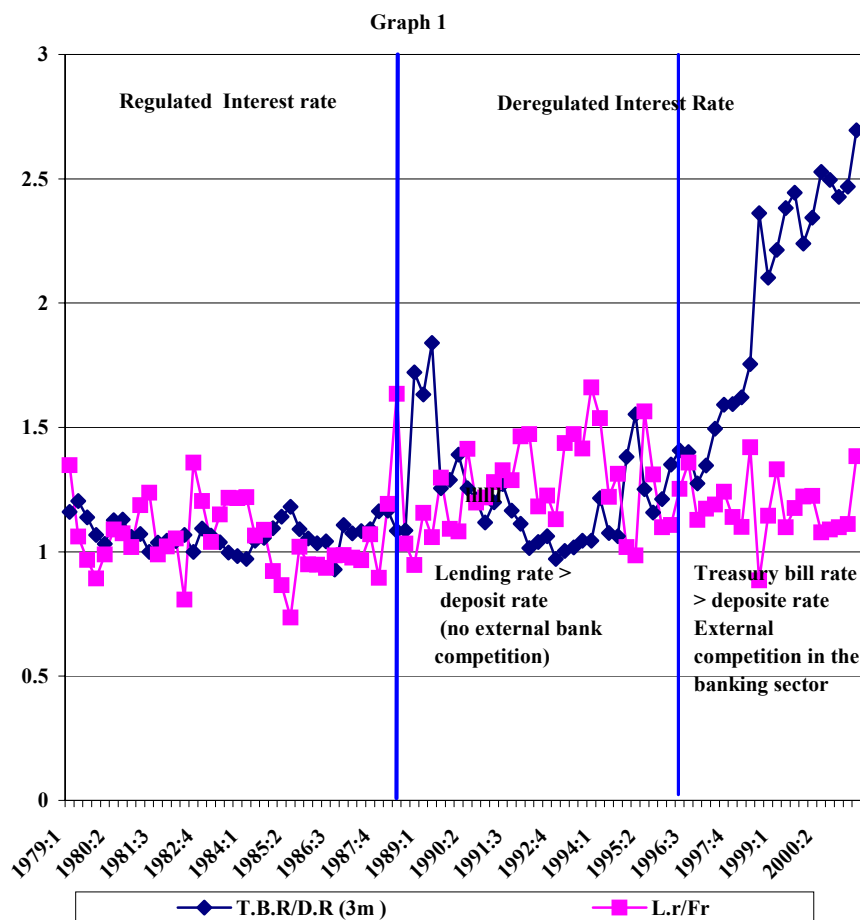
**TBR: Treasury bill rate; Dr: Deposit rate; Lr: Lending rate, Fr: Funding rate**

between the commercial bank funding cost (internal and external) and loan rates. In this sense the central bank funding rate along with the exchange rate affects the commercial bank loan rates. However, the deposit rates shows a low elasticity to the funding rate and the demand for current accounts has a low elasticity to interest rates. It should be pointed that this raising spread took place independently of the economic cycles (boom period 1990/94; deep recession 1995; boom period 1997/2000).

The above circumstances explain the wider spread between treasury bills and deposit rates, especially after the 1994 exchange rate crisis (see graph 1). Between 1979 and 1988, when interest rates were regulated, the average net interest margin

was 8% with a standard deviation of 0.10; and from 1989 to 1994, this spread rocketed to an average of 19.4%, doubling its standard deviation (0.20). From 1995 onwards, the average margin soared to 87.4% with a standard deviation of .51, reaching an historical maximum spread in the autumn of 2001 (268%).

Finally, there is an inverse relation between lending/funding and treasury bill/deposit margins.(T.B.R.D./D.R). The former was higher when the banking sector was issuing credit and, in the latter years of the nineties, it fell due to credit rationing practices and external banking competition (not linked to commercial banks within the financial system).

In graph 2, the margin between government bonds and funding rate is shown. Its main characteristic is the low variability during the whole period despite the economic fluctuations, which means that both variables moved with relatively equal trends showing the importance of the treasury bill in the interest rate structure and central banking reserve provisions and external capital inflow.

Graph 2
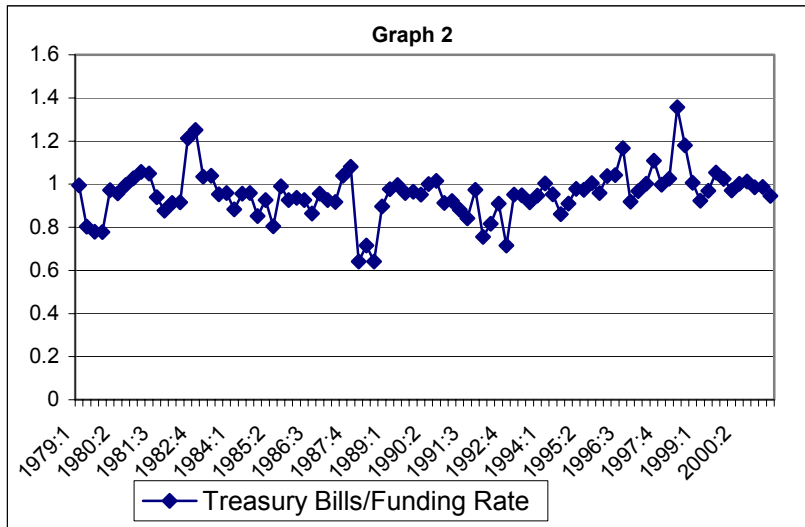
6. Concluding Remarks

The basic disagreement between the horizontalists and structuralists is over the way banks replenish their reserves. Horizontalists argue that banks cannot face liquidity problems since central banks will always act as a lender of last resort. Structuralists relate reserve replenishment and its cost to financial institutional development and at present (loose version of lender of last resort, securitization and liability management practices) they also put forward the idea that banks don't face liquidity shortages. In terms of interest rate determination, the former school suggests that it is independent of economic cycles and is set by the central bank while the latter argues that bank liquidity preference is related to economic cycles.

The evolution of the Mexican financial system doesn't fit any of those

explanations. Firstly, when confronted with high levels of external liabilities, the central bank can't perform the lender of last resort function, becoming highly dependent on the mood of financial investors.

Secondly, the Mexican financial system relies on external capital inflows to control inflation, based on exchange rate stability. Thus, exchange rate imposes important restrictions on interest rate determination. This pushes up treasury bill rates and the bank margins from high spreads between the buying and selling price and deposit rates. Commercial banks needn't issue credit to maintain their profitability, they can engage in buying government bonds risk free.

During the regulatory period, commercial banks wielded political power that enabled them to pass off their high risk activities to the public banks including foreign-currency funding through a public sector circuit. Thus, the system operated as if it had a loose version of the lender of last resort. Loans publicly demanded determined credits, deposits and reserves.

Once deregulation and globalisation were dominant features of the Mexican financial system, reserves were guaranteed by the money market through open market operations and central banks credits, facing a variable external capital supply, remaining the causality direction of the last period, with the difference that credits were private sector driven and were faced with external capital outflows that impede the central bank lending of last resort function to be fully implemented, inducing high interest rates in periods of external capital outflows.

The other difference was in terms of interest rate margins. The interest rate ceased to be an exogenous variable determined by the central bank. Under a globalised and deregulated system, the loan interest rate was highly influenced by open market treasury bill operations due to the reliance of monetary policy on exchange rate stability and/or the perception of external financial investors that determines the country-risk position that determines the cost of external finance.

Although securitisation and "management liability" were adopted by the Mexican financial system over a decade ago, they have not been able to turn money supply into a horizontal slopped function since financial markets are faced with external currency restrictions.

Notes

3.   Minsky (1975:57) writes: "In Keynes's theory the proximate cause of the transitory nature of each cyclical state is the instability of investment; but the deeper cause of business cycles in an economy with the financial institutions of capitalism is the instability of portfolios and of financial interrelations".

4. This equation is derived from the banks balance sheet, where deposits (D) are equal to reserves (R), Assets (A) and lending (L).

$D = R + A + L$

$L = D – R - A$, if divided by D

$L = (1- \tau - \alpha)D$

 where $\tau = R/D$; $\alpha = A/D$

5. Kaldor wrote "Monetary policy is represented not by a given quantity of money stock but by a given rate of interest, and the amount of money in existence will be demand determined". (ibid)

6. The public banks (Bancos de Desarrollo) main function was to finance certain activities or give credits to specific sector with interest rates below the market prices and with virtually no other requirements.

7. The inter-banking market was present since commercial banks started to operate at the end of the nineteen century. In the 1940s and 1950s this market was mainly used by deposit banks since they had liquidity shortages because they used almost all banks assets. In the late 1950s and 1960s investment banks (financieras) were integrated to this market and form 1973 all banks became part of the inter-banking market (see Rodriguez and Salas, 1985).

8. Baquiero and Ghigliaza (1983:. 86) imply than an important amount of the public banks external liabilities were utilised to provide reserves to commercial private banks.

9. Before the 25/I/1979 public bank lending to commercial banks were free of legal reserve requirement Between 1979 and March 1982 they were considered as any other bank liability subjected to reserve requirement. However from 1983 they were subjected to   100% legal requirement (ie., commercial banks could not create credit out of public bank's lending).

10. This indicator is determined by the difference between banks external liabilities and assets in terms international reserves minus gold, reaching the highest level (9.3) in 1982. See Levy and Mantey (1999).

11. In the seventies, when public spending was very high, the specialized commercial banks was transformed into universal banks, for which the government imposed a unique rate of legal reserve requirement that was lowered to induce this transformation. For further details see Levy 2001, chapter VII.

12. Bagehot (1873) proposed that central banks should act as a lender of last resort and supply reserves only in the event of miscalculations. Thus, central banks should provide temporal liquidity to prevent financial crises and not rescue individual banks on a constant basis. The loose version of this principle means constant central bank

intervention to guarantee stability in the payment system. Further reference see Aglietta (1996).

13. Between the 1982 and 1988 the Mexican economy experienced net financial outflows owing to the government's commitments to repaying the external debt that had accumulated in the seventies. In 1988 an agreement to reschedule the external debt was reached.

14. The zero average legal reserve requirement works as follows: debtor balances posted at the close of each day in the current accounts of each credit institution with the Bank of Mexico must be compensated, within 28-day periods, by posting, on other days, creditor balances of at least equal amounts in the same accounts. Non-compliance with this rule imposes a monetary penalty, calculated on the basis of the accumulated shortfall and an interest rate equivalent to twice the prevailing 28-day CETES rate. (Banco de Mexico, Anual Report 1996).

15. "The Institute establishes or increases the negative target for the consolidated balance of the current accounts it holds for banks. This tends to temporarily raise short-term interest rates, which limits the effect of existing inflationary pressures on prices"(Anual Report, Banco de Mexico;1999:93).

16. In this context it can understand the growth of return on asset (ROA) and return on equity (ROE) ratios. (See Girón Levy and Levy 2001).

References

Aglietta, M. (1996) "Systematic risk, financial innovations and the financial safety net" in Money in Motion: The post-Keynesian and circulation approaches, The Jerome Levy Institute Series, New York.

Aportela, F; J. A . Ardavin and Y. Cruz (2001) "Comportamiento histórico de las tasas de interés en México, 1951-2000", working document, Banco de México, www.banxico.org.mx

Banco de Mexico, "Anual Report", variuos years.

---- "Economic Indicators ", information on line
       Baquiero A. C. And S. Gigliazza "Política monetaria en México: el marco institucional" in Sistema Económico Mexicano: un análisis sobre su situación, editor H.E. Gonzalez, ed. Premia 1983, México

Brothers D. and L. Solis M. (1967) "Evolución Financiera de México", CEMLA, Mexico.

Chick (1986) "The evolution of the banking system and the theory of saving, investment and interest", in On money and Keynes: selected essays. Victoria Chick. P. Arestis and A. S. Dow (editors), St. Martin, New York, 1992.

Dow A. C. and S. C. Dow (1989), "Endogenous money creation and idle balances", in J. Pheby (Ed.), New Directions in Post-Keynesian Economics, Edward Elgar, Aldershot, Great Britain.

Dow, S.   (1996) "Endogenous Money", in <u>A second edition of the General Theory</u>, vol.2, Macmillan, Great Britain

Eatwell J and L. Taylor (2000) "Global Finance at Risk. The case for International Regulation. The New Press New York, United States.

Keynes, J. M (1936) "La Teoría General de la Ocupación, el Interés y el Dinero", Fondo de Cultura Económica, Mexico, 1986.

--- (1937) "Alternative Theories of the rate of interest", in <u>Collected Writings de John Maynard Keynes</u>, vol. XIV, The General Theory and After, edited by Donald Moggridge. Macmillan, Great Britain,, 1973.

Levy, N and G. Mantéy (1999) "Indicadores Gráficos de Inestabilidad Financiera en América Latina y el Sudeste de Asia", ENEP Acatlán-UNAM-Facultad de Economía-DGAPA, México.

----   (2001) "Cambios institucionales del sector financiero y su efecto sobre el fondeo de la inversión. México 1960-1994", FE-UNAM-DGAPA-UBJO, México.

----   and Girón A. "El sector financiero mexicano en los noventa", paper presented at ECLAC, Chile, 2001

Martínez, L, O. Sánchez and A. Werner (2001) "Consideraciones sobre la Conducción de la Política Monetaria y el Mecanismo de Transmisión en México", working document, Banco de México, www.banxico.org.mx

Minsky H. P. (1975). "John Maynard Keynes", Columbia University Press.

Rochon, L. P. (1999) "Credit, Money and Production. An Alternative Post-Keynesian Approach" Edward Elgar Publishing. USA

Rodriguez, F. and J. Salas (1985) "Estructura y funcionamiento del mercado de crédito interbancario en México", en <u>El Trimestre Económico</u>", April-June

Schwartz M (1998) "Consideraciones sobre la instrumentación de la política monetaria", workn document , Banco de Mexico,www.banxico.org.mx

Wolfson M. H. (1996), "A Post-Keynesian theory of credit rationing", in <u>Journal of Post-Keynesian Economics</u>, Vol. 18, No. 3, Spring.

The Future of Monetary Integration in Southern Africa: Should SADC Join the Rand Monetary Area?

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Abstract. The states of southern Africa face a dilemma: while the region already sustains a successful and long-running monetary union, the Common Monetary Area (CMA), the region's leading economic integration organization, the Southern African Development Community (SADC) is opposed to joining the union. However, the Common Market for East and Southern Africa --a less successful, but rival economic organization-- favors a monetary union. Should SADC join CMA? The conclusion of this paper is that the necessary convergence criteria for a viable monetary union appears to be lacking. Until and unless there is more convergence, the chances for a successful monetary union are low. Equally important, until SADC countries produce a more diverse set of goods and services that will allow increased trade with each other, reaching the goal of a monetary union remains unlikely, and even unnecessary. Finally, there is a lack of political will at present to institute such a union.

1. Introduction

The states of southern Africa face a dilemma: while the region already sustains a successful and long-running monetary union, the Common Monetary Area (CMA, known as the "Rand Zone"), the region's leading economic integration organization, the Southern African Development Community (SADC), is opposed to joining the union. However, the Common Market for East and Southern Africa (COMESA), a less successful, but rival economic organization favors a monetary union. The situation is further complicated by the existence of the successful and also long-lived Southern African Customs Union (SACU) and by the recent Cross Border Initiative (CBI). The somewhat confusing and overlapping memberships in these organizations are illustrated in Figure 1, below.

While several scholars have looked at southern African regional integration (Mwase 1995, Holden 1998, Mclymont 1999, Maasdorp 1992, Collings 1983, Mukherjee 1996, Fine 1994), there has been little research on the specific issue of expanding CMA (Jenkins 1996). There are a number of reasons for this. The first, and most important, is that the region's dominant player, South Africa, is not in favor of expansion at this time. (1) The second is also somewhat political: the existing regional organizations are so rivalous that reaching any sort of agreement is a difficult, time consuming and cumbersome process. Third, the smaller non-CMA members might be reluctant to join because of South Africa's overwhelming

economic and commercial dominance. Fourth, there is no general consensus that SADC is ready for monetary integration. Fifth, the Rand is not the region's strongest currency. Sixth, no state has yet come forward with a concrete proposal.

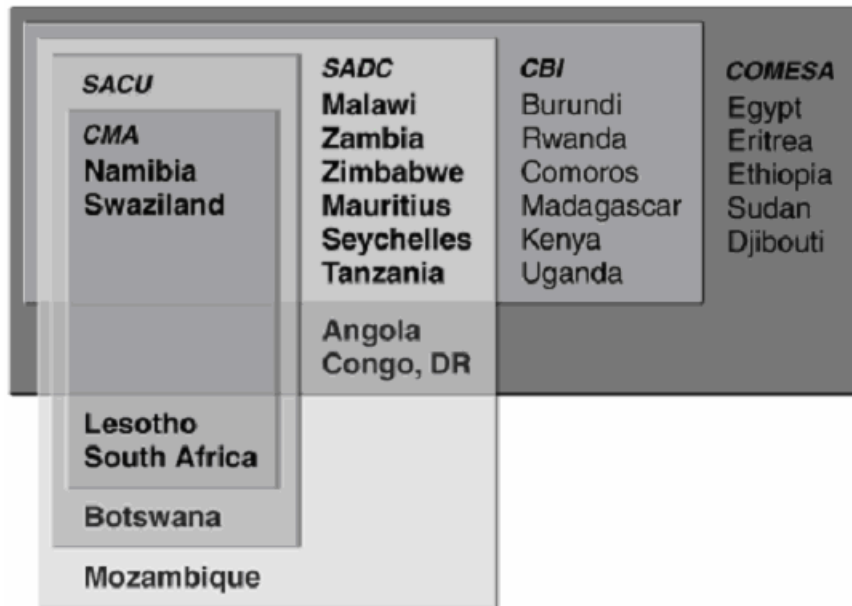| SACU	SADC	CBI	COMESA
CMA	**Malawi**	Burundi	Egypt
Namibia	**Zambia**	Rwanda	Eritrea
Swaziland	**Zimbabwe**	Comoros	Ethiopia
	Mauritius	Madagascar	Sudan
	Seychelles	Kenya	Djibouti
	Tanzania	Uganda	
	Angola		
	Congo, DR		
Lesotho			
South Africa			
Botswana			
Mozambique			

Figure 1. Southern African Membership in Major Regional Organizations

To help fill the gap in the literature, this paper will attempt to answer the basic --and indeed important-- question: should SADC join CMA? To examine that question, the study must look at the nine SADC members (of the 14) which are not in CMA and will examine the possibility of them joining.   The paper will also include a brief examination of the performance of the two existing regional trade arrangements (i.e., the Common Market for Eastern and Southern Africa, COMESA, and the Southern African Customs Union, SACU) and also briefly include a synopsis of the Cross Border Initiative.

2. An Economic Overview of the Region

The states of southern Africa are varied in size, both in population and economic terms. (2) This paper includes only the 14 SADC members as comprising southern Africa. (3) The combined population of the area is approximately 187 million. The smallest state, Seychelles, has a population of only 80,000, while largest, the Democratic Republic of Congo has 48 million.   Also, the states are unequally endowed with natural resources. For example, South Africa, Namibia, Botswana,

Congo (DR), and to a lesser degree Zimbabwe and Zambia have significant and important strategic mineral reserves including copper, cobalt, diamonds and gold, Angola is heavily endowed with petroleum, while other states, eg. Swaziland, Lesotho and Tanzania have very little such natural resources (Europa Publications 2000). The countries have differing levels of education, literacy, health provisions and other social indicators.

There are two important and fundamental characteristics of the SADC region: (1) it is poor; and, (2) South Africa is the dominant economic force. The region's average GDP per capita is $1,763 (in current 1997 prices), which places it in one of the lowest such areas in the world. These per capita GDPs range with a low of $94 in Mozambique to a high of $7,304 in Seychelles. The CMA average is a bit higher than the SADC average, at $1,825. Growth rates have been uneven. The average GDP growth rate for the region from 1989 to 1997 was 3.9 percent. The fastest grower, Seychelles, averaged 8.2 percent during that time, while the Democratic Republic of Congo achieved only 0.6 percent growth over the same period. The sizes of the economies also vary dramatically: South Africa, with 13 percent of land area and 22 percent of the population accounts for some 73 percent of SADC's total GDP, with $129,094 million of a SADC total of $178,710 million. South Africa dominates CMA, comprising 96 percent of the area's GDP. Such poverty and unequal economic power makes further economic integration difficult.

3. A Brief History Of SADC

The Southern African Development Community (SADC) was established in 1979 as a loose association of states grouped in an effort to coordinate economic development projects. It was originally known as the Southern African Development Coordination Conference (SADCC) and it was not concerned with regional trade issues such as integration, other than to lessen dependence with then apartheid-ruled South Africa (Maasdorp and Whiteside 1993). It changed its name and mission with the 1992 treaty. The original nine members have been joined by five more, most importantly South Africa, upon its gaining majority rule in 1994. The 14-member economic community has a long-term goal of becoming a full common market. However, it has never officially acknowledged the desire for a monetary union.

In 1997 the community agreed to phase in a Free Trade Agreement over 8 years. This could increase intra-regional trade and boost foreign investment (Holden 1998). However, there are serious obstacles to increased intra-regional trade. The countries' trade patterns are similar. Typically they trade little with themselves, for obvious reasons. Most of the exports are commodity products, with little value added (Europa Publications 2000). Tanzania, for example, does not need to import tobacco from Malawi, Zimbabwe doesn't need to import minerals from South Africa. As South Africa's former trade minister once stated, the region produces products that, "we dig from the earth and shake off the trees." (The Economist 1995) Only 10 percent of the region's trade is among its members themselves -- by way of contrasts, the EC has over 60 percent of its trade within its community (Foroutan 1993, The

Economist 1995). About 86 percent of intra-regional imports are supplied by South Africa.

The organization has taken steps toward greater coordination in finance, investment and monetary affairs. For example, the SADC Finance and Investment Co-ordinating Unit (FISCU), established in 1995, has been working on a framework to achieve regional macroeconomic stability and convergence. (4)

Currently the FISCU is drafting a protocol which is planned to be developed during the next four years. According to FISCU, the relevant areas being drafted are:

* Develop an information data bank on policies and structures of SADC central banks and the financial markets in SADC countries;
* Develop a payment, clearing and settlement system;
* Repatriation of bank notes and coins among SADC countries;
* Train central bank officials;
* Examine exchange controls and their impact on the cross-border flows of goods, services and capital; and,
* Examine aspects of the legal and operational framework of SADC central banks. (5)

Also in 1995 the Committee of Central Bank Governors was established as part of the Finance and Investment Sector of SADC. The South African Reserve Bank coordinates this and the Governor of the South African Reserve Bank acts as the committee's chairman (SADC 1998). In 1998 the SADC member states created a Banking Association to establish international banking standards and a regional payments system. Although not specifically mentioned, a major component of fuller integration could include a common currency arrangement. (6)

Thus, while there is a general agreement among SADC members that some sort of deeper coordination in financial and monetary areas is essential, there are neither plans for establishing a monetary area, nor for joining CMA.

4. A Brief History of CMA

The Common Monetary Area (CMA, known as the "Rand Zone") is composed of South Africa, Namibia, Lesotho and Swaziland, all of which are SADC members (Coilins 1983, van der Merwe no date). It is the region's only currency area. Before independence, Botswana, Lesotho and Swaziland (the B-L-S states) used the South African Rand, and there was free movement of capital among these states. After independence in 1972, the B-L-S states and South Africa began negotiations for rationalizing the existing system. The Rand Monetary Agreement came into force in 1974, when Botswana opted out. The Rand Monetary Area was replaced by CMA in 1986 with the signing of the Trilateral Monetary Agreement (TMA) between South Africa, Swaziland and Lesotho. This agreement gave both Swaziland and Lesotho considerably more power in determining their respective monetary policies, although in reality not much was changed. The TMA was in turn replaced by the Multilateral Monetary Agreement in 1992 when Namibia formally joined (although it had been a

de facto member as a protectorate administered by South Africa).

The CMA uses the South African Rand as a common currency, although each member issues its own currency as well, at par with the Rand. The South African Reserve Bank in effect plays an important --even dominant-- role in the monetary policies of each member. (Lundhal and Peterson, 1991). The residents of Lesotho, Namibia and Swaziland can freely access to the South African capital and money markets. There are a number of other important aspects of the CMA (van der Merwe no date, Maasdorp and Whiteside, 1992). The member states:

> * Share a common pool of foreign exchange reserves, managed by the South African Reserve Bank;
> * Apply a common exchange control policy towards the outside world;
> * Hold regular consultations to make changes to the agreement, [7] and,
> * Must permit the repatriation of their notes and coins issued which may circulate in other countries of the CMA.
> * All maintain current accounts with the South African Reserve Bank. In addition, Lesotho, Namibia and Swaziland can hold foreign reserves managed by themselves for their own immediate needs. They can hold up to 35percent of these reserves in currencies other than the Rand.

One of the most important aspects of the CMA is South Africa's obligation to compensate Lesotho and Namibia for using the South African Rand, ie. the loss of seignorage (Fisher 1982). The assumption is that these states could have earned an income if the Rand circulating in their areas had been issued by them and had been fully invested in income-generating assets. Swaziland does not receive such compensatory payments, because it "officially" suspended the use of the Rand as legal tender in 1986, although the Rand is widely accepted in Swaziland.

In discussing options for the region, and specifically whether SADC should join CMA, a preliminary question must be asked: what are the gains of closer monetary coordination? The answer to this question depends, of course, on which countries or sets of countries are being considered (Kenen 1969, Connolly 1982). Clearly, instituting a common currency among geographically related countries could be expected to reduce the fluctuations and uncertainty --and thus costs-- of foreign currency conversions. For small and open economies, the costs of flexible exchange rate systems can outweigh the advantages (Artis 1991, Emerson 1992). Many countries with relatively small economies will peg their currencies of their main trading partner or –in the case of Botswana-to a basket of currencies of their main trading partners. This can promote greater price stability than under a flexible exchange rate system. Greater price stability in turn can lead to long term confidence, increased foreign investment, trade and growth.

In addition to the above, Van der Mewre sites several specific and significant benefits accruing to the smaller members of CMA. He suggests:

> "they have free access to the South African money and capital markets;
> capital and labour move freely between the countries because there is no exchange control or other restrictions;

no foreign exchange problems arise in the servicing of foreign debt, which facilitates raising loans for development purposes from non-member countries;

trade is promoted between member countries through the absence of any exchange risk, payment restrictions, inconvenience or additional costs of transactions;

the close relations with South Africa have been to the benefit of macro-economic stability; and,

the countries concerned have experienced relative exchange rate stability, which might have been difficult to achieve if an independent exchange rate policy had been pursued." (Van der Mewre no date)

The associated question is: what are the costs of monetary union? The most obvious answer is loss of autonomy and control over domestic monetary and fiscal affairs. This has proven to be a major reason for the UK's reluctance for joining the Euro (Schnitzer 1999). The small members of CMA have surrendered their monetary policy to the South African Reserve Bank. Ultimately, the best interests of South Africa may not necessarily always also be in the best interest of CMA. The Reserve Bank is guided by domestic economic stability, most importantly price stability, but also associated goals, for example lessening unemployment. The smaller members have little power to influence policy which would have profound effects over their own destinies. A good example of this came in the 1980s when the appreciating rand had adverse effects on the smaller members (Guma, 1985). The benefits generally appear to outweigh the costs. As Van der Mewre suggests, " Despite the fact that these other countries have forfeited monetary, exchange rate and fiscal autonomy by deciding to become members of a monetary union, their close relationship with the rand currency and financial markets in South Africa probably outweighs these disadvantages. Co-operation and consultation between members as well as other arrangements have ensured that overall control of the rand currency and foreign reserves of the area has not been autocratic or centralised." (Van der Mewre no date).

5. Other Regional Economic Organizations

The other major regional organizations in southern Africa are: the Southern African Customs Union (SACU), The Common Market for Eastern and Southern Africa (COMSEA), and the Cross Border Initiative (CBI). (7)

The five member SACU was established in 1910 and is thus one of Africa's oldest organizations. Like most customs unions, SACU provides for duty free movement of goods within the union, and a common tariff rate extended to non-members. Tariffs are collected by South Africa on behalf of the members and placed into a common pool. The smaller members receive a share with a 42percent bonus over what they would have received had the tariffs been collected by the smaller members themselves. This is designed to compensate those members for a loss of fiscal policy options (Lennart and Peterson 1991). The agreement has been under

negotiation for over five years (Maasdorp, Robson and Hudson 1995) with the small members wanting even greater compensation, and South Africa pushing for less (Fagenbaum, Sharer, Thugge and DeZoysa, 1999). Tariff revenues are very important for the smaller members. In 1996 SACU revenue as a share of central government revenues was: Lesotho, 50.6percent; Swaziland, 50 percent, Namibia, 30percent; and, Botswana, 16percent. (Holden 1998). In addition, the smaller states must accept the reduced tariff rates South Africa has been accomplishing under GATT and now WTO (Harrold, 1995). The CMA no doubt facilitates trade between the SACU members. (8)

The twenty two-member organization COMESA was originally begun as the Preferential Trade Area for East and Southern African States (PTA) in 1983. As the name implies, its goal was to offer preferred tariff rates among its members. More ambitiously, it had hoped to abolish all tariffs among members by the year 2000. For a variety of reasons, not least because tariffs contribute such a proportion of member government's revenues, this goal has not been met. In 2000 it announced the COMESA Free Trade Area to be completed by 2002. In 1994 COMESA replaced the PTA. COMESA has several initiatives that duplicate or overlap SADC, such as a clearing house for settling accounts between members.

In 1998 PTA began issuing checks denominated in PTS Units of Accounts. In 1990 COMESA declared a goal of establishing a monetary union by 2020 (Holden 1998). According to COMESA, its Monetary Harmonisation Programme will… "be implemented in four phases, from 1991 to 2025, with the final phase to culminate in full monetary union which implies the use of irrevocable fixed exchange rates; a single currency… and the establishment of a common monetary authority." (COMESA 2001)

COMESA has not been very successful in reducing tariffs in particular, on in promoting intra-regional trade in general (Rwegasira 1998, Foroutan and Pritchett 1993). It remains unclear if SADC members will abandon COMESA, although Tanzania already has. And, most importantly, until South Africa joins, the future of a successful COMESA is unclear at best. Competition between SADC and COMESA diverts members from accomplishing their goals and instead continues to muddle the political landscape (World Bank 2000). Finally, the point most relevant to this study is that the organization has done little –if anything-- to move its goal of monetary union to fruition.

The 14 member CBI, established in 1990, is funded by the World Bank, IMF, EU and AfDB. (Fagenbaum, Sharer, Thugge and DeZoysa, 1999). The goal is to promote trade and investment in east and southern Africa. According to the IMF, about one half of the CBI states have either fully or substantially implemented financial sector reforms, essential in achieving its overall goals. Nonetheless, according to Holden, "The CBI represents the interesting combination of unilateral trade liberalisation through the low common external tariff with a lower probability of trade diversion occurring." (Holden 1998).

6. Is Southern Africa An Optimal Currency Area?

There have been a number of studies of the criteria of optimal currency areas (OCAs) (Mundell 1961, 1971, Ricci 1977, Williamson 1982, Bayoumi 1994, DeGrauwe 1977, Rose 2000, Tower 1976, Giordano 1998). In the 1960's, OCAs generally included such criteria as similar tax regimes, flexible wages, labor and capital mobility, free prices, similar inflation rates, degrees of openness and perhaps geographical proximity (Mundell 1957, 1961, Bertola 1989, Gros 1996). However, the consensus today is that perhaps the idea may not be so relevant (Tavlas 1993). Indeed, Cohen (1994) examined six cases where the OCA criteria would have not predicted monetary union. This paper will not enter this theoretical debate, but will nonetheless look at some convergence criteria that might be important for the SADC region. In other words, are the countries sufficiently close in a number of important macroeconomic fundamentals to make a monetary union viable? While there are numerous potential criteria that are essential for the feasibility of a monetary union, this paper will use six.   They are: (1) currency exchange rate fluctuations; (2) inflation rates; (3) public debt as a percentage of GDP; (4) foreign economic assistance per capita and (5) as a percentage of GDP; and, (6) importance of trade, all based on available data from the past five years. These criteria were selected because they are probably the most important ones for an area representing developing nation. (9) Other important criteria, such as the size of budget deficits cannot be used because of the lack of data.

Clearly members' currency rates should show stability over time.   The criteria here could be that local currency rates would not fluctuate more than a given percentage annually against the Rand over the past five-year period. If a (arbitrary) 3 percent threshold were established, then only Botswana (0.4 percent) and Mauritius (3.0 percent) would "qualify".   If that threshold were raised to 5 percent, then Tanzania (5.5 percent) could be added to the list. The currencies of the other states fluctuations range from 9.4 percent up to 892 percent. Clearly only three states would meet this convergence criteria.

Another important fundamental is annual rate of inflation. A possible criteria would be that no country's inflation rate would exceed 10 percent on average. Only Mauritius and Seychelles met that criteria. The other states' inflation rates range from 12 percent to 1,865 percent. It should be noted, however, that inflation has been reduced in all states, and seriously reduced in some (e.g., Angola and Congo).

The level of external debt in an economy is an important fundamental. The criteria here could be that total debt should not exceed 100 percent of GDP on average during the past five years. The countries which met that criteria are Botswana, Malawi, Mauritius, Seychelles and Zimbabwe.

Foreign economic assistance is important in most countries in the region. Excessive dependence on official development assistance (ODA) probably indicates some structural problems in an economy. A possible criteria here would be that no country should have more than $50 per capita in ODA (roughly the SADC average),

and that ODA should not represent more than 10 percent of GDP. The countries which met the per capita criteria are Angola, Congo, Mauritius, Tanzania and Zimbabwe. The countries meeting the 10 percent of GDP criteria are Angola, Botswana, Congo, Mauritius, and Zimbabwe. If the threshold were raised to 15percent then Tanzania and Zambia would also be eligible.

The "openness" of an economy may not be, strictly speaking, an important or necessary convergence criteria. However, it is important for illustrative and comparative purposes. If a country's exports are relatively low, for example, this could point to the lack of need for monetary union. Except for Mozambique, exports represent at least 20 percent of the GDP in each country. The high is Swaziland, whose exports equal 86 percent of GDP. The SADC and CMA averages are very close, 40.7 and 47.6, respectively.

7. Conclusions

As the literature shows, monetary unions themselves are not panaceas for solving economic development problems (Kenen 1969, Obstfeld 1995). In SADC the convergence criteria for a viable monetary union appears to be lacking. Of the six areas examined above, only one or two were close to convergence. Until and unless there is more convergence, the chances for a successful monetary union are low. As important, until SADC countries produce a more diverse set of goods and services that will allow increased trade with each other, reaching the goal of a monetary union remains unlikely, and perhaps even unnecessary.

In addition to the macroeconomic fundamentals discussed above, there is also a political consideration. While it is outside the scope of this paper to go into detail, the point is important enough to make: there is a political reality on the ground that indicates the smaller SADC members are afraid of South African political, economic, commercial, military and strategic hegemony. Perhaps South Africa needs a longer track record of "good neighbourness" before these concerns are laid to rest (Sparks 1992, 1993). The other aspect, of course, is whether South Africa wants to expand the CMA northward. While there are a number of commercial reasons to go with such expansion, there are the risks of the poorer performing countries causing problems for the whole. One might consider, for example, a parallel in the EU where the German Central Bank feared "importing inflation" from the high inflation EU members into the rest of the union. Additional analysis needs to be done to determine whether it would be in South Africa's interest to push for CMA expansion.

Although there has been very little official discussion on monetary integration by SADC officials, in early 2000 Dr Baledzi Gaolathe, Botswana's Minister of Finance was asked the specific question: "What about the issue of monetary union? Do you think that's a realistic prospect that SADC should be thinking about?" His reply is below:

" I don't think that monetary union is a priority at this stage, because monetary union is one of the last things in an

economic community that you deal with. Again looking at the European Union, it is only recently that they achieved monetary union. Even then, you are having countries like the United Kingdom which are still hesitating. So, I think in the case of SADC, we still have a long way to go. We have something like 11 Protocols that we still have to implement fully. For instance there is the Trade Protocol which is still to come into force because a number of countries are still to sign. And as you know in economic union, the movement of goods across borders and so on is very important. So the short of it is that yes, eventually we should get there, but we are still very far from the concept of creating a monetary union in SADC. We must get these other things done. But having said that, of course there are certain experiences here. There's a mini-monetary union, which involves South Africa, Lesotho, Namibia and Swaziland, to some extent, the Rand Monetary Union. Possibly those SADC countries which are not part of it, like ourselves, would be observing how that works as time goes on."

Even more importantly, on the question, should Botswana re-join CMA?

"Not at the moment, no. We don't see the question of a monetary union at the moment as a priority. But if you look at Botswana, we are slightly ahead of a number (not all) of SADC countries in liberalisation. For instance, we have removed all exchange controls. We would like to see other countries perhaps moving in that direction a bit faster than they are doing. We have seen this happening, even in South Africa – they have also been liberalising. It is just the speed at which this liberalisation is taking place in SADC. I think those are the areas that we are saying should be given greater priority." (SADC/FISCU 2000)

Nonetheless, according to SADC, one of its objectives is to, "develop policies aimed at the progressive elimination of obstacles to free movement of capital and labour, goods and services, and of the peoples of the region generally among member states." (SADC/FISCU 2000) In addition, the organization may, "develop such other activities as member states may decide in furtherance of the objectives of SADC." (SADC/FISCU 2000) This seems to leave open the door of a monetary arrangement in the future.

As van der Mewre reminds us, "In the final analysis, the appropriateness of a country's exchange rate system depends on the extent to which the level of its currency reflects the long-term equilibrium real exchange rate of the country, i.e. the exchange rate at which internal and external equilibrium exist in the economy." (Van der Mewre no date) One could add to that analysis the need to examine the external

consideration: does an expanded monetary union in southern Africa make sense?

Thus, without a significant change in the political and economic climate in southern Africa, it is unlikely that SADC will soon join CMA. However, in the near term some states, perhaps Botswana, Mauritius or Seychelles, may individually negotiate joining. This paper calls for further study of such individual potential members to estimate the costs and benefits of unilateral decisions to join CMA. In reality, if CMA expands, it will probably be gradually, one new member at a time.

Notes

1. Personal communication with R Mowatt, SADC Finance and Investment Co-ordinating Unit (FISCU) Republic of South Africa .

2. See Table 1.

3. Other states in the area, eg. Madagascar and Comoros, are excluded since they are not SADC members.

4. Personal communications with R Mowatt, FISCU, and www.sadcreview.com.

5. Information provided by the Sector Coordinator, Finance & Investment Programme, Republic of South Africa.

6. While it is clear that these efforts fall short of developing a monetary union, it clearly demonstrates the need for closer monetary policy coordination.

7. The Common Monetary Area Commission convenes at regular intervals or at the request of any member. A technical committee also meets every quarter to solve problems of a technical nature encountered by members.

8. For membership in each organization, refer to Figure 1 above.

9. The EU, for example, did not have to concern itself with the levels of official development assistance.

References

Artis, M. "One Market, One Money: An Evaluation of the Potential Benefits and Costsof Forming an Economic and Monetary Union", Open Economics Review, 2, 1991.

Bayoumi, T. "A Formal Model of Optimum Currency Areas", *IMF Staff Papers*, 41, 1994.

Bayoumi, T. "Operationalising the Theory of Optimum Currency Areas", in Baldwin, R, Cohen, D and Sapir, A (eds), *Market Integration,Regionalism, and the Global Economy*. Cambridge: The Cambridge University Press, 1999.

Brown, M. "Exchange Controls in South Africa", *FP Economic Research*, June 1995.

Coilings, D. "The Rand Monetary Area". International Monetary Fund DM/83/6, February 1983.

COMESA."Monetary and Fiscal Co-Operation in COMESA", www.comesa.int/fiance/econmph.

Commission of Inquiry into the Monetary System and Monetary Policy in South

Africa: *Exchange Rates in South Africa*, (Interim Report), Government Printer, Pretoria, RP 112/1978.

Connolly, M. "The Choice of an Optimum Currency Peg for a Small, Open Country", *Journal of International Money and Finance*, Volume 1, 1982.

Commission of Inquiry into the Monetary System and Monetary Policy in South Africa. *The Monetary System and Monetary Policy in South Africa*, Government Printer, Pretoria, RP 70/1984.

Cooper, R. "Toward a Common Currency?", *International Finance*, 2000.

Cukierman, A. *Central Bank Strategy, Credibility and Independence: Theory and Evidence*. Cambridge: MIT Press, 1992.

De Grauwe, P. *The Economics of Monetary Integration*. Oxford: Oxford University Press, 1997.

Elbadawi, I A. "The Impact of Regional Trade/Monetary Schemes on Intra Sub-Saharan Africa Trade", AERC Research Workshop (Harare, Zimbabwe), 1995.

Eichengreen, B. *International Monetary Arrangements for the 21st Century*. Washington, DC: Brookings Institution, 1994.

Emerson, M, Gros, D, Italianer, A, Pisani-Ferry, J, Reichenbach, H. One Market, *One Money: An Evaluation of the Potential Benefits and Costs of Forming an Economic and Monetary Union*. Oxford: Oxford University Press, 1992.

Europa Publications. *Africa South of the Sahara 2000*. London: Europa Publications 1999.

Fajgenbaum, J, R Sharer, K Thugge and H DeZoysa. "The Cross Border Initiative in Eastern and Southern Africa", International Monetary Fund, 1999.

Fine, J and S Yeo. "Regional Integration in Sub-Saharan Africa: Dead End or a Fresh Start?" AERC Project Regional Integration and Trade Liberalization in SSA (Nairobi, Kenya), 1994.

Fisher, S. "Seigniorage and the Case of a National Money", *Journal of Political Economy*, 90, 1982.

Flood, R and P Garber. "Collasping Exchange Rate Regimes: Some Linear Examples", *Journal of International Economics*, August 1984.

Foroutan, F and L Pritchett. "Intra-Sub-Saharan Trade: Is It Too Little?", Policy Research Working Paper 1225, World Bank, 1993.

Frankel, J and Rose, K, "The Endogeneity of the Optimum Currency Area Criteria", *NBER Working Paper* 5700, 1996.

Garber, P and M Taylor. "Sand in the Wheels of Foreign Exchange Markets: A Skeptical Note", *Economic Journal*, January 1995.

Garner, J. "An Analysis of the Financial Rand Mechanism", Research Paper No9, Centre for the Study of the South African Economy and International Finance London School of Economics, 1994.

Gidlow, R.M. "Forward Exchange Policy in South Africa: Guidelines for Reform", *The South African Journal of Economics*, Vol. 53, No. 3, September 1985.

Giordano, Francesco and Persaud, Sharda. *The Political Economy of Monetary*

Union. London: Routledge, 1998.

Green, RH and A Seidman. *Unity or Poverty: The Economics of Pan- Africanism*. Baltimore: Penguin Press, 1968.

Guma, X.P. "The Rand Monetary Area Agreement", *The South African Journal of Economics*, Vol. 53, No. 2, June 1985.

Gros, D. "A Reconsideration of the Optimum Currency Area Approach: The Role of External Shocks and Labor Mobility", *Center for European Monetary Studies Working Papers*, 101, 1996.

Holden, M. "Economic Integration and Trade Liberalization in Southern Africa", *World Bank Discussion Paper* Number 342, 1996.

Holden, Merle. "South African Economic Integration", *World Economy*, June 1998, volume 21, issue 4.

Horwood, C.P.F. "Progress in the Implementation of the New Exchange Rate System", Statement in the House of Assembly, May 1979.

The Economist. "Southern Africa Dreams of Unity". 9/2/95, p35.

International Monetary Fund. "Initiative for Promoting Cross-Borrder Trade, Investment, Payments in Eastern and Southern Africa". Washington, DC: IMF, SM/94/91, 1994.

International Monetary Fund. "The Cross-Border Initiative in Eastern and Southern Africa" SM/96/94. Washington: International Monetary Fund, 1996.

International Monetary Fund. "Trade Liberalization in Fund-Supported Programs" EBS/97/113 Washington: International Monetary Fund, 1997.

International Monetary Fund. *International Financial Statistics Yearbook*. Washington, D.C.: International Monetary Fund 2000.

International Monetary Fund. "Revenue Implications of Trade Liberalization" SM/98/254 Washington: International Monetary Fund,1998.

Ishiyama, Y. "The Theory of Optimum Currency Areas: A Survey", *IMF Staff Papers*, 22, 1975.

Jenkins, C and L Thomas. "Is SADC Ready for Closer Monetary Integration?", Arne Ryde Symposium, Lund, Sweden, 1996.

Kahn, B. "Capital Flight and Exchange Controls in South Africa", Research Paper No. 4, Centre for the Study of the South African Economy and International Finance London School of Economics, 1991.

Kawai, M. "Optimum Currency Areas", in Eatwel, J, Milgate, M and Newman, P (eds). *The New Palgrave: A Dictionary of Economic Theory and Doctrine*. New York: Macmillan, 1987.

Kenen, P. "The Theory of Optimal Currency Areas: An Eclectic View". In Mundel, R and A Swoboda, eds, *Monetary Problems of the International Economy*. Chicago: University of Chicago Press, 1969.

McCallum, B. "Theoretical Issues Pertaining to Monetary Unions", in *NBER Working Papers Series*, October 1999.

McKinnon, R, "Optimum Currency Areas", *American Economic Review*, 53, 1963.

McLymont, R. "Regional Pact Spurs Trade", *Journal of Commerce*, December 29,

1999.

Mehran, H, et al. "Financial Sector Development in Sub-Saharan African Counties", IMF Occasional Paper Number 169, 1998.

Meijer, J.H., "Monetary Policies: The Reserve Bank's Exchange Rate Policy", Address at the GATT Conference, Fourways, 4 October 1994.

Maasdorp, G and A Whiteside. "Rethinking Economic Cooperation in SouthernAfrica: Trade and Investment", Occasional Papers, Konrad AdenauerStiftung, Johannesburg, South Africa, 1992.

Mukherjee, N and S Robinson. "Southern Africa: Economic Structure, Trade and Regional Integration". International Food Policy Research Institute, Washington, DC, 1996.

Mundell, Robert A. "Currency Areas, Volatility and Intervention", *Journal of Policy Modeling* 22, 2000.

Mundell, Robert A. "A Theory of Optimum Currency Areas", *American Economic Review*, 51, 1961.

Mundell, Robert A. *Monetary Theory: Inflation, Interest and Growth in the World Economy*. Pacific Palasades: Goodyear Publishing, 1971.

Mwase, Ngila. "Economic Interation for Development in Eastern and Southern Africa", *Round Table*, October 1995, Issue 336.

Nyerere, J. "Problems of East African Co-Operation", in *Freedom and Socialism*. Nairobi: Oxford University Press, 1968.

Obstfeld, M and K Rogoff. "The Mirage of Fixed Exchange Rates", *Journal of Economic Perspectives*, Volume 9, Number 4, Fall 1995.

Obstfeld, M. and K Rogoff. "Exchange Rate Dynamic Redux", *Journal of Political Economy*, June 1995, 102.

Peterson, T and G Tabellini. "Designing Institutions for Monetary Stability", Carnage-Rochester Conference Series on Public Policy, Fall 1993, 39.

Ramos, M.: "The Development of the Forward Exchange Market in South Africa", Research Paper No. 3, Centre for the Study of the South African Economy and International Finance London School of Economics, 1991.

Ricci, L. "A Model of an Optimum Currency Area", *IMF Working Paper* WO97, 1997.

Rose, A and Engel, C. "Currency Unions and International Integration", in *NBER Working Papers Series*, October 1999.

Ross, A.A.: "The South African Forward Exchange Market", *Investment Analysts Journal*, October 1980.

Rwegasira, DG. "Economic Cooperation and Integration in Africa: Experiences and the Road Ahead", Understanding New Orders Between Old Borders Workshop, Cape Town, South Africa, 1998.

SADC. "Report by the Subcommittee on Exchange Control to the Committee of Central Bank Governors in SADC". Pretoria, South African Reserve Bank, 23 October 1998.

SADC/FISCU. *SADC Finance & Investment Sector News: December 1999-*

February 2000. Internet edition: www.finance.gov.za.

Sadeh, T. "Managing a Common Currency: Political and Cultural Preferences", paper presented to *Conflicts in Monetary Unions*, Universitat Gesamthoschschule Kassel, Kassel, Germany, 2001.

Schelkle, W. *"The Optimum Currency Area Approcah to European Monetary Integration: A Framework of Debate or Dead End?",* paper presented to *Conflicts in Monetary Unions*, Universitat Gesamthoschschule Kassel, Kassel, Germany, 2001.

Schnitzer, MC. *Comparative Economic Systems (8th Edition)*. Cincinnati: South Western College Publishing, 2000.

Sparks, D. "Economic Trends in Africa South of the Sahara, 2000", in *Africa South of the Sahara 2001* (30th Edition) London: Europa Publications, Sparks, D. "The Economic Consequences for Southern Africa after Apartheid: The Regional Costs and Benefits", in *Economic Digest, Quarterly Journal of the Economics Association of Swaziland,* Volume 3, Number 2, June 1992.

Sparks, D. *South Africa's Economic Relations with Africa: A Case Study of Malawi.* Unpublished PhD Thesis, School of Oriental and African Studies, University of London, 1985. (Available at Senate House Library, University of London.)

Sparks, D. "The Peace Dividend: Southern Africa After Apartheid", in *Indicator South Africa*, Volume 10, Number 2, Autumn, 1993.

Stahl, HM. "Hard Core Tariffs on Intra-SADC Trade and Their Elimination in the Context of the Implementation of the SADC Trade Protocol", Trade and Industry Policy Secretariat, Johannesburg, South Africa, 1997.

Stals, C.L. "Integration of the Money Market and the Spot and Forward Exchange Market", Address to the Institute of Bankers in South Africa, 28 April 1981.

Stals, C.L. "Foreign Exchange Control in South Africa", Address to the Johannesburg Branch of the Economic Society of South Africa, 17 May 1983.

Stals, C.L. "The South African Foreign Exchange Market in Perspective", Address at a Conference on Foreign Exchange, Johannesburg, 23 May 1985.

Tavlas, G. "The 'New' Theory of Optimum Currency Areas", *The World Economy*, 33, 1993.

Tower, E and Willet, T. *The Theory of Optimum Currency Areas and Exchange Rate Flexibility*. Princeton: Princeton University Press, 1976.

UN/ECA. *Treaty for the Establishment of the Preferential Trade Area for Eastern and Southern Africa* (Addis Ababa) 1981.

UN/ECA. "Exchange Rate Management Policies in Africa: Recent Experience and Prospects". www.un.org/Depts/eca/confr/6finmin/experm1.html.

Van der Merwe, E.J.: "Forward Exchange Cover Transactions of the South African Reserve Bank", *Quarterly Bulletin*, South African Reserve Bank, March 1990.

Van der Merwe, E.J. "Exchange Rate Management Policies in South Africa: Recent

Experience and Prospects". Study prepared for the UN Economic Commission for Africa, (no date) http://www.un.org/Depts/eca/confr/6finmin/experm2.htm**.**

Van der Merwe, E.J. and de Clerck, J.N. "Activity in the South African Foreign Exchange Market", *Quarterly Bulletin*, South African Reserve Bank, September 1990.

Van der Merwe, E.J. "Exchange Rates and Exchange Rate Policy in South Africa", Address to the Käpstädter Wirtschaftsrunde, 7 November 1990.

Wickham, P.: "The Choice of Exchange Rate Regime in Developing Countries", *IMF Staff Papers*, Vol. 32, No. 2, June 1985.

Williamson, J. "A Survey of the Literature on the Optimal Peg", *Journal of Development Economics*, Volume 11, pp.39-61, 1982.

World Bank. "Inter-regional Trade in Sub-Saharan Africa", Trade and Finance Division, Africa Region, Washington, DC, 1991.

World Bank, *Global Development Finance, Country Tables,* 2000

EMERGING MARKETS AND FRAGILITY
(LATIN AMERICA AND MEXICO)

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Abstract. Emerging markets have been characterized by expansion, deepening, and concentration, with new competition and a new market distribution. The behavior of capital flows, far from representing net resources with which to finance economic activity, has sustained a net outflow of funds from these economies. The relationship between financial deregulation and banking crises creates the conditions for financial fragility in which the rate of growth of productivity and employment decline. Deregulation and successive financial crises have destroyed local currencies as well as the financial structures that sustained the conditions that previously allowed productive capacities to expand.

1. Changes In Financial Markets

Since the breakdown of the Bretton Woods international agreements, foreign-exchange and interest-rate instability in the major financial markets has led to genuine structural changes in those markets; nevertheless, there is still no sign of a new financial structure capable of providing the stable long-term financing essential for the expansion of production capacities. In this period, financial markets have been awash in growing competition, within the framework of deregulation and financial liberalization and without proving more efficient in financing productive activity or in promoting higher economic growth rates (Aglietta 1995). Liberalized financial markets have been unstable, and financial fragility has induced recurrent financial and banking crises in more than 130 countries. "Depressed" markets, which have now become liberalized markets, have not led to increased savings or to investment and growth or to lower real interest rates, either for the largest economies or for the economies of so-called "emerging markets" (Correa 1999). The structural financial changes that have occurred over the past 30 years include the following:

1. Exponential growth of liquidity in private hands. Accelerated growth of global financial assets, doubling and tripling the annual rate of growth of worldwide production and trade (Aglietta 1995).

2. The shortening of terms for deposits and financial instruments has been accompanied by the emergence of an active secondary market in securities, leading to a blurring of the distinctions between the various concepts of money supply. "In particular, 'money' has been less distinguishable from the other

liabilities of financial intermediaries" (OECD 1995).

3.   Bank funds have been converted into liabilities yielding returns and originating mainly in the money markets; there has been a growing securitization of credit, together with an enormous increase in the off-balance-sheet operations of banks, particularly involving the use of derivatives and the management of, and trade in, securities; all of this has changed bank income from one based on margins to one based on commissions.

4.   The dividing lines, where they existed, between deposit banks and investment banks have gradually disappeared; at the same time, activity in the money and capital markets has increased, while credit activity has declined in the different markets, especially in the United States.

5.   Investment-fund activity has increased, with financial assets being highly concentrated in the hands of a few managers who shift around large volumes of assets in short periods of time, destabilizing currencies and economies as powerful as that of the United Kingdom, in 1992, and as small as those of Mexico, Thailand, Indonesia, and the Republic of Korea.

6.   The volume and the size of financial transactions have grown rapidly; the increasing number of off-balance-sheet operations has tightened the links between financial intermediaries, a few of whom dominate the markets, and the trend towards the formation of global financial mega-consortia has been strengthened.

7.   The problems of financial supervision have grown increasingly complex; at the same time, risk-level assessment and intervention by financial authorities have become more difficult, despite the organized intervention of the Bank for International Settlements, the International Monetary Fund, and the World Bank.

8. Government debt has become one of the most important bases for the growth of financial assets, while the interest rates offered by these instruments are the chief means used to pursue exchange-rate and capital-flow objectives so as to finance deficit positions.

9.   In general, public budgets have supported all kinds of financial assets remuneration, including by financial intermediaries facing situations of stress or bankruptcy, which has limited the capacity to stabilize public expenditures.

10.   The growing inability of nation-states to regulate the activity of the major financial consortia in order to oversee the risk levels of their various operations casts doubt on financial authorities' ability to control a systemic financial crisis.

11. The propagation and deepening of financial crises has been restrained by growing liquidity levels generated by banks and the intermediaries themselves.

Believing that all these changes in the financial markets are irreversible is as unrealistic as attempting to ignore the profound changes that have occurred in the ownership of assets and in monopolistic competition. As the history of finance has shown on other occasions, it is possible to return to regulated financial systems in which the state takes back its capacity to control and supervise financial markets and

intermediaries. For now, financial systems are part of the as-yet unconcluded processes of the new economic divvying up of the world; hence, the growing fragility of markets may continue, as long as foreign-exchange and financial formulas are not devised.

Since the breakdown of Bretton Woods and the disappearance of fixed exchange rates and of the dollar-gold exchange standards, neither national governments nor international financial bodies have found a solution to the problem faced by both developed and developing countries in finding a path to growth that will eliminate the continual financial, stock-market, and banking crises into affecting an increasing number of countries. There is a pressing need for financial markets to be given a new institutional and regulatory framework capable of limiting financial instability and the damage to output capacity, growth, and job creation.

2. Concentration Within Financial Markets

Financial intermediation has become rapidly integrated in recent years, as real mega-consortia that manage all kinds of financial services with increasing power in national and international markets have been formed. It is estimated that during the nineties, more than 7,300 mergers and takeovers were carried out in the financial sector, with a total value of 1.6 trillion dollars (BPI 2001). This amount was just over two-thirds of the foreign debt of developing countries in 2002, and three times the amount this debt represented in 1980.

In the final years of the last decade, the wave of conglomerations intensified. In recent years, the number of conglomerations increased with the mergers between BankAmerica and NationsBank, Chase Manhattan and Chemical Bank, and Citicorp and Travelers, also the financial consolidation in Japan, with the merging of Fuji Bank-Dai-Ichi Kangyo-Bank-Industrial of Japan, Sanka Bank-Tokai-Asaki Bank, Bank of Tokyo, and Mitsubishi Bank; and in Europe, with the emergence of UBS-Swiss Bank Corp. (Berger 1999). In the United States, the dynamics of integration encouraged the Gramm-Leach-Bliley reform, which made possible, for the first time since the thirties, the integration—through financial holding companies—of financial intermediaries as different as commercial banks, investment banks, and insurance companies. Hence, we might ask *where* national financial regulation and supervision have achieved efficiency within the competitive framework of this conglomeration in financial services.

Many countries' banking systems are dominated by a few large banks. The share of total bank assets held by the five largest banks is around about 40% in Argentina, 50% in India, 60% in Thailand and Mexico, 27% in the United Sates, 30% in Japan, 20% in Germany, 70% in France, 40% in Italy and the United Kingdom, 77% in Canada, 58% in Switzerland, 78% in Australia, 72% in Belgium, 82% in the Netherlands, 48% in Spain, and 84% in Sweden. In most of these countries the concentration is higher now than it was in 1980, and during the successive financial crises it was the engine of their economic dynamism—

especially in the Asian and Russian crises—with an accelerated consolidation during the last three years of the century (BPI 2001).

Worldwide financial corporations have until now represented the means to face unexpected declines in the prices of financial assets, to transfer losses and consolidate operations in the search to increase stockholder returns, and to avoid falling into bankruptcy. At the same time, these financial conglomerations are beginning to form a new structure of financial power operating on a global scale, in addition to a new market structure brought about by financial crises in Latin America and Asia.

In addition, the relative global importance of large banks has changed significantly. Thus, whereas in the early seventies, seven of the ten largest banks in the world were, in terms of the size of their assets, American, towards the mid-eighties, nine were Japanese, which had displaced U.S. banks completely. As seen in Table 1, by the end of the nineties only three of these banks were Japanese and only two were American. The large growth of Japanese banks during the eighties also reflected the revaluation of the yen vis-à-vis the dollar and the presence of this currency in international markets. Nonetheless, by the late nineties, in the face of the strong dollar and Japan's deep financial crisis, Japanese financial intermediaries had reorganized their operations both domestically and in the international market, quickly losing their global position and ceding ground to financial corporations in the United States and Europe.

Table 1. *The World's Ten Largest Financial Conglomerates*
(according to assets, in billions of dollars)

Institution	Country	Assets
Mizuho Holdings	Japan	1219
Citigroup	United States	1051
Allianz	Germany	880
Sumimoto Mitsui Banking	Japan	870
Deutsche Bank	Germany	857
Mitsubishi Tokyo Financial Bank	Japan	802
Fannie Mae	United States	800
UBS	Switzerland	800
BNP Paribas	France	771
HSBC Holdings	United Kingdom	703

Source: *Business Week*, 15 July 2002

The U.S. stock market accounts for nearly 50% of the value of all stock markets throughout the world, as can be seen in Table 2. Still, we must consider the financial structure of the market, in contrast with the banking financial structures that characterize other of the largest economies, in which financial conglomerates'

participation in the stock market is not as important. The assets of institutional investors in the United States represent 54% of the global market, but U.S. banks account for only 29% of total bank assets. Megamergers, together with the expansion of U.S. financial conglomerates' relative share of "emerging markets," will likely lead to a new positioning of these intermediaries within a few years.

The segmentation of financial intermediaries in the United States resulted from regulations enacted in the thirties that imposed geographic and operational restrictions on them.[1] Nevertheless, starting with successive financial reforms from the mid-eighties on, and mainly during the nineties, the entire sector has become quickly integrated. The deregulatory steps taken include the creation of subsidiaries under Section 20, starting in April 1987, and the slow repeal of the McFadden Act in several U.S. states. This process culminated November 1999, with the passage of the Financial Services Modernization Act. By 2001 financial holding companies (FHCs) controlled 25% of the U.S. financial market, excluding pension funds. In 1980, the 10 largest banking organizations managed 22% of the total assets all U.S. commercial banks, and by 2001, 45%; the largest 25 banking organizations increased their market control from 33% to 61% (Olson 2002).

Table 2 *The United States in the World, 2002 (percent of the world total)*

GDP	21.1
Exports	12.4
Reserves (minus gold)	4.3
Capitalization value of the stock market	50.1
Public and private debt securities	46.3
Bank assets	29.3
Bank bonds, stocks, and assets	38.1
Institutional investors' assets (a)	54
Capital flows (b)	35.8

Source: World Bank, *World Development Indicators Database*, April 2003; and International Monetary Fund, *Global Financial Stability Report*, March 2003.
(a) Year 200
(b) Entry of capitals

During the nineties, major investment banks developed an important internationalization strategy, staking out positions in the most important securities markets as well as those with the best prospects for growth. A small group of corporations is dominant is several areas; the five largest ones control more than 50% of the underwriting market in the United States as well as in Europe (BPI 2001).

Also during the nineties, the exponential growth of derivative products, the growing presence of non-bank financial intermediaries, the strong dollar, and the

process of greater concentration of consortia allowed the United States to recover its dominant position in the international financial market. What to a large extent prevented the outbreak of financial crisis in the late eighties was the extraordinary growth of international liquidity achieved through the development and penetration of derivative products. The market for these products resumed fast growth during the late eighties. The Bank of International Settlements estimated that the notional amount of outstanding OTC contracts stood at $141.7 billion dollars at the end of 2002. Their explosive growth partly explains the expansion of stock markets throughout the globe. In the United States, more than half of the operations in the private market are conducted by the 10 largest financial conglomerates (CCAN 2000). The large commercial and investment banks in the United States, Switzerland, Japan, France, Great Britain, and Germany are dominant, and mid-sized and small intermediaries tend to be end users.[2]

Institutional investors include mutual funds, as well as private pension funds and insurance companies. In the United States alone, it is estimated that in 1993 these investors managed assets worth more than eight trillion dollars, about 125% of GDP, and by 1996 this amount had risen to 13 trillion dollars (Farnetti 1996). Moreover, the OECD estimated that by the end of 2001 they managed assets worth more than 16 trillion dollars, despite the decrease seen that year. The expansion of institutional investors has been sustained mainly by credit securitization and the incorporation of local and foreign enterprises into capital markets, following several deregulations.

3. Capital Flows Into Developing Countries And Net Transfers

The broad financial expansion of major commercial banks throughout the world, especially U.S. banks, was channeled to toward a small group of developing countries. The limit of this expansion was marked by the 1982 foreign debt crisis. Indeed, net transfers of foreign credit (new credit minus interest payments and amortizations of principal) had been declining for years for most debtor countries.

Starting with a new wave of financial expansion in the international markets, developing economies that were net capital exporters, due to excessive foreign debt servicing during the "lost decade," once again become net recipients of resources mainly through foreign capital allocations in public and private securities in domestic markets (Correa 1992). The new financial expansion starting in the early nineties into the so-called emerging markets was sustained by financial innovation for only a few years, and by certain deregulations that allowed the renewal of institutional investors' activities. As shown in Table 3, the increasing flow of capital into emerging markets grew extraordinarily at the beginning of the nineties, as portfolio allocations and foreign direct investment (FDI) increased, with FDI participating in the privatization of public enterprises and mergers and takeovers of local enterprises.[3]

Still, capital flowed mainly among the developed countries themselves. Developing countries have participated to a small, and even decreasing degree

during the last 10 years. They accounted for only 22% of FDI flows in 1991, and in 2000 their share declined to 15%. They received nearly 12% of total FDI in 1991. By 2000 this amount had declined to 7.6%.

Nonetheless, the diversification of capital flows into developing countries, with a combination of portfolio allocations, bank credit and FDI, has not translated into a stable source of funds, because these countries' flows have varied significantly, and because the increase in FDI flows has been matched by the increase in outflows of capital, as seen in Table 4**.** Hence, these flows have not been a net source of resources, since they do not constitute positive net funds toward the small group of countries into which they enter. In any event, they have only constituted net inflows for given countries in years when they have carried out large-scale privatizations. Therefore, the volume of resources entering developing countries has been matched or even outstripped by capital outflows. The World Bank thus noted that "in the year 2000, as well as during the nineties, several capital inflows were reflected in capital outflows or 'errors or omissions' in the balance of payments."[4] These private capital flows have not translated into greater resource availability for investment and growth; in fact, they have been an attraction of profitable asset allocation of these countries by capitals coming mainly from larger economies in search of higher profits.

These markets became spaces with attractive returns, profiting from liquidity and arbitrage opportunities, and from the portfolio diversification of institutional investors, pension and mutual funds, insurance companies, stockbrokerage institutions, and investment banks. In sum, several elements should be considered:

1.   Starting with the decline in international loans during the 1980s' "debt crisis," the financial markets reactivated their expansion towards the emerging economies through stock instruments and securities involving greater liquidity and higher risk. The general use of securitization provides even direct investment greater liquidity by largely blurring the distinction between direct investment, on the one hand, and portfolio investment and FDI, on the other, in terms of the impact of portfolio investment and FDI on external accounts (Kregel 1998).

2.   Financial deregulation and liberalization in the various national financial systems took place in response to the need to increase intermediation margins and the commissions charged by national banks. Financial innovation and the growing presence of intermediation and institutional investors are closely linked to the marketability of enterprises, to increased private debt securitization, and to privatizations with specific financial purposes.

3.   Globally, a number of the countries are increasing their share of capital flows through portfolio investments abroad and FDI; this increase and the yields from these flows greatly exceed these countries' economic growth. Asymmetry is thus generated between the economic growth rate and the rate of return on financial investments.

4.   During the nineties, developing countries overall, despite their growing

presence in global production and trade, had a declining share of private capital flows, in securities issues, bank credit, and FDI.

4. Banking Crises

Banking crises have arisen during the last fifteen years hand-in-hand with international financial deregulation both in developed and in developing transitional countries. Crises occur when the active management of bank balances comes up against currency mismatch problems; when credit is concentrated in certain sectors (for example, oil or real estate) or companies; when interest rates are high during periods of lower economic growth; when there are high leverage levels resulting from rapid privatization or takeovers; or where there is a combination of these factors (Correa 1994; Girón 1998; Girón and Correa 2002).

Recent bank crises have resulted from the deregulation and liberalization of national financial systems and from increasing competition in the financial sector.[5] They may be preceded by monetary crises, foreign-debt crises, stock-exchange crises, or sectoral crises. Perhaps the most noteworthy crises of the last few years have been the bank failures in Thailand, Indonesia, the Republic of Korea, and Japan, as well as those in Scandinavia in the early nineties and in Latin America since the middle of the decade, for example, in Mexico, Argentina, Brazil, and Venezuela. Nor should we overlook the failure of the savings and loans associations in the United States during the 1980s, which cost the Federal Reserve 500 billion dollars, or the bank crises in Spain, the United Kingdom, and Chile during the same period.

Many of the recent banking crises stem largely from greater competition in markets that have become increasingly integrated at the global level, and from the participation of non-bank intermediaries. Developing countries and transitional economies have been beset, however, by comparative disadvantages, inasmuch as their sources of liquidity are associated with relatively weak monetary standards. In these countries, the differential maintained in interest rates in order to achieve a degree of currency stability tends to increase the foreign-exchange component of bank liabilities, and even of corporate liabilities. An influx of short-term capital, attracted by interest rate differentials and relative currency stability, quickly abandons the local market, precipitating a monetary imbalance in the banks and non-bank corporations' inability to pay.

The new global competition that accompanies financial deregulation has turned debtor countries' traditional financing and refinancing methods towards credit securitization. At the same time, the stock exchange listing and privatization of firms has provided a profitable opening for the expansion of non-bank financial services.

The soundness or and fragility of a banking system results from

Table 3. *Long-Term Capital Net Flow into Developing Countries 1990-2000*
(billions of dollars)

	Total	Official Flows[b]	Private Flows	Capital Markets[c]	Foreign Direct Investment
1990	98.5	55.9	42.6	18.5	24.1
1991	124.2	62.2	62	26.4	35.7
1992	153.7	54.3	99.4	52.2	47.1
1993	220.9	53.4	167.6	101	66.6
1994	222.4	46	176.4	86.3	90
1995	260.2	54.1	206.1	99.3	106.8
1996	306.6	30.3	276.2	145.5	130.8
1997	341.4	40.7	300.7	128.2	172.5
1998	336.7	53.4	283.3	105	178.3
1999	271.8	47.4	224.4	40.1	184.4
2000[a]	261.1	35.3	225.8	59.1	166.7
2001[b]	196.5	36.5	160	-8.3	168.2

Note: Refers to contracting of net debt amortizations, and to FDI net of
disinvestment. Hence, these figures are in some cases considered "net flows."
a: Preliminary   b. Estimate: c: Includes debt flows and portfolio flows
Source: World Bank, *Global Development Finance*, 2002

Table 4. *Capital Flows to Developing countries 1991-2000* (billions dollars)

	1991	1992	1996	1997	1998	1999	2000a
Origin of funds[b]	143.1	194	354.4	358.7	283.7	246.2	299.3
Net long-term flows	123	155.8	211.2	342.6	334.9	264.5	295.8
Net short-term flows	20.1	38.2	43.2	16.2	-51.2	-18.3	3.5
Use of funds	143.1	194	354.5	358.7	283.7	246.2	299.3
Current account deficit	76.5	85	114.5	101.3	46.1	-26.8	60.3
Change in reserves	49.7	16	89.6	29.1	49	26.2	53
Capital outflows and errors and omissions	19.9	93.1	150.3	228.3	188.5	246.9	306.6

a: Estimate
b: Refers to contracting of net debt and amortizations and FDI net of
 of disinvestment. Hence, these figures are considered, at times, "net" capital
flows.
Source: World Bank. Global Development Finance, 2001.

macroeconomic and structural policies that allow, or fail to allow, a tight correlation between the financial sector and the productive system. In Latin America, trade and finance liberalization has not succeeded, precisely because, rather than leading to increased investment and growth rates, it has increased financing costs and has brought about bank and financing crises. Therefore, regardless of the adequacy of their regulation and oversight, banking systems are vulnerable to macroeconomic changes. They are thus exposed to changes in the demand for the national currency or to foreign capital flows, undermining domestic banks' ability to meet their obligations.

The fiscal cost of bank restructuring or bail-out has been very high vis-à-vis gross domestic product; in the Republic of Korea alone it represents 33.0% of GDP; in Japan, 31.0%; and in Mexico, between 12 and 15%. However, banking crises also exact a high cost: in addition to the fiscal cost of restructuring the financial sector there is the effect of this process on the level of economic activity, as well as the inability of the financial markets to function efficiently for a long period.

The management and resolution of the bank crises in both Asia and Latin America have scarcely begun. The various measures taken by governments are aimed, in accordance with IMF guidelines, at declaring bankrupt certain banks identified as insolvent, at guaranteeing deposits (so far, to an unlimited extent), and transferring the cost of bank bail-outs to public funds. All of this is accompanied by the reform of oversight institutions within the legal framework so as to pave the way for efficient bankruptcy control and reduce deposit-insurance coverage. The participation of nation-states in the ownership of bank intermediaries is intended in any case to be temporary (via bridge banks), thus permitting the speedy repurchase of already restructured banks by solvent banks, chiefly foreign. Progress is likewise being made towards setting up receivership firms along the lines of the liquidation of savings and loan associations in the United States, which will enable rapid change in the ownership of firms facing insolvency.

History shows that banking crises are very slow to be resolved. The economic capacity to cope with a volume of liquid assets in the form of deposits tied to loans to insolvent economic operators takes a long time to acquire and may entail sweeping structural adjustments. In any case, monetary austerity makes it more difficult to deal with these banking crises and causes borrowers and the banks themselves to become insolvent. The fiscal burden entailed by bank bailouts ties up a substantial and growing portion of public budgets already depleted by recession.
In Mexico, for example, the positioning of foreign banks in the market is geared toward corporate services, particularly consumer credit and investment funds. Foreign banks' profitability will depend both on the expansion of their share of the corporate market and on their share of the foreign-exchange and money markets. These banks have a growing presence, particularly as providers of foreign-currency to local banks, thus establishing themselves as a determining factor in the cost of financing in both national and foreign currency. Domestic banks are thus not only

yielding growth on the local markets but also losing their power to impose their own strategy for managing balance sheets in that market.

The risk of losing domestic control over the payment system thus arises from two factors: first, the inability of local banks to restore the payment capacity of insolvent bank borrowers and, second, the larger number of foreign financial intermediaries who gradually impose their own margins and cost structure on the operation of the banking system as a whole.

Financial opening and liberalization in economies such as those known as "emerging economies," in the economies of countries in transition, or even in developed economies like Japan jeopardize monetary sovereignty (De Brunhoff 1996; Kregel 1996).

The recent international financial crisis and the financial bankruptcy of Argentina underscore the inability of local financial authorities to cope with such contingencies and the need to have recourse to the United States Federal Reserve and International Monetary Fund as lenders of the last resort.

Recurrent financial and bank crises have been deteriorating, if not bankrupting, the cohesion of national productive spaces; financing terms are therefore subordinated to the dynamics of the international financial markets, particularly to the U.S. dollar, and the domestic reference in terms of earnings and prices is linked to it.

The current opening and financial deregulation represent for several countries not only the end of the loss of sovereignty and of control over monetary policy, but also, and especially, the loss of the capacity to use surpluses, to move resources, and to expand credit for accumulation. Therefore this incapacity becomes an economic and political issue, when financing of accumulation is conducted from another political space.

Notes

1. In 1994, bank assets accounted for 23% of total financial assets in the United States, while in Japan and Germany bank assets accounted for 79% and 77% of all assets, respectively. In 1993, US share in investment funds reached almost 50%. Considering bank assets as well as assets managed by funds, the United States held that year 21% of the global market, surpassed only by Japan, with 24%, whereas Germany's share was 4.3% and that of France and the United Kingdom was 6.8% and 3.6%, respectively (Barth, 1996).

2.   The high concentration of derivatives has been noted for years. Fifteen members of the International Swaps and Derivatives Association accounted for 93.6% of the derivates activity of commercial banks. Of these 15, 6 (Banker Trust, Bank of America, Chase, Chemical, Citicorp and Morgan) are described as the "ruling world derivatives," because they accounted for 89.5% of the derivatives held by the 15. One study found that U.S. banks (as end users as well as intermediaries) have weak capital positions, large assets growth, that they pay a higher portion of their yield as dividends, and that they use more notes and bonds to fund assets (Sinkey, Hiles and

Carter, 1995, p. 2). There is a "high concentration in derivative activities. Not more than 50 world institutions currently dominate the market, with the bulk of activity being carried out by a much smaller number" (Witschi and Hozler, 1995, p. 5).

3.   According to the World Bank, the 10 countries that received the largest amount of FDI from 1991 to 2000 were: China, Brazil, Mexico, Argentina, Malaysia, Poland, Chile, Korea, Thailand, and Venezuela. Those that saw the largest number of mergers and acquisitions during this period were Brazil, Argentina, Mexico, Korea, Chile, the Philippines, Poland, South Africa, Venezuela and China (World Bank, 2001). On the tight relationship between FDI and privatization processes, see Vidal (2001).

4.   And the WB report goes on to point out that "[e]rrors and omissions show the inability of the international financial statistics to identify a significant part of capital transactions" (World Bank 2001, p. 34).

5.   Even the International Monetary Fund pointed out in a recent study that banking crises during the last ten years, among them the Mexican and Asian crises, can be explained by financial deregulation and liberalization processes context as well as the participation of international capital flows and financial innovation (International Monetary Fund 1998).

References

Aglietta, M. 1995. *Macroéconomie financière.* Ed. La decouverte, Paris.

Barth, R. J. et. al. (1996) "Commercial Banking Structure, Regulation and Performance: An International Comparison," paper presented at the International Trade and Finance Association's Sixth International Conference, May, San Diego, California.

Berger, A. 1999. The Integration of the Financial Service Industry: Where Are Efficiencies?, in SSRN, on-line

Chesnais F. Coord. 1996. *La mondialisation financière.* Syros, Paris.

Correa, E. 1992. Una nueva etapa del endeudamiento de América Latina," *Economía Informa* 208, Aug.- Sept.

Correa, E. 1994. Reforma financiera y cartera vencida," *Economía Informa* 229, May-June, 1994, Facultad de Economía, UNAM, México.

Correa, E. 1999. Liberalización y crisis financiera, *Revista Comercio Exterior*, vol. 49, 1, Mexico, January. Banco Nacional de Comercio Exterior.

De Brunhoff, Suzanne. 1996. L'Inestabilité monétaire internationale, coord. Francois Chesnais, in *La mondialisation financière*. Syros, París.

Farnetti R. 1996. Le rôle des fonds de pension et d´investissement collectifs anglo-saxons dans l'essor de la finance globalisée, coord. François Chesnais, in *La mondialisation financière*. Syros, París.

Girón, A and E. Correa. 2002. *Crisis y futuro de la banca en México*. Ed. Miguel Porrúa-UNAM.

Girón, A. 1998. Crisis Financiera del Sudeste Asiático: Mutaciones financieras y crisis Bancarias, *Comercio Exterior*, Mexico.

International Monetary Fund. 1998. *World Economic Perspectives,* Washington.

International Settlement Bank. 2001. Group of Ten. *Consolidation in the Financial Sector*. January, www.bis.org.

Kregel J. 1998. Flujo de capitales, fragilidad e inestabilidad financiera en el desarrollo económico, coord. Girón A. and Correa E., in *Crisis financiera: mercado sin fronteras*. Ediciones El Caballito, Mexico

Kregel J. 1996. Some Risks and Implications of the Financial Globalization for National Policy Autonomy," *UNCTAD Review*, Geneva.

Olson, M. 2002. Observations on the Evolution of the Financial Services Industry and Public Policy," Center for the Study of Mergers and Acquisitions, University of Miami School of Law, Sixth Annual Institute on Mergers and Acquisitions, Miami Beach, Florida, February 7, on-line.

Organisation for Economic Co-operation and Development. 1995. *The New Financial Landscape*, Paris.

Sinkey J., E. Hiles., and A. Carter. 1995. The Determinants of Hedging and Derivatives Activities by U.S. Commercial Banks. American Finance Association Meeting, Washington.

Sunkel, O. and O. Paz. 1970. *El Subdesarrollo Latinoamericano y la Teoría del Desarrollo*. Siglo Veintiuno Editores, Mexico.

Thompson, G. and Paul Hirst. 1996. *Globalization in Question*, London: Blackwell.

United States General Accounting Office. 1996a. *Bank Oversight Structure*, Washington.

United States General Accounting Office. 1996b. *Financial Derivatives*, Washington.

Vidal, G. 2001. *Privatizaciones, fusiones y adquisiciones*. Ed. Anthropos-UAM, Barcelona.

Witschi D. and S. Holzer. 1995. The Rise of New Markets—Some Characteristics, *Economic and Financial Prospect*, Swiss Bank Corporation. Special. Geneva.

World Bank. 2001. *Global Development Finance*, Washington.

ECONOMIC AND TRADE ASYMMETRIES

Trade Liberalization And Productivity Growth: Some Lessons From The Mexican Case

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Abstract. Applying the most recent methodology for explaining economic growth differences across countries, see Barro (1997), education and infrastructure have been considered relevant in explaining productivity growth differences in Mexican urban manufacturing , see de León (1999). In this article, I evaluated whether there is a significant change in the relevance of these variables under trade liberalization. In particular, I evaluated the hypothesis that trade liberalization would promote productivity growth in the northern cities as result of the dynamic effect of trade given that these cities are close to the new central market for Mexican manufacturing and the lost of relevance in the previous accumulated growth factors (Livas y Krugman, 1992 and Hanson, 1994). In contrast to that hypothesis, I observe that urban manufacturing close to the U.S.A. did not show a better performance than the rest of the cities as expected and that accumulated growth factors, such as education and infrastructure are still relevant in explaining productivity growth across urban manufacturing in Mexico.

1. Introduction

How does trade liberalization affect productivity growth across regions? In this article, I study the effects of economic integration with the United States on productivity growth in Mexican urban manufacturing within the framework provided by the new growth empirics (see, for instance, Barro, 1997). That international trade causes an increase in productivity growth in sectors or firms involved in trade is a basic insight of trade theory. However, the effect of trade on the spatial economic performance is not clear. Economists have begun to pay closer attention to regional economic growth patterns in order to understand how the transition to an open economy affects local economic growth.

The basic theme of recent economic growth literature is that externalities are related to the productivity of firms in a location in two ways: i) to the facilities for acquiring knowledge or skills due to the extension of the market, and ii) to the previous local accumulation of resources related to productivity growth. According to the type of growth factors involved in these externalities I call the first type of effect, "*trade-induced-growth-factors",* and the second ones *"localized* endogenous growth factors".

The *"trade-induced-growth-factors*" (**TIGF**) are the most familiar kind of factors that underlie the explanation of the positive effect of trade on productivity growth. According, Adam Smith, for instance:

"By means of [foreign trade], the narrowness of the home market does not

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hinder the division of labor in any particular branch of art or manufacture from being carried to the highest perfection. By opening a more extensive market for whatever part of the produce of their labor may exceed the home consumption, it encourages them to improve its productive powers." (Smith, 1776, vol. 1, p. 413, quoted from Skott and Ros, 1997).

For more recent explanations on economic growth and trade liberalization, See Romer (1986 and 1990), Grossman and Helpman (1991), and Young (1991). In most of these explanations, growth is related to market extension.

"*Localized endogenous growth factors*" (**LEGF**) are related to factors that "complement" physical capital, such as human capital public as well as infrastructure that generate a technological externality that affects productivity growth positively.

Most empirical studies have evaluated the relationship between trade liberalization and productivity growth based on the first set of externalities, the "trade-induced-growth- factors" (**TIGF**), see Edwards (1995), but in any case, there has been no conclusive research that includes both growth factors. I argue in this article that the explanation of the trade effect on productivity growth is not conclusive because of the absence of the **LEGF** in the previous works. Some studies, such as Hanson (1994), have looked into this relationship but for different reasons, as shown later in this article, they have not been satisfactory.

Recent changes in Mexico's trade policy make the country an ideal case study. In 1985, after four decades of import-substitution industrialization, Mexico began to open its economy to trade. The government enacted reform swiftly, eliminating most trade barriers in the following three years. Mexico's location in North America makes trade liberalization equivalent to economic integration with the United States. For Mexican firms, proximity to foreign markets means proximity to the U.S. market. Yet, Mexico's closed-economy main industrial centers are located far from the United States. Since the 1950's, manufacturing capacity has been concentrated in the country's interior around the largest cities such as Mexico City, Guadalajara and Monterrey. While foreign-market access lures firms to the Mexico-U.S. border, the existing pattern of growth productivity due to "*localized growth factors*" works against this shift.

In this article, I estimate the change in productivity growth across urban manufacturing before and after trade reform as a function of trade related and localized growth factors, as well as other control variables. I define *"trade-induced-growth-factors"* as the effect of the location of a particular urban manufacturing on the northern Mexican border. I have included educational attainment and infrastructure within the *"localized growth factors"*. If trade-related-growth-factors matter, I shall observe that productivity growth will be higher in cities close to the United States. If localized factors matter, I shall observe that productivity growth will be higher in those with higher education attainment and more public infrastructure.

Section 2 in this article reviews the empirical and theoretical context of growth theory, trade theory and economic geography. Section 3 then describes the

empirical model that will be used to explain the impact of trade liberalization on productivity growth in urban manufacturing. In Section 4, the results of the empirical analysis are reported. Section 5 shows a sensitivity analysis that complements the previous results, while Section 6 present the main findings of the article.

2. Empirical and Theoretical Framework
In de León (1999), I reviewed how the literature on economic growth has been developed in explaining differences in productivity growth among cities or regions. In this article, trade liberalization is introduced and some implications for the Mexican case will be explored. More specifically, I explore how differences in urban economic growth can be affected, taking into consideration transportation costs and variables related to recent growth models. In the Mexican case, I argue that since economic growth is based on specific urban characteristics that are created over time in cities, history matters when an economy is opened.

Specifically, what are the regional productivity implications when a previously closed economy is opened by trade tariff reductions? If trade liberalization implies, in regional terms, a relocation or moving of the central market for "national" firms, from the "interior" to the "foreign" market, how does this relocation changes the pre-trade differences in productivity growth?

This idea can be easily illustrated in the Mexican urban manufacturing case. Under import substitution industrialization (ISI), as the internal market was to be promoted, the central market was where the people were. As has been the case with others countries under ISI, these locations were the largest central cities. Under trade liberalization, because the internal market is no longer protected, and because of export promotion strategies (EPS), the central market is now located closer to the "foreign" market, in Mexico's case, in its northern cities. What have been the implications of this change on the differences in the rate of productivity growth?. According to Livas and Krugman (1992) and Hanson (1994), if the externalities due to market extension are important, then we should see higher productivity growth rates in the region spatially close to the new central market, i.e. the northern cities, not around the largest cities as happened before trade liberalization. In particular, Hanson (1994) finds that, consistent with market extension considerations, employment growth, as related to productivity growth, is higher in regions that are relatively closer to the United States. He adds that the results describe the decomposition of the Mexico City manufacturing belt and the creation of a smaller, broadly specialized center in Mexico's north.

In order to evaluate the former argument, in de León (1999), I presented data at the state level that confirms Livas's and Krugman's (1992) and Hanson's (1994) findings based on employment and output growth but not productivity levels and growth rates. Table 1 confirms these results at urban manufacturing level; the manufacturing employment share in relation to the national total, for the three largest cities in Mexico (Mexico City, Guadalajara, and Monterrey) decreased from 57.97 to 33.90 between 1975 and 1998. At the same time, Northern cities, those located in

states close to the border (1) excluding Monterrey, also show an increasing share of total employment, from 9.68 to 22.73 percent. The same behavior can be observed for manufacturing output by selected cities. (See table 2). We now turn to analysis of the performance of both kinds of cities in terms of productivity levels and rate of growth.

Table 1. *Manufacturing employment share (in relation to national total) by selected cities, Mexico 1975-1998*

	1975	1980	1985	1988	1993	1998
Largest cities	57.97	47.73	46.98	43.99	38.73	33.90
Northern	9.68	9.03	13.52	17.85	19.26	22.73

Sources: Mexican Industrial Census, various years

Table 2. *Manufacturing output share (in relation to national total) by selected cities, Mexico 1975-1998*

	1975	1980	1985	1988	1993	1998
Largest cities	67.14	54.63	53.09	49.62	49.19	40.62
Northern	8.57	6.13	12.10	11.33	12.45	18.16

Sources: Mexican Industrial Census, various years

If we observe the behavior of labor productivity for the same cities during the same period, our perception about the performance of each set of cities changes. Table 3 presents the level of output per worker, labor productivity, for selected cities from 1970 to 1998. The largest cities in Mexico have kept, with some variations, their productivity steady in relation to the national level. At the same time, Northern cities have seen their labor productivity level decrease in relation to the national average. The data is reported in comparative terms in order to "isolate" variations observed at the national level. In any case, our interest is in observing comparative performance across cities.

At this point, it is clear that even though Krugman's, Livas's and Hanson's conclusion applies to labor and output levels, it does not apply to productivity. How, then, can a better story be told?

Krugman's introduction of dynamic externalities has certainly extended the analysis of the impact of trade on regional growth. However, his analysis is limited.

Table 3. *Manufacturing output per worker (in relation to national total) by selected cities, Mexico 1975-1998*

	1975	1980	1985	1988	1993	1998
Largest cities	1.16	1.14	1.13	1.13	1.27	1.20
Northern	0.89	0.68	0.90	0.63	0.65	0.80
Total	1.00	1.00	1.00	1.00	1.00	1.00
In thousand of 1980 pesos	300	271	268	320	281	255

Sources: Mexican Industrial Census, various years

Since he observes externalities as related exclusively to market size and not to the specific conditions that promote productivity growth or regional competitiveness.

Later in this section, I will introduce the sources that promoted productivity as a whole for regional and urban areas according to new growth theories. Introducing these sources will be seen to have relevant implications for the impact of trade on regional growth differences.

As shown in de León (1999), new economic growth models have analyzed the kinds of urban characteristics that are the relevant sources of endogenous growth. In this research, I have considered: education, as the engine of growth, and infrastructure. Because economic growth is promoted by urban characteristics related to growth factors that are created over time in cities, history may matter when an economy is opened. In particular, if this is the case, trade liberalization should make proximity to the foreign market important, as suggested by Krugman and others, but it does not necessarily weaken other externalities generated in some regions or cities. In other words, mere agglomeration of economic activity is not the only source of externalities. Specific characteristics related to variables related to new growth models in the location must also be considered. Moreover, if urban characteristics related to variables tied to recent growth models are relevant, the outcome, in terms of regional growth patterns under trade liberalization, cannot be determined solely by considering such variables as transportation costs. If this is the case, adjustment away from the closed-economy growth pattern is likely more protracted. Trade causes proximity to the new central market (the U.S. market, in the Mexican case), more important, but it does not directly weaken the externalities generated by factors related to endogenous growth. Moreover, the sectoral reallocation of economic activity that trade brings may cause some closed-economy centers to grow in the short or medium term. As specialization redirects activities from some industries to others, the relevance of these urban characteristics makes specific industrial centers, all else being equal, the ones more likely to benefit.

3. Empirical Analysis
The recent work on growth empirics suggests a simple empirical approach for

studying how regional productivity growth adjusts to trade liberalization. To the extent that market extension affects urban performance, we expect trade liberalization to cause a productivity growth in cities that are located close to the U.S. To the extent that "localized factors" matter, we expect that cities which have accumulated physical capital as well as human capital and infrastructure to grow in comparison to those which have not accumulated said factors.

My estimation will be based on the next equation. This equation is extended to include a dummy variable for time. The "time-dummy-variable" is 1 for the period 1985-1993, and 0 otherwise. Because Mexico initiated trade liberalization in 1985, it will proper to define two set of observations about differences in productivity growth by cities: from 1975 to 1985, the period preceding trade liberalization, and from 1985 to 1998, the period following the initiation of trade reform. See Hanson (1994) for a detailed explanation on when the Mexican economy was opened. The new model to be estimated will have the following general form:

$$Y = \beta_1 + \beta_2 X + \beta_3 Z + \eta_t + \varepsilon_{i,t}$$

where Y is the growth rate of added value per worker, X and Z are matrices of explanatory variables, β_1 is the common constant, η_t is the time-dummy-variable and $\varepsilon_{i,t}$ are residuals.

Regarding the explanatory variables, matrix X contains those variables other than my specific growth factors that potentially explain differences in productivity or long-term growth, such as output per worker at the beginning of the period. Matrix Z includes the two types of factors related to endogenous growth models: infrastructure and human capital. Matrix Z also includes a dummy variables for those urban manufacturing located in the northern states. See Appendix for definitions of variables and their means and standard deviations. There are 60 potential observations per time period that corresponds to 60 major manufacturing centers in Mexico. The manufacturing center in Mexico were defined according the definition of metropolitan areas proposed by Garza and Rivera (1994).

4. Trade Liberalization and Growth

This section presents the results of the model developed in the prior section pooling the data for the two periods, 1975-85 and 1985-1998. The analysis will be developed using a generalized least squares estimation model in order to considering a panel model with random effects. The table 4 shows the specific variables that are included for each regression; for example, in equation 1, I include the output per worker at initial period (**Ln y),** my control variable, and the North cities dummy as part of my explanatory variables; for equation 2, I include on the left side of regression equation the ***ln y initial*** and elementary education, and so on. In relation to the expected sign in the other estimates, I observe in equation 5 that all "endogenous growth factors" show an expected positive sign. The North regional dummy shows a negative sign in equations 1 and 5, that supports my hypothesis about the poor performance of

manufacturing in the Northern cities in terms of productivity growth. Note that this estimate is statistically significant.

Table 4. *Regressions results on pooled sample*

Dependent variable: $(1/T) \ln(y_{i,t}/y_{i,0})$; y is output per worker,					
Equation #	1	2	3	4	5
Ln y initial	-0.052	-0.043**	-0.044**	0.554**	-0.054**
North cities "dummy"	-0.024**				-0.037**
Elementary Ed.		0.332**			0.374**
Middle School Ed.			0.223**		0.011**
Infrastructure				0.058*	0.021*
R^2	0.32	0.39	0.38	0.37	0.40

Dependent variable: $(1/T) \ln(y_{i,t}/y_{i,0})$; y is output per worker,

Number of observations 120.

*significance level at 5%

**signficance level at 1%

To formally test my hypothesis on the effects of trade liberalization, I use the former regression model, including an "interactive" dummy variable for the year 1985, for each one of the explanatory variables. If trade liberalization has indeed caused a structural break, the regression coefficients in the period after 1985 will differ from those before 1985. The results are presented in table 5. Comparing periods 1975-1985 and 1985-1998, I observe an increasing convergence rate after 1985, and increasing negative effect on northern cities location. All the other explanatory variables show an expected positive sign after 1985.

5. Sensitivity Analysis

To check the robustness of these findings, I estimate the regression equation shown in table 5, imposing some restrictions on the sample. One possibility is that the results are driven by the "dis-industrialization" of the largest cities, and that in outlying cities the role of specialization and location close to the U.S.A. as negative growth effects which are evident in table 4 and 5 do not exist. To test this, the urban manufacturing variables of largest cities (Mexico city, Monterrey, and Guadalajara) are dropped from the sample, which reduces the number of observations from 120 to 114 in the pooled sample. Table 6 shows the results. Coefficient magnitudes and patterns of significance are virtually identical to those in the corresponding table 5.

Table 5. *Regressions results on pooled sample including an interacting 1985-dummy-variable*

Dependent variable: $(1/T) \ln(y_{i,t} / y_{i,0})$; y is output per worker,

Ln y initial	-0.0159a
North cities "dummy"	-0.0198
Elementary Ed.	0.5055*
Middle School Ed.	0.4237a*
Infrastructure	0.0419
Ln y initial*year85	-0.0415**
North cities "dummy"*year1985	-0.0403*
Elementary Ed.*year1985	0.1099
Middle School Ed.*year1985	0.4712*
Infrastructure*year1985	0.1373

Number of observations: 120
R^2 0.51
      *significance level at 5%
      **signficance level at 1%
      a*signficance level at 10%

A second possibility is that the results are caused by regional variations in adjustment to Mexico´s stabilization policies in the late 1980´s. Mexico experienced a severe recession over the 1986-1987 period. Due to the presence of the *maquiladora* industry, cities along the Mexico-U.S. border were oriented toward export production before trade liberalization. Producers in interior cities may have suffered a large fall in demand for their goods in comparison with border producers during 1985-1993 due to the fact they were primarily oriented toward production for the domestic market. What may be poor performance of northern cities in terms of output per worker may only have been the uneven effect of different employment growth. Employment grows faster in northern cities than in the rest of the country. To verify if the presence of *maquiladoras* changed the results, the urban manufacturing located in the Northern border region is dropped from the sample. Table 7 shows that the results are very similar to those in table 5.

So far, I have pooled all urban manufacturing together encompassing all manufacturing branches, which poses the assumption that endogenous growth factors matter equally for all manufacturing branches. This approach is somewhat restrictive. However since some manufacturing branches produce goods that are widely traded across regions or that are intensive in the use of relatively immobile inputs, I plan to take this restriction into consideration in future research.

Table 6. *Regressions results on pooled sample including an interacting 1985-dummy-variable and excluding largest cities*

Dependent variable: $(1/T) \ln(y_{i,t} / y_{i,0})$; y is output per worker,

Ln y initial	-0.0245*
North cities "dummy"	-0.0132
Elementary Ed.	0.4553*
Middle School Ed.	0.4120[a]
Infrastructure	0.0428
Ln y initial*year85	-0.0425**
North cities "dummy"*year1985	-0.0367a
Elementary Ed.*year1985	0.1166
Middle School Ed.*year1985	0.4423*
Infrastructure*year1985	0.1265

Number of observations: 114

R^2 0.53

* significance level at 5%
**signficance level at 1%
a *signficance level at 10%

Table 7. *Regressions results on pooled sample including an interacting 1985 dummy-variable and excluding northern cities*

Dependent variable: $(1/T) \ln(y_{i,t} / y_{i,0})$; y is output per worker,

Ln y initial	-0.136*
Elementary Ed.	0.4945*
Middle School Ed.	0.3504
Infrastructure	0.0419**
Ln y initial*year85	-0.0125
Elementary Ed.*year1985	-0.1238*
Middle School Ed.*year1985	0.3529
Infrastucture*year1985	0.1170

Number of observations: 86
R^2 0.49
*significance level at 5%
**signficance level at 1%

6. Conclusions

This article has empirically examined the growth effects of trade liberalization. It focuses on the role of human capital and infrastructure that encourage growth of pre-existing manufacturing centers and the locations with good access to foreign markets, which encourages the growth of cities along the Mexican border. I have compared productivity growth in Mexican urban manufacturing before and after trade liberalization. Consistent with the argument that productivity growth in the new areas (Northern cities) is restricted by the unavailability of non-physical capital in those areas, I have found that manufacturing in the northern cities shows poor performance in productivity growth.

The empirical results describe the general features of the post-trade reform pattern of productivity growth in Mexican urban manufacturing. Under trade liberalization, there was not a northward shift in productivity growth. Mexico´s closed-economy manufacturing centers around the largest cities have not diminished in importance in terms of productivity growth as firms relocate their activities to cities in northern Mexico where they have better access to foreign markets. The implementation of the North American Free Trade Agreement, which should reinforce the motivation for firms to locate near the United States, has not been promoting a higher rate of productivity growth.

Finally, it is relevant to note that one of the limitations of my research is the problem about price deflactor. I have used the GNP deflactor. However, while I am taking into consideration foreign trade relations, trade volume is affected by exchange rates and import taxes, as well as, transfer prices among multinational firms. In further research, analysis at the firm level could help to work out this restriction.

Notes

1. Furthermore, these states are included in a special tariff structure the allows in-bound production free of tariffs from and to the United States. This structure created the *maquiladora* operation.

Appendix: Definition Of The Explanatory Variables

Primary education: Share of total population older than 25 years of age with at least one year of primary education.

Secondary education: Share of total population older than 25 years of age with at least one year of secondary education.

Infrastructure: This variable was identified as the capacity of kilowatts generated in each Metropolitan Area.

Variable means and standard errors

Variables	1975-1985		1985-1993		1975-1993	
	Mean	Std. Err.	Mean	Std. Err.	Mean	Std. Err.
Real output per worker at initial year	622.4610	1033.6660	569.1501	1100.2497	N/A	
Real output per worker –growth rate-	-0.0255	0.0554	0.0293	0.0810	-0.0012	0.0296
Elementary School attainement	0.7202	0.0578	0.8455	0.0341	N/A	
Secondary School attainement	0.2043	0.0514	0.3842	0.0695	N/A	
Electrical Capacity (infraestructure)	135.9690	278.9794	124.6837	221.1134	N/A	

References

Barro, Robert J. (1997). *Determinants of Economic Growth: A Cross-Country Empirical Study*, Cambridge, MA: MIT Press.

de León, Adrián (1999). *Trade Liberalization and Endogenous growth*. Ph. D. Dissertation. Notre Dame, IN: University of Notre Dame. Chapter 3.

Edwards, Sebastian, (1995). *Crisis and Reform in Latin America: From Despair to Hope*, New York: Oxford University Press.

Garza, Gustavo, and, Salvador Rivera (1994). *Dinámica Macroeconómica de las Ciudades en México,* México DF: INEGI.

Grossman, Gene M., and, Elhanan Helpman (1991). *Innovation and Growth in the Global Economy*, Cambridge, MA: MIT Press.

Hanson, Gordon (1994). *Regional Adjustment to Trade Liberalization*, Cambridge, MA: NBER Working Paper No.4713.

Livas Elizondo, Raul, and, Paul R. Krugman (1992). *Trade Policy and Third World Metropolis*. Cambridge, MA: NBER. Working Paper No. 4238.

Romer, Paul M. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy,* 94, 1002-37.

Romer, Paul M. (1990). *Are Nonconvexities Important for Understanding Growth*?. Cambridge, MA: NBER. Working Paper No 3271.

Skott, Peter, and, Jaime Ros (1997). The 'Big Push' in an Open Economy with Nontradable Inputs, *Journal of Post Keynesian Economics*, 20, 149-162.

Young, Alwyn (1991). Learning by Doing and the Dynamic Effects of International Trade. *Quarterly Journal of Economics*, May, 369-405.

Young, Alyn A. (1927). Increasing Returns and Economic Progress, *Economic Journal* 38, 527-42.

Labor Market Asymmetry in a Core-Periphery Model of Globalization

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Abstract. A two-country, two-sector new geography model where workers are imperfectly monitored is used to examine the relationship between falling trade costs and unemployment. It is shown that as trade costs fall over time the world naturally falls into an industrialized core and an agricultural periphery. Globalization has a positive effect on employment in the core in both the short and long term. It is shown that countries with lower rates of job separation are more likely to end up in the core.

1. Introduction

In his 1991 article, Paul Krugman shows that the interaction between the falling costs of trade and scale economies provide incentives for industry to cluster into a small number of regions. The intuition is simple. Firms will want to set up factories where demand is highest since that will minimize trade costs. However, demand will be highest in larger markets since a considerable share of demand comes from the manufacturing labor force. These forces are referred to as *backward linkages*[1]. These backward linkages are complemented by the fact that it will be more advantageous for a worker to reside in a larger market where trade costs apply to a smaller share of consumption goods. These forces are referred to as *forward linkages*[2]. The reinforcing forward and backward linkages induce both manufacturing firms and workers to form a small number of industrial regions given that trade costs are sufficiently low

There have been many extensions of this basic framework. Some have shown that the same forces apply in international markets. However, the framework must be altered slightly since labor is immobile across international borders. Krugman and Venables (1995) use an intermediate good to play the role that mobile labor does in the Krugman (1991) model. A country with a large manufacturing base provides firms locating there a greater variety of intermediates. This gives firms locating there lower costs of production, or a forward linkage[3]. A large base of final goods manufacturers also provides a large local market for intermediate goods producers, or a backward linkage. What results is a concentration of manufacturing into a small number of countries[4]. So, one can conclude that globalization, in the form of falling trade costs, results in a change in the international distribution of production.

Given the above result, it would make sense that globalization would also have an impact on unemployment patterns. If industry shifts more heavily to a single

country one would expect that more jobs would be created there than in less industrious countries. This has been a long-time claim of politicians. However, with the exception of a few studies[5], such issues have been absent from the literature. In fact, the relationship between globalization and unemployment has received scant attention in the trade literature even outside the realm of the New Geography[6]. So, even in the limited literature that does exist on this subject there is no clear-cut conclusion among economists.

It would also make sense that asymmetries between countries may also have an impact on both industry location and the pattern of unemployment. Again such issues have been previously ignored in the literature. In fact, most of the New Geography literature focuses on the case of symmetric countries. But, it is clear that countries in the real world are not symmetric. In particular, rates of job tenure (i.e. turnover) vary significantly between countries. In the European Union, for instance, average rates of tenure range from 4.4 years in Denmark to 10.7 years in Germany[7].

The goal of this paper, then, is twofold. First, to examine the relationship between the falling costs of trade and unemployment at the national level. And second, to examine the impact that asymmetrical labor markets have on agglomeration patterns and unemployment. The model employed for this task draws on the framework proposed by Krugman and Venables (1995). The model presented here builds on this framework to include unemployment. The form of unemployment used is a variant of the efficiency-wage/worker-discipline model first proposed by Shapiro-Stiglitz (1984)[8]. Quite surprisingly, this particular form of unemployment provides an additional force encouraging manufacturing to concentrate into a small number of countries due to the effects that agglomeration has on employment. The model also shows that countries where agglomeration arises reap employment gains and countries that are the victim of a manufacturing exodus suffer employment losses in the short term. Which countries gain and which countries lose is jointly determined by industrial history and the structure of each country's labor market. That is, which countries historically have devoted a large proportion of their labor force to the production of manufactures and which have not. And, which countries have high rates of turnover and which do not. In the long term, however, all countries can enjoy employment gains from globalization if trade costs fall far enough. Furthermore, it is shown that agglomeration is more likely to occur where rates of turnover are lower. And, it is shown that rates of unemployment are lower in low turnover countries compared to high turnover countries.

Section 2 describes the model. Section 3 describes the simulation techniques used to obtain the model's results. Section 4 presents the simulation results. And section 5 provides some concluding remarks and directions for future research.

2. The Model

Consider a world in which there are two countries; one factor of production: labor; and two goods: agriculture and manufactures. Labor is permitted to move between

sectors but not across international borders. The size of each country's labor force is normalized to one.

Agriculture is produced in a perfectly competitive environment. However, workers in this sector, as well as the manufacturing sector, face the possibility of unemployment. The unit labor requirement is one and agriculture is taken as numeraire so that both the price of agriculture and the wage paid to farmers is equal to unity. For simplicity it is assumed that agriculture can be traded at no cost[9].

All individuals in the economy share the utility function

$$U = X_A^{\gamma} X_M^{1-\gamma} - e \tag{1}$$

for $0 < \gamma < 1$, where X_A is consumption of agriculture, X_M is consumption of an aggregate of manufactured goods, and e is workers disutility of effort. It is assumed that $e > 0$ for non-shirking workers and $e = 0$ for shirking workers.   The manufactures aggregate is given by the CES subutility function

$$X_M = \left[\sum_{i=1}^{n_1} \left(x_{i1}\right)^{\frac{\sigma-1}{\sigma}} + \sum_{i=1}^{n_2} \left(x_{i2}\right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \tag{2}$$

where n_k is the number of manufacturing varieties produced in country k, and $\sigma > 1$ is the elasticity of substitution between varieties.   The price index over manufactures in country k can then be expressed

$$\Pi_k = \left[n_k P_k^{M\,1-\sigma} + n_j \left(P_j^M \tau\right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}} \tag{3}$$

where P_k^M is the price of a single variety of the manufacturing good in country k, and τ is the iceberg trade cost of shipping one unit of manufactures from one country to the other. That is, in order for one unit of the good to arrive at its destination τ units must be shipped. After solving the utility maximization problem a sector r worker's indirect utility in country k can be written

$$U_k^r = \Gamma w_k^r \Pi_k^{-\gamma} - e \tag{4}$$

for $r = \{A,M\}$ where $\Gamma = \gamma^{\gamma} \left(1 - \gamma\right)^{1-\gamma}$.

Manufacturing production in country k requires the use of a composite input that is a Cobb-Douglas combination of labor and intermediate goods. For simplicity it is assumed that the price index over intermediate goods is identical to that of final manufactures. Hence, the price index of both intermediate goods and final goods is given by equation (3)[10]. The production function for the composite input in country k can be expressed

$$C_k = \Theta \ell_k^{1-\theta} X_M^{\theta} \tag{5}$$

where ℓ_k is the number of workers hired by a manufacturing firm located in country k, and $\Theta = \theta^{-\theta} \left(1 - \theta\right)^{\theta-1}$. After solving the cost minimization problem the unit cost for the composite input in country k can be expressed

$$P_k^C = w_k^{1-\theta} \Pi_k^{\theta} \tag{6}$$

Production for the final good, then, requires a fixed and a marginal input of this composite good. The amount of the composite good required for firm i in country k to produce x_{ik} units of the final good can be written

$$C_{ik} = \alpha + \beta x_{ik} \tag{7}$$

where α and β are the fixed and marginal inputs respectively. So, the total cost of producing x_{ik} units of the final good can be expressed

$$TC_{ik} = C_{ik} P_k^C = (\alpha + \beta x_{ik}) P_k^C \tag{8}$$

In this monopolistically competitive environment each firm will view itself as a monopolist facing a demand curve with elasticity σ. So, each firm will set price $\sigma/(\sigma - 1)$ over marginal cost. Choosing units of measurement for the composite good such that $\beta = (\sigma - 1)/\sigma$ all firms in country k will set price for the final manufacturing good

$$P_k^M = w_k^{1-\theta} \Pi_k^{\theta} \tag{9}$$

So, the price of the final good is identical to that of the composite good. In equilibrium price must equal average cost. Setting equation (9) equal to average cost and solving for the firm's scale of production yields

$$x = \alpha\sigma \tag{10}$$

Hence, all firms produce an identical scale of output that is independent of both input prices and location. Given the production function and that firms earn zero profits in equilibrium, it is evident that firms will devote a fraction $1 - \theta$ of their total revenue to the wage bill. Hence,

$$(1 - \theta)P_k^M n_k x = w_k^M n_k \ell_k \tag{11}$$

Choosing units of measurement for the final good so that $x = 1/(1-\theta)$, equation (11) can be solved for ℓ_k to get

$$\ell_k = \frac{P_k^M}{w_k} = \left(\frac{\Pi_k}{w_k}\right)^{\theta} \tag{12}$$

While the scale of output is independent of location, the number of workers hired by firms is not. A low cost for labor or a large cost for intermediates will tend to increase the amount of labor and decrease the quantity of intermediates used in production. However, firms the world over will use the same number of units of the composite input. Thus, firms in each country will produce the same amount of output, but with a different mix of inputs.

Workers in both sectors receive disutility e of exerting effort. In addition, workers are imperfectly monitored. So, workers have an incentive to shirk if they believe that they can avoid being detected. To deter this behavior workers are paid in excess of their marginal products and are immediately discharged if caught shirking. The threat of being fired will eliminate all shirking in equilibrium. Let ρ

be the exogenous discount rate, let q be the exogenous rate at which shirking workers are detected, and let b_k be the exogenous rate at which non-shirking workers lose their jobs in country k. In addition, let h_k^r be the endogenous rate at which sector r workers are hired in country k. Then, the asset value equations for a sector r worker in country k are

$$\rho V_k^{ur} = h_k^r \left(V_k^{nr} - V_k^{ur} \right) \tag{13}$$

$$\rho V_k^{nr} = \Gamma w_k^r \Pi_k^{-\gamma} - e + b_k (V_k^{ur} - V_k^{nr}) \tag{14}$$

$$\rho V_k^{sr} = \Gamma w_k^r \Pi_k^{-\gamma} + (b_k + q)(V_k^{ur} - V_k^{sr}) \tag{15}$$

where V_k^{ur} is the expected lifetime utility of an unemployed sector r worker in country k, V_k^{nr} is the expected lifetime utility of a non-shirking sector r worker in country k, and V_k^{sr} is the expected lifetime utility of a shirking sector r worker in country k. This assumes that, if hired, an unemployed worker will not shirk and that an unemployed worker has no alternative source of income.

A necessary and sufficient condition so that workers do not shirk is $V_k^{nr} \geq V_k^{sr}$. Solving equations (13) – (15) and adhering to this inequality yields the no-shirking condition (NSC) for sector r in country k

$$\Gamma w_k^r \Pi_k^{-\gamma} \geq \frac{e}{q} \left[\rho + b_k + q + h_k^r \right] \tag{16}$$

To complete equation (16) an expression for h_k^r must be obtained. In any steady state equilibrium the flow into employment must equal the flow out of employment. Equating these flows and solving for h_k^M gives

$$h_k^M = \frac{b_k l_k n_k}{L_k - l_k n_k} \tag{17}$$

Substituting this into equation (16) and doing some algebra yields the NSC for the manufacturing sector in country k

$$\Gamma w_k^M \Pi_k^{-\gamma} \geq \frac{e}{q} \left[\rho + q + b_k / \mu_k^M \right] \tag{18}$$

where $\mu_k^M = (M_k - \ell_k n_k)/M_k$ is the unemployment rate in the manufacturing sector in country k. Note that when trade costs fall the left hand side of this inequality rises. Hence, the unemployment rate that ensures this inequality is satisfied must fall.

Doing the same for the agriculture sector yields

$$h_k^A = \frac{b_k A_k}{1 - M_k - A_k} \tag{19}$$

Substituting this into equation (16) and doing some algebra yields the NSC for the agriculture sector in country k

$$\Gamma \Pi_k^{-\gamma} \geq \frac{e}{q_k} \left[\rho + q + b_k / \mu_k^A \right] \tag{20}$$

where $\mu_k^A = \left(1 - M_k - A_k\right)/\left(1 - M_k\right)$ is the unemployment rate in the agricultural sector in country k.

In country k, national income can be expressed

$$Y_k = A_k + w_k \ell_k n_k \tag{21}$$

where the first term is the income of agricultural workers and the second term is the income of manufacturing workers. Due to the Cobb-Douglas form of both the utility function and the production function for the composite good, total expenditures on manufactures in country k is given by

$$E_k = \gamma Y_k + \theta P_k^M n_k x \tag{22}$$

where the first term is expenditure by consumers and the second term is expenditure by firms. Then, the demand for a single country k variety can be expressed

$$x_k = \left(P_k^M\right)^{-\sigma} \left[E_k \Pi_k^{\sigma-1} + E_j \left(\Pi_j / \tau\right)^{\sigma-1} \right] \tag{23}$$

where the first term inside the brackets represents domestic demand and the second term represents foreign demand. Firms earn zero profits when the scale of production, x_k, is equal to that in equation (10). Equilibrium is now characterized by equations (3), (9), (12), (18), (20), (21), (22), and (23) which can be used to solve for the equilibrium values of P_k^M, w_k, n_k, ℓ_k, Y_k, E_k, Π_k, and A_k, given the distribution of labor, M_k, between sectors in each country.

In any steady state equilibrium unemployed workers must be indifferent to the sector in which they are searching for employment. So, the expected lifetime utility of an unemployed worker must be the same in each sector. It can be shown that this is equivalent to having equal hiring rates in each sector. Hence, in addition to the system of equations above being satisfied, it also must be true that in any steady state equilibrium where both agriculture and manufactures are produced in both countries

$$h_k^M = h_k^A \tag{24}$$

for k = 1,2[11][12].

3. Model Simulation

Analytical results are rare in new economic geography models. So, outcomes are attained largely through numerical simulations. This is the methodology used here. Table 1 lists the values of the parameters used in the simulation. Since the steady state condition requires that the hiring rate be equal in both sectors, anything that increases the manufacturing hiring rate relative to the agricultural hiring rate in the larger region will encourage agglomeration and anything that decreases the

manufacturing hiring rate relative to the agricultural hiring rate in the larger region discourages agglomeration. So, a logical question to ask is how will a shift in the distribution of labor affect the relative magnitudes of the manufacturing and agricultural hiring rates? The forces at work here can be separated into five effects. Four of them work symmetrically while the fifth is a result of the labor market asymmetry. Forces that work against the agglomeration of manufactures into a single country will be referred to as *anti-agglomeration effects*.   And, forces that work in favor of the agglomeration of manufactures into a single country will be referred to as *pro-agglomeration effects*.

Table 1*: Parameter Values*

γ	σ	θ	e	b_1	b_2	q	ρ
.4	5	.5	.1075	.1	.16	.5	.05

Without loss of generality, suppose that there is a shift in the labor distribution into the manufacturing sector in country 1.   Again, there are five forces at work. First, there is the extent of competition. Increasing the number of varieties in a single region will lower the price index in country 1since more varieties are now produced there. This will reduce the demand for each individual variety and will tend to lower the manufacturing hiring rate relative to that of agriculture. This is an *anti-agglomeration effect*. Second, the lower price index in country 1 reduces the cost of the intermediate good produced in country 1. So, firms' expenditure on country 1 intermediates will increase. This tends to increase both the manufacturing wage and the manufacturing hiring rate relative to those of agriculture. This is the forward linkage mentioned in section I. Third, an increase in the amount of labor producing manufactures in country 1 increases expenditure in country 1 since more varieties are being produced there.   This tends to increase the demand for each individual variety and increase the manufacturing hiring rate relative to that of agriculture. This is the backward linkage mentioned in section I. Fourth, the fall in the price index will increase employment in both sectors since higher real wages result in larger demand. This generates a further increase in expenditure through an increase in national income. This will tend to increase the manufacturing hiring rate relative to that of agriculture.   These last three effects at work are the *pro-agglomeration* effects.

Finally, there is a greater incentive for workers to shirk in country 2 since separation rate is higher there.   This *shirking effect* leads to higher levels of employment in country 1 relative to country 2[13]. Since demand favors local over non-local products, this allows manufacturing to expand further in country 1 than in country 2. This favors agglomeration in country 1 over country 2 purely because of the labor market asymmetry. Which effects dominate depend on the value of trade costs. Figure 1 shows, for each country, the locus of labor distributions where the hiring rate is identical in both sectors when trade costs are high ($\tau = 3$). The thin line is country 1's curve and the thick line is country 2's curve. If $M_k = 0$ then country k's entire labor force produces agriculture, and if $M_k = 1$ country k's entire labor

force produces manufactures.

**Figure 1:** *Labor Dynamics with High Trade Costs*
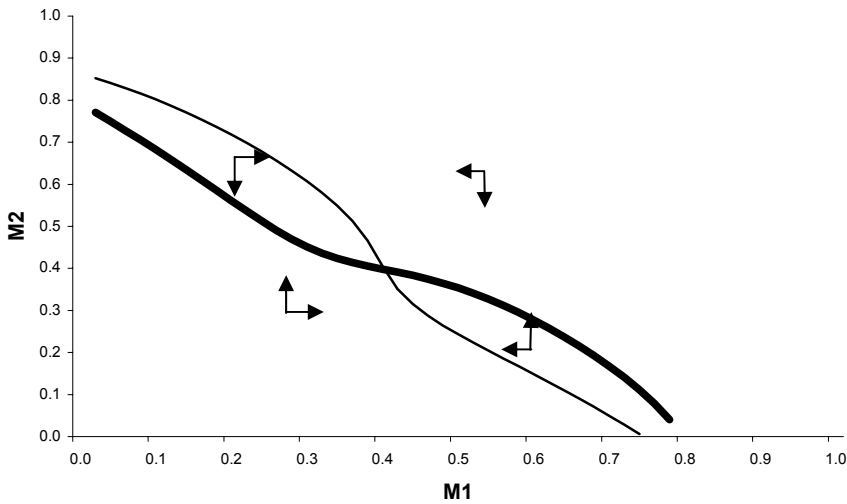
For distributions of labor that lie below each country's curve, the hiring rate is larger in the manufacturing sector so unemployed workers will shift their search efforts towards manufacturing until the hiring rates are equalized. For distributions of labor that lie above each country's curve, the hiring rate is larger in the agricultural sector so unemployed workers will shift their search efforts towards agriculture until the hiring rates are equalized. It is clear from the diagram that, when trade costs are high, there is a single, globally stable equilibrium. In this equilibrium country 1 has a slightly larger share of its labor force in manufacturing compared to country 2[14].

Since both countries have some of their labor force devoted to the production of each good this will be referred to as a *diversified equilibrium*. There are two conclusions that can be made. First, the pro-agglomeration forces are not strong enough to combat the increased competition in the larger region. Hence, agglomeration economies do not arise. Second, the shirking effect is drawing more manufacturing into country 1 relative to country 2.

Figure 2 shows the same type of diagram when trade costs are low ($\tau = 1.5$). Here there is a saddle path leading to a diversified equilibrium as in Figure 1. However, this equilibrium is now unstable. Any deviation from the diversified equilibrium will result in one country specializing in agriculture and the other country supplying the total world demand of manufactures in addition to the remaining demand for agriculture. Such equilibria will be referred to as *specialized equilibria*. The particular specialized equilibrium that will prevail depends entirely

on the initial distributions of labor in both countries. With lower costs of trade the pro- agglomeration forces are strong enough to overtake the extent of competition. Hence, if trade costs fall low enough a catastrophic core-periphery pattern will emerge where one country produces all of the world's manufactures. However, the unstable, diversified equilibrium is skewed with a higher proportion of the labor force devoted to manufacturing in country 2 than in country 1[15]. Again, this is due to the shirking effect. This skewness makes it more likely, when starting from a random distribution of labor, that agglomeration occurs in country 1 than in country 2.

Figure 2: *Labor Dynamics with Low Trade Costs*
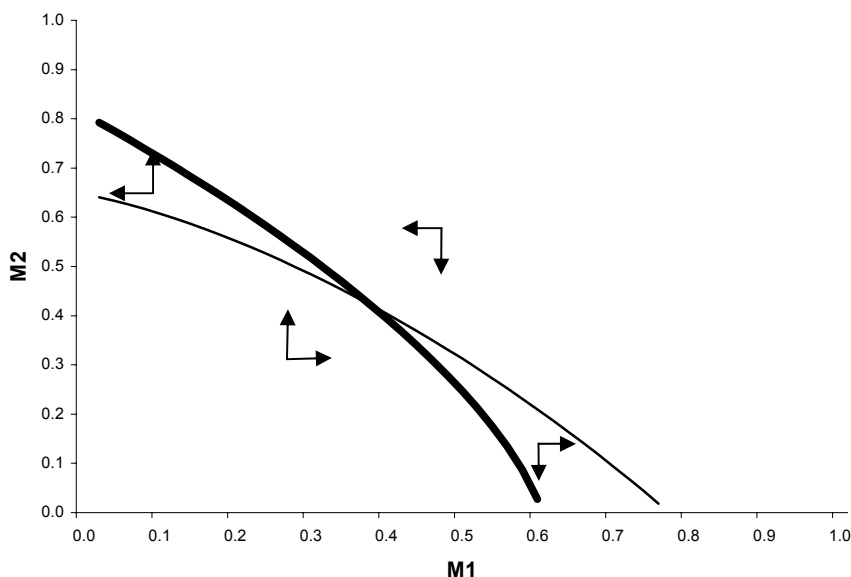
Figures 1 and 2 suggest that as trade costs fall a threshold level is reached in each country where the stable, symmetric equilibrium breaks down. Call this level of trade costs the break point, τ (B). In addition, there is a threshold level of trade costs in each country where a specialized equilibrium can be sustained. Call this level of trade costs the sustain point $\tau_k(S)$. Figure 3 summarizes these facts with a bifurcation diagram showing the equilibrium distributions of labor as a function of the level of trade costs.

Figure 3: *Bifurcation Diagram*
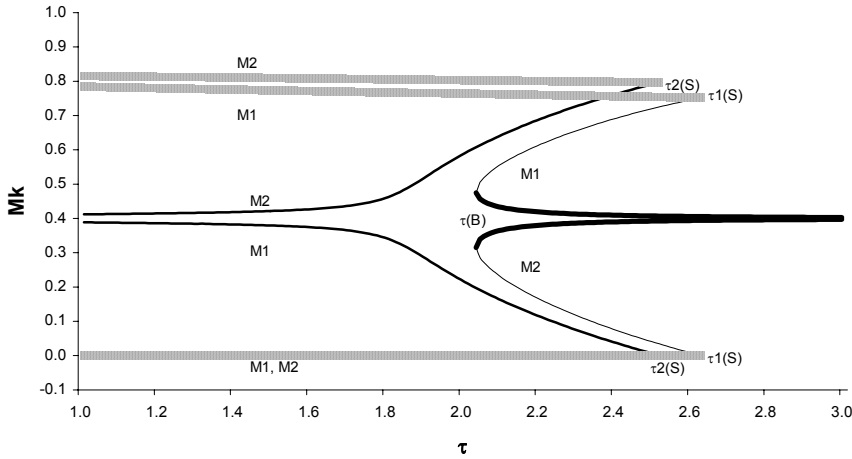
The thick lines represent stable equilibria and the thin lines represent unstable equilibria. When trade costs are very high there is only one stable equilibrium for a given value of trade costs. These are the diversified equilibria where country 1 has a slightly larger proportion of their labor force in the manufacturing sector than country 2. These equilibria are represented by the thick black lines. As trade costs fall below the country 1 sustain point, $\tau_1(S)$, a stable equilibrium can be sustained in which country 1 produces all of the world's manufactures and country 2 specializes in agriculture. As trade costs fall further to the country 2 sustain point, $\tau_2(S)$, an additional stable equilibrium can be sustained in which country 2 produces all of the world's manufactures and country 1 specializes in agriculture. These equilibria are represented by the thick grey lines. As trade costs fall even further below the break point, $\tau(B)$, a diversified equilibrium can no longer be sustained. These unstable equilibria are represented by the thin black lines. There are two other classes of equilibria depicted: one where country 1 has a larger proportion of its work force in manufacturing than country 2, and one where the reverse is true. These are the unstable equilibria that arise when trade costs take on an intermediate value and are represented by the thin grey lines. What figure 4 shows is that as trade costs fall over time the two countries will naturally divide themselves into an industrialized core and an agricultural periphery. However, the sustain point is larger in country 1, the country with the lower rate of turnover, than in country 2 since the shirking effect allows manufacturing to expand further there. Hence, for a random initial distribution of labor and level of trade costs it is more likely that industry agglomerates into country 1 than country 2.

How will the structure of equilibria discussed above affect unemployment at the national level in each country? The aggregate unemployment rate in country k

can be expressed

$$U_k = 1 - A_k - \ell_k n_k \tag{25}$$

The answer to this question, then, depends on what effects changes in trade costs and the resulting shifts in the distribution of labor have on the number of agricultural workers, firm size, and the number of varieties produced.

Figure 4 shows the aggregate unemployment rate in both countries along the stable equilibria depicted in figure 3. The thick black lines are the diversified equilibria; the thick grey lines are the equilibria where country 1 produces all of the world's manufactures; and the thin black lines are the equilibria where country 2 produces all of the world's manufactures. There are several significant features of this diagram. First, if trade costs are such that a diversified equilibrium is reached, unemployment is strictly increasing in trade costs in both country 1 for all values of trade costs. This is evident from the strictly upward slope of the unemployment curve along the diversified equilibria. When trade costs fall real wages increase which allows the manufacturing sector to expand increasing employment in this sector. In addition, the lower turnover rate allows the manufacturing sector to expand even further. Unemployment must be identical in both sectors since wages are the same in both sectors or else both no-shirking conditions will not be satisfied. This allows employment to expand in the agriculture sector. Since, employment expands in both sectors the aggregate unemployment rate must fall. In short, increased employment in the manufacturing sector creates demand for agriculture allowing both sectors to expand.

Second, in country 2, the aggregate unemployment rate falls and then rises as trade costs fall along the diversified equilibria. Although the price index tends to fall as trade costs fall, the shirking effect gains strength as trade costs fall which tends to increase the price index since a larger proportion of manufactures are being produced in country 1. After a point, the shirking effect takes over such that the loss in manufacturing due to the lower rate of turnover in country 1 outweighs the falling trade costs and the price index actually begins to rise. Hence, real wages fall causing both sectors to contract.

Third, if trade costs are such that a specialized equilibrium arises, the aggregate unemployment rate is strictly increasing in trade costs in both countries. This can be seen by the strictly upward slope of the unemployment curves for both countries along the specialized equilibria. country 1, as trade costs fall real wages increase which increases the level of employment required to deter shirking in the agriculture sector. Since agriculture is the only industry in country 1 this will increase aggregate employment in country 1. In country 2, when trade costs fall real wages rise which allows the manufacturing sector to expand. Unemployment must be the same in both sectors since wages are the same in both sectors or both no-shirking conditions will not be satisfied. This allows employment to expand in the agriculture sector. Since, employment expands in both sectors the aggregate unemployment rate must fall.

Figure 4: *Unemployment for Stable Equilibria*
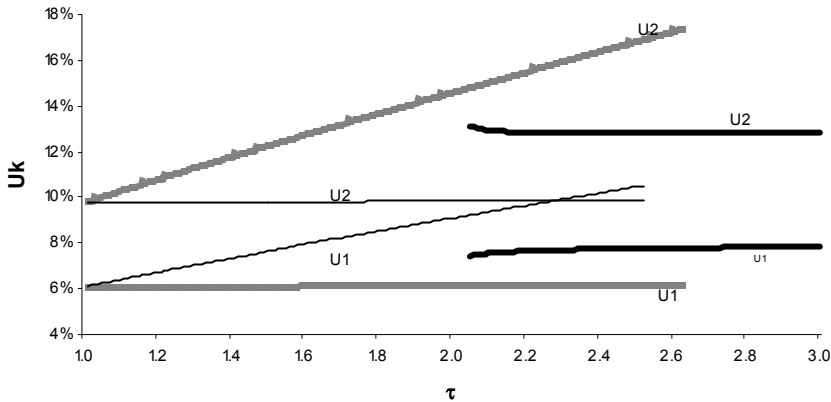
Fourth, if trade costs are sufficiently low, the aggregate unemployment rate is lower in country one for all classes of stable equilibria. This is a direct result of the effect that the lower rate of turnover in country 1 has on the unemployment rate required to deter workers from shirking. A lower turnover rate requires a lower unemployment rate to deter workers from shirking. So, one would expect that the unemployment rate would be higher in country 2 than in country 1. There is one exception to this: when manufacturing production is entirely located in country 2 and trade costs are high. In this case, trade costs are sufficiently high so that the higher price index in country 1 has a larger effect on unemployment than does the loer rate of turnover. However, as trade costs fall, this trend reverses and the result is, as one would expect, that unemployment is lower in country 1.

This finding has significant implications for core and periphery nations in the real world. What this suggests is that over time as trade costs fall there will be a period of diverging employment rates between core and periphery nations followed by a period of convergence. However, absolute convergence is not possible. The core nations will always have lower rates of unemployment due to the lower rates of job turnover. Furthermore, globalization is always good for employment in the core. However, this is not true for the periphery. If trade costs are such that the world lies in the period of divergence periphery nations stand to suffer employment losses. However, in the long term, as trade costs fall further, the periphery will see gains in employment.

4. Conclusion

The paper constructs a two-country new geography model to examine the relationships between falling trade costs, labor market asymmetry, and

unemployment. It is shown that as trade costs fall over time the world will naturally divide itself into an industrialized core and an agricultural periphery. The core will consist of countries with a traditionally large manufacturing base (i.e. the developed world) and the periphery will consist of countries with a traditionally large agricultural base (i.e. the less developed world). Furthermore, countries with low rates of job turnover are more likely to develop into core nations.

It is also shown that in this asymmetrical world of imperfect monitoring, if the world reaches a point where agglomeration occurs the core gains and the less developed periphery loses from the initial bifurcation. However, if trade costs continue to fall, the unemployment rates of the two will begin to converge. Unequivocally, falling trade costs due to globalization have a positive effect on the core countries of the developed world. Whether current global trends are good for the less developed world depends on which stage the world is currently experiencing: divergence or convergence. However, in the extreme long term, globalization will help both groups as trade costs fall lower and lower.

Notes

1.   Perhaps the term "supplier linkages" would be more appropriate since backward linkages refer to the reasons that suppliers would want to locate in a large market.
2.   Perhaps a better term here would be "demander linkages" since forward linkages refer to reasons why the demanders of manufactures would want to locate in a large market.
3.   The linkages here may seem confused from the earlier story. However, here final goods producers are the demanders and intermediate goods producers are the suppliers.
4.   There have been many articles that use this same reasoning. See Krugman and Venables (1996) and Venables (1996) for examples
5.   See Hanson (1998) and Francis (2002).
6.   For some exceptions see Milner and Wright (1998), Brecher and Choudhri (1994), Revenga (1997), and Agenor and Aizeman (1996).
7.   See OECD (1998).
8.   For other mergings of monopolistic competition and the worker discipline model see Matusz (1996,1998).
9.   Including trade costs on the agricultural good in these types of models can shrink the range of parameters for which agglomeration can be sustained. However, it will not change the results presented here. For more on this see Davis (1998), Fujita et al. (1999), and Rauch (1999).
10.   This is a simplification proposed by Krugman and Venables (1995) making it possible to include intermediates in production without explicitly modeling the intermediates sector. Using this approach, intermediate goods and final goods are the same good, X_M.

11.   In addition, there are steady state equilibria where equation (24) is not satisfied. These are equilibria where a country devotes all of its resources to the production of a single good (i.e. manufactures or agriculture). The dynamics spelled out below make it clear that these need not be considered when deriving the diagrams that determine all of the steady state equilibria, including those where equation (24) is not satisfied.

12.   It may seem unusual that individuals face a forward looking decision with respect to their labor market behavior, but face a static decision when it comes to location. Ottaviano (1999) and Baldwin (2001) show that in the standard core-periphery model of Krugman (1991) if agents have forward looking expectations with respect to location oscillating paths to the core-periphery solution can be supported such that expectations overturn the role of history if adjustment is sufficiently swift. That is, oscillating equilibrium paths exist where agglomeration occurs in the region that is initially smallest. However, the equilibrium paths that arise when adjustment is sufficiently slow are identical to the results gained using the ad-hoc dynamics used here. Hence, implicit in the ad-hoc rule here is an assumption that adjustment is sufficiently slow so that these oscillating equilibrium paths do not arise.

13.   This can be confirmed through inspection of equation (18).

14.   The equilibrium labor distributions are $M_1 = .402787$ and $M_2 = .397052$.

15.   The equilibrium labor distributions are $M_1 = .379425$ and $M_2 = .421593$.

References

Agenor, Pierre-Richard and Aizeman, Joshua (1996) 'Trade Liberalization and Unemployment'. Journal of International Trade and Economic Development 5, 265-86.

Baldwin, Richard (2001) 'Core-Periphery Model with Forward-Looking Expectations'.Regional Science and Urban Economics 31, 21-49.

Brecher, Richard A. and Choudhri, Ehsan U. (1994) 'Pareto Gains from Trade Reconsidered: Compensating for Jobs Lost'. Journal of International Economics 36, 223-238.

Davis, Donald (1998) 'The Home Market, Trade, and Industrial Structure'. American Economic Review 88, 1264-1276.

Dixit, Avanish and Stiglitz, Joseph (1977) 'Monopolistic Competition and Optimum Product Diversity'. American Economic Review 67, 297-308.

Francis, John (2002) 'Unemployment in a Core-Periphery Model of Globalization'. Mimeo, Auburn University Montgomery.

Fujita, Masahisa, Krugman, Paul and Venables, Anthony (1999) The Spatial Economy. Cambridge: MIT Press.

Hanson, Gordon (1998) 'Regional Adjustment to Trade Liberalization'. Regional Science and Urban Economics 28, 419-44.

Krugman, Paul (1979) 'Increasing Returns, Monopolistic Competition, and
        International   Trade'. Journal of International Economics 9,
        469-479.
_____ (1980) 'Scale Economies, Product Differentiation, and the Pattern of Trade'.
        American Economic Review 70, 950-59.
_____ (1991) 'Increasing Returns and Economic Geography'. Journal of Political
        Economy 90,483-499.
_____ (1998) 'Space: The Final Frontier'. Journal of Economic Perspectives 12,
        161-174.
Krugman, Paul and Venables, Anthony (1995) 'Globalization and the Inequality of
        Nations'. Quarterly Journal of Economics 110, 857-880.
_____ (1996) 'Integration, Specialization and Adjustment'. European Economic
        Review 40, 959-967.
Matusz, Steven (1996) 'International Trade, The Division of Labor, and
        Unemployment'. International Economic Review 37, 71-84.
_____ (1998) 'Calibrating the Unemployment Effects of Trade'. Review of
        International Economics 6, 592-603.
Milner, Chris and Wright, Peter (1998) 'Modeling Labour Market Adjustment to
        Trade Liberalisation in an Industrializing Economy'. Economic Journal
        107, 509-528.
OECD (1998) Employment Outlook. Paris: OECD.
Ottaviano, Gianmarco I.P (1999) 'Integration, Geography, and the Burden of
        History'.   Regional Science and Urban Economics 29, 245-256.
Rausch, James E. (1999) 'Networks Versus Markets in International Trade'. Journal
        of International Economics 47, 7-35.
Revenga, Ana (1997) 'Employment and Wage Effects of Trade Liberalization: The
        Case Of Mexican Manufacturing'. Journal of Labor Economics 40, S20-
        S43.
Shapiro, Carl and Stiglitz, Joseph (1984) 'Equilibrium Unemployment as a Worker
        Discipline Device'. American Economic Review 74, 433-444.
Venables, Anthony (1996) 'Equilibrium Locations of Vertically Linked Industries',
        International Economic Review 37, 341-35.

Foreign Finance And Trade: The Experience Of Large Mexican Enterprises During The 1990s

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Abstract. During the 1990s the Mexican economy experienced severe changes. Liberalization policies were applied and the economy suffered a sharp business cycle, including deep currency, financial and economic crises in 1994-1995. The financial sector entered in protracted disarray, and foreign trade and foreign finance became more important. In the 1990s, large Mexican enterprises were growing and profitable, but they followed the economy's business cycle, and experienced increases in leverage and in the share of foreign sales and foreign debt. However, leverage in Mexican enterprises seems to be explained for the same variables that were found in other countries. Enterprises are adjusting to a target leverage ratio and leverage is positively associated with the enterprises' size, while increasing profitability, liquidity and tangibility reduce the leverage level.

I. Introduction

In this paper the growth evolution and the financial behavior of a sample of forty-eight non-financial Mexican enterprises from 1990 to 2000 are analyzed. Special emphasis is put on the evolution of their capital structure and foreign relations (sales and debt). The financial statements of these enterprises, quoted in the Mexican Stock Exchange (Bolsa Mexicana de Valores, BMV), are used to construct several economic and financial ratios. The aim is to track the enterprises' structural change during a particularly turbulent time in the Mexican economy and to determine how outside finance is used.

The paper is organized as follows: Section II summarizes the relevant economic and financial evolution of the Mexican economy during the period. Section III presents a description of the sample and the indicators used. Section IV shows the main descriptive results. Section V reviews recent literature on capital structure. Section VI presents an econometric exercise to test the determinants of leverage for Mexican enterprises. Finally, section VII contains concluding remarks.

2. Evolution Of The Mexican Economy During The 1990s[2]

During the 1990s, the Mexican economy underwent huge structural changes. The external and financial sectors were liberalized in the early 1990s and the economy faced a deep financial and business crises in 1995-1996. In many ways the economy as a whole and the regions of the country are still adjusting to the effects of the economic liberalization and the 1994 crises.

The performance of the Mexican economy has been very volatile both in its

real and financial variables. The GDP per capita was slowing its rate of growth between 1990 and 1993. It improved in 1994, and then took a deep dive in 1995 (growth rate of -7.8 percent). In 1996, growth recovered to high levels and achieved a maximum in 1997 (5.0 percent). After 1997 growth rates began to slow in 1998 and 1999. There was a recovery in 2000, and then the economy entered into a new recession in 2001. Gross fixed investment was even more volatile, with its growth rates ranging from minus 29 percent in 1995 to 21 percent in 1997.

Foreign trade gained importance in the Mexican GDP. From 1990 to 2000, both exports and imports more than doubled their share in GDP. The share changed from roughly 15 percent in 1990 to roughly 35 percent in 2000. The tendency of foreign trade to increase its share was only reverted in 2001. The economy changed from a trade deficit in 1990-1994 to a surplus in 1995-1997 and then again to a deficit position in 1998-2001.

Inflation came down from a level of 30 percent in 1990 to 7 percent in 1994. The crises triggered inflation to 52 percent in 1995, and then it began again to come down in the next years. By 2000, the inflation rate was similar to the one of 1994 and continued to fall in 2001. The real interest rate changed from negative during the high inflation years to positive during the low inflation years. Finally, the peso-US dollar exchange rate changed from a period of relative stability in 1990-1993 to a period of recurrent devaluation in 1994-1998 and then to stability again in 1999-2001.

The exchange rate adjustments had an impact on the financial statements of the Mexican enterprises, especially at the end of 1994. The exchange rate devaluation increased the value in real pesos of foreign debt and foreign sales, certainly in a different way since the former is a stock and the later a flow. One dollar of foreign debt (or foreign sales) expressed in real pesos changes according to the expression: $[(e_t\, p_{t-1})/\,(e_{t-1}\, p_t)]-1$, where e_t and p_t are the peso-dollar exchange rate and the price index in Mexico at year t, respectively. For most of the years, dollar quantities in real pesos had been decreasing, but in 1994, the real peso value of one-dollar increased in 60 percent.

Historically, the Mexican financial sector has not been very deep. The financial savings share in the GDP gained more than ten percentage points between 1990 and 1994, achieving a maximum of 47.3 percent. The crises generated a setback for the next years. In 2000, financial savings were 40.8 percent of GDP. Mexican commercial banks credit portfolio shrank between 1994 and 2001.[3] The credit portfolio in 2001 was only 42 percent of the credit portfolio of 1994. The decline of credit is associated with the aftermath of the financial crisis and the increase in the share of non-performing credits. Already high in 1993 and 1994, non-performing credits increased rapidly in the following years. By 1998, the non-performing credits were one third of the total credit portfolio. Though this share began to fall for the next years, it was still very high in 2001.

The financial sector stopped financing enterprises. In 2001, enterprises' finance was only 58.7 percent of the 1994 amount. Commercial banks credit

shrinkage explains a big part of this reduction. In 1994, commercial banks were financing roughly two thirds of all enterprises' outside finance. By 2001, commercial banks only accounted for roughly a little more than one-third. At the same time, since 1994 (and probably before) foreign finance has been gaining importance in the financing of enterprises in Mexico. By 2001, two-fifths of finance for enterprises came from foreign sources (roughly two times the share in 1994).

Banco de Mexico surveys the sources and uses of total outside finance of Mexican enterprises since 1998. In average, suppliers, commercial banks and foreign banks supply the bulk, around 80 percent, of outside finance for Mexican enterprises. The composition changes with the size or whether the enterprise exports or not[4]. Suppliers' finance is inversely related to size, while commercial bank credit and foreign bank credit increase with size. Particularly, foreign bank credit share increases markedly with size. Assuming that "other liabilities" account for securities issued by the enterprises (such as commercial paper and new equity issues), only large and especially very large enterprises (labeled AAA) use non-banking financial sources, though its share is still low. Export enterprises use more commercial bank and foreign bank credit than non-export enterprises.

Size or export position seem to matter less for the use of commercial bank credit. Enterprises use around 75 percent of commercial bank credit as working capital (60 percent) or for investment purposes (15 percent). Nevertheless, the use of bank credit for foreign transactions grows with size and increases when enterprises export. The fact that Mexican enterprises depend on imported inputs implies that even non-export enterprises use bank credit for foreign transactions. Finally, it is noteworthy that more than 10 percent of the bank credit is used to refinance former liabilities. Liability restructuring is a legacy of the 1994-1995 financial crisis and grows with size.

3. Sample Description And Measures Used

The sample includes some of the major non-financial Mexican enterprises usually controlled by Mexican shareholders; though in several of them, foreign ownership is important or complete. The enterprises are basically parent companies. Some of them are connected by shareholders ownership or through the holding of shares of each other. A detailed description of the sample appears in Mendoza, 2001. Each enterprise in the sample is considered financially healthy in the sense that in 60 percent of the years in the period net income was positive. For each enterprise, there exist continuous financial statements from at least 1991 through 2000. For some enterprises, there exist financial statements for 1989 and 1990.

The forty-eight enterprises in the sample are in all the economic sectors, except the primary and energy sectors. Twenty-three are manufacturing enterprises, with eight in the food, beverages and tobacco activities and seven in the non-metallic minerals products, except for petroleum and coal. The second sector in importance is commerce, restaurants and hotels with twelve enterprises. The BMV classifies seven enterprises as highly diversified enterprises. These are enterprises that have

operations in more than one economic sector.

The twelve first enterprises accounted for almost 74 percent of the total assets of the forty-eight enterprises in 2000. The largest enterprise, TELMEX, the national telephone company, was 437 times the smallest and had more than 14 percent of the sample total assets in 2000. The coefficient of variation of total assets between the enterprises was equal to 1.48. Real total assets for the forty-eight enterprises grew at an annual rate of 5.3 percent in 1991-2000. According to 2000 real sales (1997 pesos), following Banco de Mexico classification, one enterprise was small, two were medium, 21 large and 24 very large (AAA).

The variables to track the growth and financial behavior of the enterprises are the following. **Growth rates**: Annual change in net total sales, Gross investment rate (investment in property, plant and equipment plus construction in process divided by the net capital stock). **Profitability**: Markup (operating income divided by net total sales), Profit rate (net income divided by average stockholders equity), Cash flow (net income plus depreciation) to net lagged capital stock ratio, Payout ratio (dividends divided by net income). **Liquidity**: Current ratio (current assets divided by current liabilities), Interest coverage ratio (operating income plus depreciation divided by interest payment). **Leverage**: Debt ratio (long-term debt divided by total capitalization, which is equal to total assets less current liabilities). **Debt structure**: Long-term debt to total debt ratio, Total bank debt to total debt ratio, Long-term bank debt to total long-term debt ratio. **Foreign currency transactions**: Foreign sales to total net sales ratio, Annual change in foreign sales, Total foreign currency debt to total debt ratio, Long-term foreign currency debt to total long-term debt ratio, Annual change in total foreign currency debt ratio.

4. Main Descriptive Results

Net sales grew at a rapid pace, while the investment rate was disappointing (see table 1). The net sales growth rate was positive and high, on average, for the whole period. The median growth rate of sales was 6.4 percent. The volatility of this growth rate was high according to the standard deviation and the minimum and maximum values. Assuming that the depreciation rate of the stock of capital is around 10 percent, the evolution of the gross investment rate was less impressive. The mean investment rate was 14.1 percent, while the median achieved only 10.1 percent. The volatility of this rate was smaller than the volatility of the growth rate of sales but was still comparability high.

On average, the enterprises were profitable and were paying dividends. Cash flow was larger than enterprises' investment financial needs. The markup tended to be the most stable of all profitability measures. The profit rate and the cash flow to capital stock ratio were high. The median year-enterprise had a profit rate of 10.6 percent. The mean and median cash flow measures were always bigger than their respective investment rates. The mean and median year-enterprises were paying dividends, though the payout ratio was very volatile. In fact only 25 of the enterprises paid dividends in 60 percent or more of the years.

Table 1. *Sample of Mexican enterprises. Summary measures of the variables in 1990-2000*

	No. of obs.	Mean	Standard Dev.	Min	Max	Median
Annual change in sales	504	0.083	0.228	-0.689	1.520	0.064
Investment rate	504	0.141	0.165	-0.047	1.994	0.101
Markup	526	0.127	0.095	-0.227	0.520	0.109
Profit rate	504	0.101	0.123	-0.612	0.908	0.106
Cash flow to capital stock ratio	504	0.202	0.236	-0.465	2.184	0.179
Payout ratio	526	0.102	2.787	-61.33	11.852	0.088
Current ratio	526	1.940	1.359	0.117	11.262	1.539
Debt ratio	526	0.202	0.167	0.000	0.687	0.187
Interest coverage ratio	506	30.081	203.203	-1.175	3598.66	3.061
Long-term debt to total debt ratio	526	0.382	0.259	0.000	0.946	0.404
Total bank debt to total debt ratio	526	0.463	0.274	0.000	0.964	0.510
Long-term bank debt to long-term debt ratio	463	0.690	0.354	0.000	1.000	0.842
Foreign sales to total sales ratio	526	0.179	0.228	0.000	0.951	0.079
Annual change in foreign sales	344	0.559	2.019	-1.000	16.539	0.043
Total foreign currency debt to total debt ratio	526	0.497	0.334	0.000	0.997	0.556
Long-term foreign debt to long-term debt ratio	463	0.638	0.406	0.000	1.000	0.849
Annual change in total foreign debt	454	0.519	2.786	-1.000	35.132	0.047

(Source: Bolsa Mexicana de Valores)

The mean and median year-enterprises were able to cover its current liabilities and interest payments. The mean and median current ratios were larger than one. The mean and median year-enterprises had more operating income plus depreciation than interest payments. The median was 3.0. However, this ratio was highly volatile.

The debt ratio (long-term debt to total capitalization) was around 20 percent and was less volatile than the growth and profitability measures, but leverage heterogeneity is clearly present. While some enterprises did not have long-term debt in some years or during the whole period (minimum value of zero), the leverage for other enterprises was high (maximum value of 69 percent).

In the composition of debt, bank debt was the main source of outside finance, especially for long-term debt. The mean and median long-term debt of the year-enterprises represented around two fifths of total debt. Meanwhile, the median and mean shares of bank debt in total debt were around 50 percent. The share of long-term bank debt in total long-term debt was larger: mean of 69 percent and median of 84.2. The maximum shares of long-term debt and total bank debt in total debt are near one, and there are enterprises whose long-term debt is exclusively long-term

bank debt. The volatility of these ratios is relatively low.

Enterprises have relatively more foreign debt than foreign sales. The median and mean year-enterprises sold in foreign currency around 8 and 18 percent of its net sales, respectively. Several enterprises, due to the nature of their products and services, did not have foreign currency sales, but there are enterprises that sold almost all its products in foreign markets (maximum value of 95 percent). Total foreign currency debt to total debt was around 50 percent for the median and mean year-enterprises, while long-term foreign currency debt to long-term debt was larger (median of 84.9 and mean of 63.8 percent). There are enterprises without foreign debt at all, but some enterprises debt (either total or long-term) comes entirely from foreign sources. The growth rates of foreign sales and foreign total debt were very volatile with huge maximum values. Nevertheless, the median growth rates of both foreign sales and foreign total debt are less than the median growth rate of total sales.

The sample has good growth, profitability, and liquidity measures during the period. The evolution of the variables through time shows a pronounced business cycle that followed the cycle of the Mexican economy. During the decade, there were changes in the debt structure and in the foreign currency transactions that may last a long-time. The crises of 1994-1995 were critical points for the enterprises. Growth measures did not recover their pre-crisis levels, profitability and liquidity measures increased, and the capital structure changes were accelerated.

The annual median investment rate shows that the enterprises suffered a strong business cycle with troughs in 1990, 1995-1996 and 1999-2000 (see table 2). The most dramatic fall occurred in 1995-1996. If the ten-percent replacement investment rate is considered, the net investment rate has been negative after the crisis, except in 1998. The annual median profit rate fell sharply in 1994, with a strong recovery in 1995-1996. Profitability was bigger in 1996-2000 than in the pre-crises years. However, the median year-enterprise payout ratio achieved its maximum in 1993 (17.0 percent), and fell to zero in 1995, 1996 and 1999. Enterprises were paying fewer dividends per unit of net income after 1993, even as profitability more than recovered after the crises.

The enterprises improved their liquidity positions after the crisis. The annual median current ratio fell in 1994-1995, but it recovered in the next years. Enterprises began to operate with a better capacity to face current liabilities. Leverage was increasing from 1990 to 1995. The annual median debt ratio doubled between 1990 and 1995. The high level achieved (23.5 percent) was continued in the post-crises years. Even the retreat of the variable in 1999 and 2000 was far away from the levels of early 1990s. The annual median share of long-term bank debt in long-term debt increased. The positive trend began in 1991. This annual median ratio changed from 71 percent in 1991 to 96 percent in 2000.

The annual median share of foreign currency sales in total sales increased during the 1990s. The 1994-1995 crises represented a big push for this increase. Until 1994, the annual median share of foreign currency sales in total sales had been less than four percent. In 1995, the annual median share jumped to 14.1 percent and

Table 2. *Sample of Mexican enterprises. Annual median evolution in 1990-2000*

	Investment rate	Profit rate	Payout ratio	Current ratio
1990	0.094	0.091	0.096	1.339
1991	0.114	0.098	0.108	1.530
1992	0.145	0.106	0.115	1.615
1993	0.153	0.095	0.170	1.613
1994	0.163	0.039	0.070	1.350
1995	0.088	0.081	0.000	1.381
1996	0.079	0.163	0.000	1.642
1997	0.096	0.156	0.091	1.783
1998	0.109	0.104	0.156	1.623
1999	0.084	0.133	0.000	1.646
2000	0.093	0.106	0.089	1.548

	Debt ratio	Long-term bank debt to long-term debt ratio	Foreign sales to total sales ratio	Total foreign currency debt to total debt ratio	Long-term foreign debt to long-term debt ratio
1990	0.104	0.802	0.035	0.416	0.429
1991	0.087	0.711	0.028	0.324	0.360
1992	0.148	0.762	0.025	0.439	0.612
1993	0.198	0.775	0.033	0.534	0.701
1994	0.235	0.901	0.036	0.613	0.909
1995	0.235	0.880	0.141	0.640	0.928
1996	0.199	0.885	0.128	0.639	0.964
1997	0.242	0.878	0.132	0.686	0.977
1998	0.238	0.977	0.172	0.607	0.985
1999	0.203	0.874	0.139	0.568	0.972
2000	0.192	0.955	0.156	0.549	0.934

(Source: Bolsa Mexicana de Valores)

continued around the same level in the following years. In 2000, the median share was 15.6 percent.

The increase of the annual median share of foreign currency debt ratio in total debt was a phenomenon previous to the 1994-1995 crisis, though this ratio continued growing in the next years. The annual median total foreign currency debt to total debt ratio increased significantly moving from 32 percent in 1991 to 69 percent in

1997 and finished the period with a level of 55 percent. The most dramatic change occurred with the annual median foreign currency long-term debt to long-term debt ratio, which changed from 36 percent in 1991 to 91 percent in 1994 and achieved a level of 99 percent in 1998.

There exists an asymmetry in the foreign relations of Mexican enterprises. The income generated by foreign sales is relatively less important than the foreign debt burden. This asymmetry will increase if imports were included. Martinez and Werner 2002, recognize that leverage of foreign total debt increased for Mexican enterprises, but they state that the exchange rate exposure was reduced, since the median of foreign sales to foreign debt increased.

Nevertheless, the importance of the asymmetry and the exchange rate exposure of foreign debt can be pointed out with two facts. First, there are more enterprises with foreign debt than with foreign sales. In 2000, 35 out of 48 enterprises had foreign sales, while 45 and 43 had foreign debt and foreign long-term debt, respectively. Enterprises without foreign revenue were borrowing in foreign markets. Second, while the median sales to total debt ratio is around two, the median foreign sales to total foreign debt was never more than one half during the period. Therefore, foreign sales do not cover foreign debt as well as total sales cover total debt.

5. Recent Literature On Capital Structure

According to Myers 2001, putting aside the well-known Modigliani-Miller's proposition that finance does not matter, there are three conditional, non general, theories trying to explain the debt and equity mix of an enterprise. In the tradeoff theory, debt levels are adjusted to balance the tax advantage of debt (interest is tax deductible income, while corporate income is not) and the bankruptcy and agency costs of financial distress. In the pecking order theory, internal funds are preferred over borrowing, and borrowing is preferred over equity issues. In the free cash flow theory, high debt levels will increase the firm's value regardless of threats of financial distress when operating cash flow exceeds profitable investment opportunities. In the majority of cases, the predictions of these theories coincide (see Harris and Raviv 1991). The most important divergence is the pecking order theory postulate of a negative relationship between leverage and profitability and the opposite prediction of the tradeoff and free cash theories.

For Myers, there are three elements that can make hard an interest tax shield strategy. First, the enterprise's profitability level can set the firm below the average corporate tax rate. Second, the future interest tax shield depends on the absolute debt, which is a magnitude that is not fixed, since it depends on the profitability and the value of the enterprise. Third, the interest tax shield can be offset by the tax advantage of equity income (dividends plus capital gains) to individual investors. Rajan and Zingales 1995 stress that the right personal tax should be included in the computation of the tax advantage of debt, a task that requires an entire study. The empirical fact that there is a negative correlation between profitability and debt ratios

works against the tradeoff theory, though the theory is in accordance with the empirical fact that debt levels are positively associated with the enterprises' tangible assets.

Empirical data in developed countries show that the major part of enterprises' financial needs are financed with internal resources (cash flow), then issuing debt, and finally, if necessary, enterprises issue equity. Nevertheless, there are marked differences between countries. In the US net stock issues are negative, while in Japan external finance makes 50 percent of total finance (Rajan and Zingales 1995). Additionally in the US, according to Harris and Raviv 1991, for new investment internal funds represent a large but declining part, while leverage has increased steadily since World War II.

The pecking order theory tries to explain these facts. Profitable enterprises have internal resources to finance their expansion. If not they will first use the least risky security (debt) and finally, if debt is not available, they will issue equity. If managers act to maximize the value of existing shares, they will avoid issuing equity because it drives down the price of shares.

In regard to the free cash theory (also known as agency theoretic framework), for Myers, the leverage buyouts of the 1980s were a classic use of debt to increase the value of the enterprises. The increase in debt levels put enterprises on a diet, cut wasteful investment, forced the sale of underutilized assets and strengthen managers incentives to maximize investors value and payout cash. Then, more than a theory on capital structure, the free cash theory warns of the consequences of high debt ratios.

In a survey of 392 chief financial officers (CFO), Graham and Campbell 2001 found that those CFOs do not strictly follow the theoretical prescriptions just summarized. They concluded "informal criteria such as financial flexibility and credit ratings are the most important debt policy factors. Other informal criteria such as EPS [earnings per share] dilution and recent stock price appreciation are the most important factors influencing equity issuance. The degree of stock undervaluation is also important to equity issuance…[They found] moderate support that firms follow the trade-off theory and target their debt ratio. Other results, such as the importance of equity undervaluation and financial flexibility, are generally consistent with the pecking order view. However, the evidence in favor of these theories does not hold up as well under closer scrutiny…" (Graham and Campbell, 2001, p. 232).

There exists a marked heterogeneity in size, tangibility, liquidity and capital structure among enterprises within a country (Myers 2001) as well as among enterprises in the world. This heterogeneity depends on several factors such as the industries where enterprises operate, the development and characteristics of the national financial sectors, the tax codes, the level of ownership concentration and the bankruptcy laws (Harris and Raviv 1991, Rajan and Zingales 1995).

Booth, et. al. 2001 found that enterprises in developing countries have lower debt ratios (especially in the case of long-term debt) than enterprises in the developed countries. The enterprises' capital structure changes with the business cycle. When the economy is in the stage of capital tightening, due to credit crunches,

collateral squeezes or saving squeezes and lending "flights to quality" (Bernanke et. al. 1994), leaving poor capital enterprises squeezed (Holmstrom and Tirole 1997).

Harris and Raviv 1991 wrote that there is agreement that leverage increases with fixed assets, non-debt tax shields, growth opportunities, and firm size and decreases with volatility, advertising expenditures, research and development expenditures, bankruptcy probability, profitability and the uniqueness of the product. Rajan and Zingales 1995 used tangibility (share of fixed assets in total assets), growth opportunities (the market to book ratio), firm size (log of net sales), and profitability (earnings before interest, taxes and depreciation divided by total assets) to explain leverage (debt to capitalization ratio both at book and market value). They performed tests for enterprises in US, Japan, Germany, France, Italy, UK and Canada. They found that for all the countries leverage is similarly correlated with the variables included. Leverage increases with size and tangibility and decreases with growth opportunities and profitability. Notice that the result for growth opportunities is the opposite of the one reported by Harris and Raviv 1991.

In a study of United Kingdom enterprises in 1986-1996, Ozkan 2001 defined leverage as total debt divided by total assets. The author made this ratio a function of one lag leverage, size (log of sales), liquidity (current ratio), non-debt tax shields (annual depreciation to total assets ratio), profits and growth opportunities (book value of total assets minus the book value of equity plus the market value of equity to book value of total assets). The UK enterprises in the sample tend to adjust their leverage ratios quickly (the adjustment coefficient to a target change in leverage, given by one minus the coefficient on the one lag debt term, is greater than 0.5)[5]. Growth opportunities (which the author regards as intangible assets), the levels of liquidity and profitability, and non-tax shields exert a negative influence on leverage. Finally, size is only weakly significant to leverage. Then the UK enterprises seem to adjust to a target debt ratio and leverage reacts inversely to their growth opportunities (intangible assets) according with the tradeoff theory. Leverage is negatively associated with profitability and liquidity (pecking order theory).

Booth et. al. 2001, tested the total debt to total assets ratio and the long-term debt to total capitalization ratio as a function of the enterprises tax rate, the tangibility of assets, the size (the log of sales), the return on assets and the market value to book value ratio. They used enterprises' data for ten developing countries (among them Mexico) from 1980 to 1990. They found that the coefficient of profitability for all the countries resulted negative and strongly significant for both debt ratios. While assets tangibility tends to have a negative coefficient for total debt, it turns positive for long-term debt. Meanwhile, the coefficient of the tax rate tends to be non-significant and in most of the countries negative for both debt ratios, though the authors say that their measure of the tax rate seems to be a proxy for profitability.

In developing countries the coefficient of the market to book ratio (which could not be used for Brazil and Mexico) tends to be positive and significant for both debt ratios. The coefficient of the size of the enterprises is significant and positive

also for both leverage measures. The authors concluded that, except for the market to book ratio, it turns out that the same factors influence the enterprises' capital structure in both developed and developing countries. Though the authors stress that country factors, such as GDP growth, inflation, and the development of the capital markets, are important in the determination of debt levels.

6. Determinants Of Leverage In Mexican Enterprises

The leverage of Mexican enterprises in the sample changed in the last decade. Enterprises were using more long-term debt, more bank debt and more foreign currency debt than at the beginning of the decade. Following the preceding theoretical considerations and taking into account the increasing weight of foreign sales in the Mexican data, several variables were tested as determinants of debt ratios. The debt ratios used are Total debt to total assets ratio, Long-term debt to total capitalization ratio, Total foreign debt to total assets ratio and Long-term foreign debt to total capitalization ratio. The explanatory variables are: One lag of the corresponding debt ratio (to check for debt ratio targets), Profit rate, Natural log of sales, Current ratio (for liquidity), Tangibility (total assets minus current assets divided by total assets), and Foreign sales to total sales ratio. Using **DPD for Ox** (see Doornik, et. al. 2002), mean deviations, first differences and orthogonal deviations were calculated for several specifications. Table 3 reports results for GMM orthogonal deviations[6] with time dummies and using the corresponding debt variable lagged three times as instrument. Only variables that were significant at 5 percent are reported.

Foreign sales to total sales ratio resulted non-significant for the four debt ratios. For Mexican enterprises, as important as the variable has become, the weight of foreign sales in total sales is not a determinant of leverage, even leverage in foreign currency. Tangibility was significant only for the total debt to total assets ratio. The same empirical regularity found in Booth et. al. 2001 for total leverage appears in the results: the coefficient sign of tangibility is negative (this result is opposite to the one of Rajan and Zingales 1995). Therefore, Mexican enterprises borrow less total debt when their long-term assets share grows. Nevertheless, in the Mexican sample tangibility is not a determinant of long-term leverage. Theoretically long-term leverage can increase with more long-term assets. This result was found in general in Booth et. al. 2001. Though in their Mexican sub-sample long-term leverage was negatively associated with tangibility.

The liquidity variable resulted significant only for the two total leverage ratios. Higher liquidity may exert two contradictory effects on leverage: it can support higher debt ratios or it can reduce leverage due a major availability of internal resources. The negative sign of this variable means that for the Mexican enterprises the second effect dominates for total debt leverage and total debt leverage in foreign debt: when the current ratio increases, leverage falls. It is possible that for the long-term leverage measures both liquidity effects cancel out. Nevertheless, since the long-term leverage ratios calculated here do not include current assets or

Table 3. *Determinants of debt and foreign debt in the sample of Mexican enterprises*

A. Mean and median values of variables used in the regressions

	Mean	Median
Total debt to total assets	0.374	0.365
Debt ratio	0.202	0.187
Total foreign debt to total assets	0.205	0.174
Long-term debt to total capitalization	0.147	0.099
Profit rate	0.101	0.106
Natural log of sales	8.194	8.301
Current ratio	1.94	1.539
Assets tangibility	0.665	0.683

B. Regressions

	Dependent variable							
	Total debt to total assets		Debt ratio		Total foreign debt to total assets		Long-term foreign debt to total capitalization	
Explanatory variable	Coefficient	Sd Error	Coefficient	Standard Error	Coefficient	Sd. Error	Coefficient	Sd. Error
One lag debt	0.527	0.038	0.572	0.047	0.524	0.048	0.622	0.054
Profit rate	-0.169	0.027	-0.174	0.048	-0.116	0.048	-0.110	0.053
Natural log of sales	0.041	0.011	0.049	0.014	0.041	0.012	0.037	0.014
Current ratio	-0.034	0.006			-0.012	0.003		
Assets tangibility	-0.265	0.064						
Wald (joint)	Chi^2(5)	482.3	Chi^2(3)	170	Chi^2(4)	161.4	Chi^2(3)	151.7
Number of observations	456		456		456		456	
No of Ent.	48		48		48		48	

liabilities a different measure of liquidity, perhaps cash flow, would be more appropriate. Additionally, liquidity levels may be associated with the profit rate.

One lag of the corresponding debt ratio tests the existence of a debt target following Ozkan 2001. The achieved fraction of the desired target change (λ) is given by 1 minus the corresponding lagged debt term coefficient. In the orthogonal deviations exercise, the four debt ratios have a positive and significant one-lag leverage coefficient[7]. Around forty to fifty percent of the target change is done in one

year (it will take from two to two and have years to achieve the target debt ratio). The tendencies to increase leverage of Mexican enterprises in the 1990s can be associated with a change to higher target debt ratios originated by the financial and economic liberalization of the Mexican economy.

The profit rate is significant and inversely related with leverage for all the considered ratios. This result is in line with the pecking order theory. As internal resources grow, enterprises borrow less (which is perhaps the same effect that the current ratio caught for total debt). The coefficient of the size of the enterprises is always positive and significant for the four leverage measures. According with Rajan and Zingales 1995, since large enterprises are more diversified and fail less often, the log of sales may be an inverse proxy for the probability of bankruptcy.

In regard to the foreign total and long-term debt ratios, though both increased their values during the last decade in the case of Mexican enterprises, the regressions show that their determinants are the same than the ones for the leverage ratios considering domestic and foreign debt. The increase in the share of foreign debt in Mexican enterprises does not seem to be a result of changes in the operation of the enterprises, but of the protracted disarray of the Mexican financial sector.

7. Concluding Remarks

During the 1990s the Mexican economy experienced severe changes. Financial and commercial liberalization policies were applied. The economy suffered a sharp business cycle, including a profound currency, financial and productive crises in 1994-1995. The financial deep of the economy was not large at the beginning of the period and it did not increase. After the crisis, the financial sector, entered in protracted disarray. At the same time, both foreign trade and foreign finance increased their importance in the Mexican economy.

In the 1990s, large Mexican enterprises were growing and profitable but followed the economy's business cycle and experienced increases in leverage. Foreign transactions increased for these enterprises, though less for the share of foreign sales than for the share of foreign debt. However, leverage in Mexican enterprises seems to be explained for the same variables that were found in other countries. Enterprises adjust to a target leverage ratio and leverage is positively associated with the enterprises' size. Increasing profitability, liquidity and tangibility reduce the leverage level. The growing importance of foreign sales does not explains total leverage or leverage in foreign currency. These results agree with empirical research in other countries.

Notes
1. e-mail: gamp@servidor.unam.mx
2. All data in this section have been taken from Instituto Nacional de Estadística, Geografía e Informática, INEGI, (http://www.inegi.gob.mx/) and Banco de Mexico (http://www.banxico.org.mx/).
3. Due to changes in accounting practices comparable data for the early 1990s are

not available.

4. Non-export firms are those that do not have foreign trade as well as those that only import goods and services. Small firms are those with sales under 100 million pesos in 1997. Medium firms are those with sales from 101 million to 500 million pesos in 1997. Large firms are those with sales from 501 million to 5,000 million pesos in 1997. AAA firms are those with sales over 5,000 million pesos in 1997.

5. Following Ozkan 2001, suppose the target debt ratio is given by

$$D_{it}^* = \sum_k \beta_k x_{kit} + \varepsilon_{t\tau}$$

where there are K explanatory variables x_k of the target debt ratio. Then the difference between the current debt ratio and the one lagged debt ratio is given by

$$D_{it} - D_{i,t-1} = \lambda(D_{it}^* - D_{i,t-1})$$

Only a fraction λ of the needed target change is achieved. The current debt ratio can be written as

$$D_{it} = (1 - \lambda)D_{i,t-1} + \sum_k \lambda \beta_k x_{kit} + \lambda \varepsilon_{t\tau}$$

6. Orthogonal deviations eliminate the specific (enterprise) error term without introducing (like mean deviations) all lagged values of the disturbances into the transformed error term (see Doornik, et. al. 2002). The transformed observation is the deviation from the average of the future observations in the sample for the same individual multiplied by a factor to standardize the variance. Then the orthogonal deviation $x_{it}*$ of the t observation of the i individual, x_{it}, for $t= 1,..., T-1$ is given by

$$x_{it}^* = \left(x_{it} - \frac{x_{i,t+1} + ... + x_{iT}}{T - t} \right)\left(\frac{T - t}{T - t + 1} \right)^{1/2}$$

7. For the one lag leverage term, regressions using first differences yielded different results from mean deviations and orthogonal deviations. In first differences, the one lag debt term coefficient resulted negative, though only significant for the foreign total debt to assets ratio.

References

Bernanke, B., M. Gertler and S. Gilchrist, 1994. "The financial accelerator and the flight to quality." WP 94-18, Board of Governors of the Federal Reserve System, Washington D.C., 1994.

Booth, Laurence, Varouj Aivazian, Asli Demirguc-Kunt, and Vojislav Maksimovic, 2001. "Capital structures in developing countries." *The Journal of Finance*, Vol. LVI, No. 1, February 2001, pp. 87-130.

Doornik, Jurgen A., Arellano, Manuel and Bond, Stephen, 1999. *Panel Data Estimation Using DPD for Ox.* December 2002, http://www.nuff.ox.ac.uk/Users/Doornik/.

Graham, John R. and Campbell R. Harvey, 2001. "The theory and practice of corporate finance: evidence from the field." *Journal of Financial Economics*,

60(2001), pp. 187-243.

Harris, Milton and Arthur Raviv, 1991. "The theory of capital structure." *The Journal of Finance*, Vol XLVI No. 1, March 1991, pp. 297-355.

Holmstrom, Bengt and Jean Tirole, 1997. "Financial intermediation, loanable funds, and the real sector." *The Quarterly Journal of Economics*, Vol. CXII, August 1997, Issue 3, pp. 663-691.

Martínez, Lorenza and Alejandro Werner, 2002. "El régimen del tipo de cambio y la composición de la deuda corporativa: la experiencia mexicana." Documento de Investigación No. 2002-02, Dirección General de Investigación Económica, Banco de México, February 2002.

Mendoza Pichardo, Gabriel, 2001. "Liquidity constraints on investment. A Study of Non-Financial Enterprises in Mexico, 1990-1998." PhD Dissertation, Graduate Faculty of Political and Social Science of the New School University, January 2001.

Myers, Stewart C., 2001. "Capital structure." *Journal of Economic Perspectives*, Vol. 15, Number 2, Spring 2001, pp. 81-102.

Ozkran, Aydin, 2001."Determinants of capital structure and adjustment to long run target: evidence from UK company data." *Journal of Business, Finance & Accounting*, 28(1) & (2), January/March 2001, pp. 175-198.

Rajan, Raghuram G. and Luigi Zingales, 1995. "What do we know about capital structure? Some evidence from international data." *The Journal of Finance*, Vol L, No. 5, December 1995, pp. 1421-1460.

"Early Exit" Optimal Strategy From A Fixed Exchange Rate Regime

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Abstract .   Uncovered operations against the currency risk are frequent in emerging countries. In case of a change in the investors' expectations, banking crises of liquidity can occur. Despite the quantity of research about the currency crises, the liquidity and currency risks of the banking system do not play an essential role in the current "second generation" model of currency crises. Moreover, the exit from a fixed exchange rate regime always occurs in a turbulent period, never in a favorable period. This paper tries to fill these two deficiencies using the Obstfeld (1994) model. It shows in which conditions an emerging country, during a favorable period, could exit from a fixed exchange rate regime with lower costs than those that would be incurred in the case of self-fulfilling currency crisis. The contribution of this paper is double : i) The banking system is explicitly introduced in the model and ii) The banking crisis is linked with the currency crisis.

1. Introduction[1]

Currency crises have occurred as well as in industrialized countries than in emerging countries : Europe (currencies of the EMS in 1992-1993), Latin America (the Mexican peso in 1994-1995, the Brazilian real in 1998-1999, the Argentina peso in 2001-2002), Central Europe (the Czech crown in May 1997), South Africa (the rand in May 1997), South-East Asia (the bath in 1997 and the monies of the countries bordering on Thailand), Russia in 1998 and Turkey in December 2000. Moreover, financial and banking systems have been damaged by crises of the 1990's.

The international financial liberalization in early 1990's has permitted massive short term capital inflows in emerging countries. These capital inflows are intermediated by the banking system. For example, in Thailand, banking operations have been essentially short term foreign borrowing in dollars with other international banks. They can be explained by a domestic yield superior to the foreign yield, particularly with the United-States. Moreover, these operations are not covered against the currency risk (Burnside, Eichenbaum and Rebelo, 1999). Thus, in case of a change in the investors' expectations, banking crises of liquidity can occur.

These stylized facts raise two essential questions : i) Why foreign investors did not lend in the currency of the emerging country ? ii) Why the banking system of the emerging country did not cover its operations in foreign currency against the currency risk ? Recent studies about twin crises choose the moral hazard assumption[2]. The alternative assumption of the *incomplete emerging financial market*[3] from Eichengreen and Hausmann (1999) seems better. The emerging country has difficulties in borrowing in domestic currency. Because of the risk of the

exchange rate manipulation, foreign investors do not have an incentive to lend in domestic currency. Consequently, the country cannot cover its operations. Thus, the origin of the absence of covered operations is very certainly double : The non complete emerging financial market and the stability of the nominal exchange rate.

The main question of this paper is the following : How to encourage the banking system to cover its operations against the currency risk ? We investigate the possibility for an emerging country to exit from a fixed exchange rate regime and to float the domestic currency in a favorable period so as to avoid future financial crises. With the introduction of a currency risk, this kind of regime would avoid disadvantages of a fixed exchange rate regime. Thus, this would encourage the banking system to cover against the currency risk. In reality, the exit from a fixed exchange rate regime always happens in a turbulent period (Eichengreen, 1999). It seems that the authorities never choose to float the currency while it would seem to be better to consider an exit from the exchange rate regime in a favorable context in order to limit economic costs[4]. The question of the exit from a fixed exchange rate regime in a favorable period has not been modeled before.

The banking system has certainly been at the center of several financial crises. Despite the enormous number of studies on self-fulfilling crises, it is surprising that the banking system has never played an essential role in the model. Currency crisis models of the "third generation" analyze twin crises. Nevertheless, optimization problem is not considered in these models. We adapt Obstfeld's (1994) "second generation" currency crisis model with assumptions of self-fulfilling expectations and minimization of the authorities loss function. We show in which conditions an emerging country, during a favorable period, could exit from a fixed exchange rate regime with lower costs than those that would be incurred in the case of self-fulfilling currency crisis. Our contribution lies in introducing the banking system in a "second generation" currency crisis model and in linking the banking crisis of liquidity with the currency crisis.

In the second section, we introduce the banking system in the model with "escape clause". We consider the "endogenous exit" from a fixed exchange rate regime in turbulent period in the third section. We specify costs of this exit strategy. In the fourth section, we model the "early exit" from a fixed exchange rate regime in favorable period and we specify its costs. The possibility of presence or absence of self-fulfilling expectations is studied. We also compare the costs of the two possible strategies and we determine the optimal time of the exit from a fixed exchange rate regime in the same section.

2. Assumptions Of The Model With "Endogenous Exit" Strategy

We make the assumption of a small open economy whose currency is pegged on a big economy. The discrete time model is composed of two sub-models, each with two periods. At the beginning, the exchange rate regime is fixed and credible. In order to simplify the model, we ignore the inter-temporal budget constraint of the authorities and the international reserves. The real sector, particularly the property

sector, is not modeled. We assume the presence of a domestic banking system. The banking system is the intermediate of all international financial operations[5]. *A contrario*, domestic investors can deposit in domestic currency or in foreign currency in the domestic banking system.

2.1. The Assumption Of The Incomplete Domestic Financial Market

We assume that the banking system cannot cover its operations because of the incompleteness of the domestic financial market. The domestic financial market is less attractive[6]. As a result, the domestic banking system has difficulties to cover its operations as it cannot find foreign investors willing to buy domestic currency in order to sell it later against foreign currency. It is for the same reason that the banking system must borrow in foreign currency : The banking system must accept deposit in foreign currency because foreign investors do not want buy the domestic currency in order to avoid risk.

2.2 The Profit Of The Domestic Banking System

Our fundamental assumption is that the domestic banking system, which gives loans to the property sector in domestic currency only, must borrow in foreign currency from foreign investors. This is because deposit of the domestic investors is insufficient[7].

At each period t, the banking system collects term deposit in domestic or foreign currency. It converts into domestic currency the part of the deposit in foreign currency with a nominal exchange rate at the uncertain S_t. Then it lends in domestic currency to the domestic property sector. To simplify, we assume an unique domestic interest rate on deposit in domestic currency and on the loan. We assume the domestic country is dominated by a foreign country that determines its interest rate depending on its economic policy objective. The foreign interest rate is then exogenous for the domestic country. We assume that the domestic interest rate is higher than the foreign interest rate. The deposit in foreign currency is remunerated at the rate $i_t^* + u_t$, with u_t, being the risk premium[8] and the deposit in domestic currency is remunerated at the rate i_t.

In period $t+1$, the property sector reimburses the loan of the previous period. The banking system converts the reimbursed loan (with interests) to foreign currency with a nominal exchange rate S_{t+1} in order to honor the deposit withdrawal from the bank in foreign currency.

D_t is the deposit amount in period t in foreign currency withdrawn in period $t+1$. $(D_t S_t)$ is a part of the loan for the domestic property sector reimbursed in period $t+1$. F_t is the deposit amount in period t in domestic currency (by domestic investors) withdrawn in period $t+1$. We assume that the total loan is $L_t = D_t S_t + F_t$.

When there is no problem[9] , in period t+1, there is equality between :
-    The volume of the new deposit in $t+1$ ($D_{t+1} S_{t+1} + F_{t+1}$) and the domestic loan in $t+1$ (L_{t+1}) ;

- The reimbursement of the domestic loan of the period t (L_t) and the withdrawal of the deposit of the period t ($D_t S_t + F_t$) ;
- The interests from the loan ($i_t L_t$) and interests on the deposit [$(i_t^* + u_t)(D_t S_t) + i_t F_t$].

Thus, the profit of the banking system is equal to zero despite an increase in the volume of the deposit in foreign currency (and then the loan)[10] at each period.

A contrario, in the case of *devaluation*, the two previous equalities are not possible. Thus, the liquidity risk of the banking system increases because of the rise of the deposit withdrawal cost in foreign currency for the domestic banking system. In this case, we assume that the banking system cannot honor the withdrawal of the deposit : It is the *banking crisis of liquidity*.

The *liquidity risk of the banking system* increases at each period because of the increase in the volume of the uncovered operations in foreign currency against the currency risk.

In order to determine the profit of the domestic banking system, we compare :

- The amount of the reimbursement of the part of the loan converted in foreign currency (used to honor the deposit withdrawal in foreign currency) with the amount of the deposit withdrawal in foreign currency ;
- The amount of the reimbursement of the second part of the loan with the amount of the deposit withdrawal in domestic currency.

The domestic interest rate being unique for the loan and for the deposit in domestic currency, then the profit of the second part of the operations is equal to zero.

Deposit interests in foreign currency are paid in period $t+1$. The first part of the profit of the banking system in period $t+1$ in foreign currency is determined by:

$$(1) \qquad \pi_{\$,t+1} = \frac{D_t S_t (1 + i_t)}{S_{t+1}} - D_t (1 + i_t^* + u_t)$$

This part of the profit of the banking system in period $t+1$ denominated in domestic currency is the following :

$$(2) \qquad \pi_{d,t+1} = D_t S_t (1 + i_t) - D_t (1 + i_t^* + u_t) S_{t+1}$$

The profit of the banking system is dependant on the domestic and foreign interest rates, on the risk premium and on the variation of the nominal exchange rate between periods t and $t+1$. Under the assumption of uncovered operations, the profit decreases with the devaluation of the domestic currency ($S_{t+1} > S_t$)[11].

2.3. Equilibrium Of The Domestic Country Balance Of Payments

At each period, the volume of the deposit in foreign currency increases[12]. Thus, the surplus of the capital account increases while the deficit of the current account raises (because the interests amount on the deposit in foreign currency increases). Under the assumption of the fixed exchange rate, we assume that the deficit of the commercial balance B_t allows the equilibrium of the balance of payments[13].

In the case of expectations of an increase in the exchange rate for the period $t+1$, investors renounce in period t to deposit in foreign currency. Thus, the country

meets *net capital outflows* in respect of the withdrawal of the previous period deposit in foreign currency. In other words, in the absence of a new deposit in period *t*, the currency tends to *depreciate in the period t*. This is because of the conversion into foreign currency of the reimbursement of the domestic loan used to honor the withdrawal of the previous period deposit. Thus, there is a deficit of the capital account. If authorities choose an unchanged exchange rate they defend the domestic currency. We will see above the domestic currency defense mechanism. In the opposite case, they can decide to devalue the domestic currency.

2.4. The Domestic Interest Rate Determination

As in McKinnon and Pill (1999), we assume that the domestic banking system cannot cover operations in foreign currency against the currency risk. The absence of covered operations increases the liquidity risk of the domestic banking system. When the domestic banking system borrows in foreign currency, it must pay higher interests than the foreign banking system. u_t is the risk premium required from the domestic banking system.

The uncovered interest rate parity condition is not verified. The domestic interest rate is determined by the following condition[14] :

(3) $\quad i_t = i_t^* + \dfrac{E(S_{t+1}) - S_t}{S_t} + u_t$

With an approximation of $\dfrac{E(S_{t+1}) - S_t}{S_t}$ by $lnE(S_{t+1})$-$ln(S_t)$ with $ln(S_t) = e_t$ and

$lnE(S_{t+1}) = E(e_{t+1})$, we obtain :

(4) $\quad i_t = i_t^* + E(e_{t+1}) - e_t + u_t$

We assume the risk premium u_t is a random variable[15].

2.5. Quasi-Rationality Assumption Of The Investors

We imagine the complete model is composed of two sub-models :

1) The "exit endogenous" strategy is composed of two periods 1 and 2. It takes place in turbulent period : At the time t_2, the currency crisis is produced by self-fulfilling expectations of an increase of the exchange rate ;

2) The "early exit" strategy is composed of two periods 1 and 2. It takes place in favorable period : At the time t_1, before a turbulent period, the authorities decide to exit from the fixed exchange rate regime in order to avoid higher costs of a self-fulfilling currency crisis at the time t_2.

In the sub-model with "endogenous exit" strategy, we assume that there is no exit from the fixed exchange regime at the time t_1. The complete model is the following :

```
              t₁                    t₂
- - - -I-----------I-----------I------------I------------I- - ->time
       Period 1   Period 2  Period 1    Period 2
        =1ˢᵗ  sub-model        =2ⁿᵈ sub-model
```
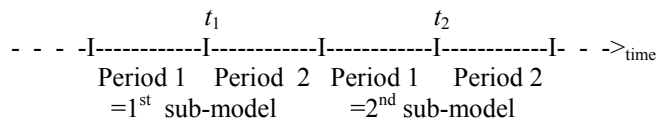
Expectations are assumed quasi-rational. In the first sub-model, foreign investors are unaware that the authorities are worried by the surplus of the capital account that will become excessive in the future. Foreign investors are short-sighted : They behave as if they do not know the present sub-model.

2.6. The Events Chronology
At the beginning, the exchange rate is fixed and the exchange rate regime is credible. The balance of payments is in equilibrium. The banking system must honor the deposit withdrawal at the end of the period 1^{16}. $\hat{\imath}$ is the target domestic interest rate. The events chronology is the following :
- Step 1 : At the beginning of the period 1, foreign investors formulate their expectations about the level of the exchange rate for the end of the period 2, $E(e_2)$. If investors do not expect an increase of the exchange rate, they continue to deposit their foreign currency in the banking system (then there is not net outflows) and the exchange rate does not depreciate ;
- Step 2 : Realization of the random variable u_t ;
- Step 3 : The authorities determine the new level of the exchange rate according to the level of the shock and the expectations.

2.7. The Authorities Arbitrage Between Two Costs
The authorities arbitrate between two costs :
- The first cost is dependent of the realignment. The banking system has accepted deposits in foreign currency in order to lend to the property sector in domestic currency. Thus, a devaluation of the domestic currency has a negative backlash because it *increases the deposit withdrawal cost for the banking system*. The authorities must take account of this problem in their minimization program of the costs. The higher is the devaluation, the higher is the liquidity risk of the banking system. The authorities have a fixed nominal exchange rate objective;
- The second cost is dependent of the fixed exchange rate. A high interest rate is used to defend the domestic currency. In the case of expectations of an increase in the exchange rate, investors renounce to make a new deposit. They expect an increase of the liquidity risk of the domestic banking system. This is because of the increase of the deposit withdrawal cost in foreign currency – because of the increase of the exchange rate – for the domestic banking system. We have assumed that the deposit denominated in domestic currency is smaller than the volume of the deposit denominated in foreign currency. Thus, the increase of the remuneration of the domestic loan is higher than the one of the deposit withdrawal denominated in foreign currency. Thus, the increase of the domestic loan remuneration can compensate the effect of an increase of the exchange rate on the deposit withdrawal cost in foreign currency. Investors understand that the increase of the domestic interest rate can compensate the effect of an increase of the exchange rate and thus can avoid an increase of the liquidity risk. Thus, the increase of the domestic interest rate leads to the renewal of the deposit in

foreign currency. This is the defense of the domestic currency mechanism. Nonetheless, the authorities deviate from the target domestic interest rate.

There is a conflict between the nominal exchange rate stability objective and the target domestic interest rate.

3. The "Endogenous Exit" Strategy *À La* Obstfeld
3.1. Step 1 : Determination Of The Expectations
The authorities loss function in period 1 is the following :

(5) $\ell_1 = \dfrac{\theta}{2}\left(\dfrac{S_1 - S_0}{S_0}\right)^2 + \dfrac{1}{2}(i_1 - \hat{\imath})^2$

$0<\theta<1$ is a parameter to measure the relative aversion of the authorities between the

two costs of the quadratic function. S_0 is normalized to 1 and $\left(\dfrac{S_1 - S_0}{S_0}\right)$ is

approximated by lnS_1-lnS_0, i.e. by lnS_1, then the authorities loss function in period 1 is the following :

(6) $\ell_1 = \dfrac{\theta}{2}(e_1)^2 + \dfrac{1}{2}(i_1 - \hat{\imath})^2$

One condition to minimize the costs (6) in period 1 under the constraint of the condition (4) determining the domestic interest rate is that the derivative over e_1 is equal to zero :

(7) $-\theta(e_1) + i_1^* + E(e_2) - e_1 + u_1 - \hat{\imath} = 0$, or:

(8) $e_1 = \dfrac{i_1^* + E(e_2) + u_1 - \hat{\imath}}{\theta + 1}$

This is a maximum because the second derivative is negative : $-\theta - 1 < 0$.

The lower is the target interest rate or the higher is the shock, the higher is the exchange rate fixed by the authorities. In the case of a positive shock (the increase of the risk premium), the authorities should raise the domestic interest rate in order to restore the condition (4) that determines the domestic interest rate. The increase of the domestic loan remuneration let the banking system honor the deposit withdrawal in foreign currency. Nevertheless, the authorities deviate from the target domestic interest rate. Thus, the authorities choose the devaluation in the case of a positive shock.

Now, we assume additional costs and the authorities loss function in period 1 is the following :

(9) $\ell_1 = \dfrac{\theta}{2}\left(\dfrac{S_1 - S_0}{S_0}\right)^2 + \dfrac{1}{2}(i_1 - \hat{\imath})^2 + (k + b)Z_1$

with $Z_1 = 1$ if devaluation, $Z_1 = 0$ instead.

k is the cost of the loss credibility of the authorities in the case of devaluation. This is an exogenous cost. b is a disturbance cost caused by the currency crisis and by the deterioration of the fundamentals during the crisis when the devaluation produces in turbulent period. Thus, the cost of a devaluation increases in the turbulent period against the favorable period.

If the authorities maintain the fixed exchange rate, then $e_1=e_0$ and $Z_1=0$. The loss function becomes :

$$(10) \quad \ell^F = \frac{\theta}{2}(e_0)^2 + \frac{1}{2}(i_1^* + E(e_2) - e_O + u_1 - \hat{\imath})^2$$

If the authorities renounce to the fixed exchange rate, then $Z_1=1$. The authorities determine the exchange rate at the level (8) and the loss function becomes :

$$(11)\, \ell^D = \frac{\theta}{2}\left(\frac{i_1^* + E(e_2) + u_1 - \hat{\imath}}{\theta + 1}\right)^2 + \frac{1}{2}\left(i_1^* + E(e_2) - \left[\frac{i_1^* + E(e_2) + u_1 - \hat{\imath}}{\theta + 1}\right] + u_1 - \hat{\imath}\right)^2$$

$$+ k + b$$

The authorities modify the level of the exchange rate if the loss of the realignment is lower than the loss of the fixed exchange rate. The necessary and sufficient condition for the realignment would be better than the fixed exchange rate is $\ell^F - \ell^D > 0$:

$$(12) \quad -\frac{\theta}{2}\left(\frac{i_1^* + E(e_2) + u_1 - \hat{\imath}}{\theta + 1}\right)^2 - \frac{1}{2}\left(i_1^* + E(e_2) - \left[\frac{i_1^* + E(e_2) + u_1 - \hat{\imath}}{\theta + 1}\right] + u_1 - \hat{\imath}\right)^2$$

$$+ \frac{\theta}{2}(e_0)^2 + \frac{1}{2}(i_1^* + E(e_2) - e_O + u_1 - \hat{\imath})^2 > k + b$$

Solutions to (13) treated as an equality are the two roots $\hat{u}$ and $\hat{u}'$, with $\hat{u}'<\hat{u}$. If $u_1>\hat{u}$, the devaluation amount e_1 is fixed at the level (8). $\hat{u}$ is the largest shock consistent with a continuing fixed exchange rate. For $u_1<\hat{u}'$, there would be a revaluation, but we will not study this case.

The equation (12) shows that the level of the shock $\hat{u}$ at which the authorities choose to devalue depends on investors' expectations. These expectations depend on the level of the shock at which the investors believe that the authorities will devalue. This circular process creates the possibility of multiple equilibria. A currency crisis can then occur while the shock is negative.

In the case of expectations of an increase of the exchange rate, foreign investors do not make new deposit in foreign currency because they are worried of a liquidity banking crisis (see 2.3). Thus, capital inflows (*i.e.* a new deposit in foreign currency) do not compensate for the capital outflows (*i.e.* withdrawal of the deposit in foreign currency). This produces a depreciation of the domestic currency. This process can be corrected by the increase of the domestic interest rate only (see the mechanism in 2.7). Nevertheless, the authorities can choose not to defend the domestic currency and to devalue because of the target domestic interest rate. This is a self-fulfilling expectations process.

We assume that the investors *believe* the authorities will devalue if the shock is higher than the threshold level $\hat{u}$. Now, we seek the depreciation expectations given an expected threshold level $\hat{u}$[17].

When investors think in $t=1$ that $e_2 > e_1$ if $u_1 > \hat{u}$, then :

(13) $E(e_2) = [\text{Prob}\{u_1 \leq \hat{u}\}.E\{e_2/u_1 \leq \hat{u}\}] + [\text{Prob}\{u_1 > \hat{u}\}.E\{e_2/u_1 > \hat{u}\}]$

Under the uniformity distributed over the interval $[-\mu, \mu]$, we have :

(14) $\text{Prob}\{u_1 \leq \hat{u}\} = 1 - \dfrac{\mu - \hat{u}}{2\mu} = \dfrac{\mu + \hat{u}}{2\mu}$

(15) $\text{Prob}\{u_1 > \hat{u}\} = \dfrac{\mu - \hat{u}}{2\mu}$

(16) $E\{u_1 / u_1 > \hat{u}\} = \dfrac{\mu + \hat{u}}{2}$

Moreover ,

(17) $E\{e_2 / u_1 \leq \hat{u}\} = e_1 = e_0$

Investors are quasi-rational, thus they know the optimization program of the authorities, then :

(18) $E(e_2 / u_1 > \hat{u}) = \dfrac{1}{\theta + 1}\left(i_1^* + E(e_2) - \hat{\imath} + \dfrac{\mu + \hat{u}}{2} \right)$

In order to obtain (18), we have substituted u_1 for its value (16) in the solution (8) of the authorities optimization program. After simplifications, the equation (13) becomes :

(19) $E(e_2) = \dfrac{1}{2\mu\theta + \mu + \hat{u}}\left[(\theta + 1)(\mu + \hat{u})e_0 + (\mu - \hat{u})i_1^* - (\mu - \hat{u})\hat{\imath} + \mu^2 - \hat{u}^2 \right]$

We write this value of expectations by $\delta(\hat{u})$.

3.2. Step 2 : The Choice Of The Authorities And Equilibria Solutions

Now, we calculate the threshold level given investors' expectations. Maintaining the fixed exchange rate is not possible. The authorities must validate investors' expectations. They consider this value of expectations (19) as given and minimize their loss function.

$\grave{u}$ is the largest value of the shock consistent with a fixed exchange rate and is a solution to :

(20) $-\dfrac{\theta}{2}\left(\dfrac{i_1^* + \delta(\hat{u}) + \grave{u} - \hat{\imath}}{\theta + 1} \right)^2 - \dfrac{1}{2}\left(i_1^* + \delta(\hat{u}) - \left[\dfrac{i_1^* + \delta(\hat{u}) + \grave{u} - \hat{\imath}}{\theta + 1} \right] + \grave{u} - \hat{\imath} \right)^2$

$+ \dfrac{\theta}{2}(e_0)^2 + \dfrac{1}{2}(i_1^* + \delta(\hat{u}) - e_O + \grave{u} - \hat{\imath})^2 = k + b$

We have substituted $\delta(\hat{u})$ for $E(e_2)$ in the inequality (12) transformed in an equality and u_1 by $\grave{u}$. Under the quasi-rationality expectations assumption, investors' believes are "*true*"[18]. In equilibrium : $\grave{u} = \hat{u}$.

We substitute $\grave{u}$ for $\hat{u}$ in the expression (20) and we simplify :

$$(21) \quad \frac{1}{2(\theta+1)}\hat{u}^2 + \left[\frac{i_1^* - \hat{i}}{\theta+1} - \frac{\theta}{\theta+1}\delta(\hat{u})\right]\hat{u} + \left[\frac{\theta}{2(\theta+1)}\left(-(i_t^*)^2 + \delta(\hat{u})^2 + \frac{\hat{i}^2}{\theta}\right)\right]$$

$$+ \left[\frac{\theta}{\theta+1}\left(\frac{-i_1^*\hat{i}}{\theta} - i_1^*\delta(\hat{u}) + \hat{i}\delta(\hat{u})\right)\right] = k + b$$

Solutions to this equation (*i.e.* equilibria thresholds) can be obtained with a numeric simulation only.

3.3. Numeric Simulation

We choose : $\theta=0.15^{[19]}$, $\hat{i}=0.08^{[20]}$, $i_1^*=0.05^{[21]}$, $e_0=0$, $\mu=0.3$, $k=0.02$, $b=0.01$. In the graph 1, we obtain equilibria thresholds $\hat{u}' \approx -0.2$ and $\hat{u}' \approx +0.29$. The associated expected exchange rates for the period 2 are $\delta(-0.2) \approx 0.0814$ (*i.e.* an expected depreciation for the period 2 of 8.48%) and $\delta(+0.29) \approx 0.0118$ (*i.e.* an expected depreciation for the period 2 of 1.19%).

The interpretation of these results is the following. If we assume that investors expect the second equilibrium threshold, then the authorities renounce to maintain the fixed exchange rate if the shock is superior to 0.29. The probability of this event is of 16.67%[22]. Because expectations are low, the costs of the defense of the domestic currency are low. Thus, the authorities will be incited to devalue if the shock is positive only.
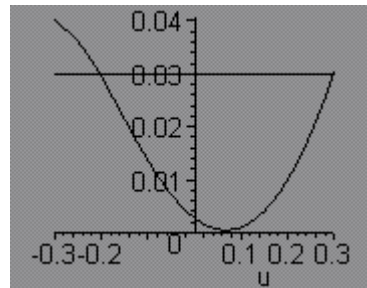
Graph 1 *: "Endogenous exit" strategy*

A contrario, in the case in which the investors expect the first equilibrium threshold, the authorities renounce to maintain the fixed exchange rate if the shock is superior to –0.2 . The probability of this event is 83.33%. Why ? When investors expect this first equilibrium threshold, the authorities must renounce to maintain the fixed exchange rate because of the domestic currency defense costs. Expectations of the increase of the exchange rate are high, then the economy goes from the second equilibrium threshold to the first equilibrium threshold with an increase of the risk of

the change of the exchange rate. Thus, for the first equilibrium threshold, the shock is negative. Nonetheless, because of expectations of an increase of the exchange rate are high, there is a self-fulfilling currency crisis. Expectations of a variation of the exchange rate are so high that the investors fear a liquidity banking crisis and then they do not make a new deposit. This creates a net capital outflows which produce a depreciation of the domestic currency. The authorities choose a devaluation of the domestic currency instead of the increase of the interest rate in order to avoid the deviation from the target interest rate. *In fine*, the increase of the exchange rate produces a banking crisis of liquidity because of the rise of the deposit withdrawal cost for the banking system (operations are not covered). Only the realization of a very negative shock ($\hat{u}<-0.2$) would avoid both a currency crisis and a banking crisis.

> **Proposition 1**
> With the "endogenous exit" strategy, there are multiple equilibria. The authorities choose to devalue in period 1 if the shock u_1 is superior to –0.2. In this case, there are a currency crisis and a banking crisis of liquidity.

Sensibility tests results with Mapple show that the possibility of multiple equilibria is eliminated when we choose :
-   θ superior to 0.17. The authorities have relatively less aversion for a higher interest rate, thus the exchange rate regime is more credible. For a value superior to 0.17 and inferior or equal to 0.45, the equilibrium is unique and the equilibrium threshold is negative. For a value superior to 0.45, there is not equilibrium ;
-   μ inferior to 0.3. The space of possibilities for the shock is reduced. For a value superior to 0.85, there are two positive equilibria thresholds.

4. The "Early Exit" Strategy
The loss function of the authorities in period 1 is the following :

$$(22) \qquad \ell_1 = \frac{\theta}{2}(e_1)^2 + \frac{1}{2}(i_1 - \hat{\imath})^2 + kZ_1$$

The cost of a devaluation in favorable period are lower than in a turbulent period. In the case of the turbulent period, there was a b cost in the loss function (see expression (9)).

As in the "endogenous exit" strategy, $\ell^F - \ell^D > 0$ is the necessary and sufficient condition and there are two roots. If $u_1 > \hat{u}$, the devaluation amount e_1 is fixed at the same level (8) than in the "endogenous exit" case.

We are in a favorable period and we assume that expectations are quasi-rational. The exchange rate regime is credible. The investors expect in period 1 a fixed exchange rate for the period 2^{23} : $E(e_2) = e_0$. The authorities consider this value of expectations as given and minimize their loss function. We obtain :

(23) $\dfrac{1}{2(\theta+1)}\hat{u}^2 + \left[\dfrac{1}{\theta+1}(i_1^* - \hat{i}) - \dfrac{\theta}{\theta+1}e_0\right]\hat{u}$

$\qquad + \left[\dfrac{\theta}{2(\theta+1)}\left(-(i_1^*)^2 + e_0^2 + \dfrac{1}{\theta}\hat{i}^2\right) + \dfrac{\theta}{\theta+1}\left(-\dfrac{1}{\theta}i_1^*\hat{i} - i_1^*e_0 + e_0\hat{i}\right)\right] = k$.
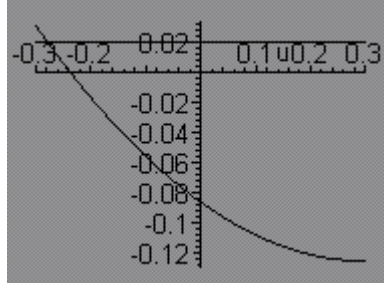
Graph 2 : *"Early exit" strategy*

We choose the same parameters as for the "endogenous exit" strategy. In the numeric simulation (graph 2), we obtain one equilibrium threshold $\hat{u} \approx -0.28$. For this equilibrium threshold, expectations of a depreciation (in level) for the period 2 are equal to 1. In the context of a fixed exchange rate regime with adjustable parities, the authorities should have to devalue when the shock is higher than –0.28. Here, we assume that the *authorities take the initiative* to exit from the fixed exchange rate regime if the shock is higher than $\hat{u}$. This is in order to avoid costs of a future currency crisis in turbulent period.

Proposition 2
With the "early exit" strategy, the credibility of the authorities' policy avoids a self-fulfilling currency crisis. The authorities take the initiative to exit from the fixed exchange rate regime by floating the domestic currency when the shock u_1 is superior to –0.28.

The possibility of unique equilibria is eliminated when we choose : θ superior to 0.25 (there is not equilibrium) or μ inferior to 0.28 (there is not equilibrium). For a value superior to 0.88, there are two equilibria thresholds.

Proposition 3
The "early exit" strategy in time t_1 (in favorable period) is optimal. The authorities modify the type of exchange rate regime by floating the domestic currency when the shock u_1 is superior to –0.28.

Proof :   The cost of the "early exit" strategy is lower than those of the "endogenous exit" strategy : $k=0.02 < b+k=0.03$. In the case of the change of the exchange rate regime in time t_1 we avoid the cost $b=0.01$.

5. Concluding Remarks

This paper shows that the "early exit" strategy is optimal. The exchange rate regime credibility avoids a self-fulfilling currency crisis and a banking crisis of liquidity. Costs of the exit from the fixed exchange rate regime are lower than in the "endogenous exit" strategy.

Nevertheless, there are two risks. The first one is the loss of the authorities' credibility after the floating currency. The second risk is the effects of floating the currency on the banking system. The authorities would face a new dilemma :

1)   Here, we find again the traditional incompatibility between an independent monetary policy and an international capital mobility with a fixed exchange rate regime. By breaking from this triangle of incompatibility by floating the currency, will the authorities reach their aim of decreasing the liquidity risk of the banking system ? The following question thus arises : What will happen after the change of the exchange rate regime ? Will operations be covered ? The raise of the volatility of the exchange rate should incite the banking system to cover its operations against the currency risk. This was the main aim of the creating a floating exchange rate regime. Nevertheless, it is possible only if we do not assume the incomplete domestic financial market ;

2)   The volatility of the exchange rate could have disastrous consequences on the banking system that finances loans in domestic currency with foreign currency. This could produce a banking crisis of liquidity. Avoiding a currency crisis by a destabilization of the domestic banking system does not seem the best solution.

To avoid the last pitfall, the solution would be perhaps that the authorities choose an intermediate exchange rate regime as a crawling peg.

Notes

1.   I would like to thank the Professor Eric Girardin, Yusuf Kocoglu and participants of the International Conference untitled "Exchange Rates, Economic Integration and the International Economy" organized by the Ryerson University in May 2002 for their helpful comments and suggestions, and Sylvia Wamae and Cynthia Kalasopatan for reading the English version. I am of course solely responsible for any remaining errors.

2.   See for example McKinnon and Pill (1999) and McKinnon (1999).

3.   About the narrowness of the Asian financial markets, see Min and McDonald (1999).

4.   See also Eichengreen and Masson (1997).

5.   Thus the foreign country cannot invest directly in the domestic property sector. Foreign investors cannot deposit in foreign currency directly in the domestic banking system : they must use the foreign banking system. Therefore, the banking system

does play an essential role in the economy. This allows us to simplify our model because only banking systems are taken into consideration.

6. Because of the risk of the exchange rate manipulation for example.

7. The narrowness of the domestic market justifies massive small term capital inflows.

8. In some emerging countries, as in Thailand from the 19th May 1997, domestic banks that borrow in dollars must accept a higher interest rate than the other foreign banks. We name this the Thailand premium (see Puibasset, 2003).

9. i.e. when i) the exchange rate is fixed ; ii) the exchange rate regime is credible ; iii) $i_t^* + u_t = i_t$; iv) it+1 = it.

10. At each period, the volume of the deposit increases : the condition of the equilibrium of the balance of payments must be verified.

11. The profit is equal to zero if the exchange rate is fixed and the regime is credible

12. The increase of the massive short term capital inflow is then taken account.

13. In the model, international reserves and variation are ignored.

14. We have assumed that the domestic interest rate is higher than the foreign interest rate. In the context of a fixed exchange rate regime, we must introduce a risk premium ut variable with the time in the standard uncovered interest rate parity. Then in fixed exchange rate regime, we have: $i_t - i_t^* - u_t = 0$ with $u_t = i_t - i_t^*$. if $i_t > i_t^*$, then ut>0.

15. It can depend on the political risk, the domestic financial volatility, etc.

16. We find again these assumptions in the sub-model with the "early exit" strategy.

17. In fact, these expectations are not function of the time because the shock is not serially correlated. Nevertheless, we use the notation E(e2).

18. Jeanne et Masson (2000), p. 333. See also Obstfeld (1996).

19. This corresponds to a case in which the authorities have a higher cost for the spread of the domestic interest rate from the target interest rate.

20. The target interest rate is near of the foreign interest rate.

21. This corresponds to a foreign interest rate of 5%.

22. The result is obtained with the expression (15).

23. Because $E\{e_2 / u_1 > \hat{u}\} = E\{e_2 / u_1 \leq \hat{u}\} = e_0$ in the equation (13).

References

Burnside C., Eichenbaum M., Rebelo S. (1999) Hedging and Financial Fragility in fixed Exchange Rate Regimes. CEPR Discussion Paper No. 2171.

Corsetti G., Pesenti P., Roubini N. (1998) Paper Tigers? A Model of the Asian Crisis. NBER Working Paper No. 6783.

Eichengreen B. (1999) "Kicking the Habit : Moving from Pegged Rates to Greater Exchange Rate Flexibility", *The Economic Journal* CIX (454), p. 1-14.

Eichengreen B., Hausmann R. (1997) Exchange Rate and Financial Fragility. NBER Working Paper No. 7418.

Eichengreen B., Masson P. (1997) Exit Strategies – Policy Options for Countries Seeking Greater Exchange Rate Flexibility. IMF Working Paper No. SM/97/285.

Jeanne O., Masson P. (2000) "Currency Crises, Sunspots and Markov-Switching Regimes", *Journal of International Economics* L, p. 327-350.

Mckinnon R. I. (1999) The East Asian Dollar Standard, Life After Death? *mimeo*.

Mckinnon R. I., PILL H. (1999) Exchange Rate Regimes for Emerging Markets : Moral Hazard and International Overborrowing. *mimeo*.

Min H. G., Mcdonald J. A. (1999) Does a Thin Foreign Exchange Market Lead to Destabilizing Capital-Market Speculation in the Asian Crisis Countries ? *mimeo*.

Obstfeld M. (1994) "The Logic of Currency Crises", *Cahiers économiques et monétaires* No. 43, p. 189-213.

Obstfeld M. (1996) "Models of Currency Crises with Self-Fulfilling Features", *European Economic Review* XL, p. 1037-1047.

Ozkan F. G., Sutherland A. (1998) "A Currency Crisis Model with an Optimising Policymaker", *Journal of International Economics* XLIV (2), p. 339-64.

Puibasset C. (2003) Exchange Rate Regime Switching in Favorable Period. Thesis. University of Aix-Marseille 2.

Changes In Canadian Productivity And Real Output Gap Since NAFTA

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Abstract: This study revises estimates of real Canadian potential output and the real GDP gap by applying a method of directly estimating the actual and potential factor utilization rates. The effects of developments since the formation of NAFTA are directly considered. The empirical results indicate that capital utilization varies slightly more than does labour over the cycle and that the real GDP gap has closed somewhat since the formation of NAFTA, but that this result may be due to a slowing of the rate of potential growth resulting from a reduced rate of capital formation since 1994.

1. Introduction

Many economists consider the output gap to be the most important and comprehensive measure of the state of the economy [Flaig and Plotscher (2001)]. Thus the real output gap is critical in the development of a proper policy framework. Recent studies have presented new estimates of the real output gap for European countries [Dimitz (2001), Flaig and Plotscher (2001), and Apel and Jansson (1999)]; Japan [Haltmaier (2001), and Sato, (2001)]; Australia [de Brouwer (1998)]; and the United States [Kahn (1996) and Kuttner (1994)].

Some studies have considered factors such as the development of the so-called 'high tech' or 'new economy' [Helmenstein and Zagler (2001)], while others, notably those on European countries, have attempted to incorporate the effects of continental integration on the estimation of the real output gap.

Within the North American context, some work has been done on the effects of continental integration on the labour markets [Smith (2001), Arndt (1997), and Roberston and Dutkowsky (2002)], trade flows [Brox (2001) and Sarkar and Park (2001)], and the general nature of the production process [Gullason (2000) and Aretis and Paliginis (1999)]. However, no recent attempts to estimate the output gap for Canada since NAFTA have been undertaken.

It is the purpose of this paper to begin to examine the question of whether the formation of the Canada-U.S. Free-Trade Pact and its subsequent expansion to NAFTA has significantly changed the level of potential output in the Canadian economy. The rest of this paper is organized as follows: Section 2 discusses the believing that the formation of the free-trade agreements may have affected the

Figure 1: Canadian International Trade
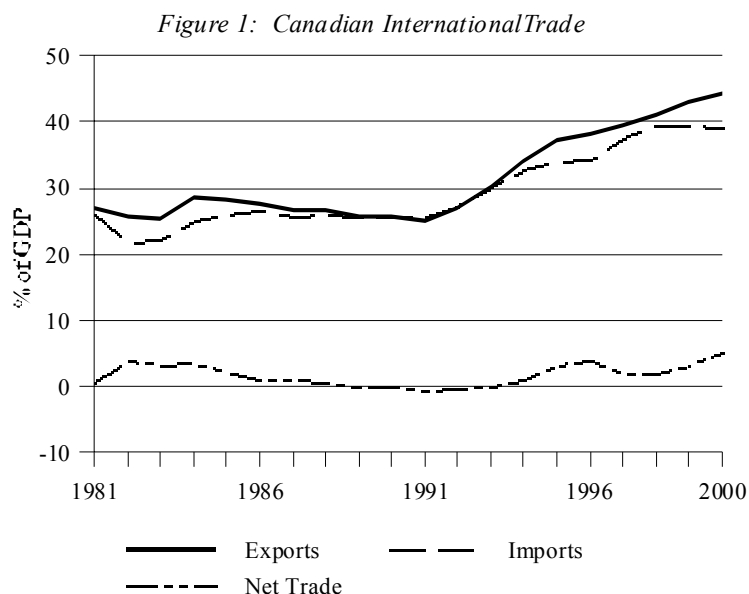
Source: Canadian System of National Accounts

current situation with respect to productivity in Canada and gives some reasons for underlying relationships. Section 3 outlines the basic model employed to test the base hypotheses. Section 4 provides an analysis of the empirical findings and Section 5 contains a summary of the main conclusions.

2.   Current Situation

Why would one expect the formation of the free-trade agreement between Canada and the United States and the subsequent expansion to include Mexico in NAFTA to affect productivity in Canada or the level of potential output? There are, of course, a number of possible reasons to suspect that this may be the case.

One such reason is the pronounced impact that free trade has had on Canadian imports and exports.

As illustrated in Figure 1, Canada has always been a relatively open economy, with significant export and import shares. However, an accelerated rate of growth of both exports and imports, beginning in the 1990 – 1991 period, clearly indicates that the trade pacts have had a pronounced impact on the Canadian economy. International trade is not a closed system and hence the net trade position is of interest. For most of the period under consideration, Canada had a surplus on its total balance-of-trade position. The exception was for the period from 1988 to 1992.

Of interest to the question of the extent to which trade creation may be offset by trade diversion is the percentage of trade with the United States versus the

*Figure 2: Per Capita Disposable Income and Consumption: 1992$*
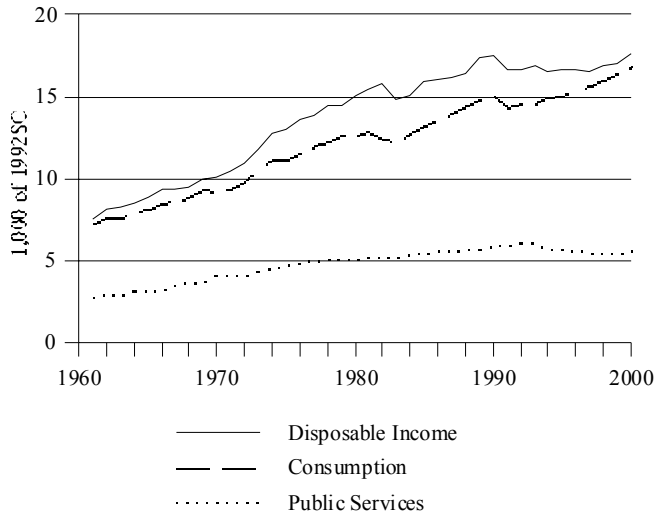
rest of the world. In 1990, 69.2% of Canadian merchandise imports came from the United States. By 1999 that percentage had risen to 76.3%. It is perhaps difficult to argue that the U.S. is the lowest-cost producer available to Canada. With respect to exports, the situation is even more dramatic, with 85.9% of Canadian merchandise exports in 1999 going to the United States.

This significant increase in the level of international trade should have led to growing prosperity in Canada. However, as shown in Figure 2, the nineties were not particularly good for Canadian consumers. Real per capita personal disposable income peaked in 1990, declined with the recession thereafter, and did not return to the 1990 peak level until 2000. Per capita consumer spending followed a similar pattern, but with a slightly stronger growth rate. As a result, per capita savings, shown as the distance between the disposable income and consumption lines in Figure 2, declined throughout the decade.

Per capita public services expenditures peaked in 1992 and have gradually declined since. Part of the reason for the reduction in public expenditures has been the pressure to harmonize the fiscal environment across NAFTA countries. To the extent that this impact has been felt on infrastructure investment, direct productivity effects may well have resulted [Brox and Fader (1996)].

Output growth rates for both Canada and the United States are illustrated in Figure 3. Here it appears than Canadian output performance has lagged behind that in the United States since the formation of the free-trade agreement. In the earlier period, the growth rates were quite similar, with the Canadian economy actually performing slightly better on average. A simple linear regression indicates that the

Figure 3: Output Growth Rates
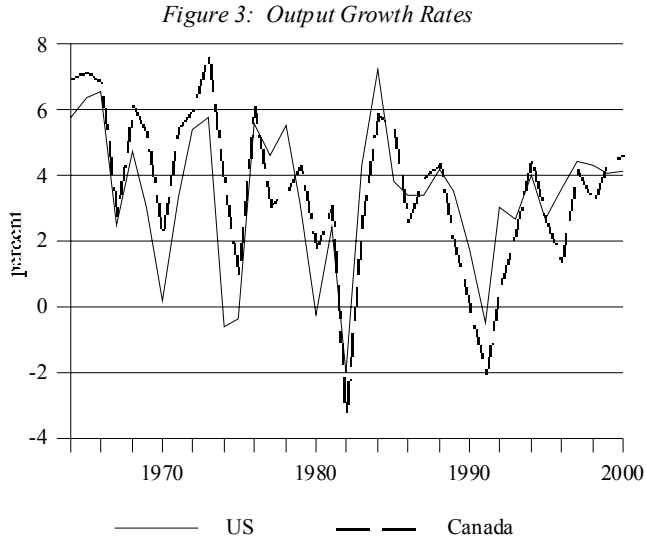
Source: Canadian System of National Account and U.S.
Department of Commerce

Figure 4: Output Per Employee
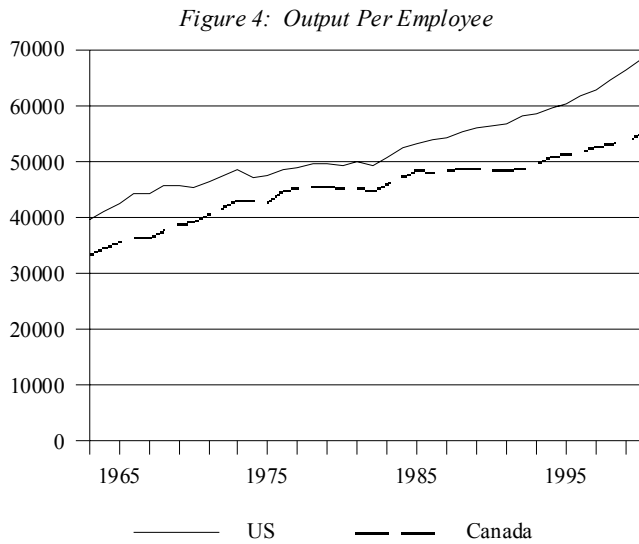
Source: Based on GDP per employee measured in 1992 Canadian Dollars

Canadian growth rate was 1.035 times that of the U.S. prior to the FTA, but only 0.85 as much afterwards. Of course, output growth without reference to input use

can be quite misleading.

Output per worker is illustrated in Figure 4. Here it is noted that while the Canadian performance has consistently been below that of the American economy, the gap appears to have expanded since the formation of the Canada-United States Free-Trade Agreement. Again, a simple linear regression estimated that Canadian output per worker was 88. 3 per cent of that of American output per worker prior to NAFTA, and only 83 per cent as high afterward.

As concerns only the Canadian experience, the growth rates of hours worked, of total capital stock, and of final output produced are plotted in Figure 5. The growth rate of net capital stock averaged approximately six per cent from the earlier sixties until the late eighties, when a dramatic downturn occurred, with a low point of less than one per cent growth being observed in 1993. Since that point, the rate of capital formation has increased, but has not yet returned to the heights seen in the sixties, seventies, and early eighties. The growth rates both of hours worked and of real output produced have been much more volatile. This might lead one to believe that the actual number of hours worked is a good predictor of actual output produced, while the total available capital stock is a good measure of the potential capacity of the economy.

In the next section, we present a relatively simple model which appears to be able to predict effectively both current actual production and the long-run potential capacity of the economy.

3. The Model

The model, originally developed by You (1979) and applied to Canadian data by Brox (1984 and 1986), follows directly from the standard production function approach to measuring potential output.[1] The model is as follows:

$$P_{t=} = Ae^{rt}K_t^a M_t^{1-\alpha} \tag{1}$$

$$Q_t = Ae^{rt}k_t^{\alpha}m_t^{1-\alpha} \tag{2}$$

where P_t is potential output at time t; Q_t is real GDP at time t; A is a constant; r is the rate of neutral technical progress; K_t is the total capital stock available at time t; M_t is full-employment hours worked at time t; k_t is utilized capital stock at time t; and m_t is actual hours employed at time t.

Neither equation may be directly estimated since utilized capital stock, full-employment hours available for work and potential output are not directly observable. If one assumes that the average hours and the labour-force participation rates remain constant over the cycle, the relationship, m = EM, where E is the employment rate measured as employment divided by labour force, would allow the

Figure 5: Input and Output Growth Rates
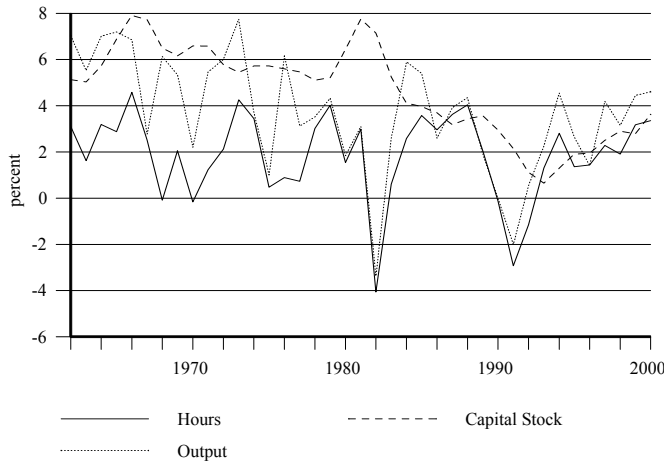
Source: Data taken from CANSIMII matrix #301-0003.

estimation of potential hours available for work. However, it is likely that both the participation rate and the average number of hours worked will vary procyclically. If one uses the following notation: E_t is the actual employment rate at time t; E^*_t is the "natural" rate of employment at time t; R_t is the actual participation rate at time t; R^*_t is the participation rate when the employment rate is at the natural rate; N is the working age population; h_t is actual average hours per employee at time t; h^* is average hours per employee when the employment rate is at the natural rate; L_t is total employment at time t; and L^* is full employment, the cyclical variation in the participation rate, R_t, may be captured via:

$$\left(\frac{R}{R^*}\right)_t = B_O E^a e^{[(b+b'D)t]} \tag{3}$$

where D is a dummy representing changes in trend participation rates. Further, the cyclical variation in average hours may be modelled as:

$$\left(\frac{h}{h^*}\right)_t = B_1 E_t^\lambda e^{-dt} \tag{4}$$

By using the above-mentioned notation, full employment hours, M_t, and actual hours worked, m_t, may be expressed as:

$$M_t = h^* E^* R^* N_t \tag{5}$$

and

$$m_t = h_t E_t R_t N_t \tag{6}$$

respectively. Thus one may express the cyclical variation in actual hours worked as:

$$\left(\frac{m}{M}\right)_t = \frac{hERN}{h^* E^* R^* N} = \left(\frac{h}{h^*}\right)_t \left(\frac{R}{R^*}\right)_t \left(\frac{E}{E^*}\right)_t$$

$$OR \tag{7}$$

$$m_t = \left(\frac{h}{h^*}\right)_t \left(\frac{R}{R^*}\right)_t E_t M_t$$

when $E^* = 1$.[2]

Now, by combining (3), (4) and (7), one may obtain:

$$m_t / N_t = BE_t^{1+a+\lambda} e^{[-(d-b)t+b'Dt]}. \tag{8}$$

where $B = B_0 B_1$

By definition, at full-employment, M=m(E=1). Therefore:

$$M_t = BN_t e^{[-(d-b)t+b'Dt]} \tag{9}$$

or:

$$N_t = B^{-1} M_t e^{[(d-b)t-b'Dt]}. \tag{10}$$

Substituting (10) into (8) yields:

$$m_t = ME_t^{1+a+\lambda} \tag{11}$$

which shows that the elasticity of hours worked with respect to the employment rate is $(1+a+\lambda)$.

Capital utilization is likely to be a function of the state of the production cycle. Solow (1957) assumed that $k = EK$. Thus utilization of capital would be proportional to the employment rate. However, You (1979) assumed that:

$$k = KE^g \tag{12}$$

where g may be viewed as a function of the elasticity of hours worked with respect to the employment rate $(1 + a + \lambda)$, and of factors affecting the distribution of demand across industries with different capital intensities.

A measure of the relationship between actual and potential output may be obtained by substituting (11) and (12) into (2), yielding:

$$Q_t = Ae^{rt}E_t^{\alpha g+(1-\alpha)(1+a+\lambda)}K_t^{\alpha}M_t^{1-\alpha} = E_t^{\beta}P_t \tag{13}$$

where $\beta = [\alpha g + (1 - \alpha)(1 + a + \lambda)]$. However, (13) cannot be estimated because potential output and potential hours available for work are not observable. Estimates of α and g may be obtained by substituting (12) into (2), which yields:

$$Q_t = Ae^{rt}E_t^{\alpha g}K_t^{\alpha}m_t^{1-\alpha} \tag{14}$$

Since $(1 + a + \lambda)$ may be estimated from (8), β may now be estimated and then potential output may be calculated via (13).

The potential output gap, measured as a percentage of actual output, is then equal to:

$$G_t = (Q_t - P_t)/Q_t = 1 - E_t^{-\beta}. \tag{15}$$

4. Analysis of Empirical Results

The empirical calculation of both the level of potential output and real output gap requires the estimation of equations (8) and (14). The data used are as follows: D, a dummy variable = 1 from 1994 on capturing the possible impacts of the formation of NAFTA; E, the ratio of employment (V716374) to the labour force (D980048); K, the net capital stock (V1408321); Q real GDP minus rent on owner-occupied housing (I600001); m, total hours worked (V715818); N, the population (D1); and t, a time trend = 1, in 1961. The estimation and calculation of the level of potential output and the output gap require an assumption concerning the potential or full-employment unemployment rate. Following Brox (1984) this rate is assumed to be five per cent.[3]

Since the data series employed in this study are non-stationary, the model has been estimated in log difference form:

$$\log\left(\frac{m_{t+1}}{N_{t+1}}\right) - \log\left(\frac{m_t}{N_t}\right) = (1+a+\lambda)[\log(E_{t+1} - \log(E_t)] + [-(d-b)] + b'D \tag{8'}$$

and

$$\log(Q_{t+1}) - \log(Q_t) = r + r'D + (\alpha g)[\log(E_{t+1} - \log(E_t)]$$
$$+ \alpha[\log K_{t+1} - \log(K_t)] + (1 + \alpha)[\log(m_{t+1} - \log(m_t)] \qquad (14')$$

where D is a dummy accounting for a possible change in the rate of technological progress, and the estimation results are as follows:

Equation (8'):

$\Delta\log(m/N) = 1.7053\Delta \log(E) + 0.0074185 - 0.006059D$
    (11.76)   (4.43)   (1.55)
  $R^2 = 0.821$ d.w. = 1.53.

Equation (14'):

$\Delta\log(Q) = 0.47501\Delta \log(K) + 0.52499\Delta \log(m) + 0.86191\Delta \log(E) + 0.0032 + 0.0024$ D
    (2.52)   (2.79)   (2.00)   (0.54)   (0.34)
  $R^2 = 0.638$ d.w. = 1.44.

These results are in line with prior expectation and generally consistent with those found earlier by Brox (1984). The elasticity of hours worked with respect to the employment rate, $(1 + a + \lambda)$, is found to be 1.71. Therefore, we estimate that total hours worked will increase by 1.71 per cent for every one per cent increase in the employment rate. The positive sign on the time trend in equation (5) indicates that rising participation rates have more than offset the falling number of hours worked over the period. The negative sign on the NAFTA variable indicates that since the formation of the free-trade agreement, the increase in participation rates has declined sharply.

From equation (14) we obtain values for αg and α of approximately 0.86 and 0.47 respectively, thereby implying a value of 1.83 for g, the elasticity of utilized capital services with respect to the employment rate.[4] Thus we find that capital use varies only slightly more than does that of labour. Brox (1984) found that capital varied just under twice as much as labour in Canada, and You (1979) found capital even more volatile in his study of the United States. No significant NAFTA effects have been identified in the production function estimates.[5]

From the results of equations (8) and (14) we obtain an estimated value for β of 1.757. By substituting this value into equation (13), an estimated series for the Canadian potential output may be calculated. The levels of actual and the estimated values for potential output measured in terms of real gross domestic product are shown in Figure 6.

An estimate of the real output gap follows directly from equation (15) and is shown in Figure 7. This estimate of the Canadian real output gap suggests that the Canadian economy was operating above capacity for much of the later sixties. Since then, however, a sizable gap is evident. Since the formation of NAFTA in 1994, the size of the output gap has steadily fallen, but this appears to be a natural occurrence of the cycle rather than being related to the trade agreement.

Figure 6: Actual and Potential Real Canadian Output
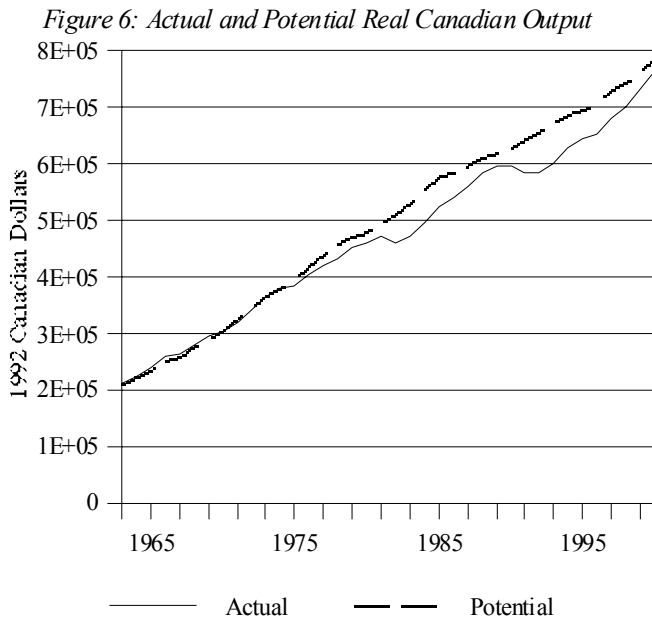
Source: Actual output from System of Canadian National
Accounts; potential output as estimated in this study

Table 1*: Growth Rates of Output and Factor Inputs*				
	Potential Output	Actual Output	Capital Stock	Hours Worked
1964 - 1993	3.92%	3.58%	5.12%	1.74%
1994 - 2000	2.38%	3.57%	2.42%	2.34%

Indeed, as shown in Table 1, the growth rate of real output was almost exactly the same in the pre-NAFTA period concerned in this paper as it has been since. What has closed the output gap in recent years is the fact that the growth rate of potential output has declined from an average of 3.92 per cent in the pre-NAFTA period to an average of 2.38 per cent since the formation of NAFTA. The factor that appears to be responsible for the decline in the growth rate of potential output is the reduction in the rate of capital formation over this period. It is unclear whether this has been the result of the formation of NAFTA or not. However, as Canada has historically relied

Figure 7: The Real Canadian Output Gap
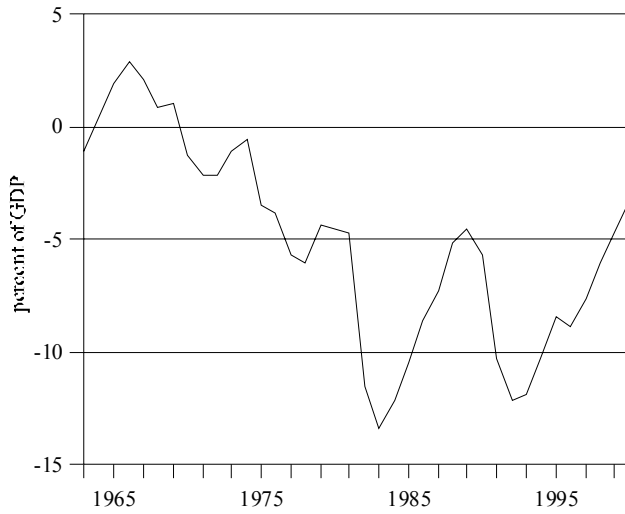
Source: Estimated in this study

on foreign direct investment for much of its capital formation, it is conceivable that the formation of the free-trade area has reduced the activeness of foreign investment in Canada, thereby reducing the potential capacity of the Canadian economy.

5. Summary

This paper has attempted to update the measures of Canadian potential output and the real Canadian output gap using the methodology used by Brox (1984 and 1986). As an extension, the model has been modified to test for structural changes related to the formation of the Canada-U.S. Free-Trade Agreement and its subsequent expansion to NAFTA. The model has successfully estimated a version of the real output gap consistent with those found by earlier studies.

The model relies on estimating the elasticity of hours worked with respect to the employment rate, $(1 + a + \lambda)$, which is found to be 1.71, and the elasticity of utilized capital services with respect to the employment rate, which takes on a value of 1.83 in this study. In earlier studies Brox (1984) found values of 1.50 and 2.67 for Canada, and You (1979) found values of 1.83 and 5.26 for the United States respectively.

While a significant output gap has been estimated, no direct effect attributable to the formation of NAFTA has been identified in the estimation results. The recent changes appear to be a result of a slower rate of capital formation. Whether this is attributable to the formation of NAFTA is unclear.

Notes

1. For a summary of the various approaches that have been used to measure potential output see Cerra and Saxena (2000) and Dupasquier, Guay and St-Amant (1999).

2. The assumption that $E^*= 1$ implies that the natural rate of unemployment is zero. In the empirical analysis reported below, the natural rate of unemployment is assumed to be five per cent and thus a corresponding adjustment would be required here.

3. You (1979) tested both a constant rate of four per cent and one based on the assumption of constant demographically weighted unemployment rates. You found no significant difference between the two versions of his model.

4. This value is significantly smaller than that found by both You (1979) and Brox (1984).

5. Alternative assumptions were tested, allowing the NAFTA variable to represent a change in the elasticity with respect to the employment in both equations, rather than as an intercept or trend shift as reported. In no case was such an attempt successful in finding a significant result.

References

Apel, M., and P. Jansson, "Systems of Potential Output and the NAIRU", *Empirical Economics*, 24 (3), 1999, 373-388.

Arestis, P. and E. Paliginis, "Globalization of Production and Industrialization in the Periphery: The Case of the EU and NAFTA", in Deprez, J. and J.T. Harvey (eds.), *Foundations of International Economics: Post Keynesian Perspectives*, New York: Routledge, 1999, 215-228.

Arndt, S.W., "Globalization and the Open Economy", *North American Journal of Economics and Finance*, 8 (1), 1997, 71-79.

Brox, J.A., "A Note on Capacity Utilization, Productivity and the Canadian Output Gap", *Empirical Economics*, 9 (3), 1984, 131-138.

Brox, J.A., "Capacity Utilization and Productivity in Canada: A Provincial Analysis", *Canadian Journal of Regional Science*, 9 (2), 1986, 241-249.

Brox, J.A., "Changing Patterns of Regional and International Trade: The Case of Canada under NAFTA", *International Trade Journal*, 15 (4), 2001, 383-407.

Brox, J.A.and C.A. Fader, "Public Infrastructure, Regional Efficiency and Factor Substitutability in Atlantic Canada Manufacturing", *Canadian Journal of Regional Science*, 19 (2), 1996, 143-59.

Cerra, V. and S.C. Saxena, "Alternative Methods of Estimating Potential Output and the Output Gap: An Application to Sweden", International Monetary Fund Working Paper # WP/00/59, 2000, 30pp.

de Brouwer, G., "Estimating Output Gaps", Reserve Bank of Australia Research Discussion Paper: 9809, 1998, 27pp.

Dimitz, M.A., "Output Gaps in European Monetary Union: New Insights from Input Augmentation in the Technological Progress", Institute for Advanced Studies:

Economic Series 102, 2001, 24pp.

Dupasquier, C., A. Guay, and P. St-Amant, "A Survey of Alternative Methodologies for Estimating Potential Output and the Output Gap", *Journal of Macroeconomics*, 21 (3), 1999, 577-595.

Flaig, G. and C. Plotscher, "Estimating the Output Gap Using Business Survey Data: A Bivariate Structural Time Series Model for the German Economy", Ifo Studien, 47 (2), 2001, 221-232.

Gullason, E.T., "The Dynamics of the U.S. Occupational Structure during the 1990's", *Journal of Labour Research*, 21 (2), 2000, 363-375.

Haltmaier, J., "The Use of Cyclical Indicators in Estimating the Output Gap in Japan", Board of Governors of the Federal Reserve System: International Finance Discussion Paper : 701, 2001, 24pp.

Helmenstein, C. and M. Zagler, "U.S. and EU Economic Performance – Between a New Economy Boom and Bust", *Wirtschaftspolitische Blatter*, 48 (2), 2001, 228-237.

Kahn, G.A., "New Estimates of the U.S. Economy's Potential Growth Rate", *Contemporary Economic Policy,* 14 (4), 1996, 1-16.

Kuttner, K.N., "Estimating Potential Output as a Latent Variable", *Journal of Business and Economic Statistics*, 12 (3), 1994, 361-368.

Roberston, R. and D.H. Dutkowsky, "Labor Adjustment Costs in a Destination Country: The Case of Mexico", *Journal of Development Economics*, 67 (1), 2002, 29-54.

Sarkar, S., and H.Y. Park, "Impact of the North American Free Trade Agreement on the U.S. Trade with Mexico", *International Trade Journal*, 15 (3), 2001, 269-92.

Sato, K., "Japan's Potential Output and the GDP Gap: A New Estimate", *Journal of Asian Economics*, 12 (2), 2001, 183-196.

Solow, R.M., "Technical Change and the Aggregate Production Function", *Review of Economics and Statistics*, 39 (3), 1957, 312-320.

Smith, M.R., "What Have the FTA and the NAFTA Done to the Canadian Labor Market?" *Forum for Social Economics*, 30 (2), 2001, 25-50.

You, J.K., "Capacity Utilization, Productivity and Output Gap", *Review of Economics and Statistics*, 61 (1), 1979, 91-100.

Integrated International Production and Economic Development in Europe: The Case of the Balkans

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Abstract. In recent years the process of international production of affiliate firms underwent dramatic changes both quantitatively and structurally. This paper address the issue of uneven distribution of FDIs in the European transition economies and concentrates on explaining the reasons why the region of the Balkans lags behind the rest of Europe in the attraction of MNEs. The issue is approached first in an indirect way by bringing into the picture the high concentration of FDIs within the European Union as well as the prevailing trends on FDI inflow in the rest of the CEE countries. The second part of the paper points to the asymmetries in the CEE region that explain the slow capital inflow in the Balkans and attempts to show that development integration of the region is a *sine qua non* for the region to attract foreign investment.

1. Introduction

It is well established in the literature that Foreign Direct Investment (FDI) that, in the era of the "new economy", is *sine qua non* factor for economic development. Indeed, the dramatic rise in international production in recent years stands out as the most decisive factor in the globalization of economic activity. Foreign Direct Investment has been growing very rapidly in recent years while international trade ceased being the principal mechanism linking national economies. It is rather the inter-linkage of trade and FDI that influence the economic growth and welfare of countries in a global environment that undergoes continuous change. In this sense, FDI inflow is viewed as the essential link between national economies and in effect it is a measure of the extent to which a country or a region is integrated into the world economy.

In recent years the process of international production of affiliate firms underwent dramatic changes both quantitatively and structurally. Structure wise, changes in FDI investment strategies have been in the center of new developments in international economic relations.

In the past, the dominant factor motivating the manufacturing firms to invest abroad was the search for export markets and tariff jumping. For the most part, foreign investment abroad materialized when the foreign firm found producing abroad more profitable than exporting home produced goods. Nowadays, the typical

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large size multinational firm engages in foreign investment projects in the context of an *efficiency–oriented corporate system*. The simple FDI scheme in manufacturing with stand alone affiliates give way to more complex relationships of *regionally integrated production networks* with considerable intra – firm trade flows among affiliates and with the parent firm capitalizing on the tangible and intangible assets in the corporate system. Each productive unit in this network, whether an affiliate or the parent company, could be viewed as part of a value added chain. Therefore, the location of the affiliate is decided on the basis of criteria of efficiency for the corporate system i.e. it is *located where it contributes most to the overall efficiency for the corporate network.*

This development was made possible thanks to the changed environment for international transactions. For one thing, the dramatic improvement in technology allows firms to process and communicate information at reduced costs. Also, in recent years, there has been substantial liberalization of policies on trade and investment flows. These changes have helped FDI attain easier access to foreign markets of goods and productive factors. Furthermore, the size of national markets ceased being a decisive factor for the location of FDI since trade liberalization has led to substantial decreases in tariff and no –tariff barriers. The center of gravity in decision making on these matters has shifted to efficiency as it relates to cost differences between locations, the quality of infrastructure and the availability of skills.

FDI growth is unevenly distributed. Recent statistics (UNCTAD, 2001), show that 80% of total world FDI inflow is accounted for by the "*Triad*" which also hosts 90% of the world's largest (in terms of foreign assets) multinationals. In fact, 95% of total world FDI inflow and 90% of stocks are accounted for by the top 30 host countries. As far as the Central and Eastern Europe (CEE) is concerned, the region attracts a very small share of the world FDI. Uneven distribution of the world FDI is also present in the CEE region. The countries of Central Europe and Baltic states have received more FDI per capita than Southeastern Europe and the CIS countries (Sengenberger, 2002).

The literature that has tried so far to explain this uneven allocation of the FDI to the transition economies is not very extensive. Most of the studies are descriptive or case studies (eg Glaiser and Atanasova, 1998; Tuselmann, 1999; Sengenberger, 2002; Barry, 2002). Recently some papers use empirical analysis to deal with the FDI activity in the transition economies (Tondel, 2002) Most all of these works stress the role of he market as the most significant factor for the attraction of FDI in the transition economies while institutions are also included in their analysis.

This paper address the issue of uneven distribution of FDIs in the European transition economies and concentrates on explaining the reasons why the region of the Balkans lags behind the rest of Europe in the attraction of MNEs. The issue is approached first in an indirect way by bringing into the picture the high concentration of FDIs within the European Union as well as the prevailing trends on FDI inflow in the rest of the CEE countries. The second part of the paper points to

the main factors that affect adversely capital inflow in the Balkans and attempts to show that development integration of the region is a *sine qua non* for the region to attract foreign investment.

2. Regional Asymmetries in CEE and FDI Inflows

The countries of Central and Eastern Europe are now eager to attract foreign investors. Their deteriorated economic conditions during the early 1990s and the limited financial resources have led them to pursue the restructuring of their economies through the attraction of foreign direct investment. Foreign companies are expected to provide the required impetus of growth through the following channels. First, the multinational companies will contribute to the upgrading of competitiveness through innovation in products, production process and organizational structures. Second, foreign direct investment will provide short and long term relief from their significant financial problems. Finally, foreign direct investment will help reduce the social tensions related to low income, job loses and poverty.

What are the main poles of attraction for MNEs in the CEE countries? Using Dunning's (1993) classification of MNEs (market seekers, national resources seekers, efficiency seekers and strategic asset or capability seekers), it would seem that it is mainly market seekers that invest in the CEE countries. Indeed, the literature on the FDI in CEE countries has recognized the market size as the most significant factor affecting the decision of MNEs. There is widespread argument that most CEE bound FDI has been "market seeking" (Tuselmann, 1999; Tondel, 2001; Sengenberger, 2002) rather than reflecting an attempt to integrate CEE – production into the EU production networks (Barry, 2002). Countries of the region with fast increasing per capita income experience relatively higher FDI inflows. This explains partially why countries of Central Europe have received more FDI per capita than South Eastern Europe countries, as we will see below.

This strategic behavior by the MNEs in the CEE countries explains also why FDI inflows have been in low – tech sectors. High – tech sectors need high investment and more secure environment to guaranty future profits. Now, given that per capita income of the host CEE countries was relatively low, and the high tech products are high income – elastic, it is no surprise that low-tech sectors were more appropriate for the market seeking MNE's. Of course, good market performance does not exclusively depend on market liberalization and privatization. The enabling market setting requires, among others, an appropriate kind and degree of regulated institutions, effective law enforcement and qualitative public services (Sengenberger, 2002). Thus, excessive bureaucracies, delays in privatization, unclear and arbitrarily enforced rules, monopoly control of real sector (Glaister and Atanasova, 1998), the lack of tripartite social dialogue, insufficient industrial relations (Sengenberger, 2002) could be investment barriers even for market seeking MNEs (Ekholm and Markusen, 2002).

Important for the business decision are also the civil liberties such as the

freedom of expression, the association and organization rights and the rule of law and human rights. For example if there are no free trade unions and the collective bargaining is ineffective the feelings of the job insecurity run high and the FDI performance worsens in the country. Empirical research, (eg. Sengerberger, 2002), has shown that this feeling is present in the CEE countries. Furthermore, the independence of the judiciary system, the prevalence of the rule of law in civil and criminal matters, the treatment of population under law with equality and other related issues such as corruption, mafia, etc. may influence significantly the decision of an MNE to enter into a new market. For example, even though Bulgaria has adopted a very liberal legal framework for foreign investors, the endemic nature of the organized crime in business and the official bureaucracy have resulted in a lag behind most of the other CEE countries in terms of FDI (Glaister and Attanasova, 1998).

Getting back to the uneven distribution of FDI, our discussion here suggests partial explanation of why South-Eastern Eastern Europe lags behind the rest of the CEE countries in inflow of foreign investment. The systemic transformation for Central and Eastern Europe (CEE) shows an asymmetric transition process (both in economic, social and political terms) for the countries involved. It has become evident that the region of the Balkans, with the exception of Slovenia, lags behind the tempo of the transition process in the Central European Countries, and the Baltic States. Worse yet, the gap between the front runners and the South-Eastern Europe in increasing over time. Poor economic performance and instability characterize the post-1989 period for most Balkan countries (Petrakos and Totev, 2001).

Most of the attempts in the literature to provide explanations for the poor performance encompass inadequacies that range from the initial conditions to political, administrative, institutional and economic weaknesses. The adverse initial conditions and the defective political and administrative structure are the focal points to explain these delays in the first part of the 90's. For the second part of the decade the factor "market failure" takes on more importance. In particular, the slow pace of market liberalization and the lack of adequate privatization attract the attention of the researchers (Jackson 2001).

In the following, before dealing more explicitly with the problem of the Balkans in attracting MNEs, first we will try to explain the high concentration of FDI inflows within the European Union. This analysis will help us discuss FDI activity in the area of the Balkans.

3. The Unevenness of FDI Inflow in the European Union and the Lack of a Comprehensive Regulatory Policy

The distribution of FDI inflow in the European Union is of special interest for our discussion. Both insiders and outsiders investing in the EU exhibit preferences for closeness to the center. The main member state recipients of FDI were the UK, France and Belgium/Luxembourg among the developed economies and Spain among the lower income countries. Greece and Portugal, the lowest per capita income

countries of the EU and the ones further away from the "center", experience a relative decline in FDI inflow over the last two decades.

In order to better determine the extent of concentration in international production within the EU, one would have to examine FDI by sectors of production. Due to the lack of statistical data at the two and three digit level, we resort to M+A data, for which we have a more detailed picture. Although the data ignore greenfield investment, they can be used as a proxy for sectoral breakdown of manufacturing, considering that M+As constitute by far the largest percentage of the FDI activity in the EU.

Table 1 *Percentage Distribution of M+A Operations by Sector in EU, 1986-95*

Country	**NACE 21-29** Non energy producing minerals, Chemical Industry	**NACE 30-39** Metal manufacture, mechanical, electrical and instrument engineering	**NACE 40-49** Other (food, textile, leather clothing, footwear, timber furniture)
Belgium	27	31	43
Denmark	19	45	35
France	20	38	41
Germany	23	37	30
Greece	26	10	61
Ireland	24	23	48
Italy	30	38	34
Netherlands	25	34	43
Portugal	33	20	45
Spain	26	27	43
U.K.	19	44	36

Source*: European Commission, European Economy, No 4, 1996*

Table 1 uses NACE 2- digit manufacturing sector breakdown of data for the member states. The data refer to numbers of M+A rather than value. It is evident that most M+A activity in less developed countries is found in the third category, especially in NACE 42 and 43 (textiles and clothing). In the case of Greece, for instance, textiles have attracted 38 cases of M+As. The advanced member states on the other hand have bigger representation in the second category, which is more technology intensive. NACE 32-36 (mechanical and electrical engineering) are the main targets for M+As in these countries.

The empirical findings on FDI activity in the EU are, for the most part, accommodated by the existing body of *theoretical treatment of FDI activity*. If we use as reference framework for the theoretical consideration of FDI activity Dunning's OLI concepts, we can see the impact of integration on the locational advantage. Now, in recent years, the original OLI concepts have been refined to

reflect current developments, especially in the integrated international production of FDIs. Two points are of interest in the present context. First, the importance of non-physical aspects is stressed especially concerning ownership advantages. In particular, knowledge–based assets are considered of increasing importance as determinants of FDI ownership and location advantages (Markusen, 1995). Second, business strategy was added in the OLI configuration to account for the dynamic aspects of FDI activity. The more complex relationship of regionally integrated networks suggests increased interdependence among multinationals in dealing with location matters (Dunning, 1993).

These additions to the OLI theory place the issue of location in the dynamic context of international production and help understand the complexity of the effects of regional integration on FDI. Before the formation of the Single Market (SM), FDI theory emphasized the fact that the EC integration enhanced the locational advantages of countries in the EC and led to FDI for "*tariff jumping*" purposes. With the operation of the Single Market, there is a shift of emphasis to efficiency-seeking as a motive for FDI's in the EU.

The *new trade theories* have come to help research on the issue of integration and FDI activity. Geography of productive activity is viewed as an extension of the new trade theory which introduced economies of scale and product differentiation as factors explaining potential gains from intra–industry trade. Krugman's (1991) research brings into the picture geographical concentration due to economies of scale and decreasing transportation costs. Reduction in transportation costs may lead to concentration of production in one location with higher costs, but with economies of scale and better access to the market. This reasoning suggests that the periphery of an economic union is not necessarily favored for attraction of a new investment. Instead, a region with a head start in industrial production may become a pole of attraction of new industries.

The above seem to be in line with current developments on FDI activity in the EU. For the high-income countries the availability of created assets such as well trained manpower and innovative capacity surfaces as one of the main determinants of location especially for high technology sectors. For the less developed regions of the EU, natural factor endowments are still critical locational factors of FDI inflow in basic production.

Although the new FDI and trade theories are not free of contradictions they are useful for predicting future trends for FDI inflows in the EU. Theory and evidence point to the duality problem of the EU with the high and low value-added activities corresponding to the central core and the periphery respectively.

Based on the above discussion, one could argue for the need for a comprehensive FDI policy in the EU. To begin with, the problem arises from the complete lack of a comprehensive regulatory framework on FDI activity in the global economy. Unlike the fields of international trade and finance, international investment activity does not have to obey any general principals of a comprehensive agreement, especially after the failure of OECD's negotiations for a Multilateral

Investment Agreement (MAI*)* in 1998. It makes sense that the lack of an institutional framework to facilitate the needs of the global economy can explain the usual tactics by foreign investors to circumvent economic policies of national governments. On the other hand, the current reality of international economic life suggests that proposals for such a comprehensive agreement   [e.g. Kline (1993)] cannot materialize in the foreseeable future.

The inadequacy of EU foreign investment regional policy is more obvious and in part responsible for the uneven regional distribution of new inward investment and cross–border restructuring. Obviously, the less developed areas in the Union have not been able to capitalize on an EU policy instituted to bring the periphery's competitive. A supranational policy for inward investment in the EU could reduce the size and dimensions of the problem faced by the national states. In practice, however, due to the lack of an explicitly stated common policy on FDI inflow, individual states often resort to beggar-thy-neighbor tactics with frequent use of increased national subsides in order to recruit the type of multinational that suit their development needs.

4. The Inadequacy of FDI Inflow in the Balkans

Following our discussion above, it is no surprise that FDI inflow in the Balkans is extremely low. The region of the Balkans simply does not posses the prerequisites that modern mentality of FDI activity requires. Even in terms of traditional factors affecting FDI location, the Balkans do not possess adequate attributes to attract large scale foreign investment activity. The *traditional economic* factors driving FDIs include *large domestic markets*, the presence of *cheap labor* and possession of *natural resources*. The last two, relative abundance of labor and natural resources are potentially the main poles of attraction of FDI in the Balkans at the present time. However, as mentioned above, the importance of these factors is decreasing over time. To begin with, the role of primary products in industrial activity is diminishing. Furthermore, new contractual extraction and marketing arrangement with national firms affect the location strategy of FDIs. Low wages also are becoming less of an attraction point for FDIs. The sophisticated production techniques and new technology lead the FDIs to shift of emphasis to skills rather than low labor costs.

As for the third traditional economic factor for FDI inflow, the large size of domestic market, the Balkans are in a disadvantageous position in more than one ways. Aside from the fact that the size of the national Balkan markets is small, both in terms of population and purchasing power the region suffers from the syndrome of fragmentation rather than unification. Rivalry and instability create distances between the countries of the Balkan area and make cross–border FDI activity all the more difficult.

As mentioned earlier, increasing competitive pressures and technological advances are the driving forces that lead the FDIs to efficiency considerations in their locational strategies. Technological progress, in the fields of transport, communications and information is all the more important in the geographical

pattern of transnationals. Also, new management and organizational techniques supplement the factor of technology. Finally, liberalization of trade and productive activity enters as a third factor of crucial importance.

Our discussion here suggests that a great deal of ground-work is needed in order for the Balkans to attract large scale FDI activity in the area. Of the traditional factors of FDI location mentioned above, only one, cheap (mostly unskilled) labor is available. This is the strong point of the region in this respect that can be taken advantage of. However, given that the new determinants of location (technological progress, new management and organizational techniques and liberalization policies), suffer from severe atrophy, low wages as a factor by itself is a weak pole of attraction.

In the following we advance the point that *development integration* of the Balkans emerges as an economic policy - alternative that would help the area overcome its stagnation trap. Development integration could be relied upon to gradually produce the necessary preconditions for FDI inflow.

5. Development Integration of the Balkans, A Necessity?

As the failure of the Balkans to transform promptly continues into the decade of the 2000, researchers place more emphasis on *"basic"* negative factors that seem to exhibit endurance over time. Geography and instability in the region surface as such factors (Petrakos, 2001). Geography, in a broad sense, includes market size of the Balkan countries, while political instability and ethnic rivalry implies lack of economic cooperation of the neighboring nations. An extension of this line of thinking leads to the question whether what is needed for the Balkans to successfully pursue the objective of economic transformation in the context of the eventual accession to the EU is more *"togetherness"*. In terms of the traditional trade theory this translates to economic cooperation in the form of economic integration.

According to the theory of economic integration, the removal of internal trade barriers could bring about "*trade creation*" via specialization and division of labor on an inter-trade basis. Now, whether trade creation outweighs trade diversion depends on a number of factors such as the potential of intra–trade between the member countries and the degree on dependence on trade outside the region.

The experience of integration at low levels of development has shown that trade patterns in these regions offer little scope for trade creation and improvements of resource allocation. The region of the Balkans is no exception. Recent research on the subject (Jackson, 2001; Petrakos, 2001) show that most countries produce similar commodities that they export to industrial countries, mostly EU members, while intra–industry trade is hardly existent. Furthermore, most countries suffer from structural deficiencies with significant dependencies on agriculture, excess of labor resources and shortage of capital.

The shallowness of interregional trade reflects a defective production base of the individual countries and the region as a whole. It makes sense, therefore, to turn to the roots of the problem if benefits can be reaped via integration. It is in this sense

that *development integration*, which addresses this issue, comes into the picture in the case in Balkans. Development integration places the emphasis on better efficiency on supply matters that can come about through the enlargement and improvement of the production base. The argument in favor of development integration centers on the "dynamic" effects of regional cooperation. Development integration emphasizes better efficiency on supply matters that can come about through the enlargement and improvement of the production base. The enlargement of the market is, of course, a basic prerequisite which, when combined with other attributes, could lead to optimum size productive units in the region.

In the following, we will concentrate on what we consider the two basic prerequisites for successful economic integration in the Balkans, i.e.
(a) infrastructure upgrading and restructuring and (b) capital formation, which includes foreign direct investment. We look into (a) by way of comparison of existing conditions in the Balkans to those in the EU as we did with (b) earlier.

In a broad sense, infrastructure comprises a large number of development ingredients. In our discussion below we will leave out the infrastructures, which are more remotely related to the production base e.g. social and health infrastructure. We will concentrate on the more basic infrastructure of transport, communications and energy.

In all three areas the region of the Balkans is behind the rest of Europe in quantities and quality (Skayannis 2001). The deficiencies in these areas are most obvious when viewed in the context of the convergence concept of the Maastricht Treaty built along the Transeuropean Networks axis in order to secure a single system of General Conditions of Production. Now, taking into account the different level of development of the Balkan region on these matters, there emerges the need for regional planning so that Balkans can be spatially integrated with the rest of Europe in these areas.

How far behind are the Balkans compared to the rest of Europe in these areas of infrastructure? Using data of the World's Bank Development Indicators (1998) and Skayannis (2001) for transportation and communications (Table II) gives an indication of the dimension of the problem quantitatively and qualitatively. In both areas the Balkans lag behind the EU.

In the field of energy, the Balkans are in a relatively good position according to the same source and statistics. As a region, it possesses a relatively balanced energy system in terms of primary sources of production. Hydroelectric power in particular, presents a great potential in the region, which rates it No 2 in Europe after the Nordic countries. Coal is also in relative abundance while the natural gas network lacks adequate development. As expected, the Balkans are behind the EU in consumption of energy per capita.

In sum, the defective infrastructure of the Balkans is primarily located in the road and railroad networks, which need upgrading and expansion and in the field of communications where core work is needed with the adoption of digital technology..
In the field of energy the Balkans rate quite high in terms of capacity

Table 2. *Transportation and Telecommunications Infrastructure Comparisons*

	Balkans / EU (%)
I. Transportation	
1. Road Network	
Percentage of Paved Road Network in kms	59,8
2. Railway Network	
Density of Railway Network (km per 1000 sq. kms)	75,60
3. Airport Infrastructure	
Airport Density (% ratio of paved airport in the countries' area)	50,40
II. Telecommunications	
1. Telephone connections per 100 inhabitants	38,00
2. Mobile Telephone Connections per 100 inhabitants	0,70
III. Energy	
1.Electricity production per capita	45,6
2.Consumption of Natural Gas per capita	61,2

Sources: World Bank, Development Indicators (1998), Skayanis (2001)

and balance of primary resources. Obviously, what is lacking in all three areas is addressing the issue on a regional basis so that the Balkans will become spatially integrated in the Transeuropean Network according to the dictates of the single system of General Conditions of Production.

6. Conclusions and Policy Implications. Regional Investment Policy: A Prerequisite for FDI Inflow ?

The Balkan countries are behind in the new trends of national policies to attract FDI inflow. The highly competitive climate that prevails in the last decade reflects massive revisions of the investment regimes to create a more favorable environment for FDIs through regulatory changes and liberalization measures. A large number of bilateral investment treaties between countries at all levels of development as well as regional agreements have set the stage for a new liberalized investment regime that requires certain rules of conduct in both sides.

As discussed in the second part of this paper the asymmetric transition process in economic, social and political environment explains the uneven distribution of the FDI in CEE region. The Balkans, having lagged behind in this race for FDI attraction, are called upon as a region to agree on an investment regime, to incorporate FDI more fully into their development strategies. Regional Investment policy could follow in *two stages*. Realistically, and in view of the experience of Greece as an FDI host country, during the first period new FDI policies should focus on intra- regional rather than extra–regional inflows. Thus, regional private investment in the form of cross–border joint ventures of M+As could be encouraged

in the context of development integration. Furthermore, the larger production and resource base, which is going to come about as a result of development integration, can be taken advantage of by domestic companies wholly owned by nationals of member countries.

This regionalization of investment would require alteration of the above mentioned asymmetries by revising the national laws to comply with intra-regional agreements, which would facilitate factor mobility in the region. Large scale revisions of domestic legislations on taxation, labor and capital markets, foreign exchange regulations, taxation etc. will be required to promote regionalization of investment activity and to ensure equal treatment of regional companies and domestic firms.

During the first period, promotion of regional FDIs may require deviation from the rules of *national treatment* and *most favored nation treatment* in FDI. The target would be to design a system that would treat regional enterprises the same as natural companies. Such national treatment for regional FDIs may need to proceed on a gradual basis. Starting with preferential treatment of intra-regional investment, the ultimate objective in this first stage of development integration would be the adoption of Balkans laws that apply to all regional investment.

The duration of the first stage of development integration is open ended. The end of this stage will occur when the region has accomplished the objectives of a) upgrading infrastructure and b) liberalizing and harmonizing investments rules in the region. In addition, during this period liberalization of the movement of goods, services and productive factors will have led to an adequately unified market.

This process of gradual maturity is expected to be accompanied by an inflow of extra regional investment. Based on our discussion above, the prospects for large scale FDI inflows in the early stages, are not good. The experience of Greece as a member of the EU on this issue suggests the need for the European Union to make commitments in favor of the Balkans with the express purpose of improving the attractiveness of the region for FDI inflow.

Similar commitments on the point of the Balkans are expected in the way of macroeconomic policies to stimulate intra regional investment and attract FDI inflows. Such policies would have to promote private sector development through linkages with the EU firms. Improving the institutional framework is also of critical importance. Harmonizing investment rules and providing investment protection mechanism are top priorities in this respect.

The issue of *performance requirements* is another important link in the long process of screening and negotiations for FDI inflow. The issues at stake that usually arise relate to a) location of headquarters, b) employment of nationals, c) extent of equity participation d) transfer of technology and e) trade–related investment measures such as : domestic content, ratio of exports to total scales.

Greece, in its dual capacity as an EU member and as a Balkan country, is expected to play a role of crucial importance for the successful development integration of the Balkans. To begin with, as an EU member, Greece can play

ambassadorial role in coordinating decision and action taking in both sides, the EU and the Balkans, on matters pertaining to the role of FDIs in development integration.

The EU side could authorize the Greek authorities to implement the resolution of the European Parliament, adopted on January 15, 1999 on a European Code of Conduct for European Enterprises Operating in Developing Countries. Among other things, the resolution includes the following: a) It emphasizes that "voluntary codes of conduct by business cannot replace national rules", b) a proposal for "the provision of development cooperation and technical and financial assistance to developing countries to help ensure that international standards are incorporated in their laws"; "suggestions for the improvement of consultation and monitoring mechanisms of European Company operations in third countries and the development of a system of incentives for companies complying with the relevant international standards", c) a recommendation that, "in the negotiations of investment agreements, the European Union should contribute to establishing not only rights for TNCs, but also duties in the fields of environment, labor and human rights".

The coordinating task of Greece would be a difficult one to the extent that the individual countries have adopted FDI-specific laws that differ in pace and nature of FDI liberalization. The need is obvious for the establishment of a regional Office of FDI inflow. Such an agency in cooperation with the appropriate governmental institutions of each country could provide the guidelines for establishing a regulatory framework for intra and extra-regional FDIs. Such a harmonization of foreign investment regimes could lead to a policy framework for FDIs that would enable targeting types of foreign investment that better suit development integration of the region.

Notes
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References
Barry, F (2002) EU Accession and Prospective FDI Flows to CEE Countries: A View from Ireland, University College Dublin, Working paper,Aug..
Carl, B. (1986) Economic Integration Among Developing Nations, NY, Praeger, Special Studies.
Dobrinsky, D (2001) "Multi – Speed Transition and Multi – Speed Integration in Europe: Recent Economic Developments in the Balkans" in G. Petrakos and S. Totev (edt), The Development of the Balkan Region Ashagate, Aldershot.
Dunning, J (1993) Multinational Enterprises and the Global Economy, Workplan, Berkshire, Addison Wesley.

Ekholm, K and Markusen, JR (2002), <u>Foreign Direct Investment and EU-CEE Integration</u>, CEBR, Working Paper, May.

European Commission (1996), <u>European Economy</u>, Number 4.

European Commission (1997), <u>The Single Market Review</u>, IV vol. 1.

Glaister, K.W. and Atanasova, H (1998), "Foreign Direct Investment in Bulgaria: Patterns and Prospects" <u>European Business Review</u>, Vol.98, Nr.2, 122-134.

Jackson, M. (2001), "Intra – Balkan Trade and Economic Cooperation: Past Lessons for the Future" in G. Petrakos and S. Totev. <u>ibid.</u>

Hoye, J and Kekic, L (1997) "What is Wrong with the Balkans?" Country Forecast Economies in Transition Regional Overview, 1rst Quarter 1997, London : The Economist Intelligence Unit.

Kline, I. International Regulation of Transnational Business: Proving the Missing Leg of Global Investment Standards, Transnational Corporations, vol 1, 153 – 154.

Krugman, P. (1991), <u>Geography and Trade</u>, Cambridge, Mass

Petrakos, G, (2001) "Fragmentation on Integration in the Balkans? Strategies of Development for the 21st century" in G. Petrakos and S. Totev, <u>ibid</u>

Markusen, J and Venables, A. (1995) <u>Multinational Firms and the New Trade Theory</u>, NBER, Working Paper No. 5036

Sengenberger, W., (2002) <u>Foreign Direct Investment, Industrial Restructuring and Local Labour markets in the Transition Economies of Central and Eastern Europe</u>: <u>Issues For debate,</u> United Nations Economic Commission for Europe, Issue paper, May.

Skayannis, P. "Infrastructure Comparison in Transition Countries: A New North – South Divide in Europe?" in G. Petrakos and S. Totev, <u>ibid</u>

Tondel, L., (2001) <u>Foreign Direct Investment During Transition: Determinants and Patterns in Central and Eastern Europe and the Former Soviet Union</u>, Chr Michelsen Institute, Working Paper, Nr 2001:19.

Tuselmann H.J., (1999) <u>Foreign Direct Investment, in Central and Eastern Europe</u>: <u>Relocation of German Industry?</u> European Business Review, Vol 99, Nr 6, 359-367.

UNTAD, (1999, 2000, 2001, 2002) <u>World Investment Report.</u>

Young, S. and Hood, N (1993) "Inward Investment Policy in the Europe Community" <u>Transnational Corporations,</u> vol. 2, 35 – 60.

KNOWLEDGE ASYMMETRIES

Implications of Global Asymmetries in Power Infrastructures

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Abstract. Explosive proliferation in demand for both quantity and quality of electricity power herald a fundamental change in global consumer markets for power generation and distribution. Developed nations typically enjoy readily available power. Much of the rest of the world does not. Power requirements of contemporary commerce and regional asymmetries in power infrastructures must be considered by organizations that conduct operations on multi-national or global scales. This paper considers the forces of power demand, the extent to which adequate power may not be universally available, and presents an analytical framework for analyzing the implications of global asymmetries in power infrastructures.

1. Introduction

With few exceptions, more developed economies enjoy access to relatively abundant and generally reliable supplies of electric power, while less developed economies do not. The implications of this disparity can not be ignored. For instance, there can be little doubt that the emergence of the United States as a global power during the 20th century was accompanied, if not in part caused, by the development of abundant and inexpensive electric power sources. Additionally, having a high level of basic infrastructure (including electricity, roads, irrigation and education) has been credited as one of the factors assisting rapid economic growth in developing economies, as in the case of Thailand (Lash 2002). One of the obvious implications of infrastructure (such as electricity) for an organization is that having a proper infrastructure in a specific location enables them to produce products and/or provide services in an efficient, cost effective manner. As a result, organizations evolve in locations with suitable infrastructures and/or make strategic location decisions based on the existence of infrastructures.

As the economies of developed nations become increasingly globally oriented, organizations that operate in or desire to operate in multiple geographic regions encounter the consequences of potentially inadequate power infrastructures in less developed areas into which they seek to expand their operations. These inadequacies manifest themselves at consumer as well as producer levels. Specifically, a producer

of consumer electronics equipment is faced with two separate but significant issues: 1) will the forecasted potential market for their product(s) have the proper electricity infrastructure to actually use their products? and 2) locating a manufacturing facility in the geographical area of the potential market may provide a number of strategic advantages including lower cost labor pool and the logistic advantages of being close to their end-users. Is there an electricity infrastructure in place in that geographic region sufficient to render their manufacturing process feasible and/or cost effective?

In examining another sector of the economy, it is increasingly evident that so-called "new" economy firms, such as on-line and Internet-based businesses operate under significantly different cost structures and constraints with respect to satisfying their power requirements. The consequences of an ever-increasing reliance on abundant, high quality electric power in contemporary commerce and the asymmetries in power infrastructures among various regions have profound implications for these types of organizations seeking to develop or expand the scope of their operations to multi-national or global scale. A rapidly growing portion of global commercial activity as well as global electricity consumption is inextricably linked to such activity.

In this paper, we seek to identify the broad issues confronting organizations as they encounter the asymmetries in power infrastructures that exist between various regions of the world. After a brief discussion of the nature and extent of the power problems facing global organizations, we propose an analytical framework in which to consider alternatives for addressing those problems.

2. The Emerging Power Crisis

Organizational dependence on electricity has shown a pattern of dramatic increases in demand over the past few decades. In addition to the significant increase in total energy demand, there has been a shift in types of energy demanded. For example, electricity consumption accounted for roughly 25% of United States aggregate domestic energy needs in the mid-1970's. By the early 1990's, it had increased to approximately 35%, with the majority of the increased demand attributable to growth in the application of information technologies (Gilbert and Hahn 1996). Estimates project that it will grow to 50% by 2020 (Douglas 2000).

Until the turn of the century, throughout most of the developed world, an adequate supply of electricity could be more or less assumed, and most industries operated and evolved in an environment where periodic interruption of power supplies posed an inconvenience at worst. California's so-called power crisis of the early 21st century seemed to point to a plethora of regulatory as well as technological difficulties inherent in providing adequate total power capacity. However, a growing consensus has emerged that the alleged crisis was in large part an aberration caused by industry de-regulation and suspect business practices rather than real infrastructure inadequacies. Even though the electricity crisis in California may have been artificially induced, there is concrete evidence of a real power crisis: the growing costs organizations experience due to power shortages. According to the

Electronic Power Research Institute (EPRI), power outages and quality disturbances cost the United States economy an estimated $30 billion annually in 1995, and they revised their estimate to $119 billion annually in 2001.

In emerging information-based businesses (the firms that dominate the so-called "new" economy) the global and time sensitive nature of e-commerce requires organizations to have products and/or service available at all times. Downtime, or temporary lack of on-line access is not an acceptable option for several reasons. First, competition is likely to be just a mouse click away, and since there are reduced search costs with on-line access, an existing or potential customer can quickly find a substitute product or service. In this case, the customer or client may be lost permanently. In addition, there are potential legal costs of being unavailable, even if only temporarily. On-line exchanges illustrate this point very clearly. If a customer places an order on-line, and the order processing system becomes unavailable for even a short period of time, the conditions of the exchange may quickly change, leaving a potential liability for the business enabling such transactions. Publicly traded companies that suffer a loss of on-line capabilities may experience a third potential liability: Investors loss of confidence in their organizations.

Consider the preceding scenario(s) in the context of an organization seeking to expand or shift production or customer service facilities to emerging economies to take advantage of lower costs for a high quality labor pool, or to locate production closer to the market for products or services. The South Asian sub-continent provides an excellent illustration, as it can boast having one of the world's most highly skilled and most affordable information technology workforces, and is also one of the largest potential markets in the world for a wide range of goods and services, based on population alone. However, it would be wise to consider the effect of climate on the availability of the technology infrastructure required by this workforce. The United States Agency for International Development (USAID) January 2002 report noted that countries in the sub-continent (e.g. Sri Lanka) experience significant power shortages due to the effect of seasonal droughts on the availability of hydro-electric power. Power outages in major cities of India are frequent. The report further notes that poor power quality, restrictions on power availability, or both, significantly affect virtually all the economies of South Asia (Jayalath and Varadan 2002).

The extent of the disparity between developed and emerging economies with respect to power infrastructures is rather dramatic. According to World Bank estimates, as much as one-third of the world's population lacks access to any power infrastructure (Townsend 2000). At the other end of the spectrum, the power infrastructure (the power grid) in the United States is typically available with over ninety nine percent reliability. Even though this large disparity exists, from a business perspective, the decisions required in either extreme case or at any point in between are equally important. Even a one percent per year lack of reliability can have very costly consequences, so organizations must take action to ensure their power infrastructure is appropriate for their business needs in every location in

which they are operating.

3. Power Requirements of Contemporary Commerce

The increasing reliance on digital information technologies is one of the driving forces behind problems related to power infrastructure asymmetries.   These technologies have a growing role in virtually all types of businesses, although so-called 'new economy' types of organizations are of particular interest.   Digital technologies are integral components in managing business processes and supply chains, and it is reasonable to assert that multi-national organizations are made more efficient, and in some sense made possible, through the use of digital information technologies.

The greater the extent to which an organization relies on a particular technology, the more vulnerable it will be to any disruption in that technology. Therefore, the sensitivity of various kinds of organizations to service disruptions is an issue of special interest. (NIST, 2003) At one end of the spectrum, agricultural and traditional (analog) manufacturing activities tend to be less susceptible to power-related issues, while at the other end, (digital) call centers and on-line information providers are extremely vulnerable. We portray our interpretation of the nature of this relationship in the following figure.
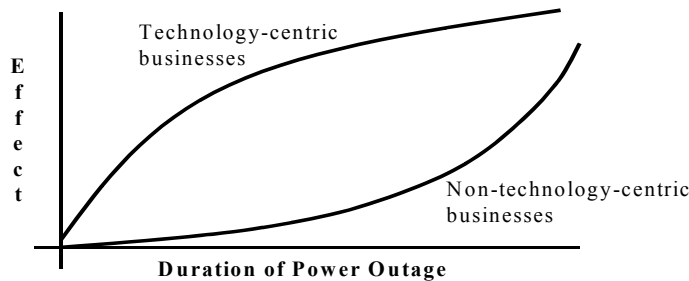

Figure 1*: Sensitivity to Power Infrastructure Problems*

The upper curve suggests the consequences of power disruptions on more technology-centric organizations. The effects are of greater intensity and their onset is more rapid. The lower curve reflects the consequences for less technology-centric organizations. While such organizations will certainly not be immune to effects of power disruptions, they are affected to a lesser extent in the short run, and severe effects are the result of prolonged rather than short-term interruptions.

The dependence of companies on the reliability of technologies, and the

infrastructures that support them varies considerably by company and industry. Even within a company, different business units may exhibit markedly different sensitivity to downtime. For example, IBM has published representative figures ranging from $89,500 per hour of downtime for airline reservations business operations in the transportation industry to $6.5 million per hour of downtime for brokerage operations in the financial industry (IBM 2001).

Contemporary information technology dependent organizations are vulnerable to a variety of potential problems related to power interruptions, and not all interruptions are the same. Some are related to power outages, while others are related to power quality. Modern digital technologies are significantly more sensitive to power quality issues than older analog equipment. The consequences of power problems can include damage to equipment and facilities, the potential loss of inventory, sales, revenues or customers, and in extreme cases (e.g. hospitals) potential loss of life.

In response to the issues raised by potential power availability and power quality problems, organizations have a growing number of alternative technologies. These include, but are not limited to power conditioning & filtration systems, power storage and power generation, and are collectively referred to as micro-power systems. Micro-power systems might include power filtration and battery backup systems, flywheel storage devices, stand-alone (diesel/gas) generators, turbine generators, fuel cells, photovoltaic (solar) systems, and other alternatives (The Economist 2000).

Traditionally, utilities have relied on massive centralized generation facilities, intended to take advantage of their obvious economies of scale while handing off power quality issues to power consumers. Historically, electric power generation research has been from the utility perspective. Hobbs (1995) surveyed optimization approaches for resource planning, commenting that planning and operating modern electric power systems so that consumers receive power reliably at an acceptable economic and environmental cost is very difficult. However, the increasing demands for energy quality and quantity are driving forces behind fundamental changes in consumer markets for power generation and distribution. Emerging alternative systems for power generation are intended to recognize and exploit the more subtle economies of scope, in much the same way that flexible manufacturing systems have challenged traditional assembly lines.

Consequently, utilities as well as consumers of electricity now face a potentially bewildering set of options for ownership of generating and distribution facilities, as well as the need to accommodate differentials in service level requirements. As new alternatives for generation and distribution of power mature into viable market products, an increasingly diverse spectrum of potential users must assess the practicality of including these technologies as part of their overall business plans. It is also important for designers, developers and manufacturers of micro-power technologies to be acquainted with the economics of a new and growing customer base, which will extend far beyond traditional utility service providers. To

give evidence of the growing awareness of the change in perspective from a utility only planning consideration, recent research has incorporated the outage costs of customers as well as the utility in developing electricity generation planning models (Wang and Min 2000).

However, in emerging economies, there are many cases where centralized utilities can not deliver adequate quantity or quality of service, or there may be no power infrastructure at all. Organizations must therefore turn to alternatives such as micro-power and other forms of autonomous power production capability. The next section describes a model that reflects the process by which decisions to pursue alternative power sources may be evaluated.

4. A Model for Evaluating Micro Power Alternatives

We propose to evaluate alternative power technologies via use of a 0-1 Integer Program, which describes the purchase and use of various electricity provision options based on trade-offs that exist with respect to the quality and availability of power. The objective of the model is to select the electricity provision options that minimize the overall cost to the organization. If an organization is not very sensitive to power outages or periods of reduced power quality, the model will likely prescribe not purchasing any of the available electricity provision options. On the other hand, if an organization places a high value on the availability of high quality power, various electricity provision options will likely be prescribed. The notation used in our model is presented in Table 1 below.

Table 1. *Micro-Power Alternative Model Variables*

Variable	Description
I	Set of electricity provision options.
J	Set of possible events. Includes events such as low power quality for a duration of time, power outage for a duration of time
y_i, $i=1,..,I$	Decision variable $y_i =1$ if electricity provision option i is purchased, 0 otherwise.
f_i, $i=1,..,I$	Fixed cost for purchasing electricity provision option I
x_{ij}, $i=1,..,I$, $j=1,..,J$	Decision variable $x_{ij} =1$ if electricity provision option i is used to protect the organization for an event j, 0 otherwise
c_{ij}, $i=1,..,I$, $j=1,..,J$	Variable cost of using electricity provision option i to protect the organization for each time an event j occurs.
p_j, $j=1,..,J$	The penalty, or cost incurred to the organization if event j occurs and an electricity provision option is not available to protect the organization.

$a_j, j=1,..,J$	The number of times that event j is expected to occur during the planning period.
$q_j, j=1,..,J$	An indicator variable used to specify if event j has not been covered by any electricity provision option. $q_j=1$ if event j has not been covered, 0 otherwise.
$S_j, j=1,..,J$	The set of all electricity provision options that will cover an event j.

The decision to purchase and use an electricity provision option is dependent on several factors. The first factor is the number of times that disruptive events are expected to occur. This will vary for different organizations based on their location and the electric utility infrastructure in their location. The more reliable the power grid, the less frequently various types of power disruptions should occur.

The second factor influencing the decision is the associated cost of disruptions. This will depend on the type of business that the organization is involved in. Although some recent literature has associated specific dollar amounts with different types of disruptions in different industries, this value is likely to be difficult to generalize, and many organizations will have to determine how much different disruptions cost them. We incorporate these variances as inputs into the model as shown below in Figure 2.

Figure 2. *Micro-Power Alternative Model & Constraint Formulation*

$$\text{Min} \quad \sum_{i\in I} f_i y_i + \sum_{j\in J} a_j \sum_{i\in I} c_{ij} x_{ij} + \sum_{j\in J} q_j a_j p_j \qquad (1)$$

$$\text{s.t.} \quad x_{ij} \leq y_i \qquad\qquad \forall i \in I, \forall j \in J \quad (2)$$

$$q_j + \sum_{i\in S_j} x_{ij} \geq 1 \qquad\qquad \forall j \in J \quad (3)$$

$$y_i \in \{0,1\} \qquad\qquad \forall i \in I \quad (4)$$

$$x_{ij} \in \{0,1\} \qquad\qquad \forall i \in I, \forall j \in J \quad (5)$$

$$q_j \in \{0,1\} \qquad\qquad \forall j \in J \quad (6)$$

The objective function of the electricity provision model (1) is to minimize the aggregate cost of insuring reliable electricity. The cost components include the fixed and variable costs of using electricity provision options as well as the cost associated with the risk of not being protected.   These options may include autonomous generation of power and filtering of 'unclean' power from utilities or autonomous sources as required. Constraints (2) require electricity provision option i to be purchased if it is used to protect the organization from any event j. Constraints (3) force the variable that indicates if an event is not covered to be 1 if no electricity provision option that protects the organization from that type of event is used. Constraints (4), (5), and (6) restrict the model variables to values of 0 or 1.

5. Practical Implications
The model described in the preceding section has been tested in several representative cases. The examples that follow are not intended to be exhaustive or all-inclusive, but serve to demonstrate the model's application in supporting managerial decision-making.

Our example considers four categories of events, along with three different company profiles and two scenarios of frequency in which these events are likely to occur, within a given planning period. This last characteristic is location dependent and illustrates that the model parameters will vary in different contexts.

This information is presented in Table 2 as follows.

Table 2. *Event descriptions, company profiles and scenario frequency parameters.*

		Company 1	Company 2	Company 3	Scenario 1	Scenario 2
Event	Event Description	Cost if not Covered	Cost if not Covered	Cost if not Covered	Frequency	Frequency
1	2 Second Interruption	$300,000	$1,375	$12.50	250	25
2	Less than 1 hour Interruption	$1,200,000	$5,500	$50.00	60	6
3	Less than 1 Day Interruption	$28,800,000	$66,000	$600.00	60	3
4	3 Day Interruption	$86,400,000	$198,000	$1,800.00	1	0

In our examples, company one is assumed to be highly dependent on abundant power sources. It requires 3,000 Kilowatt Hours (KWH) of electricity to support operations on a 24-hour per day basis. This might be typical of a large data center or integrated manufacturing facility. At the other end of the spectrum, company three is

a low volume consumer with less sensitivity to power disruptions (e.g. dry goods warehousing), requiring 10 KWH for a 12-hour per day period. Company two is a moderate volume consumer. Note: the power volumes are based on commercial rate classifications, circa 2000, for a major North American electric utility. Estimates for outage related costs are based on the literature as described in sections two and three.

The next table identifies a set of electricity provision options with their associated characteristics of fixed costs, variable costs and list of events that each option covers. Costs for each option are expressed is US dollars and are representative of commercially available products at the time of writing. It is important to note that the fixed costs are much greater for company 1 than for company 2, since company 1 has a much larger volume of electricity usage. Specifically, since company 1 requires 12 times the amount of electricity that company 2 does, their costs for each option is estimated at 12 times the amount of that for company 2. Parameter values used for micro power alternatives are presented in Table 3 below.

Table 3. *Parameter values used for micro power alternatives.*

Options	Company 1 Fixed Cost	Company 2 Fixed Cost	Company 3 Fixed Cost	Variable Cost per Kilowatt Hour	Covers Events
Battery System/UPS	$ 1,200,000	$ 100,000	$ 4,000	0	1,2
Flywheel	$ 10,000,000	$ 833,333	$ 33,333	0	1,2,3
Diesel Engine	$ 1,200,000	$ 100,000	$ 4,000	0.01	3,4
Microturbine	$ 2,400,000	$ 200,000	$ 8,000	0.01	1,2,3,4

Table 4 illustrates the solutions for the four different combinations of two companies and two scenarios:

Table 4. *Model solutions for given company profiles and scenarios.*

Options	Company 1 Scenario 1	Company 1 Scenario 2	Company 2 Scenario 1	Company 2 Scenario 2	Company 3 Scenario 1	Company 3 Scenario 2
Battery System/UPS	1	1	1	0	1	0
Flywheel	0	0	0	0	0	0
Diesel Engine	1	1	1	1	1	0
Microturbine	0	0	0	0	0	0

Interestingly, all three companies have the same prescribed solution in scenario 1,

where there is a very high frequency of outages of all types. This is an artifact of only including a limited set of options, and the need to cover all events due to the combination of their frequency and cost to the respective companies. The second scenario, which results in different prescribed outcomes for all three companies, demonstrates the utility of the model. Company 1 has the same prescribed set of solutions as they had for scenario 1. Due to their high cost of unavailability, even the costs resulting from less frequent interruptions justify the investment in full coverage of all events. In contrast, the solution for company 3 under scenario 2 is to not purchase any electricity provision options - it simply is not justified by the costs they incur due to unavailability.

Generalizing, we arrive at the following conclusions of interest. First, and with few exceptions, organizations have an easily shown economic preference to opt for quality improvement technologies (e.g. power filtration) and storage systems such as uninterruptable power supplies (UPS) to accommodate momentary fluctuations and brief power outages. Also, organizations with higher total demands for power may opt for autonomous power generating capability as a function of the anticipated frequency of severe outages (those lasting several hours or more).

Power quality and short-term power disruptions are growing problems on a global scale. For organizations wishing to expand into emerging economies, location decisions must carefully reflect power infrastructures. In many instances, in order to overcome deficits of local power infrastructures, organizations will have to generate their own power, and each scenario offers a potentially different solution.

6. Conclusion

Reliance on abundant, high quality electric power in contemporary commerce and the asymmetries in power infrastructures among various regions have profound implications for organizations seeking to develop or expand the scope of their operations to multi-national or global scale. The gap between more developed economies that enjoy access to relatively abundant and generally reliable supplies of electric power and less developed economies that do not have implications that can not be ignored. As developing economies become globally oriented as well as evolving into service-based, post-industrial forms, they will encounter the consequences of potentially inadequate power infrastructures, as will organizations seeking to expand their operations into these economies.

In situations where centralized power utilities are non-existent, or can not deliver adequate quantity or quality of service, organizations will turn to alternatives such as micro-power and other forms of autonomous power production capability. The costs of these additional requirements will certainly affect an organization's decision to locate in a specific region, or within specific areas of a given region, as the additional costs may outweigh the benefits presented by the given location.

This paper has briefly described some of the key dimensions of this problem, as well as offering a framework that can be used to evaluate decisions to acquire technologies to address global asymmetries in power infrastructures.

References

Douglas, J. (2000) Power for a Digital Society, *EPRI Journal*, Winter.

Gilbert, R.J. and Kahn, E.P.. (1996) Competition and Institutional Change in U.S. Electric Power Regulation. Chapter 5 in International Comparisons of Electricity Regulation, R.J. Gilbert and E.P. Kahn, Editors. Cambridge University Press, New York, NY.

Hobbs, B.F. (1995), Optimization Methods for Electric Utility Resource Planning. European Journal of Operational Research V83, p1-20.

IBM. (2001) IBM Global Services - Cost of Downtime. Available on the Internet at "http://www-1.ibm.com/services/its/us/highavailcost.html" viewed on January 29, 2001.

Jayalath, M.S. and Varadan, S. (2002) Assessment of Economic Impact of Poor Power Quality on Industry: Sri Lanka, Prepared for USAID-South Asia Regional Initiative/Energy (Sari/ Energy) Program, January. (www.sari-energy.org).

Lash, N.A., (2002), Thailand's Growth and Development: A Historical Perspective, in *Asymmetries in Financial Globalization*, in B. Batavia, N.A. Lash and A.G. Malliaris, ed. Athenian Policy Forum Press, 179-195.

NIST (National Institute of Standards and Technology) (2003) Advanced Technology Program White Paper Report: *PREMIUM POWER*. NIST, Gaithersberg, MD. Available at URL: http://www.atp.nist.gov/atp/97wp-ppr.htm, last updated: April 22, 2003, viewed on May 22, 2003.

The Economist. (2000), The Dawn of Micropower, August 5, pp. 75-77

Townsend, A. (2000), Energy Access, Energy Demand, and the Information Deficit. Chapter 2 in Energy Services for the World's Poor, The Energy and Development Report 2000 The World Bank. Available at URL: http://www.worldbank.org/html/fpd/esmap/energy_report2000/index.htm

Wang, C-H. and Min, K.J.. (2000), Generation Planning with Quantified Outage Costs. *Electric power Systems Research* V54 2000 p37-46.

Obscene and Indecent Material on the Internet: Case of Oman

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Abstract. The regulation of indecent (sexually explicit) material on the Internet is one of the more controversial topics facing lawmakers and technology providers around the globe. There have been many attempts to prevent the availability of such material on the Internet. The attempts to limit the availability of indecent materials on the Internet include Internet blocking/filtering, legislation, and Internet rating systems. This paper examines Internet use in Oman and restrictions applied for indecent materials on the Internet in Oman. The findings reveal a variety of opinions and practices in the Omani population, regarding this issue.

1. Introduction

The Internet is a global decentralized network connecting millions of computers. Each Internet computer, called a host, is an independent node that uses a common network layer protocol. The host operators can choose which Internet services to use and which local services to make available to the global Internet community. The only requirement is that each host has a unique Internet Protocol (IP) address that is within a globally recognizable subnet.

The Internet has experienced extraordinary growth in recent years. However, determining the number of its users is an inexact science. The worldwide Internet population, which changes and grows continuously, has to be compiled from a number of different sources. One compilation of existing surveys, published by Nua.com, estimates that the Global Internet Audience had grown to 606 million users as of September 2002. The same source shows that, from 1997 to 2002, the number of users increased 603% globally. The data shows that Latin America, Asia/Pacific, and the Middle East represent the areas of most dramatic growth. For example, while the number of the Internet users has increased 2.85 times in the US

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and Canada during the past 5 years, the Internet population in the Middle East has grown 12.8 times for the same time period.

Today, the Internet contains information on every topic imaginable. This information on the Internet also includes material that is considered by some to be obscene and indecent. Indecent material on the Internet consists of patently offensive descriptions or depictions of sexual or excretory organs or activities. Indecent material is available in different formats on Internet, such as short animated movies, sound files and stories.

The spectacular growth in availability of sexually explicit material on the Internet has stirred up attempts by legislators, families, and communities to control the publication of indecent material on the Internet. The regulation of indecent material on the Internet is one of the most controversial topics and it has been covered in a large number of studies, some of which include [1], [2,] [3], and [4]. The attempts to regulate these materials were based on the following concerns: cultural/moral concerns that view these materials as indecent, potentially harmful content such as pornography, and illegal content such as child pornography.

This paper examines Internet use in Oman and restrictions applied for sexually explicit materials on the Internet in Oman. First, a brief overview is presented of the actions taken in the USA to prevent sexually explicit materials on the Internet. Next, the use and regulation of the Internet in Oman is presented, as well as the survey results providing information about Internet users in this country. Finally, a conclusion is given on these issues.

2. Overview of the Approaches in the USA

There have been many attempts to prevent the availability of indecent material on the Internet by the concerned families/communities and lawmakers. In many ways, these concerns have been around ever since sexually explicit materials were available on various media. The attempts to limit the availability of indecent materials on the Internet include Internet blocking/filtering, legislation and Internet rating systems.

Internet blocking/filtering is a technological response to this issue. Various Internet blocking/filtering software programs were developed to enable concerned individuals to block the sites that contain indecent material. These software packages provide services that block sites containing words considered to be indecent. They also allow the users to block sites individually. Some of these software programs include Surf Watch, Net Nanny, Cyber Sitter, Cyber Patrol, and Kinder Guard. These products have marketed themselves as a convenient means to keep children away from the sexually explicit materials.

Due to their limitations, filtering software products are only partially effective at best. Blocking on the Internet is not a trivial issue, and most filtering software products fail to block all undesired sites. In addition, it is often easy, even for a non-expert user, to disable the filtering technology. For example, organizations like Peacefire present instructions and offer free downloads to disable the filtering

system. Another concern about the filtering system is that these programs may block the sites that do not contain indecent material. Studies have shown that the software used to block pornography using certain strings like "sex" also blocks Web sites dealing with health issues [5]. As a result, many fear that the filtering results in indirect censorship of the Internet [6].

The US Government attempted to limit the availability of indecent material on the Internet. Congress approved the Communications Decency Act (CDA) of 1996 to prevent indecent material from being sent to minors. The provisions of the law were so broad that the Supreme Court declared the law unconstitutional and in violation of the First Amendment right to free speech. In a second attempt, Congress passed the Child Obscenity Protection Act (COPA) of 1998 to prevent minors from obtaining harmful material. The court also has also struck down this law because of its overly broad language. Detailed information on these two major pieces of legislations can be found in references [7], [8], and [9].

The World Wide Web Consortium (W3C) developed a rating system known as PICS - Platform for Internet Content Selection [10]. The content provider or third parties can develop the content rating labels for web sites by using PICS. A web filter is used to block sites based on these rating labels. This approach aims to protect children from potentially harmful material while protecting free speech on the Internet, especially if the content provider has developed the rating of the web site. The PICS system has the greatest potential to address the issues involved in Internet content regulation. The problem with the rating systems is that it leaves the possibility that some sites are not going to be rated. Presently, a very small percentage of sites are believed to be rated [1].

3. Case of Oman: Use and Regulation of the Internet Use

Oman is an Arabic country located in the southeastern part of the Arabian Peninsula with a total estimated population of 2.402 million [11]. Telecommunication is an industry that is still expanding with 235,307 fixed telephones, 192,145 subscribers to mobile phones (GSM), and 130,849 subscribers to prepaid mobile phones in 2002. Internet service was launched in 1997. OmanTel is the sole Internet Service Provider (ISP) in Oman. It is a government owned company that provides all telecommunication services in Oman.

There are about 43,326 Internet subscribers with an estimated 120,000 users in Oman. The average daily time spent by a subscriber is one hour and 14 minutes [12]. Approximately 94% of all subscriptions are individuals, 4.8% are business and 0.6% of the subscribers are governmental agencies (including Sultan Qaboos University, the state university of Oman).

Since the introduction of Internet services in Oman, the company has adopted a restriction policy on visiting web sites containing sexually explicit materials. This decision stemmed from the general code of ethics drawn by Islam. OmanTel rules reads as follows:

"Any abuse and misuse of the Internet Services through e-mail or

news or by any other means, as for example, posting or soliciting obscene materials, hacking or trying to hack, shall result in the termination of the subscription and may result in the proceedings of Criminal or Civil lawsuits against the Customer. OmanTel shall also be entitled to disconnect the service to the Customer with or without notice." [11]

The OmanTel controls the national system using filtering software (Websence software) to identify common words used by web sites containing sexually explicit materials. In addition, OmanTel has installed a firewall (provided by Cisco) in order to block the access to proxy breaker sites (which can be used to circumvent the filtering software) that are outside its authority. This firewall identifies such proxies and blocks the sites leading to sites with pornography.

Subscriber organizations that serve a sizeable number of users, such as Sultan Qaboos University and various Internet Cafés, supplement these OmanTel efforts by imposing further restrictions on the users of their networks. The Sultan Qaboos University uses their own proxy firewalls to restrict its community from accessing web sites with indecent materials. Furthermore, the university has a dedicated staff to monitor and identify users who breach the system [12]. Although OmanTel itself has not taken any action against any user for attempting to violate the restriction policy, there are instances where Sultan Qaboos University has stopped the service for the offenders. The university has made it somewhat embarrassing for the users to re-establish their Internet connection by having them visit a staff member at the computer center and go through a discussion of the offence. The fact that the users do not want to lose their privileges to use the Internet, combined with the social embarrassment, helped reduce the number of users attempting to breach the system. This is supported by the survey results showing that 23.6% of the survey respondents visited sites containing sexually explicit materials directly through OmanTel, while this percentage drops down to 10.4% of respondents using the SQU system.

According to the Internet department at OmanTel, there are 90 Internet cafés in Oman. There are stiff regulations for operation of these cafés [13]. These regulations require that the cafés provide their services in open spaces so that each user's workstation will be fully visible. In addition, the Internet users in the cafés must present their IDs and the cafés must keep logging data for each of the users for up to three months.

4. Case of Oman: Survey

A survey was designed to gather information about the web users and their opinions on the OmanTel regulation limiting their access to sexually explicit materials on the Internet in Oman. This survey was distributed among the Omani population at various public spaces (e.g. university, libraries, shopping malls) using volunteers at the booths specially set for this purpose. The respondents filled out the surveys at these booths, and returned them to the volunteers in full confidentiality. In total,

there were 451 respondents. Among all respondents, there were 279 males and 172 females.   A breakdown of employment status shows that 58.8 percent of the respondents are full-time students, 37.5 percent are employed, and 3.5 are unemployed. Information about the respondents by age, gender and experience is given in Tables 1, 2 and 3.

Table 1. *Internet Users by Age and Gender*

Age Group	Gender		Total	Percentage
	Male	Female		
Under 18	12	10	22	4.9%
18 - 23	160	119	279	61.2%
24 - 30	61	25	86	19.1%
31 - 40	36	17	53	11.8%
Over 40	6	1	7	1.6%
Blank (Unknown)	4	0	4	0.9%
Total (Number)	279	172	451	
Total (Percent)	61.9%	38.1%		

Table 2. *Internet Users by Experience and Gender*

Experience (Years)	Gender		Total	Percentage
	Male	Female		
Less than 1	51	34	85	18.8%
1 – 2	85	59	144	31.9%
3 – 4	91	51	142	31.5%
5 – 6	33	18	51	11.3%
More than 6	15	6	21	4.7%
Blank (Unknown)	4	4	8	1.8%
Total	279	172	451	

Table 3. *Internet Users by Age and Experience in Years*

Age	Internet Experience						Total
	Less than 1	1 - 2	3 - 4	5 - 6	6 +	Unknown	
Under 18	8	6	4	4	1	0	22
18 - 23	58	109	87	10	8	4	279
24 - 30	13	16	29	20	5	2	86
31 - 40	4	10	20	12	5	2	53
Over 40	1	1	1	2	2	0	7
Blank (Unknown)	1	2	1	0	0	0	4
Total	85	144	142	51	21	8	451

The survey shows that 80.3% of the users are between 18 to 30 years old (Table 1) and 63.4% of the users have an Internet experience of 1 to 4 years (Table 2). These proportions are approximately the same for both genders. More than half (53.4%) of the users are between the ages of 18 to 30 years with 1 to 4 years of Internet experience (Table 3).

Tables 4 and 5 represents the number of respondents visiting web sites containing sexually explicit materials. The results are presented by age and gender in Table 4, and by experience in Table 5.

These results show that 29% of all the respondents visited web sites containing sexually explicit material. The great majority of visitors to sex sites are males. Approximately 44% of the male respondents visited sex sites while this proportion for the female respondents is 5.5%. 86.2% of the visitors to sex sites are between the ages of 18 and 30 years (Table 4). Almost 81% of those who have visited sex sites are males between the ages of 18 and 30 years. Within this age bracket, in Oman most of the users get introduced to the Internet through their higher education institutions. Also, in this age bracket, most Omanis are either single or just got married. It is common that once they start having families, they become more protective.

61.8% of the visitors to sex sites have Internet experience of 1 to 4 years (Table 5). Of all male visitors, 60.9% have Internet experience of 1-4 years, while this percentage increases for female visitors to 77.8%. Note, however, that a small percentage (5.5%) of the female respondents have visited the sex sites.

Table 4. *Visitors to sex sites by age and gender*

Age Group	Gender		Total	Percentage
	Male	**Female**		
Under 18	6	0	6	4.6%
18 - 23	80	7	87	66.4%
24 - 30	26	0	26	19.8%
31 - 40	9	2	11	8.4%
Over 40	0	0	0	0.0%
Blank (Unknown)	1	0	1	0.8%
Total	122	9	131	

Table 5. *Visitors to sex sites by Internet experience*

Internet Experience	Gender		Total	Percentage
	Male	**Female**		
Less then 1	22	1	23	17.6%
1 - 2	36	1	37	28.2%
3 - 4	38	6	44	33.6%
5 - 6	17	0	17	13.0%
More than 6	8	1	9	6.9%
Blank (Unknown)	1	0	1	0.8%
Total	122	9	131	

One of the questions asked in the survey was about the users' opinion on the restriction applied on Internet in Oman. Tables 6 and 7 provide the information about this question.

As shown in Table 6, about 76% of the respondents have agreed with OmanTel's policy to restrict Internet users from accessing sex sites. Only 14.6% have expressed their opposition to the policy. These percentages change between those who have visited the sex sites and those who have not. While 85% of the

Table 6. *Opinion about Internet Restriction*

Opinion	Under 18	18 - 23	24 - 30	31 - 40	Over 40	Unknown	Total
							Age
Strongly Agree	10	161	58	42	5	3	279
Agree	2	44	9	5	1	0	61
Neutral	4	25	9	4	0	0	42
Disagree	3	17	5	2	1	0	28
Strongly Disagree	3	29	5	0	0	1	38
Blank (Unknown)	0	3	0	0	0	0	3
Total	22	279	86	53	7	4	451

Table 7. *Opinion about Internet Restriction*

Opinion	Yes	Percentage	No	Percentage	Unknown	Total	Percentage
	Have Visited Sex Sites						
Strongly agree	47	16.9%	231	83.1%	1	279	61.9%
Agree	21	35.0%	39	65.0%	1	61	13.5%
Neutral	21	50.0%	21	50.0%	0	42	9.3%
Disagree	17	60.7%	11	39.7%	0	28	6.2%
Strongly Disagree	24	63.2%	14	36.8%	0	38	8.4%
Unknown	2	66.7%	1	33.3%	0	3	0.67%
Total	132		317		2	451	100%

respondents who have not visited the sex sites have agreed with the restriction policy, this percentage is about 52% for those who have visited the sex sites. As expected, those who have not visited the sex sites are more in agreement with the

restriction policy. Only 14.6% have expressed their opposition to the policy. Of those who disagreed with the restriction policy, about 70% are between the ages of 18-23 years. Among those who visited sex sites, 52.3% have agreed with the restriction, and 31.6% have disagreed with the restriction. Of those (41 respondents) who visited sex sites and disagreed with the policy, 90% are between the ages of 18-30 years. Of those respondents who have not visited sex sites and yet disagreed with the restriction policy, 80.7% are between the ages of 18-30 years.

5. Conclusion

The regulation of indecent material on the Internet is one of the more controversial issues facing today's societies. There is no agreed-upon definition of indecent material in the global environment of Internet. It is difficult to have a universally acceptable characterization of the indecent material because of the legal, cultural, and moral differences all around the world. In addition, different countries and cultures have different mentalities and sensibilities regarding eradicating free expression or hindering free thought. As a result, there appears to be no single universal solution to limit the availability of indecent material on the Internet.

The issue of Internet regulation in the international scene will be likely to generate more important debate, as more of the users across the globe gain access to the Internet. The state's problem stems from two conflicting goals of protecting the rights of its citizens and the right of freedom of expression. As a result, various approaches are currently being used in different countries. Some countries such as Pakistan and Saudi Arabia deny access to whole sections of their populations in order to control the Internet within their constituencies. Other countries such as China, Singapore, and Vietnam require Internet Service Providers (ISPs) to register political and religious content of their offerings with the state officers [6]. The case of Oman, presented here, illustrates how this country is coping with this issue, and what its citizen-users think of the policies and methods put in place for this purpose.

It is not technically feasible for a single government to dominate the Internet since there is no centralized-storage location. As a result of technological and social asymmetries, different governments will continue to use different approaches depending on their legal, cultural, and moral standards. On the individual level, in most cases, it appears that the most feasible option is for the parents not to rely solely on the governmental regulations and available technical safeguards, but to also take the personal responsibility regarding Internet-based indecent material by having an open dialogue with their children. As was illustrated by our survey, even in an environment that is shielded by a comprehensive combination of legal and technical instruments, a substantial number of users (many of whom are relative novices) are able to get to the sites beyond the restrictions.

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References

Westfall, Joseph. Cybersmut, Business and Society Review (1974), Spring 1999 – Supplement, Vol. 104, pp 89-95.

Fisher, W. and Barak, A. Internet Pornography: A Social Psychological Perspective on Internet Sexuality, Journal of Sex Research, November 2001, Vol. 38, Issue 4, pp. 312-323

Griffiths, M. Sex on the Internet: Observations and Limitations for Internet Sex Addiction, Journal of Sex Research, November 2001, Vol. 38, Issue 4.

Krause, J. Can Anyone Stop Internet Porn? ABA Journal, September 2002, Vol. 88, Issue 9, pp. 56-61.

Minkel, W. Filter Block Needed Health Facts, School Library Journal, Jan 2003, Vol. 49, Issue 1, p 18.

Alvarez, H., Gentile, M., Ranade, S., and Zweifel, C. Internet Censorship, working paper available at http://www.cs.virginia.edu/~jones/tmp352/projects98/group15/html/resources.html

Akdeniz, Y. Symposium: Cyber Rights, Protection, and Markets: Article Governing Pornography and Child Pornography on the Internet: The UK Approach. The University of West Los Angeles (UWLA) Law Review 247, 2001.

Fuertes, R. A. C. Letting the Monster Out of the Closet: An Analysis of Internet Indecency Regulation, Revista Juridica Universidad de Puerto Rico 129, 2001.

Alexander, M. C. The First Amendment and Problems of Political Viability: The Case of Internet Pornography, Harvard Journal of Law and Public Policy, Vol. 25, pp. 977-1030.

Information on World Wide Web Consortium and PICS standards http://www.w3.org/PICS.

Information on OmanTel www.omantel.net.om/care/internet/bannar.htm and www.omantel.net.om/rules

Nasir Al-Riyami, Center for Information System, Sultan Qaboos University, April 20, 2002.

Application Rules of Internet Café. Department of Internet, OmanTel.

Pension Capitalism and Issues of Governance Post Enron: Prospects for Fundamental Reform

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Abstract. The advent of full blown Pension Capitalism has raised issues of governance and accountability which, until very recently, remained of peripheral interest to economists and public policy makers. Then came the collapse and bankruptcy of several mega national and international American corporations mostly in the telecommunications industry. The most dramatic featured the Enron Corporation, the largest bankruptcy in the history of the USA, which resulted in the loss of pension savings and investments of thousands of employees. It suddenly made reform of corporate governance the central concern of public policy makers and financial market regulators during 2002.This paper assesses the prospects for fundamental reform in the USA and elsewhere.

The Emergence of Pension Capitalism

The rise of the "Employee or Wage-earning Society" has witnessed the phenomenal growth, concomitantly, of funded pension schemes, the virtues of which have become part of the conventional wisdom of finance theory, both public and private. To governments, the particular merit of funded pension schemes is that they relieve the public treasury and inferentially the taxpayers, of the burden of paying retirement pensions. In relation to the private sector, pension fund contributions can be channelled into the securities markets to provide savings for the financing of capital investment. Certainly in the United Kingdom (the UK), the USA and Canada (prominent members of the so-called Anglo-American Economies), private pension assets have attained prodigious size and importance, surpassing all other forms of private savings. To illustrate, in the USA in 1950 households owned 91 per cent of all equities, but by 1994 that figure had fallen to 48 per cent. On the other hand, whereas public and private pension funds owned less than 1 per cent of all equities in 1950, by 1994 they owned more than 25 per cent. Combining pension funds with other investors and players (mutual funds, banks and near banks, insurance companies and public and private endowments), these institutional investors control about 45 per cent of all equities. Even more noteworthy is the fact that pensions funds and institutional investors control the majority of stock (variously 56 - 60 per cent) of the largest 1000 US corporations. Similar patterns have been noted for Canada and the UK. In Canada in the mid 1990's, the financial assets of institutional investors collectively represented 35 per cent of total equity, with mutual and pension funds accounting for 25 per cent of that amount.

It is now clear that in the industrially advanced countries, employees and their

pension funds are now the only source of the enormous amount of capital needed for investment purposes not only nationally but also internationally. In the latter case, the largest 25 pension funds in the USA (those with assets over one billion dollars), account for 42 per cent of foreign equity held by all U.S investors. Of the several factors which have contributed to the rather phenomenal growth of pension assets and their institutional impact on capital and financial services markets, labour market considerations feature prominently. Other factors which may be mentioned are governmental fiscal crises and resource limitations and the ideological siege and retreat of, the modern welfare state as well as the new trading and economic environment encapsulated by the term "globalization".

Pension Capitalism and Issues of Governance
Impact of Globalization
When the expansion of funded pension schemes was being strongly advocated during the 1970's, proponents, more so in the USA, Canada, and the UK, it was argued that the build up of contributions would, among other things, provide long term finance in the capital markets for the growth and development of businesses and reverse the trend to de-industrialization or reduction in employment due to rationalization of operations. This expectation that relatively cheap long-term finance would foster productive investment has proven illusory. The huge flow and reservoir of pension contributions which are used to buy securities have provided a cheaper source of financing than the banking system and both governments and companies have replaced short term borrowing from banks by issuing short term bills or paper. The end result of this process, (exploration of which would take us outside the limits of this paper), has been to discourage fixed capital productive investment. The reason is that while fixed assets are specific to industrial processes and facilities, funds raised in the securities market can be rolled over more quickly.

The mobility of capital also has been greatly enhanced by electronic information devices which transcend spatial distance, time zones and national borders and the real economy of goods and services - the materials based economy now being referred to as the "old economy" and the "symbol" or paper economy of money appear to have been diverging and operating more independently of each other, rather than being tightly bound together, in theory and practice, as they were in the past. The increased mobility of capital also has given impetus to a new international division of labour and shared production, now popularly referred to as "globalization". Capital flows and foreign direct investment in particular, can now respond rapidly to new profit opportunities by shifting production to places where wages are low, relative to potential productivity. Thus, in effect, national economies have become production stations for trans-national corporations and trans-national confederations.

Globalization and Impact on Labour Markets.
Employment Trends and their Implications

If there is one consequence, which has become characteristic of globalization of production or shared production and enhanced mobility of capital, it is the so-called restructuring of economies and of business and governmental units.

The combination of increased competitiveness and increased mobility of investment capital, undoubtedly have served to exert strong pressures on employers to lower costs but the cost reductions ends up being directed at variable costs, the most important of which is labour. Hence the cry on the part of employers for less costly separation benefits as they focus on core operations or leaner organizational structures and downsizing. The rapid introduction of technology encompassing product technology, equipment technology and process technology, also has fuelled management demand for "flexibility" to alter either output and/or work processes associated with existing production. To cope with short and medium term fluctuations in demand, suppliers want to hire people who will work variable hours on demand.

Flexibility is often achieved not only by reducing the number of permanent full-time workers to a minimum, but by making the regular hours of work more variable or increasing reliance on people whose work can be changed easily, namely, temporary workers, part-time workers and so-called self-employed contractors including home workers who by definition usually do not participate in private pension and benefit plans. Everywhere, the once standard 8-hour-day, five-day workweek is increasingly being pushed to the margin and there is constant ratcheting effect as enterprises and individuals operating on non-standard hours demand goods and services from those who have not yet made the shift.

It is ironic that while employees through their pension funds have become the new owners of capitalist enterprises, they have been bearing the brunt of globalization.

It is not surprising, therefore, to find that income inequities and amelioration of poverty have emerged as central concerns in reports on Labour Market Reforms recently released by international developments and national governments.

Employment and Income Insecurity

In 1976 leading management theorist Peter Drucker opined[1] that pension funds presaged the era of pension fund socialism. Yet two decades later American labour leaders were lamenting " The dilemma facing workers is that their own pension funds, as owners of almost one-third of all US financial capital, are behind the scene fuelling these activities. (Spiral of corporate mergers and downsizing). They finance overseas plants. They agree to outrageous pay packages for corporate management that have shown only mediocre performance. They reward the slash and burn practices of customers that serve up quarterly to shareholders. They finance mergers and acquisitions in the name of retirement security. They ignore investments in job-creating ventures, instead preferring to finance leveraged buyouts that mean further

layoffs."[5] Accordingly, the unions had to develop strategies to take back their money in support of long term, quality jobs in local communities. They appear to have made little progress. Indeed, a recent reviewer has suggested that far from presaging the advent of pension socialism, the phenomenon of employee pension funds ownership of business enterprises represents a further evolution of capitalism rather than a break with the past. "Pension Funds depend upon the performance of national and international markets for their accumulated wealth. Their assets are the product of the employment relation and agency relationships with the investment management industry. The concentration of financial assets in pension funds, coupled with the facts that trustees and their advisers have considerable autonomy from plan beneficiaries, is analogous to the separation of ownership from control characteristic of modern corporations."[2]

Further, in Anglo-American economies, company sponsored plans are precluded from holding a large portion of stock in their sponsoring company. Similarly, individual pension funds would not normally such large holdings as to be able to directly control corporate managers disposition of company resources. It appears then, that a mutually interdependent or symbiotic relationship exists between owners/trustees of pension funds and corporate managers who are utilizing these resources. Indeed, owners now have the compound agency problem of getting fund managers (agents) to act in their best interest by getting corporate managers (agents) to act also in their best interests. In other words, can agents watch agents or who will monitor the monitors?

. Whereas mutual funds are controlled by fund managers, workers/employees as institutional investors have little direct control over the financial resources they invest in pension funds. They are more vulnerable than investors in mutual funds (pooled financial resources) in that while these funds are controlled by fund managers, exit from pension schemes is costly, if not impossible, for workers. What is more, workers as institutional investors/owners can find little consolation in the fact that they have become exposed to a double jeopardy - one the one hand to loss of retirement savings arising from corporate failures and the vagaries of financial markets and the other to loss of jobs and employment income as cutbacks in the work force becomes the preferred technique for dealing with short term variations in profits and earnings.

In the context of pension capitalism, it has been argued that management generally, can no longer claim legitimacy on the traditional capitalist grounds of ownership, and it is because employee-owners have not yet been able ownership rights-either through Boards of Directors or other participatory mechanisms- that professional managers have been able to lay claim to compensation levels which have led to a significant widening of the gap between those at the top and those at the beginning of the organizational hierarchy.

It has been one of the truisms of economic theory, that increases in real output (productivity) are the source of economic growth and development and of higher standards of living for workers to the extent that wages bear some relationship to

productivity. However, a study also undertaken in 1995, by the Conference Board of Canada an influential independent but business-oriented research body reported that structural changes in the economy were severing the link between profits, productivity and income growth. This was reflected in the fact that while unionized and non-unionized employees could anticipate wage increases in line with the rate of inflation, managerial compensation was increasing by leaps and bounds

A major contributory factor is that companies have been able to move production to, or import labour from, low wage countries, thereby putting downward pressure on wages. Another has been that faced with alternate strategies for growth of either taking a bigger share of the market from competitors or cutting costs, management tends to opt for the easier of the two – cutting labour costs.

In spite, therefore, of the evolution of industrial capitalist society into an employee (or peoples capitalist) society, institutionalizing the economic interest of employees has proved to be a much more difficult proposition. Part of the explanation may lay in the fact the issue of governance of mutual and pension funds have not been properly addressed and until this is done, the issue of voice representation at the corporate level likewise cannot be dealt with more effectively.

The Corporate Governance and Accountability Scandal and Crisis in the USA
While it may have been argued that the questions about corporate governance and accountability posed by full blown pension capitalism would become of increasing concern in the opening decade of the 21st century, it could hardly have been envisaged that they would become the national concern of legislative policy makers and financial market regulators, certainly in the United States, resulting in the introduction in the year 2002 of far reaching legislative and administrative measures for reform of corporate governance and accountability. The catalyst has been the spectacular collapse and bankruptcy of several mega national and multinational American Corporations predominant in, but not limited to, the telecommunications industry. In particular, the declarations of bankruptcy of Enron Corporation, an energy trader (Dec.2, 2001), Global Crossing Telecommunications (Jan 28,2001), Adelphia Communications (June 2002) and WorldCom Inc. (July 21, 2002), the last named being the largest bankruptcy in United States history, produced a litany of corporate management abuses and scandals, seemingly with the complicity of leading audit/consulting companies, stock brokerages, and investment and law firms.

Investigations by Congressional and financial regulatory bodies (eg. the Securities and Exchange Commission or SEC) led to allegations of deploying sham transactions involving off-the- book partnerships to move billions of dollars off balance sheets, thereby masking worsening financial situations; inflating profits through manipulative accounting, and mind boggling personal aggrandisement by CEO's and senior executives based on insider trading of stock options and other fraudulent practices and outrageous "golden handshakes" or separation packages; even as thousands of workers were losing 401 (K) pension savings and jobs as prices of company held stock collapsed and bankruptcies ensued. Charges for fraud

involving false filings, accounting improprieties, insider trading and misuse of corporate funds, have been laid by the appropriate government authorities against selected executives of a number of corporations and further arraignments are expected.

Commenting on this crisis of epidemic proportions, the Chairman of the Federal Reserve System, Alan Greenspan observed that " rapid enlargement of stock market capitalizations in the latter part of the 1990's engendered an outsized increase in opportunities for avarice. An infectious greed seemed to grasp most of our business community". Further, stock options " perversely created incentives to artificially inflate earnings to keep stock prices high". To stave off the "contagion effect" and a major economic crisis, the United States Congress moved with alacrity to enact legislation (Sarbanes-Oxley Act of 2002) including, among others: New criminal penalties and jail terms for company fraud and malfeasance eg. Shredding of documents and fraudulently certifying company financial accounts; strengthening of both internal and external auditing functions and disclosure requirements, especially of off-balance sheet transactions and pro-forma figures; prohibition on the part of Directors and Executives of most types of personal loans as well as insider trading during Pension Fund Block-out Periods and codes of ethics for senior financial officers buttressed by annual reporting.

The SEC has been strengthened to more effectively perform its monitoring and policing functions, including the enforcement of the new legislative provisions, and has imposed on the 1000 largest publicly traded corporations the obligation to provide sworn statements from their CEO's vouching for the accuracy of financial reports. Also being touted is a similar obligation on the part of financial analysts to certify their recommendations for stock trading are not influenced by their own firms' investment from client companies.

Post Enron Impact in Canada
The Canadian corporate governance reform initiatives have been much more muted and limited than in the United States. A Canadian Public Accountability Board has been set up to be an independent accounting watchdog. It is administered by an 11 member Board appointed by Council of Governors comprised of the chairs of the three major securities commissions and government financial regulators. The Board is dominated by professionals from outside the accounting business and is charged with conducting yearly inspections and ensuring the expeditious preparation of new accounting standards. Under the threat of cancelling audit contracts, it can require firms to rotate lead auditors on a regular basis and have a second partner review every audit.

More importantly, however, is the fact that the provisions of the Sarbanes-Oxley Act cover Canadian companies that are either listed in the United States or required to file annual and other periodic reports to the SEC. Thus, for example, executives of Canadian cross-border issuers must now personally certify SEC filings that contain financial statements and face significant fines and terms of

imprisonment if they knowingly and wilfully give false certification. Additionally, they are prohibited from making loans to their directors and executives, and may also be affected by the auditor independence rules.

While these measures may be expected to serve as a deterrent to corporate governance malfeasance, they are not in and of themselves a sufficient answer to the proposition that in the same way that the preservation of liberal democracy and government required a system of checks and balances, so too the stability of "employee society" or of "pension" and/or "fiduciary" capitalism will require a system of checks and balances more reflective of the new system of financing and ownership of private enterprise. Employees, through their pension plans, constitute a new class of permanent and universal owners of private (and public) enterprise systems. They are long-term owners whose interests are congruent with those of society. Indeed, numerically, they are the society at large and as such may claim to be the only group capable of providing normative direction for corporate enterprise. The long-term perspective derives from the fact that, normally, employees contribute for 30 years on average before taking out a pension and by then a new generation of employees will have begun paying in. The governing principle that pension funds should be invested for the exclusive benefit of plan members and their beneficiaries also implies that all conflicts should be resolved in their favour. By the same token, plan fiduciaries (trustees and fund managers) should be guided, in terms of investment decisions and their ramifications, by similar long-term considerations. Logically, therefore, institutional investors and the pension system in particular, are strategically placed to serve as the foundation for a new system of corporate governance and accountability.

Contradictions/challenges to be resolved:
Long-term owners but short-term perspectives
Although employees collectively through their pension plans may constitute the new and long-term owners of the private enterprise system, the trustees who legally administer scheme assets on their behalf typically have little to do with management or determination of the corporate equity investments.

What is more, in discharging their fiduciary responsibilities – duty of loyalty (sole purpose doctrine) and of care (skill and diligence/prudence) trustees and/or competing professional managers retained by them, have sought to realize the best possible returns for plan participants by focussing on short-term considerations – especially last quarters fund results, and taking advantage of any premium opportunities. This short-term perspective has been reinforced by the growing presence among institutional investors of mutual fund trusts – which have been designed for total liquidity. By being geared to investors who come in and out of the money market on a daily basis, mutual funds have been dubbed "the one night stands of institutional investing". Although aggregate share holdings are large, they are dispersed over a large number of individual funds and thus mutual fund owners and managers act as passive participants rather than longer-term owners of the companies

in which they put their money.

Pension Capitalism and Employee Responsibility:

The American Experiment with Pension Shareholder Activism

In the U.S.A., the California Public Employees Retirement System (CalPers) has been acclaimed since the 1980's as the standard bearer of a shareholder activism movement aimed at increasing participation of shareholders to the mutual benefit of both interests. CalPers has interpreted its duty of loyalty and of care to include a duty of active monitoring of corporate performance which it considers inherent in the concept of prudence.   With a view to enhancing the long-term value of shareholdings, CalPers has used shareholder proposals as a means of enacting general governance reforms such as eliminating the poison-pill in the anti-takeover atmosphere of the mid-1980's; more representative and accountable Board of Directors, including greater shareholder freedom to elect Directors; increasing the number of independent (non-management nominated/appointed) Directors; determining criteria for director qualifications and for performance evaluation of both directors and executive management of targeted companies. The ouster of a number of CEO's of large corporations has served to dramatize the effectiveness of Calpers' strategy of exercising responsible ownership rights. But to the extent that its first priority is the maximizing of albeit long-term value of shareholdings, CalPers appears to be less concerned with employment generation and employment stability.

Pension Plan Capitalism and Models of the Corporation

Another approach to the issue of corporate governance and accountability in the post-industrial or employee centred society, has been to question the relevance of traditional legal and economic theories of the corporation. For example, in the U.K. and the Americas, (and indeed in the Common law world) the corporation tends to be viewed as a private agency defined by a set of relationships between the principals and agent. Though legally the owners, shareholders tend to be too numerous and too busy to undertake the responsibilities of ownership and entrepreneurship and hire salaried executives to run their affairs. The shareholder-agency model conforms more to the entrenched authoritarian political system of government, in that the governing elite tend to be self-perpetuating and are only nominally accountable to the shareholders/electors whether through Directors who have been chosen by and/or compliant to executive management or through Annual General Meetings, which are again manipulated by management and largely ritualistic.

Financial Model

Much of the debate about corporate governance in the USA (and Canada) has flowed from acceptance of the financial approach or model associated with "fiduciary" capitalism. Its major premise has been that the only goal of the corporation is to maximize long-term shareholder wealth, a goal shared by institutional investors. From the fiduciary perspective, the challenge of corporate governance was largely

one of finding efficient solutions to the problem of divorce of ownership from control and to ensure that professional managers did not act contrary to the interests of owners. In the idealized free market scenario, the solution lay in the " market for corporate control" or "hostile take-over". If a corporation was badly enough managed, its share price would decline relatively, making it a target for take-over by more aggressive entrepreneurs and efficient managers who would displace the current managers and proceed to reap economic gains. Thus the threat of hostile take-overs provided the incentive for managers to run companies in the interest of shareholders. Indeed, it could be argued that there was a direct correlation between legislation enacted during the 1980's to curb hostile take-overs and the escalation of executive compensation. (Henry G. Manne, Financial Post, June 28, 2002). The "market for corporate control" approach was questioned on the grounds that the wholesale assault on the firm, which it entailed, was an extremely expensive and inefficient way to enhance corporate performance.

A more generalized approach to corporate governance appeared to be needed and this was provided by the "political model" or broadening of the finance model, which focussed on influencing legislators and regulatory agencies as well as litigation, to secure reforms and rule changes that would allow owners/institutional investors to pursue collective action against individual companies. CalPers already referred to, exemplifies this type of institutionalized shareholder activism.

In the post Enron/ World Com era, one may also question the appropriateness of identifying maximization of shareholder wealth with maximization of share prices, especially when it may entail understatement of costs, inflation of profits, and manipulation of employment levels by continuous downsizing. In other words, longer-term rates of return or profitability geared to long-term survival of the firm may be equally legitimate objectives.

The Social Institution or Trusteeship Model

In contrast to the "Anglo-Saxon" model touched upon above, the Continental European and Japanese model – the "social institution" model has been touted as more relevant and worthy of adaptation if not emulation in the Americas. In this model, the corporation is treated as "an institution" as distinct from an organization, with its own personality and character, its own objectives and aspirations and with obligations to a wide range of stakeholder groups – investors/shareholders, employees, suppliers, customers and the society at large represented by the public administration. Thus, the corporation as a social institution and a social system, in which the whole is greater than any of the parts, has social (public) responsibilities, including recognition of a public interest in governance. The Corporation is not governed or driven by the principal/agency contractual relationship and the goal of maximizing shareholder value as postulated by neo-classical economic theory of firm. Rather, it is obligated, as part of the socio-economic structure, to *sustain interests of all stakeholder* groups, without necessarily giving priority to any particular one. Executive management functions, therefore, as trustees seeking to

serve and to be responsive to this broad range of vested interests or stakeholders.

It may be noted that the notion of corporate management being regarded as trustees was instrumental in altering traditional labour-relations approaches in the United States as a result of New Deal pro-labour legislation which created a charter of trade union rights including compulsory recognition and collective bargaining. The trusteeship concept of management emerged as the counterpoint to the residual or sovereignty thesis of management, which held that management enjoyed certain "prerogatives" derived from property rights and that management retained a residual or absolute prerogative right of discretion to deal with matters not ceded to unions within the framework of the collective agreement or labour contract. . The trusteeship theory of management was increasingly espoused by professional corporate management who were concerned to achieve stable labour-management relations, and derived its rationale from the fact that the traditional concept of ownership had undergone a number of changes. Firstly, share ownership represented an intangible asset rather than physical property. Secondly, the separation of ownership from management and the fact that operational control could be achieved with less than full ownership. It is instructive that the courts in Great Britain have determined that legally the corporation is not owned by shareholders. "The Company is at law a different person altogether from its subscribers". Indeed the British Companies Act of 1985 reversed a 1962 rule that shareholders had exclusive claim to the residual assets in the event of liquidation, by entrenching employees' interests and imposing on Directors a duty to strike a balance between employee interests and shareholder interests.

In this broadening of shareholder interest to encompass stakeholder interests, executive management are seen as trustees rather than mere agents of owners, having a responsibility to temper the wealth maximizing presumption of liberal economic theory, by taking account of obligations to: (a) employees retaining a stable and productive work force (b) suppliers, a part of the supportive infrastructure (c) the consuming public (quality goods and services at competitive prices (d) investors, entitled to a reasonable rate of return (e) public policy makers, concerned with growth and development, price stability, and equity.

The appeal of the Trusteeship model, which generally prevails in Europe and Japan, is that it is more compatible with Pension Fund (or Employee) Capitalism. It recognizes, to an extent that the principal/agency model does not, that businesses are not just groups of people expediently linked by contractual relationships (which may or may not be renewed on the basis of essentially short-term considerations), but by a nexus of long established trust relationships. Thus, there is recognition that the profit maximization norm may be subject to a set of social constraints such as, for example, taking account of environmental concerns and ethical investing, and the human and social costs of downsizing and reducing employee protection as well as the consequences of rising income inequality in the winner-take-all ethos of competition in the so-called "new economy". However, some protagonists of the American corporate model argue that in comparison with the "social institution" model, be it

Japanese or Western European, the principal-agent model not only has produced better results for shareholders, but is superior in its ability to unravel misallocations of capital and to quickly pick-up the pieces so to speak.

It is possible, also, that as the United States clearly establishes it hegemony in the evolving global economy and its trans-national corporations play an equally pivotal role in the new mercantilism of trans-national confederations, the European model of the corporation as a social institution may, by dint of circumstances, be forced to move towards the Anglo-American model. .

The new environment may also have confounded expectations as to how the widening of market participation would affect the dynamics of politics. Among the rationales provided neo-conservative and neo-liberal regimes for including privatization of public enterprises and services in their political agenda during the 1980's and 1980's were that it would serve both to limit the scope and role of government in the economy and to widen share ownership. As more workers came to own shares, they would absorb the predominantly "small government" attitudes of business owners. But in the United States when that stake in capitalism extending to about 1 in 2 households (as opposed to about 1 in 5 in 1980), appeared to have been put in jeopardy by reckless corporate behaviour   employees, past and present as well as householders cum investors, turned to the one institution they deemed capable of protecting their interests and well-being. Put another way, as the stake of householders' (Main Street) in the stock market (Wall Street) has increased, so has the political system's sensitivity to issues related to investor and pension protection.

Notes
1. Drucker, Peter, (1976), The Unseen Revolution-How Pension Fund Socialism Came to America
2. United Steelworkers of America, (1996), Conclusions: Industrial Heartland Investment Forum

References
Clark, Gordon L., (2000), *Pension Fund Capitalism*, Oxford University Press
Drucker, Peter, (1976), *The Unseen revolution – How Pension Socialism Came to America*, Harper Rowe, New York
Government of Canada, (1994), *Report of the Advisory Group on Working Time and Distribution of Work,* Arthur Donner, Chairperson
Kay, John & Silberstone, Aubrey, (1996), *"Corporate Governance", The Guardian Stakeholder Debate,*
Guardian Media Group plc, 1996 (Extracted from National Institute Economic Review, August, 1995)
Monk, Robert A.G. & Minnow, Nell, (1996), *Watching the Watchers: Corporate Governance in the 21st Century,* Blackwell Publishers
_____ (1995), *Corporate Governance*, Blackwell Publishers
OECD (1994), *The Jobs Study: Facts, Analysis, Strategies*, Paris

Toporoski, Jan, (2000), *The End of Finance*, Routledge, London & New York
United Steel Workers of America, *(1996), Conclusions: Industrial Heartland Investment Forum*

Enron: A New Paradigm of Moral Hazard

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Abstract. The American financial markets have always prided themselves on their transparency and the consistency of the financial statements produced under rigorous accounting standards. Enron and its aftermath demonstrated that there is an asymmetry between the rhetoric and the reality. This article explores how Enron's "edge of the precipice" use, or rather misuse, of special purpose entities made a mockery of financial reporting. It also suggests that, at least in part, these scandals were driven by the short term mentality fostered by overuse of stock options which changed the risk alignment between shareholders and managers.

1. Introduction

Shortly after disclosure of the massive fraud that took place at Enron, I was asked to give a presentation on Enron for a group of securities lawyers. At that time, we were all trying to assess how fraud of that magnitude could have taken place and where did responsibility lie. Obviously, the perpetrators were responsible. But how did they "game" the system? <u>Where</u> were the gatekeepers?

Before the latter question can be answered, we need to know <u>who</u> were the gatekeepers? Inside the company, the board of directors, and particularly the audit committee, did not fulfill their responsibilities. Externally, the outside auditors were implicated, as were the attorneys. Next, where were the analysts and the regulatory bodies - private ones, such as the Financial Accounting Standards Board, and governmental ones, such as the Securities and Exchange Commission, the Federal Energy Regulatory Commission and the Commodities Futures Trading Commission? Some, including the author, believe legislation by Congress, as well as decisions by the U.S. Supreme Court, contributed to the climate that led to Enron and the subsequent corporate scandals.

What the foregoing paragraph suggests is that there was a systemic failure. How did people who presumably at one time exhibited no immoral behavior concoct the schemes they did? How did people with oversight responsibility fall asleep at the switch?

In pondering this, I thought back to a metaphor offered by a former colleague of mine who taught theology: the most serious sin is not shaking your fist at God but rather walking to the edge of the cliff and waiting for the wind to blow. I interpreted the metaphor to mean that we are culpable for putting ourselves in a precarious situation and then closing our eyes to the potential consequences. Phrased differently, it means that we so cloud our minds that we become unaware of the harmful consequences of our actions.

The metaphor of the cliff also has direct application to the legal and

accounting advice that was given. Phrases like "aggressive accounting" and "pushing the envelope" were repeated over and over. Professionals paid no heed to Justice Brandeis' advice when he testified before the U.S. Senate in 1911:

> "[Y]our lawyers...can tell you where a fairly safe course lies. If
> you are walking along a precipice no human being can tell you
> how near you can go to that precipice without falling over, because
> you may stumble on a loose stone...; but anybody can tell you
> where you can walk perfectly safe within convenient distance of
> that precipice." The difficulty which men have felt...has been
> rather that they wanted to go to the limit rather than they wanted to
> go safely.[1]

When we look at the Enron situation and the societal mileau in which it developed, there is no question that that many of the principals and gatekeepers either walked purposefully to the edge of the cliff or so blinded themselves to the consequences of their actions that they ended up in a situation where a person with forethought would not have ventured.

While neither law nor economics is supposed to dictate morality, both disciplines embody principles that relate to moral behavior. In law, a substantial body of law is focused upon dealing with and resolving conflicts of interests, while economics has given us the concept of moral hazard as a tool to evaluate situations that, in a sense, involve conflicts of interests. The notion of conflict of interests is rooted in the biblical adage that a man cannot serve two masters. At one time, a corporate officer or director was foreclosed from dealing with his or her corporation, or, rather such a transaction was voidable such that the risk of loss could not fall upon the entity to which the officer or director owed a fiduciary duty. The Enron situation is rife with conflicts of interest and the whole scheme was driven by compensation that was rife with moral hazard.

This paper will first review some of the Enron schemes and the edge of the cliff mentality behind them, analyze the conflicts of interest in the system and the moral hazard inherent in compensation devices like stock options, and suggest that, while we can never take greed totally out of a system, we need to be sensitive to the moral hazard of some of our motivational techniques to insure that we do not motivate immoral behavior.

2. Enron - the "star wars" transactions
2.1 Background
Until the fall of 2001, Enron was the darling of the investing public. It's stock had risen from $ 17 1/2 in the third quarter of 1997 to $90 3/4 a share in the third of 2000, before falling to around $40 a share in late summer of 2001. It was considered to be an innovative company which had brought new business models to the energy sector. However, as detailed by the examiner in its subsequent bankruptcy case:

> On October 16, 2001, Enron announced "recurring earnings per diluted share of $0.43 for the third quarter of 2001, compared to $0.34" for the third quarter of 2000. In the next paragraph of the Earnings Release, Kenneth Lay, Enron's Chairman and CEO, stated that "[o]ur 26 percent increase in recurring earnings per diluted share shows the very strong results of our core wholesale and retail energy businesses and our natural gas pipelines" and that Enron is "very confident in our strong earnings outlook."
>
> Yet in the paragraph following Mr. Lay's expressions of strength and confidence, Enron advised the public of "after-tax non-recurring charges" of $1.01 billion in the quarter. These "non-recurring charges" resulted in a net loss for the third quarter of $618 million (versus a reported net income of $404 million for the preceding quarter) and reported net income of $292 million.[2]

The charges arose in large part from the termination of certain "structured finance arrangements" involving LJM2, a partnership run by Andrew Fastow, Enron's CFO, and Michael Kopper, an Enron employee, and the special purpose entities ("SPEs") known as the Raptors.

About two weeks after the third quarter earnings announcement, Enron reported that the Board of Directors (the "Board") had appointed a special investigative committee headed by William Powers, Jr., the dean of the University of Texas Law School.[3] Shortly thereafter, on November 8, 2001, Enron announced its intention to restate earnings for several prior periods:

> On November 8, 2001, Enron announced its intention to restate its financial statements for 1997 through 2000 and the first and second quarters of 2001 to reduce previously reported net income by an aggregate of $586 million. Enron attributed the restatement to transactions involving three entities: Chewco Investments, L.P. ("Chewco"), a limited partnership run by Mr. Kopper; Joint Energy Development Investment Limited Partnership, an investment partnership between Chewco and Enron ("JEDI"); and LJM1, an investment partnership that had two institutional investors as limited partners and whose general partner was a limited partnership wholly owned by Mr. Fastow.[4]

The public disclosures of these related party transactions led to a crisis of confidence in Enron and its management which ultimately led to bankruptcy. According to the bankruptcy examiner, the disclosure may only have been the "tip of the iceberg" because, in the months that followed "allegations surfaced of securities fraud, accounting irregularities, energy market price manipulation, money laundering, breach of fiduciary duties, misleading financial information, ERISA

violations, insider trading, excessive compensation and wrongdoing by certain of Enron's bankers**."**

2.2. JEDI And Chewco - - The Facts

Since it was the JEDI/Chewco transaction that led Arthur Andersen to restate earnings,[5] this transaction will be first examined. Paradoxically, the JEDI/Chewco strategy started out legitimately and ultimately failed because of an arguably technical mistake.

In 1993, Enron and the California Public Employee's Retirement System (CALPERS") formed a joint venture called JEDI. Because Enron did not control JEDI, having only a 50% interest, JEDI was not consolidated with Enron. Rather Enron recognized its contractional half of JEDI's gain and losses on Enron's income statements and did not need to show JEDI's debt on its balance sheet.

In November, 1997, CALPERS was to be taken out. It was then necessary to replace CALPERS with another entity independent of Enron, to avoid consolidation of JEDI with Enron. Chewco, a SPE, was created for that purpose. To meet the accounting criterion at that time for independence, it was necessary for Chewco to have 3% of outside equity capital at risk.[6] The ultimate configuration of Chewco is shown below:

CHEWCO II – Dec 1997
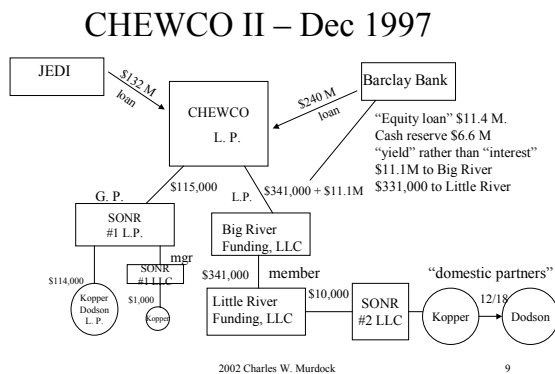
Since CALPERS was to be taken out at $383 million, this sum needed to be infused into Chewco. Three percent of $372 million was approximately $11 million. Now Kopper, the intended manager of Chewco and an Enron employee under Fastow, did not have that kind of money. Thus, the Barclays Bank was brought into the picture to provide funding at two levels. It would lend $240-250 million to Chewco, (such loan to be guaranteed by Enron) and JEDI would lend an additional $132 million. This provided $372 million of debt financing for the SPE.

Barclays, then made on $11.4 million "equity" loan[7] to entities controlled

by Kopper - - $11.1 million to Big River LLC, which was the limited partner of Chewco, and $331,000 to Little River LLC, which was the sole member of Big River. SONR #2 LLC was the sole member of Little River and Kopper (later Dodson) was the sole member of SONR #2, and invested $10,000 in SONR #2. Little River then invested $341,000 ($331,000 having been "invested" by Barclays) in Big River, and this sum, plus Barclays Banks $11.1 million "equity" loan to Big River, enabled Big River to invest $11.4 million of "equity" in Chewco.

The general partner of Chewco was SONR #1 LP, into which Kopper and Dodson as limited partners, invested $114,000. The general partner of SONR #1 LLP was SONR #1 LLC, of which Kopper was the sole member who invested $1,000. Thus, SONR #1 LP had $115,000 to invest in Chewco as the general partner of Chewco. Accordingly, there was supposedly $11.5 million of equity in Chewco.

If this sounds complex, it is. Most of us are familiar with the "KISS" principle: keep it simple, stupid. It is a principle we employ when we are trying to communicate something in a straightforward fashion. Unfortunately, some businesses today seems to have discovered another principle which I have coined as "MICI": make it complex, idiot.[8] If you plan to do something wrong, do not do it in a transparent and straightforward manner but make it as complicated and obfuscatory as possible. That certainly fits many of the Enron transactions.

2.3. JEDI And Chewco - - The Problems

JEDI and Chewco was so complex that the company and its professional advisors, Arthur Andersen, Vinson & Elkins, and Kirkland & Ellis, set it up with a fatal flow. The Barclays Bank apparently was concerned about its equity loan of about $11.4 million to Big River and Little River, both of which were controlled by Kopper, a mid-level Enron employee. Consequently, as security for the loan, the bank required JEDI/Chewco to create a cash reserve account of $6.6 million. This was reflected in a letter agreement prepared by Vinson & Elkins and signed by Kopper and an officer of Enron. Accordingly at the closing of the Chewco transaction on December 30, 1997, JEDI on behalf of Chewco wired $6.6 million to Barclay to fund the reserve accounts.[9]

2.4. The 3% rule.

In order for JEDI not to be consolidated with Enron it was necessary that Chewco not be controlled by Enron and that Chewco have 3% outside equity at risk. Since Barclays "invested" $11.4 million but contemporaneously received $6.6 million back in the form of a reserve account, there was never 3% equity at risk, assuming that the "equity loan" was truly equity. Only the legal mind–detached from reality–could conceive of an instrument that is a debt instrument from the standpoint of the bank but an equity investment from the standpoint of the SPE. Calling interest "yield," promissory notes "certificates," and loan agreements "funding agreements," does not change the essential character of an instrument.[10] Yet, the Barclays' advance was characterized as equity.

Not only are these hybrid instruments an exercise in sophistry but so also is the so-called 3% rule itself. The origin of the 3% rule is convoluted. EITF 90-15 relies on a letter from the Chief Accountant of the Securities and Exchange Commission (the "SEC") to the Chairman of the Task Force on "Impact of Nonsubstantive Lessons, Residual Value Guarantees, and Other Provisions in Leasing Transaction." (The "Task Force").

The Task Force had reached a consensus that, in summary, a lessee would need to consolidate a SPE lessor when <u>all</u> of the following conditions existed:

1) Substantially all the SPE activities involve assets to be leased to the lessee.

2) The substantive residual risks and rewards reside with the lessee, for example, through the lessee's guarantee of the SPE lessor's debt, and

3) The owner of the SPE has <u>not</u> made "an initial substantive residual equity capital investment "that is at risk through the term of the lease.

Question No. 3, addressed to the SEC, in part inquired what amount would qualify as a "substantive residual equity capital investment." The SEC responded that it understood that the Task Force believed that "3 percent is the minimum acceptable investment."[11] The SEC response clearly indicated that 3% was a floor and that it was not a "rule" but a question of fact as to what level of capital investment was necessary. The SEC stated:

> The initial substantive residual equity investment should be comparable to that expected for a substantive business involved in similar leasing transactions with similar risks and rewards. The SEC staff understands from discussions with Working Group members that those members believe that 3 percent is the minimum acceptable investment. The SEC staff believes a greater investment may be necessary depending on the facts and circumstances, including the credit risk associated with the lessee and the market risk factors associated with the leased property. For example, the cost of borrowed funds for the transaction might be indicative of the risk associated with the transaction and whether an equity investment greater than 3 percent is needed.

Notwithstanding the SEC's cautionary language, the accounting and legal profession turned the 3% figure into a rule.

It is also noteworthy that the 3% rule arose with respect to SPE's in leasing transactions which often are fairly secure transactions. JEDI was used to invest in mercantile assets, which generally involve a higher level of risk, and LJM1, discussed in the next section, was used to hedge volatile investments, raising the risk level up another notch.

2.5. The Fraudulent Use Of Spe's

While SPE's may provide a legitimate function from a financing perspective in isolating an asset to procure a more favorable interest rate, from a disclosure standpoint they are arguably inherently fraudulent. One of the primary purposes, if not <u>the</u> primary purpose, of SPE's is to make the balance sheet look better. One way this is accomplished is by moving debt off the balance sheet. The Enron situation is illustrative. On its third quarter 2001 balance sheet, Enron reported total debt of $12.978 billion. However, according to the bankruptcy examiner, the same day Enron filed its third quarter financials, it met with its bankers and informed then that the debt for which Enron was directly or indirectly responsible amounted to $38.094 billion. $13 billion of the $25.116 billion was incurred through structured finance transactions involving SPEs.[12]

Businesses spend hundred of thousands of dollars in transaction costs to "make the balance sheet look better."[13]   On the other hand, banks and other financing institutions, analysts, and investors, such as mutual fund managers, have a stake in deciphering the financial statements and the accompanying notes. Accordingly, they also spend tens of thousands of dollars in an effort to determine the true financial picture of the company.

At the risk of offering an overly simplistic analogy, investors and finaciers either figure out what the balance sheet should really look like or they do not. If they do, the economy is wasting millions of dollars in transaction costs. If they cannot come up with an accurate picture of the company's financial situation, isn't this financial fraud?

2.6. The Issue Of Control

The 3% rule, in effect, goes to the economic substance of the SPE. But non-consolidation also required that Enron not control Chewco or else JEDI would be controlled by Enron and consolidated with it. Initially, Fastow suggested that he control Chewco. Counsel advised that his participation would require disclosure in Enron's proxy statement and approval of Enron's Chairman and CEO. To avoid disclosure, Kopper, an employee who reported to Fastow, was substituted as the manager of Chewco (through the multiple entities illustrated above). However, his engagement still required approval under Enron's Code of Conduct.[14]

Chewco I was formed in November 1997 without outside equity investors. It was transformed into Chewco II on December 30, 1997 when the Barclays Bank provided the "equity loans" previously discussed. In the interim, Kopper transferred his interest in Big River and Little River to William Dodson, who was described as Koppers "domestic partner." It is not clear why this was done since transferring Koppers interests in the limited partner chain of Chewco still left him in control of the general partner of Chewco.

Normal logic would suggest that since Kopper was a mid-level employee of Enron, Enron controlled Kopper and, since Kopper controlled Chewco, Enron thereby controlled Chewco. This syllogism apparently escaped the ken of Arthur

Andersen and Vinson & Elkins, as well as the Special Investigation Committee. The Powers Report stated that:

> [E]ven if Kopper did control Chewco, it is not clear whether Enron would be deemed to control Chewco. Although Kopper may have been able to influence Enron's action concerning Chewco, he was not a senior officer of Enron and may not have had sufficient authority within the company for his actions to be considered those of Enron for these purposes.

This reasoning turns the control issue upside down. The issue is not whether Kopper controls Enron but rather Enron controls its employees. The experience of most mid-level employees is that the employer controls them, not the other way around. From another perspective, the law of vicarious employers' liability for torts is predicated upon the fact that the employer controls the employee when the employee acts out of and in the course of employment. Thus, it is sophistry to suggest that Kopper's control of Chewco was not in substance Enron's control of Chewco. Once again, the professionals–accountants and lawyers–were trying to split hairs in a fashion that normal people would deem absurd.

2.7. The Conflicts Of Interest

Enron's Code of Conduct provided in part that no full-time officer of employee should own an interest in or participate, directly or indirectly, in the profits of any other entity which does business with or is a competitor of the Company, unless such ownership or participation has been previously disclosed in writing to the Chairman of the Board and Chief Executive Officer of Enron Corp. and such officer has determined that such interest or participation does not adversely affect the best interests of the Company.

In November 1997, Kenneth Lay was both Chairman and CEO and Jeffrey Skilling was COO of Enron. The Chewco transaction was presented to Enron's executive committee on November 5, 1997 but Fastow described Chewco as not affiliated with Enron so Kopper's role may not have been discussed. Neither the minutes, nor Fastow's diagram, show the source of Chewco's equity. The Executive committee voted to approve Enron's guarantee of the loans to Chewco and such approval was presented to the full Board on December 9.[15]

The Board, whether acting in full or by committee, appears to have been passive. Penetrating questions cannot have been the order of the day.[16] From all that has been disclosed thus far, the Board did not appear to understand Enron's "business plan" or the risks associated with it. However, even if Board approval of Kopper's participation was not necessary, the Code of Conduct would have required Lay, the Chairman and CEO, to have approved Kopper's participation in an entity that would do business with Enron. Lay contends that he knew nothing of Kopper's participation. Skilling, however, acknowledges he approved Kopper's role in Chewco, based upon Fastow's recommendation. But Skilling's approval was not

what Enron's Code required.

One reason to have approval of the Chairman of the Board is to facilitate the matter being brought to the whole Board, if necessary. Judging from Lay's testimony before Congress where he appeared to have known nothing about anything–thus raising question as to how he earned the millions of dollars in compensation that he reaped–disclosure to Lay instead of Skilling would probably have accomplished little.

But the real issue is what standard should an executive of Enron have employed in determining whether to approve Kopper's participation in Chewco. Legally, when an officer or director engages in a transaction with his/her corporation it is voidable unless it is fair and the individual has the burden of proving fairness.[17] This is the perspective that an executive of Enron should have employed. In other words, the presumption should be against approving an employee dealing with his company from an adverse perspective.

The reason the law looks askance at transactions between an officer or director and the corporation is the concern that the individual may use her power over the corporation to advantage herself at the expense of the corporation. These concerns were certainly borne out in Enron.

From December 1997 through December 2000, Kopper received $2 million in fees relating to Chewco. Much of this was a $500,000 per year management fee Chewco paid to SONR #1 LP, Chewco's general partner. According to the Powers Report, Chewco required little management and many of the management tasks were performed by Enron employees.[18] Although it is unclear just what Kopper did to justify these fees, when they were being negotiated between Kopper and an Enron employee who reported to Fastow, Fastow told the employee he was "pushing too hard" for Enron and that Fastow was comfortable with the terms proposed by Kopper.[19]

Over and above the management fees, Kopper and Dodson received $10.5 million in cash from their investment of $125,000. The Powers Report calculated that this was more than a 360% internal rate of return.[20] But, in addition, Kopper sought and received a tax indemnity payment of $2.6 million to cover the taxes payable on their cash distributions. When Enron's in-house counsel objected to the payment, he was overruled by Fastow who represented that Skilling had approved it. Skilling had no recollection of this.

2.8. LJM1, Swap Sub, And Rhythms Netconnections ("Rhythms").

At the June 28, 1999 Enron Board meeting, Fastow presented another proposal involving a special purpose entity which he would control –LJM1. LJM1 was funded with $15 million from two outside limited partner investors and supposedly $1.0 million from Fastow who, through a series of entities would control it as a general partner. LJM1 undertook a limited number of activities, the most significant of which was to hedge, through Swap Sub, Enron's investment in Rhythms NetConnections ("Rhythms").

In March 1998, Enron invested $10 million for 5.4 million shares of Rhythms (about $1.85 per share), a privately held internet service provider. On April 7, 1999, Rhythms went public at $21 per share and the price rose $69 by the close of the first day's trading. By May, the value of Enrons investment in Rhythms was $300 million, which had generated substantial income for Enron because it was accounted for on a mark-to-market basis. However, Enron could not sell Rhythm stock until the end of 1999 so it sought to hedge its investment.

Swap Sub was supposed to be a non-consolidated SPE but arguably it failed both the control test and the 3% rule. Since Fastow controlled Swap Sub, and Fastow was an executive officer of Enron, Enron arguably controlled Swap Sub. Moreover, Swap Sub had negative equity of $20 million, instead of positive equity of 3% which fact ultimately led Enron, on November 8, 2001, to announce that Enron was consolidating Swap Sub.

More importantly, the whole hedge was a charade. The value of Enron's stock was a function of its assets and earning power, both of which were a function of Rhythms value. But Rhythms value was hedged by Enron stock. This circularity made the hedge a charade. But it also generated millions of dollars for Fastow and other Enron employees in fees and other payments.

Swap Sub LP was formed with LJM1 as limited partner and Fastow, through another entity, Swapco, as general partner. LJM1 had been funded with 3.4 million shares of Enron, which had a market value of $276 million but which, because of restrictions on sale, was valued at $168 million.

In a three-cornered arrangement, Enron received a $64 million note from LJM1, LJM1 transferred 1.6 million shares of Enron (valued at $80 million) and $3.75 million dollars to Swap Sub and Swap Sub gave Enron a put on 5.4 million Rhythms shares at $56. The put was supposedly worth $104 million. See diagram below.

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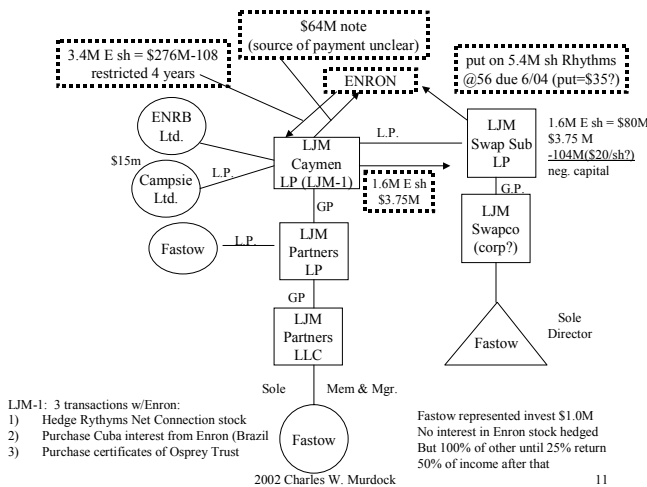
Thus, in summary, Enron transferred $168 million in stock to LJM1 and received a $64 million note from LJM1 and a put worth $104 million from Swap Sub. Thus, everything seemed to balance, except for one problem that Enron was apparently unaware of: Swap Sub was insolvent because it had assets of about $84 million (the 1.6 million shares of Enron stock and about $4 million in cash) but liabilities of $104 million–the put by which Enron's investment in Rhythms was hedged. Thus Swap Sub also failed the 3% test.

3. Structured Finance and Total Return Swaps
3.1. The NewPower Warrants And Total Return Swaps

In 2002, Enron initiated another use for SPEs, this time in conjunction with a so-called derivative characterized by Enron as a "total return swap." This was developed as a complement to the organization by Enron Energy Services ("EES"), a subsidiary of Enron, of NewPower Holdings. On January 6, 2000 EES contributed retail electricity and gas contracts to New Power in exchange for (i) 14.8 million shares, and (ii) warranty to purchase 45 million shares at $0.05 per share. Concurrently, unrelated investors contributed $100 million in exchange for (i) 5 million shares, (ii) warrants for 15 million shares at $0.05 per share, and (iii) warrants for 10.3 million shares at $9.69 per share.[21]

On March 31, 2000, Enron caused EES to contribute warrants for 6.766 million shares to McGarrett I, LLC, in exchange for a voting membership interest. McGarrett I then apparently issued a Class B membership interest (having 99.99% of the interests in McGarrett I) to Hawaii II trust in exchange for $20 million cash. This $20 million was then distributed by McGarrett I to EES. Hawaii II funded the $20 million it paid to McGarrett by borrowing $18.023 million from a syndicate of lenders led by Canadian Imperial Bank of Commerce ("CIBC"), the "McGarrett Loan," and $1.976 million that was contributed to Hawaii II by an affiliate of CIBC in exchange for something referred to as Hawaii II's "McGarrett A Certificate."

At this point, several questions arise. Why would CIBC lend or invest $20 million in Hawaii II Trust, whose only asset is a 99.9% interest in McGarrett I, whose only asset is warrants to purchase 6.776 million shares of New Power at $0.05 per share? In 1999, New Power had a net loss of $25 million on gross revenue of about $7.8 million.

The answer is that the story is not yet complete. As part of the financing, Enron entered into a so-called total return swap (the McGarrett A Swap) in which Enron agreed to pay the interest and principal payments that Hawaii II Trust was olbigated to pay to CIBC and the Hawaii II Trust agreed to pay all benefits from its investment in McGarrett I LLC to Enron, except for amounts payable under the McGarrett A Certificate. This set of transactions is illustrated below:

The foregoing was essentially replicated in each of the next two quarters, except that the amounts borrowed by Hawaii II and eventually transferred to Enron rose to $25 million and $30 million, respectively. The fourth quarter was a little more complicated because, of the $46.5 million borrowed, $20.1 million was used to

Money received from Clas B Cert except for CIBC
(Total Return Swap)

Enron

Interest & principal on loan

14.8 shares and warrants for 45.0 @ \$0.05

Sub

6.766W

Class B 99.9%

McG A Cert

EES

McG I LLC

Hawaii II Trust

\$20.0

\$20.0 Cash

\$1.976

Retail Elec. & Gas k

Loan \$18.023

CIBC

CIBC Affiliate

N.P.

\$100.0

5.0 shares + Warrants for 15.0 @ 0.05 + warrants for 10.3 @ \$9.69

investors
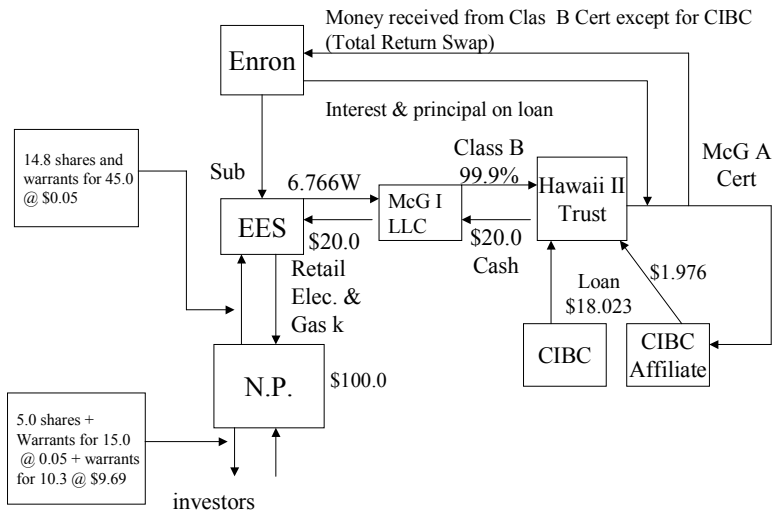
pay the McGarrett A loan and \$26.4 million was paid to Enron.

3.2. The "Creation" Of Earnings And Use Of Hedges

Enron treated the loan proceeds transferred from Hawaii Trust II to the McGarrett LLCs to EES as income from "cash from investing activities." Enron also realized income by marking to market its interests under the total return swaps. It then took into income, based upon the provision of "price risk management services" to its customers, the difference between its obligation to pay Hawaii Trust II's loans and value of Hawaii Trust II's investment in NewPower warrants through its interest in the McGarrett LLC's. This income amounted to \$118 million in the second quarter, which was 23.5% of the \$609 million of income reported for that quarter, and \$214 million in the third quarter, which was 32.1% of the 666 million reported for that quarter.

The valuation of the warrants was based upon private placements of NewPower stock and an October 5, 2000 initial public offering at \$21 per share. If the price of NewPower declined, Enron then would need to recognize a loss on these swaps so it created new SPEs (the "Raptors") to hedge the value of its swaps. The first of the Raptors was Porcupine, which agreed to pay another entity, Pronghorn (which was consolidated with Enron) any decline in value of the swaps. However, Porcupine was funded by warrants to purchase 24.1 million NewPower shares which it received by issuing a \$259 million promissory note. Once again, as in LJM1, Swap Sub, and Rhythm NetConnections, an investment was "hedged" in effect by the investment itself.

By December 31, 2000, NewPower stock had declined to $9.8125. This increased Porcupine's obligation under the hedge, while at the same time reducing its ability to pay because of the decrease in value of its assets–the New Power warrants–with the result that Porcupine was insolvent.

Other Raptors–Talon, Timberwolf, and Bobcat–were formed at this time to hedge other Enron stock. The Porcupine problem was initially solved through cross-collateralizations with other Raptors but, as the price of Enron stock fell from the $80s to the $40s during 2001, the house of cards collapsed.

4. The Driver – Stock Options And Moral Hazard
4.1. Executive Compensation In General

What drove many of the principals in Enron and the many scandals that followed, such as WorldCom and Tyco? It is too simple to say "greed." We need to look for some systemic issues.

One corrupting influence in the system is that of outlandish executive pay. If power corrupts and absolute power corrupts absolutely, the same analogy can be applied to executive compensation. Just as kings and nobles could lose touch with their subjects, so can executives. Law and economics types love to refer to the "market" as, in effect, god–it can do no wrong and is the remedy for every wrong. But markets are both efficient and inefficient, and Professor Khurana of Harvard, in a recent book, details the inefficient market for CEO's:

> To take just one example: as a result of the influence of external institutions on the external CEO selection process, many individuals who could be CEO's are not even on the radar screens of those who could be tapping them for the position. Thus, the external CEO search process has created a closed ecosystem of top-tier executives for whom the so-called glass ceiling appears perfectly opaque, since it hides those on the lower floors from the view of directors and search firms. This is not only a waste of talent but also, as it turns out, a recipe for returning corporations to the kind of oligarchic control from which external CEO search was supposed to deliver them.[22]

The disparity between CEO performance and CEO compensation has been documented over the years. In a new twist, the Institute for Policy Studies has produced a table showing the negative correlation between change in market capitalization and executive pay for those CEO's labeled as "book cookers."[23]   For the twenty three companies analyzed, market capitalization dropped 73% from the beginning of 2001 to July 31, 2002, whereas CEO pay averaged over $62 million, 70% more than the average CEO pay reported in the April 15, 2002. Business Week executive compensation survey. The Institute data is somewhat skewed by the inclusion of four companies–AOl Time Warner, Enron, Qwest, and Tyco–whose CEO compensation ranged from $178 million $331 million. The Institute's

compensation figures are apparently based on the proceeds of stock sales in the year rather than the value of options granted in the year.

The same trend appears from less skewed data. Professor Khurana reported a New York Times survey showing that the average total compensation for CEO's of major corporations in 2000 was $20 million, including 50% more in stock options and 22% more in salary and bonus than in 1999, notwithstanding that the S & P 500 Indexes fell 10% in 2000, while the NASDAQ Corporate Index fell 39%. The following long term trend is described:

> Moreover, the figures for CEO pay in the year 2000 represent but one segment of a significantly longer-term trend. One study that examined CEO pay levels at publicly held corporations found that CEO pay jumped 535 percent in the 1990s, dwarfing the 297 percent rise in the S & P 500, a 116 percent rise in corporate profits, and a 32 percent increase in average worker pay (not adjusted for inflation). To put this into further perspective, this same study found that since 1960 the pay gap between CEOs and the president of the United States has grown from 2:1 to 62:1; if average pay for factory workers had grown at the same rate as it has for CEOs during this boom instead of barely outpacing inflation, their 1999 annual earnings would have been $114,935 instead of $23,753. Finally, if the minimum wage had risen as fast as CEO pay, it would now be $24.13 an hour instead of $5.14, which is less, in real dollars, than it was in 1970.[24]

Compensation for U.S. executives is said to be about three times that of British executives.[25] While it is argued that such large salaries are needed to attract and retain key executives, as stated above, Professor Khurana has argued that the market for top executives is very inefficient. Moreover, money is not the only reward for CEOs. As Richard Singleton, the director of corporate governance for ISIS Asset Management in London, stated "One might have thought having the responsibility of running a major business would be an extraordinarily satisfying thing to do by itself."[26]

Mr. Singleton's comment is supported by the work of Professor Csikszentmihali, who has done pioneering work on the study of happiness and creativity. According to Csikszentmihalyi, there are two requisites for happiness:

> The first is the process of *differentiation*, which involves realizing that we are unique individuals, responsible for our own survival and well-being, who are willing to develop this uniqueness where ever it leads, while enjoying the expression of our being in action. The second process involves *integration*, or the realization that however unique we are, we are also completely enmeshed in networks or relationships with other human beings, with cultural symbols and artifacts, and with the surrounding natural

environment.   A person who is fully differentiated and integrated becomes a *complex* individual–one who has the best chance at leading a happy, vital, and meaningful life.

Good Business was based in part on interviews with dozens of business leaders to determine what motivated them. One response from Norman Augustine, the former CEO of Lockheed Martin, was typical:

> I've always wanted to be successful. My definition of being successful is contributing something to the world...and being happy while doing it...You have to enjoy what you are doing. You won't be very good if you don't. And secondly, you have to feel that you are contributing something worthwhile...if either of these ingredients [is] absent, there's probably some lack of meaning in your work.[27]

When asked what he wanted to accomplish in his job, Mr. Augustine responded:

> Probably the legalistic answer would be that I was trying to accomplish was to increase shareholder value. But in truth, what I was trying to build was the greatest aerospace company in the world. And I thought that if we did that, maybe that would increase shareholder value. But to me, you have to have a more lofty goal than making money.[28]

4.2. Equity Based Compensation – Is It Working?

Turning specifically to stock options and other equity based compensation, a recent study by three University of Indiana professors and one from Texas A & M purports to show that equity compensation does not improve company performance. Two of the authors summarized their study as follows:

> Our study examined research spanning more than five decades and included 229 studies and nearly 1,000,000 equity/performance relationships. The results are compelling. There is no evidence of a systematic relationship between equity and firm performance. Importantly, with this research we considered equity held by executives, by CEOs, by management board members (inside directors), by non-management board members (outside directors), and by all executives and directors. We also considered the many ways in which firm performance has been measured, including market-based measures such as shareholder returns and accounting-based measures such as return on assets and return on equity. In each case, and considering each combination, the results are invariant. There is no evidence that higher levels of executive or director equity result in better firm performance.[29]

While stock options have been around for a long time, the use of options gained impetus from the enactment in 1994 of section 162(m) of the Internal Revenue Code which disallows a deduction for executive compensation in excess of $1 million unless it is based upon performance.

It has been argued that executive compensation, particularly stock options, has failed because of design flaws, such as pricing options at the market, not indexing options, and repricing options, and that these flaws result from the fact that a model which views "independent" directors as guardians of shareholder value is also flawed.[30]

I concur that the board of director model has not been working. As the article points out, CEO's have generally controlled the directors selection process. In addition, there is the group dynamic process–it is uncomfortable going to lunch with the CEO after a board meeting in which you have told him that he is not worth what he wants. Finally, there is the incest problem. Many board members are CEO's of other companies. The higher the CEO compensation on this board, the higher the floor, or mean or average, when their own compensation is set by their boards.

4.3. Moral Hazard In Stock Options – Misalignment Of Risk

But the problem is more than design flaws. There are some serious moral hazard problems inherent in the concept of stock options. Economists generally employ the concept of moral hazard in the insurance context:

> The effect of insurance on behavior is sometimes called the problem of moral hazard. The term *moral hazard* arises from the view that it would be immoral for an individual to undertake an action for the sole purpose of obtaining the receipt of an insurance benefit. It would, for instance, be immoral for an individual to set fire to his house simply to collect his fire insurance. But though such actions might be widely held to be immoral–and indeed are illegal–there is a much broader category of incentive issues, such as the care the individual should take to prevent a fire. The term moral hazard has come to refer to this broad range of incentive effects.[31]

However, the concept of moral hazard has broader applicability if we define it as arising when the costs of a particular action are not internalized to the actor but are borne, at least in part, by a third party.

Advocates of stock options argue that it aligns the interests of executives with those of shareholders. But this is not the case. Shareholders have both a downside risk and an upside potential. Their interest in upside potential gain – from a risk taking standpoint – is tempered by the knowledge that their investment in stock is at risk. On the other hand, the executive focus is on upside potential. Since

there is no monetary investment in the stock under option, the executive does not have the same downside risk concern that a shareholder has.

While it may be argued that the executive does have downside risk since part of his compensation would be lost if the stock does not appreciate, an executive receiving millions in cash compensation is hardly in the same position as an investor who faces the potential loss of his entire investment. Moreover, if the price of the corporation's shares decline rather than rise, the options are frequently repriced.

The net effect of this – and the initial moral hazard inherent in stock options--is that risk and volatility reward the executive but may punish the shareholder. The cost of risky conduct is not internalized to the executive but is borne by the shareholders.

4.4. Enron – Risk And Volatility

This is borne out by the Enron situation. The trading price of Enron stock in 1997, ranged from a low of 17 1/2 to a high of 22 9/16. It was in late 1997 that the Star Wars transactions began. In 1998, the price ranged from 19 1/16 to 29 3/8 and, in 1999, from 28 3/4 to 44 7/8. In the third quarter of 2000, the price rose to 90 3/4.[32] Thus, volatility increased over time.

In 1997, Kenneth Lay, the chairman and CEO, was awarded stock options covering 1,920,920 shares at approximately $22 per share and Jeffrey Skilling, the COO, was awarded 2.0 million shares at about $21 per share. In 1998, the numbers were 749,630 shares at about $20 per share and 586,300 shares at about $20 per share.[33] At this time, these grants represented the bulk of Skilling's options; Lay, however, had several million options from previous years.

By the end of 1998, the options granted to Lay and Skilling in this two year period totaled over 2.5 million shares at an average exercise price of about $21 per share. With Enron's price below $30, the value of the options to each of them was around $20 million. While this is not an insignificant profit, were the price to hover around $80, which it did for much of 2000, these options would be worth about $140 to $150 million for each.

While Lay's stock sales we so voluminous that I did not analyze them, I did review Skillings's sixty transactions from 1998 to 2001.[34] In 2000, he sold about 375,000 shares at prices ranging from $72.50 to $87.25. This generated proceeds of about $300 million.

For the first six months of 2001, he sold 10,000 shares on a weekly basis at prices ranging from $50.68 share to $80.57. The median price was about $60, which means he was generating weekly revenue of $600,000 a week or a profit of about $400,000 a week. One ought to be able to live on this even if one's standard of living is rather high.

Risk and volatility served Lay, Skilling, and the other Enron executives who were awarded stock options, very well. It did not serve investors, customers or suppliers nearly as well.

4.5. The Moral Hazard Inherent In Not Expensing Stock Options
There is another moral hazard issue in the stock options game as well. The question could be asked, with hindsight, how could the board justify awarding this kind of compensation to Skilling, for example. The answer is – it didn't cost anything. The grant of stock options is not an expense for financial reporting purposes. More than that, it is actually a benefit because, with respect to non-qualified stock options, the spread between the exercise price and market price at date of exercise is a deduction for tax purposes. This helps to explain in part why so many companies today report large profits but pay little in the way of taxes.

One source estimates that Enron's 2000 tax benefit from employees' exercise of stock options was $350 million.[35] However, Enron was a piker in this regard. The study estimates that the forty largest U.S. corporations reduced their taxes by $15.7 billion in 2000 from the exercise of stock options and that for all businesses the tax savings were over $56 billion.

As discussed above, in the past, boards of directors have had little stake in controlling executive compensation. To be able to reward executives handsomely with no cost to the corporation is a world without limits. But options do have a cost. The existence of options markets demonstrates that options have value. Footnote disclosure of the estimated impact of options is largely ignored. The only way to control the largesse involved in stock option grants is to require that they be expensed on the income statement.

The expensing of stock options is a volatile topic. When the U.S. Financial Accounting Standards Board indicated in the mid-90's that it would require expensing, it caved in to pressure from industry, the accounting profession and Congress. However, Enron and the other corporate scandals have resurrected this issue. The International Accounting Standards Board has both proposed expensing and provided guidance, while Standard and Poor's, in its May 14, 2002 release, has opined that it will include stock option expense in its determinations of core earnings for companies. As of August 7, 2002, seventy-three U.S. companies had announced plans to expense options, according to Standard and Poor's.[36]

5. Conclusion
Subsequent events, including restatements of income by numerous companies because of "aggressive accounting" as well as outright fraud, demonstrate that Enron was not an aberration as was first suggested. While it would be overly simplistic to target one factor as a predominant cause, executive compensation is clearly out of control.

A major component of executive compensation–in fact the dominant one in a bull market– is the granting of huge amounts of stock options. This was driven first by the tax provision limiting the deductibility of "non-performance based" compensation and then by the moral hazard of treating options as free since they were not expensed for financial reporting purposes.

The granting of stock options was also driven by the notion that they

aligned the interests of shareholders and management. This fallacy was easy to perpetuate in a bull market but was exposed when houses of cards, like Enron, came tumbling down. Then we saw another example of the moral hazard in stock options: executives benefited from volatility and the risks executives undertook were out of line with the risk profile of investors.

While the movement to expense options is gaining steam, unless the American accounting profession is universally required to expense options, we will not have comparability of financial results in the public markets and the investing public will continue to be exposed to losses occasioned when management choices are influenced by short term share price instead of prudent business judgment.

Notes

1. Hearings before Sen. Comm. On Interstate Commerce, S.Res.No.98, 62nd Cong. 1161 (1911) (statement of Louis D. Brandeis).
2. First Interim Report of Neal Batson, Court Appointed Examiner 2002 WL 31113331, at *1 - *2 (hereinafter the "Examiner's Report"). September 21, 2002.
3. The Powers Committee filed its report on February 1, 2002 (the "Powers Report), 2002 WL 198018.
4. Examiner's Report at *3.
5. See Powers Report, supra note 3, at 65-66.
6. Emerging Issues Task Force 90-15 ("EITF 90-15"), "The impact of Nonsubstantive Lessons, Residual Value Guarantees, and Other Provisions in Leasing Transactions," discussed infra. at note 11.
7. The Powers Report described these loans as follows: "The Barclays loans to Big River and Little River were reflected in documents that resembled promissory notes and loan agreements, but were labeled "certificates" and "funding agreements." Instead of requiring Big River and Little River to pay interest to Barclays, the documents required them to pay "yield" at a specified percentage rate. The documentation was intended to allow Barclays to characterize the advances as loans (for business and regulatory reasons), while allowing Enron and Chewco simultaneously to characterize them as equity contributions (for accounting reasons). During this time period, that was not an unusual practice for SPE financing" Powers Report, note 3 supra, at 49.
8. Charles W. Murdock, "Attorney Liability after Enron - - The Attorney as Creator or Co-Author, Chicago Bar Record, April, 2003, at 34.
9. Powers Report, supra note 3 at 50.
10. See description of the equity loan in note 7, supra.
11. EITF 90-15, note 6, supra, response to Question No. 3.
12. Examiner's Report, at 3.
13. By way of illustration, Arthur Andersen billed Enron $5.7 million in consulting fees for its advice on the Chewco and LJM transactions. Powers Report, at 4.

Elsewhere, the report states that Andersen billed Enron $80,000 for its 1997 review of the Chewco transaction.

14. See text at note 15, infra.

15. Powers Report, note 3 supra at 45.

16. See minutes of the Enron Audit Committee, February 12, 2001, where some 20 agenda items covering matters such as the proposed audit report, internal controls, related party transactions, use of SPEs, legal matters, internal auditing, and the concept of materiality, were dealt with in 1 hour 25 minutes. Available at FindLaw.com.

17. See Del.Code Ann. titl. 9, §144, as interpreted by Flugler v. Lawrence, 361 A.2d 218, 221 (Del. 1976). For a more straightforward statutory provision, see section 8.60 of the Illinois Business Corporation Act, 805 ILCS 5/8.60.

18. Powers Report, note 3 supra, at 53-54.

19. Id. at 44.

20. Id. at 63.

21. Examiner's Report, note 2 supra, at *10.

22. Rakesh Khurana, Searching for a Corporate Savior - - The Irrational Quest for Charismatic CEOs (Princeton Press 2002) at 187.

23. Institute for Policy Studies, "Executive Excess 2002, CEO's Cook the Books, Skewar the Rest of Us," Aug. 26, 2002, App. at p. 21.

24. Khurana, note 22 supra, at 191.

25. Heather Timmons, "British Investors Brittle at American Size Pay Packages, N.Y. Times, May 27, 2003, at C4.

26. Mihaly Csikszentinihalyi, Good Business (Viking Penguin 2003), at 29. Timmons,

27. Id.

28. Id. at p. 147-148.

29. Catherine M. Daily and Dan R. Dalton, "The Problem with Equity Compensation," J. of Bus. Strategy, July-Aug. 2002, at 28.

30. Lucien A. Bebchuk, Jesse M. Fried & David I. Walker, "Managerial Power and Rent Extraction in the Design of Executive Compensation," 69 U. of Chicago L. Rev. 751 (2002).

31. Joseph E. Stiglitz, Economics of the Public Sector (W. W. Norton, 2d ed. 1988), at 299.

32. Data as reported in Enrons 10K annual reports for 1999, 1999 and 2000.

33. Id.

34. Source: Lexis, securities, find a source, forum 4, Enron.

35. Tax Notes Today, March 15, 2002.

36. Institute for Policy Studies, note 23 at 11

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