

**Financial Liberalisation in Mauritius**

**and**

**The Finance-Growth Nexus**

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## **ABSTRACT**

The purpose of the thesis is to explore the empirical relevance of the theory of financial liberalisation in the Mauritian context. After confronting the conflicting views in the literature, the changes that have taken place in the financial sector in terms of monetary policy and the institutional developments are examined. The study shows that government has played a role in boosting financial intermediation before liberalisation and that it has still a role to play after liberalisation. It also explains the measures taken to improve financial stability. The high concentration in both the banking and insurance sectors are also discussed.

The thesis finds no evidence of an increase in real interest rate after liberalisation or any consequential improvement in domestic savings as suggested by the liberalisation theories. Further external liberalisation has not led to a drop in real interest rate and increased savings. Some minor episodes of banking and stock market crises have been identified. The research also examines the links between interest spread after liberalisation, fund cost and market share and the results tend to support the proposition that there is unidirectional causality from market share to interest spread.

No significant change in share market size, liquidity and activity has been observed after liberalisation and the collective investment schemes have not yet indicated signs of ability to considerably mobilize savings and hence to boost the security market.

There is evidence of a slow down of the financial deepening process as the liquidity ratio  $\frac{M2}{Y}$  exceeds 65%. Financial deepening is not found to be positively

related to real interest rate. This applies not only to Mauritius but equally to some other countries of the region.

Although the evidence does not support the McKinnon and Shaw predictions concerning interest rate and mobilization of savings, yet there has been freer access to credit after liberalisation and the study has shown that private sector credit as a share of GDP is positively related to economic growth and that there is bidirectional causality between them.

With respect to corporate financing the study shows that the behaviour of listed firms is consistent with the pecking order theory of finance and that the listed companies are now more sensitive to external financing for the acquisition of physical investment, in relation to their internal growth strategy.

## **ACKNOWLEDGEMENTS**

My thanks go to all those who have helped me in one way or another in the preparation of this thesis. I wish to highlight the positive attitude of the officers from the Bank of Mauritius, the Stock Exchange of Mauritius, the Central Statistical Office and the Registrar of Companies in their dealing with me.

Professor John Adams who, in spite of his much stretched agenda, has during these few years always maintained close contact with me in addition to motivating me whenever discouragement was being felt at my level due to isolation and unsatisfied self-target resulting from difficulties of getting data. Moreover, Professor Adams has never imposed his views on me and has allowed me full liberty to deal with the subject the way I wanted without failing to make precious suggestions and highlighting the potential pitfalls related to some of my proposed directions. I therefore remain highly indebted to him for the extensive amount of learning that took place during these years under his supervision.

My deepest gratitude goes to my wife and my two sons who had to bear with me in some difficult moments especially when my stress spilled over them. I dedicate this research to them.



## **DECLARATION**

I, Jean Karl JOUAN, hereby declare that this thesis is my original work and that it has not been submitted previously for the award of any other qualification or other work undertaken by me.

The work has been completed under the supervision of Prof. John Adams.

Signature

A handwritten signature in black ink, appearing to be 'JK JOUAN', with a long horizontal stroke extending to the right.

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## **GLOSSARY OF ABBREVIATIONS**

ACF	Autocorrelation Function
ATM	Automatic Teller Machine
ASEA	African Stock Exchange Association
BAI	British American Insurance Ltd
BOM	Bank of Mauritius
BOP	Balance of Payments
CAMEL	Capital Adequacy, Asset quality, Management Soundness, Earnings and Liquidity
CAPM	Capital Asset Pricing Model
CAR	Capital Adequacy Ratio
CDS	Central Deposit Clearing and Settlement System
CR2	Two-Firm Concentration Ratio
CR3	Three Firm Concentration Ratio
CR5	Five-Firm Concentration Ratio
DW	Durbin-Watson
EFTPOS	Electronic Fund Transfer at Point of Sale
EPZ	Export Processing Zone
FATF	Financial Action Task Force
FDI	Foreign Direct Investment
FIR	Financial Intermediation Ratio
FSAP	Financial Sector Assessment Programme

<b>FSC</b>	<b>Financial Services Commission Ltd</b>
<b>FSI</b>	<b>Financial Soundness Indicators</b>
<b>FSP</b>	<b>Financial Stability Forum</b>
<b>FSPA</b>	<b>Financial Services Promotion Agency</b>
<b>GATT</b>	<b>General Agreement on Trade and Tariffs</b>
<b>GDP</b>	<b>Gross Domestic Product</b>
<b>IAIS</b>	<b>International Association of Insurance Supervisors</b>
<b>ICT</b>	<b>Information Communication Technology</b>
<b>IMF</b>	<b>International Monetary Fund</b>
<b>IOIB</b>	<b>Indian Ocean International Bank</b>
<b>IOSCO</b>	<b>International Organisation of Securities Commissions</b>
<b>IMF</b>	<b>International Monetary Fund</b>
<b>LDC</b>	<b>Least Developing Country</b>
<b>LIC</b>	<b>Life Insurance Corporation of India</b>
<b>LTCM</b>	<b>Long Term Capital Management</b>
<b>MACSS</b>	<b>Mauritius Automated Clearing and Settlement System</b>
<b>MCB</b>	<b>Mauritius Commercial Bank Ltd</b>
<b>MCCB</b>	<b>Mauritius Cooperative Commercial Bank</b>
<b>MFA</b>	<b>Multi Fibre Agreement</b>
<b>MOBAA</b>	<b>Mauritius Offshore Business Activity Authority</b>
<b>MPI</b>	<b>Macro Prudential Indicators</b>
<b>MSS</b>	<b>Mauritius Sugar Syndicate</b>
<b>N.A</b>	<b>Not Available</b>

<b>NBFI</b>	<b>Non Bank Financial Institution</b>
<b>OECD</b>	<b>Organisation for Economic Cooperation and Development</b>
<b>OLS</b>	<b>Ordinary Least Square</b>
<b>OMM</b>	<b>Official Money Market</b>
<b>PLACH</b>	<b>Port Louis Automated Clearing House</b>
<b>RTGS</b>	<b>Real-time gross settlement system</b>
<b>SADC</b>	<b>Southern African Development Community</b>
<b>SBM</b>	<b>State Bank of Mauritius Ltd</b>
<b>SBI</b>	<b>State Bank of India</b>
<b>SEC</b>	<b>Stock Exchange Commission</b>
<b>SEM</b>	<b>Stock Exchange of Mauritius Ltd</b>
<b>SEMATS</b>	<b>Stock Exchange of Mauritius Automated Trading System</b>
<b>SEMDEX</b>	<b>All Share Price Index</b>
<b>SEMTRI</b>	<b>Share Total Return Index</b>
<b>SWIFT</b>	<b>Society for Worldwide Interbank Financial Telecommunication System</b>
<b>TRI</b>	<b>Total Return Index</b>
<b>UMM</b>	<b>Unofficial Money Market</b>
<b>VAR</b>	<b>Vector Auto Regression</b>
<b>VAT</b>	<b>Value Added Tax</b>
<b>VEC</b>	<b>Vector Error Correction</b>
<b>WB</b>	<b>World Bank</b>

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## Chapter 1

### INTRODUCTION

#### 1.1 The Country

The Republic of Mauritius is a small island economy located at 800 Km east of Madagascar. Apart from the island of Mauritius of area 1865 Km<sup>2</sup> and a population of around 1.2 million, the Republic also includes Rodrigues island with an area of 104 Km<sup>2</sup> and a population of 36.1 thousands, Agalega island with area 70Km<sup>2</sup> and population of 285, the Carcados Carajos shoals (St Brandon) having an area of 1Km<sup>2</sup> and the Chagos Archipelago<sup>1</sup>, 60km<sup>2</sup>. Because of its various islands scattered in the Indian Ocean the Republic of Mauritius has a relatively large 200 nautical mile area of economic exclusive zone covering 1,700,000 km<sup>2</sup>. The island of Mauritius remains by far the main part of the republic in terms of population and economic activity

The population has no indigenous component and is composed of descendants of immigrants from India, Africa, China and Europe. In terms of religious faith, 52% are of Hindu faith, 28% are Christians, 17% Muslims and 3% other<sup>2</sup>. Adult literacy<sup>3</sup> rate is at around 85%, life expectancy at birth is 72 years and the population, grows at around 0.8% per year. 47% of the population (i.e 560,000 people) constitutes the labour force around 10% of which is unemployed.

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<sup>1</sup> Diego Garcia, the largest of the islands forming the archipelago, contains a joint UK-US naval support facility. The Archipelago was excised from the Mauritian territory at the time of Independence and is still the subject of a dispute between the Mauritian and the British governments.

<sup>2</sup> These are approximate proportions since people no longer have to declare their religion/ethnic group in population census.

<sup>3</sup> People aged above 15 and who can read and write.

Mauritius became an independent sovereign state in March 1968 after more than 150 years of British rule that followed 95 years of French colonialism<sup>4</sup>. The political system is a parliamentary democracy based on the Westminster model. The democratic process is exercised through a national assembly on the island of Mauritius, a regional assembly sitting at Rodrigues and local government. There is separation of powers between the executive, the legislative and the judiciary and the legal system benefits from enrichment from two past colonial powers for being a hybrid one combining both French Civil law (Code Napoleon) and English common law. The economy is now classified as an upper middle income<sup>5</sup> one with a national income of \$4000 per head and government expects that the current modernization process will allow a 100% increase in national income in ten years.

## **1.2 From a Monocrop Economy to Financial Liberalisation**

Prior to independence, Mauritius, just like many other British colonies, was a low-income plantation economy based to a great extent on sugar<sup>6</sup> and to a much lesser extent on tea plantation for regular supply to Great Britain. Sugar milling and tea blending therefore largely dominated the few manufacturing activities. Around two third of the jobs available were either in the agricultural sector or in the public sector. On the road to independence during the 1960s, Mauritius adopted the import substitution strategy, consistent with the prevailing mainstream economic thinking

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<sup>4</sup> 1715-1810: French; 1810-1968: British.

<sup>5</sup> The World Bank classifies countries having a national income between \$ 3, 036 and \$9,385 as upper middle-income economies.

<sup>6</sup> Basically monocrop.

from amongst the newly independent countries. Trade protectionist measures were applied in line with the infant-industry argument and appropriate fiscal measures were designed to support that economic strategy. A development bank was also created in 1964 to ensure a regular flow of subsidized credit to new investment projects. These measures gave a boost to the weak non-sugar and non-tea secondary industry activities in new areas such as edible oil refinery, soap, toothpaste, footwear, margarine and paint manufacturing. However, in these manufacturing activities it was unthinkable to consider competing with the big brands in overseas markets and so output was to be restricted to satisfy the domestic market.

Within a couple of years after independence, the political leaders realized that the inward looking strategy set up some years before independence was not able to deliver to expectations. It did not create the amount of jobs needed and unemployment had reached close to 20% in 1970. The capacity of the country to generate income and to import the basic commodities as well as capital goods continued to be over-dependent on sugar, which is exposed to regular adverse supply shocks from cyclones. The import substitution strategy was largely constrained by a narrow domestic market size and this probably constituted one important factor that pushed Mauritius to eventually seek an outward looking strategy much earlier than other third world countries.

The foundations for a mixed strategy combining import substitution with an export led growth strategy were laid down with the adoption of a legal framework for the creation of the export-processing zone (EPZ) in 1970, a set of fiscal incentives and a policy in favour of generous leasing of state land to hotel



promoters. Labour intensive production in the EPZ for the wider market would make it possible to deal with the unemployment problem. Unfortunately EPZ and tourism activity did not pick up and employment was slightly below 9000 in the EPZ in 1976. The only macroeconomic objective that was being satisfied in the early days of independence was economic growth and this was still driven by sugar. Non-sugar manufacturing and tourism activity did not contribute much to the GDP and the high income earned from the 1973-75 sugar boom<sup>7</sup> although transitory in nature was interpreted as permanent. The positive side of such misreading is that it facilitated the transfer of funds from the sugar industry to the newly created EPZ and Tourism industry. On the negative side it led to an increased propensity to import and from the higher tax collected by government, in a situation of a low standard of living, a policy of redistribution of a transitory benefit through wages, transfer payments and subsidies was introduced rather than consolidating productive capacity. These expenditure items, once in, became very difficult to be curbed for equity and political reasons. When the world sugar price dipped to a lower level and this was followed by the 1979 oil shock, the Mauritian economy headed for a crisis. It faced high inflation, high unemployment, chronic balance of payment deficit and a high fiscal deficit. Mauritius had no choice but to adopt the Bretton Woods institutions programme of stabilization and structural adjustment. The stabilization programme failed initially partly due to the J- curve effect on trade but more importantly because of exogenous factors namely (i) the country was hit by a severe

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<sup>7</sup> Mauritius had a record sugar output level (above 700000 tons) and price of sugar increased three-fold.

cyclone in 1980 and (ii) the world economy was riding the downswing of the trade cycle. Although devaluations in 1979 and 1981<sup>8</sup> to correct currency misalignment were very painful to the people with inflation being 42% in calendar year 1980, it addressed the competitiveness issue and when a holistic approach was subsequently adopted by bundling it with a repackaging of fiscal incentives, a clear signal from a newly elected government about the future of the EPZ sector<sup>9</sup>, a forceful promotion of the export led growth strategy to attract FDI, expansion of hotel room capacity and air flights frequency as well as favourable exogenous factors, Mauritius managed to add two new pillars, Tourism and Textile and Clothing to the previously sugar-based economy. In the process internal and external imbalances were corrected and the public deficit brought to a sustainable level.

Having successfully completed the stabilisation programme, Mauritius pursued the structural adjustment programme towards a more market-based economy. It completely dropped the idea of self-sufficiency in favour of increased openness to trade and investment and during the 1990s it embarked on a liberalisation path via a series of measures such as privatization, relaxing price control, abolition of exchange control and adoption of Public-Private Partnerships as a new way of providing services and physical infrastructure to the population. These coupled with supply side tax reforms were aimed at enhancing the role of the private sector in the economy.

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<sup>8</sup> 30% in October 1979 and a further 20% in September 1981.

<sup>9</sup> Before 1982, the harsh working conditions in the EPZ sector created a cultural clash leading to a permanent debate about choice of strategy and the future of the EPZ. The private sector then preferred playing the waiting game to taking initiatives.



The sugar industry which was employing 52,600 people<sup>10</sup> in 1976 had to move to more mechanisation during the 1980s as young people preferred to work in the manufacturing sector rather than in the sugar cane fields as labourers. The level of employment in sugar activity dropped consistently and reached 40,000 in 1990. That had no adverse impact on unemployment, which was at its lowest figure of 3% in 1991. From then onwards discussions about agriculture coming under the purview of GATT started sending signals to the industry about the need to modernize and reduce costs. Ad hoc measures were initially adopted but it ultimately culminated with a comprehensive centralization plan to benefit from economies of scale and lower production cost for ensuring the survival of the sugar industry which has to face both a phasing out of support pricing policy in Europe and also the entry of sugar from Least Developed Countries (LDCS) duty free and quota free into the European market. The centralization plan has been accompanied by a voluntary retirement scheme causing employment to drop to 17,770 in December 2003.

On the manufacturing front, employment reached its peak level of 89,000 in the EPZ in 1992. Upward wage pressure due to labour shortage in early 1990s, increased competition from new Asian and African producers of basic garments, relocation of some production activities to Madagascar and modernization of some firms that were moving up market all combined into a job destruction process. Discussions about the phasing out of the Multifibre Agreement (MFA) also led to a wait and see attitude hindering initiatives in the textile and garment industry.

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<sup>10</sup> This figure dropped to 48700 in 1979 following two isolated cases of centralisation of sugar mills.



Because the unemployment level started rising again by mid 1990s with job contraction in sugar and textile, the country identified a new phase of growth and job expansion powered by the services sector <sup>11</sup>. More recently focus has been on the consolidation of information and communication technology (ICT) in order to penetrate the pure ICT product markets, to take full advantage of our potential in the global business process outsourcing (BPO) market and to improve productivity in all sectors. Additionally, efforts are being made to channel resources towards turning the economy into a fishing hub and a regional knowledge hub. The economic agenda also comprises a rigorous expansion of the small and medium enterprises, which have a higher labour-capital ratio than large firms. Although the financial services sector is not expected to contribute intensively to the creation of direct jobs much attention is devoted to that sector with a view to improve the financial intermediation process for higher overall economic performance. With that in mind, a financial liberalisation policy was adopted at the beginning of the 1990s.

### **1.3 Rationale for the Research and Objectives**

The standard view worldwide at the moment is that economic growth in developing countries has been stagnant partly due to repressed financial systems. The empirical literature in the field of financial liberalisation is adequately documented but the evidence has been mixed in various fields such as financial sector crises and direction of causation between the financial superstructure and economic growth.

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<sup>11</sup> Freeport services, financial services, professional services.

Mauritius embarked on a continuous programme of financial reforms in the early 1990s and because of secondary effects no adequate evaluation of such reforms was undertaken prior to the end of the 1990s. In June 1999, when the choice of the research topic was made for application as a registered research student<sup>12</sup>, no in depth analysis had been carried out on the financial liberalisation process in Mauritius. The aim of the research was to investigate a variety of issues related to the financial liberalisation process in Mauritius. Given the broad coverage of this study, not all issues have received the same in-depth treatment. This thesis is only a modest contribution in a process of further filling the gap in the literature by attempting to answer the research questions set out below.

#### **1.4 Research Questions**

1. What is the path followed by the Mauritian authorities in monetary policy reform and what are the outcomes in terms of performance, interest spread and banking crises?
2. What were the changes undertaken at banking regulatory and supervisory level and to what extent do banks satisfy the new requirements?
3. What have been the developments in the stock market and what changes have been observed after liberalisation?
4. What has been the effect of liberalisation on the random walk of stock prices, the beta of companies and the stock market?

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<sup>12</sup> Registration as part-time MPhil/PhD student was in November 1999.

5. What are the changes in financial development and to what extent has financial liberalisation led to higher demand for bank assets as per the McKinnon and Shaw paradigm? What comparison with other Southern and Eastern African countries can be usefully made?
6. What causal impact, if any, has there been between financial development and growth?
7. Is there a link between interest rate liberalisation and corporate financial strategy in Mauritius?
8. Has liberalisation led to lower cost of intermediation and if so, what are the causes thereof?

## **1.5 Research Method**

This research is a desk-based one. It is partly qualitative to the extent that it critically analyses the literature and makes use of some descriptive statistics in examining the Mauritian reality. A second part of the research is quantitative and involves economic modeling using secondary data published by various international and domestic financial and corporate institutions. All the regressions were run using the EVIEWS software, version 3.1.

Some of the weaknesses concerning the data used are listed below:

1. Whenever the analysis mentions the region, reference is to countries in Southern and Eastern Africa. However, some countries like Mozambique had to be left out because of missing data for several years and for several variables for the sample period under consideration.



2. Some data, such as the real exchange rate index are not available for all countries from the IFS. Neither are available the data<sup>13</sup> that could facilitate the construction of the index for such countries. Such a constraint has therefore imposed the use of the real exchange rate against the US dollar. This variable has been calculated by adjusting the nominal exchange rate for relative consumer prices. Data constraint has also influenced the choice of the sample period. While the period under consideration for Mauritius separately is 1979 to 2002, for the pooled series the period is only 1986 to 2000 due to missing figures from the International Financial Statistics (IFS)<sup>14</sup> for the various cross section identifiers.

3. Some domestic financial data (e.g. non-performing loans) have been compiled by the appropriate authorities only in recent years. This has prevented the use of such data as an explanatory variable.

4. In the case of the financial corporate strategy model in Chapter 8 some companies had to be dropped from the sample because of missing annual reports from the office of the registrar of companies despite submission of such documents being mandatory. In such cases efforts to get the information directly from the companies concerned were fruitless. Private firms in Mauritius are generally not very collaborative in so far as providing information that one expects to have been archived. Absence of a research culture in the country probably explains why firms see only the associated cost and not the potential benefits. The problem concerning corporate data is that pre and post liberalisation comparison of corporate behaviour

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<sup>13</sup> Trade weights with respect to the respective trading partners.

<sup>14</sup> Published by the IMF.

had to be limited to a sample of only eleven companies since many others were not yet listed on the stock exchange before liberalisation. Because of un-uniformed accounting requirements in the early days, for some years, certain companies' profit and loss accounts start with the gross profit item rather than with turnover. Such companies also had to be excluded from the sample. From the forty listed companies, the eleven companies that have been retained for the study of corporate financial behaviour are listed in Appendix 1.

A possible approach to the data analysis is the application of Box-Jenkins ARIMA models. This was considered at an earlier stage and ruled out for the following reasons:

- The data available is too low frequency for ARIMA. Most of the data is annual and stock market data, although more frequent, is still not frequent enough (for example hourly or daily) – it is only by trading session.

- Preliminary tests revealed no positive or negative serial correlation hence none of the data is auto-regressive thus ruling out ARIMA analysis (Newbold, 1983 and Stellwagen and Goodrich, 1997)

Therefore the OLS, SUR and GMM regression methods were selected for the type of data and for the causal analysis required and implied by the McKinnon and Shaw paradigm.

## **1.6 Structure of the Thesis**

In Chapter 1 the changes in the Mauritian economy leading to financial liberalisation and the rationale for the research are discussed. The key research questions are listed and the difficulties encountered mentioned. A brief presentation of the research method is also included. More details about methodology are contained in later Chapters.

In Chapter 2 of the thesis the financial system is introduced and the early arguments about the financial intermediation and growth nexus considered. The Chapter then considers the rationale for low interest rate policy and highlights the Keynesian arguments in favour of government intervention in the financial markets. It then refocuses on the debate in the 1950s about the financial capacity of an economy. This is followed by an analysis of the debate on the “demand-following” and “supply- leading” approaches.

Finally the Chapter considers the McKinnon and Shaw Hypothesis of financial liberalisation and the development of 1st generation models explaining how the size of the banking sector affects capital accumulation, how financial repression favours the traditional sector in a context of financial dualism and how capital mobility improves access to debt and equity instruments but necessitates coordination between internal and external policy reforms.

Chapter 3 chapter deals with the second-generation models about the role of banks in improving the informational frictions, the shifting of savings from unproductive



assets (money) to productive illiquid assets and the reduction in the cost of innovation when the financial system is improved.

The Chapter also considers the refinements (macroeconomic stability, sequencing, prudential regulation and supervision) brought to the financial liberalisation argument following empirical evidence in the 1980s and 1990s of banking *cum* currency crises.

In Chapter 4 new emerging bodies of literature questioning the financial liberalisation tenet are presented. The schools of thoughts examined are:

1. The New Structuralist School emphasizing the role of the unofficial money market in developing countries and arguing that a programme of financial liberalisation reduces the supply of loanable funds and hinders growth.
2. The New Keynesian arguments about informational market imperfection. The connections with adverse selection, moral hazard and credit rationing by banks and warranting some government intervention (mild repression) in the financial markets of developing countries are examined. Intervention on the external front to reduce the volatility of capital flows and associated domestic financial fragility is also discussed.
3. The Post-Keynesian arguments are presented as being in opposition to the financial liberalisation philosophy. This body of literature highlights the transformation of ownership into tradable claims in a context of liberalisation causing an improvement in liquidity but at the cost of short-

sighted speculation-led economic development characterized by risky investment practice and causing resources to be diverted away from productive use. Emphasis is on uncertainty with endogenous expectations and endogenous instability that need to be interrupted by some institutional intervention. The idea of market makers is proposed to provide an anchor for market psychology and hence prevent any bandwagon tide leading to disruptive speculation.

Chapter 5 is a descriptive chapter presenting the banking sector, the insurance sector, the security market and the offshore sector in Mauritius.

The changes at regulation and supervision level with a view to improve the protection of both financial investors and consumers of financial services are examined.

Chapter 6 discusses domestic banking issues in Mauritius. It reviews the shift from direct to indirect control of money supply considering both internal and external reforms, banking spread and banking crises.

Chapter 7 measures financial development in terms of stock market indicators.

Some cross country comparisons are made. It also contains a pre and post liberalisation examination of the volatility of share prices, return, and non-diversifiable risk.

Chapter 8 presents an econometric analysis of financial deepening, the causality between finance and growth, corporate financial strategy before and after financial liberalisation and also the analysis regarding interest rate spread.

Chapter 9 presents a discussion, conclusions, policy implications and future directions for research.

## **Chapter 2**

### **LITERATURE REVIEW**

### **FINANCIAL LIBERALISATION: BASIC THEORETICAL**

### **FRAMEWORKS**

#### **2.1. Introduction to the Debate**

In this chapter, it is proposed to examine changes operating in the financial markets in developing and emerging countries. The changes relating to financial liberalisation are being examined from a historical perspective but at the same time, different views are critically discussed. Certain reservations are expressed about the New Classical approach which is the current dominating view influencing the policies of the major international financial institutions. Some alternative schools of thought will also be reviewed in Chapter 3.

Every country's financial system consists of the various financial institutions and their corresponding arrangements. In an Arrow-Debreu world, markets are complete and frictionless with symmetric information and no transaction costs (Arrow and Debreu, 1954). In such a perfect environment, there is no role for financial intermediaries since surplus units<sup>15</sup> and deficit units<sup>16</sup> can easily achieve risk allocation on their own. Funding is provided through two types of market contracts, equity and bonds and economic decisions are independent of financial structures, (Modigliani and Miller, 1958). However in the real world, financial markets provide various channels for the transfer of funds from surplus units to

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<sup>15</sup> Economic units whose savings exceed their planned investment.

<sup>16</sup> Economic units whose savings are not enough to satisfy their desired investment.



deficit parties. Direct financing takes place when surplus units transfer funds to deficit units in exchange for primary securities. Additionally, and more importantly, financial intermediaries provide indirect financing by acquiring surplus funds from surplus units in exchange for indirect security and transferring funds to deficit units in exchange for primary securities. Empirical studies show that in most countries, a small proportion of firms' capital structure is financed by equity and bonds (Mayer, 1990).

Financial intermediaries then have a major influence on the economy as they carry out two basic functions, namely:

- (i) Providing an efficient mechanism for making payments, and
- (ii) Facilitating the flow of funds in the economy by making it feasible for certain classes of borrowers to obtain greater quantities of credit and better credit terms than they would otherwise get from direct issuing of securities to lenders (Gertler, 1988)

These functions of the financial system contribute to economic growth in various ways:

- (a) They facilitate trade and hence specialization, both resulting in economies of scale and welfare gains.
- (b) They favour increases in aggregate expenditure and hence a higher level of economic activity.

The financial intermediation process involves the institutions in creating liquidity to the lender<sup>17</sup> as well as in maturity transformation by aggregating small

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<sup>17</sup> Liquid securities - deposits.

amounts of funds and lending large parcels. Liquidity risk is thus reduced (Diamond and Dybvig, 1983). Diamond, (1984) further explains that deposit-taking institutions also provide risk pooling and monitoring services<sup>18</sup> and hence idiosyncratic risk is reduced. Regarding the delegated monitoring function, Townsend, (1978), Gale and Hellwig, (1985) and Williamson, (1986) point out that transfer of this function from individuals to specialised institutions can reduce cost as the latter benefit from economies of scale. This allows borrowers to get funds at lower cost than via direct lending. Additional resources can then be freed for productive use. Financial intermediation then results in a more efficient allocation of resources.

The debate concerning the link between financial intermediation and growth was initiated long before the arguments about financial liberalisation emerged. Hamilton<sup>19</sup>, (1791) pointed out that banks were the “happiest engine” that ever were invented for creating economic growth. With government encouragement the number of banks in the U.S.A rapidly rose from three in 1791 to above 800 in half of a century. However, Hamilton does not provide any academic rationale in support of his ideas. Bagehot (1873) and Schumpeter, (1912) underscore the causal role of intermediaries on spurring growth. Bagehot highlights the role of banks in providing liquidity to firms and the need for the former to get access to a public sector provider of liquidity, the central bank. Schumpeter on his part focused on the contribution of financial institutions in both evaluating and financing entrepreneurs in the initiation of innovative activity as well as in bringing new products and new processes to the

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<sup>18</sup> Monitoring of borrowers by lenders.

<sup>19</sup> Hamilton was the person to act as “Secretary of the Treasury” in the USA and he made important recommendations to government to promote the manufacturing sector. The development of banks was part of his recommendations.



market. The crux of his argument is that while technological innovation is a major determinant of long-run economic growth, it actually depends on the ability of the financial sector to extend credit and to provide other services<sup>20</sup> to the entrepreneur. It was very much later that historical economists like Cameron (1967) and Sylla (1969) examined the historical experiences of England<sup>21</sup> and the U.S.A<sup>22</sup> just before and during industrialization and gave empirical content to the idea of a link between financial development and growth.

Friedman and Schwartz (1963) examined the cash nexus in early bank crises in the U.S.A. During the 1907 crisis banks mutually agreed not to convert deposits to currency for a while to avoid a crash. Restrictions on conversion from deposits to currency were to become unnecessary with the establishment of the central bank as a lender of last resort. However, Friedman and Schwartz (1963) observe that after the stock market crash in 1929 the US Federal Reserve Bank was passive<sup>23</sup> and failed to provide sufficient liquidity. The weak expansionary or tight monetary policy after the stock market crash in 1929 could not offset the movement towards a reduction of credit and money supply and made the depression deep and long.

The collapse of the financial system and of the real economy at the time of the Great Depression led Fisher (1933) to argue that the economic downturn of the Great Depression resulted from poorly performing financial markets. The prosperity period preceding 1929 was characterised by high leverage. Fisher argues that debts

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<sup>20</sup> Evaluating projects, managing risks and monitoring managers.

<sup>21</sup> England 1730-1844

<sup>22</sup> USA 1863-1913

<sup>23</sup> Because it lost the leadership of B. Strong who passed away.

were great enough to not only 'rock the boat' but to start it capsizing and so the triggered downturn inevitably precipitated a series of bankruptcies, which in turn reinforced the downturn itself. While accepting Friedman and Schwartz' analysis about sharp reductions in money supply causing a fall in output, Bernanke (1983) argues that the non-neutrality of money over such a long period had no theoretical foundation. He therefore investigated the role of finance in a depression and argued that during the early 1930s, the collapse of the banking sector following large loan losses choked off financial flows to the real economy. As banks substantially withdrew from their credit intermediary role, both consumer and investor demand were reduced and this was a more important factor influencing the depth and persistence of the depression than monetary forces. Bernanke's approach revives the Keynesian tradition but enriches it with the role of the financial system. Financial considerations played an important part in the theory of investment behaviour as per Keynes' general theory (Keynes, 1936). Keynes viewed the collapse of either borrowers or lenders as being sufficient to induce a downturn and that a return to prosperity required both borrowers and lenders to be confident. However, the financial system as such did not play a key role in Keynes' theory of output determination.

In a financial accelerator model, Bernanke and Gertler (1989) explain the interaction between macroeconomics and finance. They argue that with the decline in net worth following deflation, collateral value falls and that such a weakening of the balance sheet forces borrowers to cut back on current expenditure and future commitments. Banks on their part are faced with a riskier position as collateral are

eroded with deflation. They therefore shift to government bonds and other safe liquid assets. These two factors combined to amplify a downturn and have an adverse impact on output and employment.

## **2.2 Pre-Liberalisation Period: Low-Interest Policy**

In his analysis of the Great Depression Keynes (1936) argues that investment is determined by business confidence, animal spirit and expected demand. Although interest rate matters to him, the demand factors are more important. According to the Keynesian theory of money (Keynes, 1936), after the interest rate has fallen to a certain level, almost every economic unit wishes to hold money rather than financial assets because they expect the next move to be a rise in interest rates leading to a capital loss for bond holders. Speculative gains will arise only from holdings of cash. This liquidity preference to holding productive capital causes an insufficient level of investment. The liquidity trap creates a floor to interest rates preventing the latter from falling to a lower level until a full employment level of investment is reached. After Keynes Keynesians have build-up from his theoretical framework to propose a standard policy of low-interest rate to favour economic growth

Tobin, (1965, 1967) provides a justification for what is to-day called financial repression policies by extending the Solow Growth model<sup>24</sup> so as to include money and the effect of monetary policy on growth. In this model of a two-asset portfolio choice, economic units allocate their wealth between real money balances and

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<sup>24</sup> Robert Solow (1965) neoclassical growth model

productive (physical) capital. The higher the return on capital relative to the yield on money, the greater is the amount of capital that will be in every individual's portfolio. So, capital deepening<sup>25</sup> leads to higher economic growth since a higher capital-labour ratio creates greater income per capita. Capital deepening can be obtained by reducing the deposit rates of interest thereby encouraging asset holders to prefer physical capital to money.

Tobin's central thesis is that in a non-monetary economy all savings are held in the form of physical capital. Tobin then introduces money in the economy as government fiat only. This new asset has the effect of reducing the level of physical capital since some savings will be held as real money balances for precautionary and speculative demand. Precautionary balances are still more important in developing countries where income and output are more vulnerable to shocks. In order to neutralise the resulting contractionary effect, government has to provide new money to satisfy the precautionary and transaction demand. This is done by government continuously running a deficit financed by the issue of new money. The resulting increase in money supply lowers the rate of return on real balances and leads to capital deepening, albeit provoking inflationary pressures.

Tobin's model largely dominated the economic debate in the 1960's and 1970's on account of two largely accepted views, namely: -

- (i) Fiscal expansion stimulates investment and hence favours growth.
- (ii) For investment to occur the return on money must be rendered lower than the marginal productivity of capital.

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<sup>25</sup> A process of accumulating capital at a faster rate than at which labour grows.



However, today notes and coins in circulation forms only a small part of the money supply<sup>26</sup>. The model is therefore limited in the sense that it considers only government fiat money and ignores inside money created through credit via the fractional reserve banking principle<sup>27</sup>.

Keynes's liquidity trap argument, as well as Tobin's two-asset portfolio allocation model, constituted the rationale for an inflation tax, low interest rate policy and high banking reserves requirement throughout the world for several decades so as to prevent the allocation of savings to unproductive money balances. Additionally, just after the widespread bank failures in the early 1930's, many commentators argued that without interest rate ceilings, banks would engage in ruinous competition for funds by bidding up deposit rates and then try to cover the increased cost by acquiring risky assets for higher potential returns.

Levahri and Patinkin (1968) launched the first attacks on the Keynes-Tobin model that they consider to disregard money. These scholars argue that in a monetized economy output depends not only on physical capital but also on working capital and so money is actually a productive function of output  $\left[ Y = f\left(L, K, \frac{M}{P}\right) \right]$ <sup>28</sup>.

However the Keynes-Tobin model remained the mainstream and during the 1960's and early 1970's, market failure/imperfection and infant industry arguments provided additional support to the policy of imposing artificially low interest rates. On these

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<sup>26</sup> Currency today represents 6 % of broad money in Mauritius.

<sup>27</sup> The fact that banks keep only a fraction of their asset in liquid form allows a process of deposit expansion with a credit multiplier.

<sup>28</sup> Y represents Output, L represents Labour, K represents physical capital,  $\frac{M}{P}$  represents real money balance.

two fronts government intervention was seen as a powerful answer and the newly independent countries adopted interventionist policies.

(i) Market imperfection/failure: Stern (1991) developed a taxonomy of reasons<sup>29</sup> for market failures in developing countries. As for the financial sector, in the early post independence era, it was largely dominated by commercial banks and there was very little presence of non-bank financial institutions. The banks themselves were in most cases foreign-owned, with branches in the main towns only, and they supplied only short-term commercial and trade credit. They provided long-term credit almost exclusively to foreign-owned natural resources industries and failed to support the modernisation of agriculture and industrialisation. Further, because of the oligopolistic structure of the banking industry, the market determined rates tended to be rather high. Markets were also deficient in the provision of information and access to credit by local enterprises. This favoured the existence of an indigenous money market<sup>30</sup> providing basically short-term loans to farmers and small businesses. Wai (1977) also observes that while in the 1950s the unorganised money markets in most developing countries were larger than the organised ones this pattern had changed in the 1970s. Wai reported that 55-60% of demand for non-institutional credit was for purely productive purposes. The role of the unofficial money market in developing countries will be examined in Chapter 3 when considering the arguments of the “New Structuralists”.

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<sup>29</sup> e.g externalities, monopolistic/oligopolistic competition, increasing returns to scale, acute informational problems , concern about improving the allocation of resources.

<sup>30</sup> Made up of money lenders, traders, pawnbrokers.



High interest rates were charged because of high rates of default, difficulties in enforcing contracts and the high cost of screening borrowers. Intervention in favour of low interest rates was thus considered as fully justified.

The lack of provision of long-term credit constraining output and growth in developing countries constituted another market failure and motivated a role for government. Government intervention in the credit market was considered as fully justified on account of its impact on growth and also on income distribution in so much as it allowed credit to reach individuals short of collateral and earning below-average income. Information imperfections in credit markets also created problems that could be moderated only by government intervention. This will be further examined in chapter 3 where New-Keynesian ideas are discussed.

Cho, and Khatkhate (1989) suggest that still another rationale for a low interest rate policy was the severe limits to fiscal expansion in many countries because of a narrow tax base, low limits on income tax due to low real wages, inefficiency and high cost of tax collection in these countries. This argument is indirectly associated with the market failure one in the sense that tax revenue allows government to play its allocative role as regards public goods and merit goods as well as its redistributive role with respect to income inequality. These constraints on fiscal expansion were seen as almost binding and therefore the policy of low interest rates was designed to provide an environment in which access to cheap finance was possible for both individuals and government. This policy was considered as especially important where Government deficits were primarily being financed by

financial institutions that play a key role in supplying finance by having to compulsorily buy government debt at a predetermined rate.

(ii) Infant Industry: Hamilton (1791), in his report on manufactures<sup>31</sup> in the U.S.A, suggested high tariff walls to encourage the production of textiles, ferrous metals and other industries that were less competitive than Britain. In line with the prevailing import substitution strategy it was widely accepted that some production activities could not initially face foreign competition but could subsequently develop a competitive advantage, if only they could get started and be given the necessary breathing space. The U.S.A actually adopted extensive import barriers in its first 100 years to shelter its manufacturing sector from world competition. The infant industry argument was adopted equally by Germany against British competition in the 19<sup>th</sup> century and by Japan in the automobile industry just after World War II<sup>32</sup>. Various writers, Prebisch (1950), Myrdal (1960), contributed to the flourishing of the infant industry argument amongst the developing countries' political leaders in the aftermath of independence after World War II. These authors claimed that developing countries face two problems, (1) as exporters of primary commodities they are exposed to world swings in commodity prices (2) the primary sector cannot absorb the abundant supply of labour available in developing countries and rather than waiting passively for comparative advantage to direct resources to labour intensive manufacturing, industrialization should be forced by import substitution industrialization. Apart from tariff protection the infant industry argument also

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<sup>31</sup> Just after the civil war in USA.

<sup>32</sup> Before Japan became a tough competitor.

pushed towards government intervention in the allocation of credit with a view to boost economic development. Directed credit programmes with interest rate ceilings were adopted by the newly independent developing countries in the 1950s and 1960s in view of providing a subsidy to firms undertaking projects in the priority sectors as per government economic strategy. Such projects may have been unprofitable at the market interest rate and would have been excluded from the process of allocation of resources. Governments also imposed controls on international capital flows, especially to restrict outflows. Such restriction coupled with an excessively overvalued currency fitted well the import substitution strategy by making technology available at artificially lower cost. Unfortunately, an overvalued currency has its anti-exports bias and renders domestic agricultural and manufacturing products uncompetitive in world markets. Governments then had to resort to import controls to correct balance of payments difficulties.

After Keynes much of the economic debate was over the transmission mechanism linking money to real activity. Early Keynesians emphasised the role of real factors such as multiplier/accelerator effects and fiscal policy while monetarists put emphasis on the key role of money and its direct transmission to the real economy. Both the followers of Keynes and the monetarists have for long ignored other aspects of the financial system and the debate about the finance-growth nexus had been minimal.

Gurley and Shaw (1955, 1967) tried to focus the debate towards the interaction between financial structure and the real economy highlighting the role of

financial intermediaries in transmitting loanable funds between spending units. The argument put forward by Gurley and Shaw is as follows:

*“Economic development is retarded if only self-finance<sup>33</sup> and direct finance<sup>34</sup> are accessible.....but total debt, including both the debt that intermediaries buy and the indirect debt of their own that they issue, rises at a faster pace relative to income and wealth than when finance is either direct or arranged internally.”*

[Gurley and Shaw, 1955, pp.518 & 519].

Gurley and Shaw also argued that as the intermediary system evolves, the exclusive focus on money becomes less justified for two reasons, namely:

- (i) The money stock becomes a less exact measure of the flow of credit.
- (ii) The liability of non-bank financial intermediaries (NBFIs) provides an alternative form of holding liquid balances. But NBFIs whose developments in recent decades have diversified indirect finance are actually ignored in the Keynesian liquidity preference model.

With the development of NBFIs in sophisticated economies and their increasing role in lending, monetary policy becomes a less efficient measure of controlling flows of loanable funds and spending on goods and services. It actually exerts control on money, which is only one of the financial assets while it has

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<sup>33</sup> Investment out of retained corporate earnings.

<sup>34</sup> Deficit units issue direct securities to surplus units in exchange of funds. There is no intermediation.



become more appropriate to adopt financial control that regulates the creation of all assets. Referring to the Quantity Theory of Money, Gurley and Shaw observe that if other indirect financial assets exist increasingly as a substitute for money (narrowly defined), the latter asset represents a smaller share of the total financial assets and money supply may fall while interest rates decline simultaneously. This does not imply that monetary policy is of no influence on real activity. However, more important is the economy's overall financial capacity. This is the measure of the borrower's ability to absorb debt and is an important determinant of aggregate demand. In that perspective, intermediaries have an important role as they expand borrowers' financial capacity.

Gerschenkron (1962) observed from the German industrialization experience that banks played a management role in industry and also prevented fratricide struggle among industries. He further observed the role of institutions like the "Credit Mobilier" for the industrialization of France and the *"abortive upswing the Italian industrial development in the 1880s mainly because the modern investment bank had not yet existed in Italy"*. [Gerschenkron, 1962, pp363]

Gerschenkron therefore argued in favour of "universal banking" style of Germany<sup>35</sup> highlighting that in economically backward countries, the setting up of banks constitutes the main source for finance and consequently for entrepreneurship. Based on evidence from Russia where public mistrust of banks kept small saver's

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<sup>35</sup> Where Investment banks channeling fund to firms are not separated from commercial banks responsible for the payment system as per the policy of dividing banks by function adopted by the USA and some other countries after the great depression.



funds outside the banking sector Gerschenkron also suggests that state ownership of banks could deepen financial markets.

Goldsmith (1969) suggests that the financial superstructure of an economy accelerates economic growth and improves economic performance to the extent that it facilitates the migration of funds to the best user, i.e. the place in the economic system where the funds will yield the highest social return. Goldsmith developed a Financial Intermediation Ratio (FIR) of financial assets to national wealth and observed that the FIR tends to increase with the real economy. However, this sheds no light on the direction of causation between FIR and growth.

Gurley and Shaw (1955) and Goldsmith (1960) all gave evidence of a positive correlation between the performance of the financial and the real sector and showed a relationship between financial deepening<sup>36</sup> and the growth rates of real output. In fact an important implication of the Gurley and Shaw analysis about financial development<sup>37</sup> is that as an economy experiences growth, the rate of growth of accumulation of financial assets will be higher than the growth rate of the real economy.

In the 1950s and 1960s, the dominant thinking remained nonetheless that of Robinson (1952), namely that the financial system responded passively to demand for various types of services as a result of economic growth i.e enterprises lead and finance follows.

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<sup>36</sup> i.e the size of the intermediary sector relative to nominal income.

<sup>37</sup> Monetisation of the economy and increased intermediation via banks and NBFIs.

*“When a strong impulse to invest is fettered by lack of finance, devices are invented to release it.... And habits and institutions are developed.”*

[Robinson, 1952, pp. 86-87]

The arguments on the financial system stimulating growth moved the debate towards whether the provision of financial facilities should be demand-following or supply-leading, Patrick (1966). Patrick identified two possible patterns in the causal relationship between financial development and economic growth.

“Demand-following” is defined as the phenomenon in which the creation and expansion of financial institutions, their financial assets and liabilities, and related financial services is in response to demand for these services by investors and savers in the growing real economy, as per Robinson’s hypothesis. Real economic growth leads to development of financial markets and this increases the opportunity of acquiring liquidity for reducing risk. This in turn has a positive feedback on real growth.

Patrick observes that the demand-following argument assumes that the supply of entrepreneurship in the financial sector is very elastic with respect to the profit opportunities. However, in practice the supply of financial services in response to demand may not be as flexible and automatic as claimed because of restrictive banking legislations<sup>38</sup> and market failures<sup>39</sup>. The resulting lack of financial services then restricts the growth process.

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<sup>38</sup> E.g France in early 19<sup>th</sup> Century.

<sup>39</sup> Religious barriers preventing the market to respond.

“Supply-leading” is where the creation of financial institutions and the supply of their financial assets, liabilities and financial services are in advance of demand for them. The idea is to create favourable expectational and psychological effects on entrepreneurs, enabling them to “think-big”. The likely result is the transfer of resources from traditional sectors to modern sectors and the stimulating of entrepreneurial response in the modern sectors. Hicks (1969) argued that the industrial revolution in England in the late 18<sup>th</sup> and early 19<sup>th</sup> centuries was not due mainly to technology but to financial reforms.

The setting up of the Development Bank of Mauritius just after independence, the creation of the State Bank of Mauritius, the creation of the Stock Exchange of Mauritius can be viewed as being in conformity with a partial adoption of the “supply-leading” approach as an engine for growth.

Since the 1950s the World Bank has been a promoter of development banks in developing countries as part of its institution building strategy to alleviate some form of market failures by meeting certain credit needs not supplied by commercial banks, (Fry, 1987). Many projects generating positive externalities would otherwise be underfinanced. While in Mauritius the setting up of a development bank in a “supply-leading” strategy has been effective, development banks became insolvent in many developing countries. Expansion of credit supply does not automatically stimulate investment to trigger growth.

For “supply-leading” to be effective, there should exist an entrepreneurial culture as well as an economic background favourable to investment. “Supply-leading” then represents an opportunity to induce real growth but not a necessary

pre-condition. Intermediaries set up in a context of lack of demand for available funds can lead to lending to projects of dubious quality resulting in a mountain of non-performing loans. Further, resources having alternative uses, a supply leading approach must be able to stimulate the economy to a reasonable extent to justify its adoption. Patrick actually argues in favour of a sequential mix of the two approaches with the leading pattern in the causality changing over the course of the development. That is *“as the process of real growth occurs, the supply leading impetus gradually becomes less important, and the demand-following financial response becomes dominant”*

[Patrick, 1966, p. 174].

There are however some well-known scholars like Lucas (1988), Stern (1991) and Ireland (1994) who simply deny any causal relationship in whichever direction between financial deepening and economic growth.

### **2.3 The McKinnon and Shaw Paradigm (*Financial Liberalisation*)**

Government intervention in the form of credit ceilings, directed credit programmes, imposition of high reserve requirements and capital controls were common practices in the 1960s and 1970s. However, while the Keynesian approach proposed to solve the market failures and imperfections, its implementation (or mis-implementation) often led to widespread government obstructionism in the form of apparent inefficiencies in the financial system and poor economic performance<sup>40</sup>.

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<sup>40</sup> Free marketers would argue that the economic deterioration was actually due to government intervention and that there was a case of government failure.



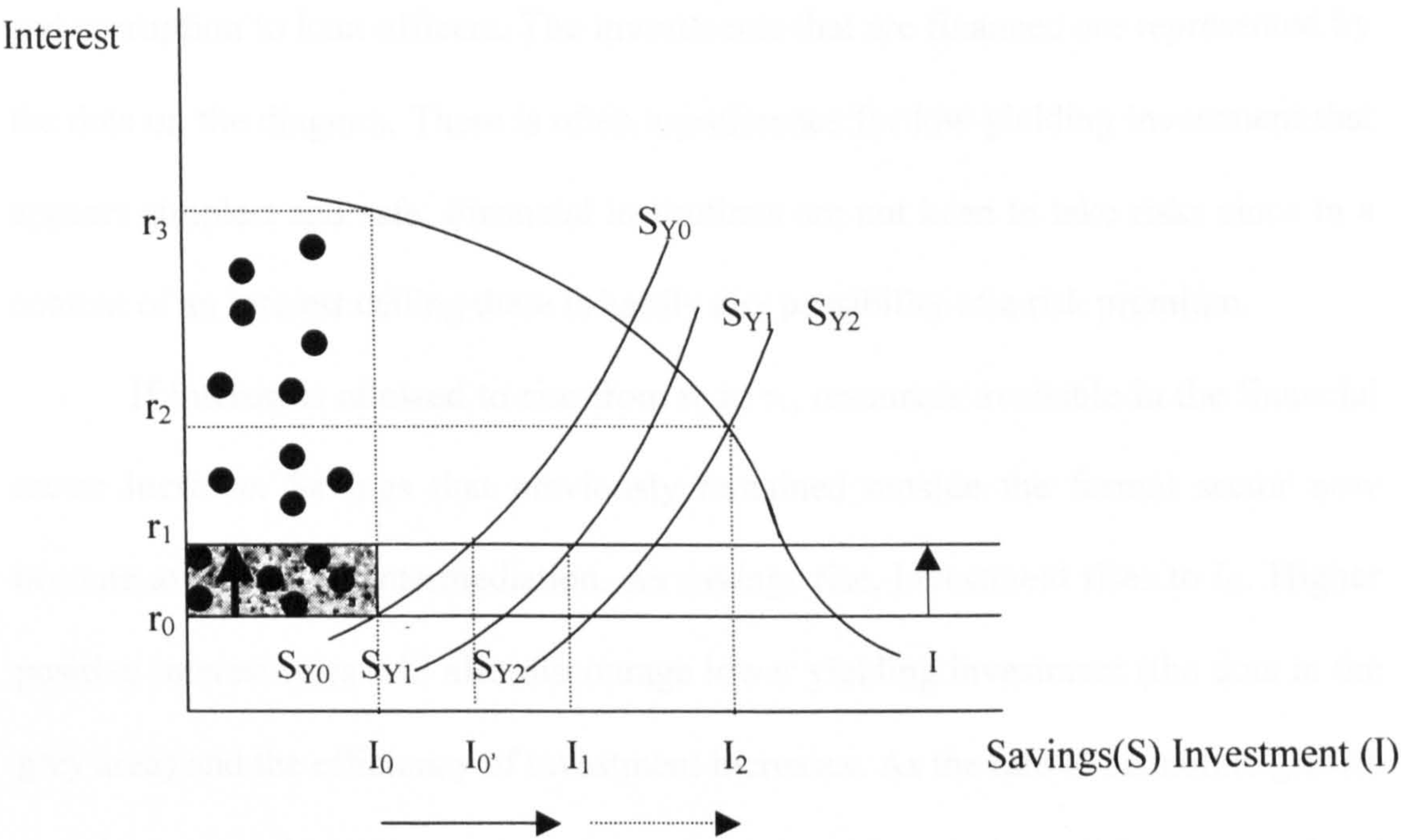
The prevailing economic conditions of the 1960's and 1970s then constituted a fertile ground for an increasing belief in free market forces and its ability to allocate resources in a more efficient manner.

In this context, McKinnon (1973) and Shaw (1973) independently made a case for financial liberalisation so as to improve growth in developing economies. They introduced the term “financially repressed economy” in the literature to explain unintended distortions in the domestic capital market by tax<sup>41</sup>, interest ceilings, directed credit and exchange control. Their arguments regarding the abolition of explicit controls on price and allocation of credit still constitute the core theoretical basis for freeing the financial sector from its “regulatory shackles”. The argument is that at a low, below market rate, interest rate reduces savings and inhibits growth. This is obviously based on the assumption that saving is sensitive to interest rate and that the two variables are positively related. The McKinnon and Shaw paradigm is depicted in the dynamic model of savings and investment developed by Fry, (1978) as shown below.

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<sup>41</sup> i.e the financial system being taxed implicitly and explicitly

**Figure 1.2**  
**Saving and Investment under Interest Rate Ceilings.**



Source: Fry (1978)

- Savings are positively related to the interest rate.
- $S_{Y0}$  represents savings at income level  $Y_0$
- $r_0$  represents the administered interest ceiling.
- Investment is negatively related to the interest rate.

At the artificially low interest rate  $r_0$ , actual investment is constrained to be at  $I_0$  because of low savings.

But, if an interest ceiling applies only to deposits (Savings) and not to loans, then borrowers would face rate  $r_3$ . Fry (1978) suggests that if the banking sector is competitive, the spread  $r_3-r_0$  would be spent on non-price competition. However, financially repressed economies would generally apply a ceiling to both deposit and

loan rates. Credit would then be rationed<sup>42</sup> by non-price factors such as quality of the collateral, perceived risk of failure, political pressures, name (including nepotism), and corruption to loan officers. The investments that are financed are represented by the dots on the diagram. There is often a preference for low yielding investment that appears simplest and safe. Financial institutions are not keen to take risks since in a context of an interest ceiling there is hardly any possibility of a risk premium.

If interest is allowed to rise from  $r_0$  to  $r_1$ , resources available in the financial sector increase. Savings that previously remained outside the formal sector now become available for intermediation. As savings rise, investment rises to  $I_0$ . Higher positive interest rates will also discourage lower yielding investment (the dots in the grey area) and the efficiency of investment increases. As the rate of economic growth and the income level increase, the savings curve shifts to  $S_{Y1}$  and investment level reaches  $I_1$ . If the interest rate is allowed to reach  $r_2$ , the same set of events takes place with investment ending at  $I_2$ . Higher domestic investment level then reduces excessive dependence on foreign capital flows.

The specific arguments of McKinnon and of Shaw are now examined separately. The McKinnon analysis rests on two assumptions:

(i) Every economic unit is confined to self-finance.

(ii) Investment expenditures are indivisible and are much lumpier than consumption expenditure. Hence any potential investor must initially accumulate the money balances needed for financing their investment projects. Deposits accumulated in advance are complementary to physical capital.

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<sup>42</sup> Credit rationing will be more extensively debated in Chapter 3.



The higher the real deposit rate of interest, the lower will be the opportunity cost of saving real balances to invest. Firms thus get an incentive to invest. However, when the real yield on the deposit rate is low or negative, firms cannot easily accumulate liquid assets in preparation for making discrete investments. Self-finance is then improved with the removal of interest ceiling.

Earlier we saw that in Tobin's portfolio approach money and capital were taken to be substitutes. McKinnon for his part considered them to be complements. The only thing both analysts have in common in this debate is the assumption of a purely fiat money stock in a world without credit. The demand for money function is then: -

$$\frac{M}{P} = f(Y, I/Y, d - \pi^e) \quad ; \quad \frac{\partial (M/P)}{\partial (I/Y)} > 0 \quad (1.a)$$

Where,

$M$  , is the money stock (time and sight deposits plus currency in circulation)

$P$  , is the price level.

$I/Y$  , is the ratio of gross investment to real GNP

$d - \pi^e$  is the real deposit rate  $d$  , being the nominal deposit rate and  $\pi^e$  , expected inflation.

Complementarity between real money balances and investment is shown by the partial derivative being a positive value (positive relationship).

Empirical evidence is in fact inconclusive about McKinnon's complementarity analysis. While Vogel and Buser (1976) confirmed the analysis in



cross-country regressions of some Latin American countries, Fry (1978) obtains a negative coefficient for savings in McKinnon's money equation<sup>43</sup> in a cross country regression involving 10 Asian countries, especially in those with high inflation. Inconclusiveness could be due to certain cross-sectional and time-series differences as well as difficulties in specifying the variables and or data quality problems.

Shaw (1973) held a debt-intermediation view and developed a model in a world of credit where financial intermediaries have a role to play. If returns to depositors are increased, the financial intermediaries get possession of larger volumes of funds for lending and this result in a higher quantity of investment. As the banking sector expands, it is possible to reap economies of scale in lending and risk diversification. Operational efficiency is increased and information cost is lowered to both savers and investors through specialisation and division of labour. Consequently, the investor gets a lower cost of borrowing from the banks and the average efficiency of investment rises. Shaw's debt-intermediation view can be summarised in a money demand equation:

$$\frac{M}{P} = f(Y, v, d - \pi^e) \quad ; \quad \frac{\delta(M/P)}{\delta d - \pi^e} > 0 \quad (1.b)$$

Where,

$v$  is a vector of opportunity costs in real terms.

The argument is that yields in all forms of wealth, especially money, have a positive effect on the savings ratio and hence on investment.

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<sup>43</sup> Equation 1.a above

According to the Shaw analysis, when economic units increase savings, aggregate demand is not reduced as such but its composition is altered from consumption to investment expenditure. Investment is limited by the lack of savings received by banks. The policy response then is to increase demand for real money balances. Rises in deposits, in investment and in growth will follow. Therefore, holding of money balances (savings) is the engine of growth.

Although Shaw's debt intermediation view coincides with that of McKinnon both are different in that one stresses the role of deposits in self-financed investment while the other focuses on increased lending of banks with higher deposit rates stimulating a flow of real balances to deposits<sup>44</sup>. The McKinnon model lacks consideration for credit money while Shaw's model lacks a mechanism specifying the working of the banking system. The two approaches remain however complementary since most investment projects are financed partly from own funds and partly from borrowings. Also, a reduced flow of loanable funds in financially repressed economies forces potential investors to become more dependent on self-finance.

The basic McKinnon and Shaw prescription is then to allow the market to determine the price and the allocation of credit. This would increase the attractiveness of holding claims on the banking system. The improved saving rate will then increase funds available for investment. Further, with real interest adjusting to equilibrium, lower investment projects would be eliminated. Economic

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<sup>44</sup> i.e external indirect financing.

development would be enhanced by both increased investment and an increase in the average productivity of capital.

There is some discord on the effectiveness of the financial liberalisation policy that remains an empirical question. With regard to the contention that a rise in real interest rate would increase savings, Deaton (1989) refers to econometric studies of interest-elasticity of savings that show low elasticities and makes the following observation:

*“there is no theoretical basis, whatsoever for this presumption. Changes in interest rates have both income and substitution effects, and can increase or decrease current consumption depending on the balance between the two. Higher (real) interest rate do indeed increase the incentive to postpone consumption and tend to make planned consumption profile grow more rapidly over time, but the current starting point of that profile can move either up or down. There is also an enormous body of research, mostly but not exclusively in developed economies, that has singularly failed to show any empirical relation between interest rates and the rate of saving.”*

[Angus Deaton, 1989, pp. 87-89]

Giovaninni (1985) points out that in LDCs the response to higher interest rate policy is either insignificant or too small to be of any policy relevance. Turtleboom (1991) on his part observes that real deposit rates did not change significantly in several African countries after liberalisation. Concerning an expected fall in interest

spread, Brock and Suarez (2000) observe that a high interest spread persisted in some latin American countries after liberalisation. In Chapter 7 the situation regarding mobilisation of savings in Mauritius will be examined.

Although the McKinnon and Shaw prescription focuses on improved intermediation and self-finance, the champions of the financial liberalisation paradigm also expect direct financing to equally improve with the introduction of new capital market instruments as the financial market develops. McKinnon and Shaw supported their analysis by empirical evidence from reforms made in the financial sector in Taiwan in the early 1950's and Korea in the mid-1960's. Financial repression is considered to have adverse effects on growth for the following reasons:

(i) As explained in Fry's graphical model, low (or even negative<sup>45</sup>) real interest rates provoke a disincentive effect on savers and so domestic deposits reach a sub-optimal level. Both interest rate ceilings and the oligopolistic nature of the banking industry push to create a wide spread between loan and deposit rates. The absence of a developed equity market is yet another disincentive to savers. The resulting increased current consumption creates demand-pull inflationary pressures.

(ii) In a financially repressed economy, because of low or even negative real deposit rates of interest on monetary assets, the demand for money (saving, term deposits and current accounts) falls as a proportion of G.D.P. Financial deepening outside the banking system also becomes impossible when firms are illiquid and or inflation is high and volatile. Robust open markets in stocks/bonds or intermediation by trust and income companies require monetary stability.

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<sup>45</sup> Especially in countries with high inflation.



(iii) Fry, (1997) observes that the financially repressed system is actually heavily taxed with both explicit taxes and implicit taxes:

- (a) Taxes on interest income, on bank intermediary profits, on financial transactions in the form of stamp duty and VAT (if any) constituted the explicit taxes and contributed to widening of interest spread.

- (b) High reserve and liquidity ratios<sup>46</sup> constituted the implicit tax on banks<sup>47</sup>.

These allowed for a ready demand for government securities issued at low interest rates and created scope for huge amounts of tax revenue. From a bank's perspective the reserve is a taxed asset. Banks are further taxed in the sense that in addition their non-reserve assets are made to yield below world market interest rate returns. The commercial banks acted as taxpayers and the central bank as tax collector but the tax was also being implicitly borne by the depositors earning below market interest rates. High reserve/liquidity ratios taxed to credit market by weakening the credit multiplier. Implicit taxation on the banking system impacts adversely on capital formation.

(iv) Low administered interest rates also encourage banks to even lend to entrepreneurs whose projects would have been excluded if the interest rate was at market level because of the low yields of their projects. Investment then suffers in quality as banks do not ration the available funds on the basis of the marginal

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<sup>46</sup> In 1966 required reserve ratio against sight deposits was 35% in S.Korea.

<sup>47</sup> Sometimes referred to as a financial repression tax.

productivity of the investment projects. This argument was initially developed by Goldsmith (1969).

(v) Directed credit<sup>48</sup> at an artificially low price means easy access to credit for firms identified as being in the priority sectors as per government strategy. Such easy access finally moves the firms towards a lack of discipline in the efficient use of credit and causes misuse of resources. Some firms may also get involved in unnecessary capital intensive projects with adverse consequences on the employment level

(vi) Exchange controls restrict access to foreign assets (credit), and prevented portfolio diversification. This, together with the interest rate ceiling, reduces the ability of banks to properly match demands for borrowers and creditors.

To-day's policy of removal of restrictions to capital mobility and development of an integrated global financial market linked by computer network is consistent with the McKinnon and Shaw analysis and facilitates interest arbitrage. However, with removal of restrictions on capital flows, the monetary authority loses some control over its monetary policy since a simple decision to change the amount of money in circulation is offset by inflows/outflows of hot money. Liberalisation theories also rejected state ownership of banks and revived some early arguments that public ownership leads to credit being allocated on the basis of political rather than economical considerations (Kane, 1977).

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<sup>48</sup> Banks are compelled to grant a certain share of their loan portfolio to specific sectors.

## 2.4 Some Empirical Evidence

The pattern of behaviour in developing countries reveals a very active role of government in finance as follows:

(1) Part of the subsidised loans to priority sectors were often funded by government owned Development Banks<sup>49</sup> at a negative differential between priority loans and deposit rates and financed by a direct budgetary subsidy. Woo and Nasution (1989) highlight that in some countries like Indonesia, subsidized credits from government-owned financial institutions were easily available and could be rolled over. Firms favoured as per the priority sector criteria could acquire large debts that were less expensive than issuing and servicing equity. Risk became concentrated among some specific groups. In Korea, the main recipients of credit were firms from a core of powerful groups (chaebols) that gradually dominated the heavy and chemical industries. In Korea as well subsidized credit led to increasing financial leverage at the expense of development of the equity market. The high leverage situation led to a high level of non-performing loans in periods of recessions and repeated bailout of banks encouraged big businesses to rely further on debts, (Choi, 1991). A high level of non-performing loans had become a problem in many developing countries.

(2) Both high liquid reserve policy and directed credit pushed many financial operators, especially the small and medium firms, into the unofficial money

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<sup>49</sup> These credit programmes were usually set up with funds obtained from international donor agencies such as the World Bank.

market<sup>50</sup> where “depositors” could get higher yields. For their part, borrowers could either get some access to the credit they needed, although without subsidy, or rely on self-financing.

(4) Resources were directed in financing government deficits or flew to capital-intensive projects of para-statal bodies and not always necessarily to the most productive investment.

(5) High levels of government intervention in the financial markets rendered the banks dependent on government policy and government guaranteeing loans to priority sectors. They failed to develop the loan appraisal skills that banks normally acquire when being fully exposed to market forces and they were eventually very much fragilised by increasing levels of non-performing loans.

(6) Apart from being financed not only by cheap finance and easy sales of Treasury bills, the PSBR was often additionally financed by government having recourse to the printing press. Leite and Sundararajan (1991) argue that such central bank’s accommodative policy of government spending together with credit pressures relating to the directed credit program generated high inflationary pressures. Inflationary financing then compelled government to have a minimum level of monetary control by requesting high reserve asset ratios for banks and this inevitably reduced the availability of credit to non-priority sectors. Bailey, (1956) and Friedman, (1971) argue that inflation acts as a tax by reducing the wealth and purchasing power of currency holders and also by yielding a revenue for government through a reduction in the real value of domestic currency denominated debt. In

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<sup>50</sup> Money lenders, indigenous banks, extended family and friends, landlords, traders, pawnbrokers.



Tanzania, Kenya and Ghana for instance, during the early 1970s the rise in inflation was associated with a rising inflation tax and relatively stable real balances, yielding total seigniorage<sup>51</sup> of 0.7 percent of G.D.P in all three countries (Adam, Ndulu, and Sowa, 1996). In Mexico, revenue from financial repression represented 40% of tax revenue and 5.7% of the G.D.P during the period 1984-1987 (Giovannini and De Melo, 1993). The inflationary pressure on both prices and incomes yields a higher government reserve for a given tax base. To prevent an erosion of the tax base, the authorities imposed controls on both inflows and outflows of capital and rendered contracts in the unofficial money market unenforceable.

Roubini and Sala-i-Martin (1992) in a cross section analysis of Latin American countries find evidence of negative effects of financial repression on economic growth. Much of the above discussion relates to policies regarding price and allocation of credit. The impact of policy changes in price and allocation of credit on the corporate sector in Mauritius will be examined in Chapter 9 with a view to tackling the following research questions: -

- (1) What has been the impact of financial liberalisation on the financial deepening?
- (2) What has been the impact of financial liberalisation on economic growth?
- (3) What has been the impact on corporate financial strategy?

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<sup>51</sup> Net revenue received by the central bank, hence by the government by “turning to the printing press”.

## **2.5 Extensions of the McKinnon and Shaw Framework**

McKinnon and Shaw developed the theoretical foundation showing that financial repression reduces both the quantity and quality of investment. They conclude that financial liberalisation can increase growth through higher mobilisation of savings. They did not however develop a formal financial economic growth model. The first generation extension of the McKinnon and Shaw models were developed later. Kapur (1976a, b) and Galbis (1977) explored the premise that financial liberalisation enhances growth by improving the quality of investment while Mathieson (1979) examined the pace of the reform and the coordination of internal and external reforms affecting the quality of investment.

### **2.5.1. Kapur's Model of Liberalisation**

Kapur's model (1976) is based on the postulation that financial liberalisation fosters economic growth. That is so because a rise in the interest rate leads to an increase in the amount of loanable funds and eventually investment as argued in the Shaw debt-intermediation view. Shaw's argument about an expansion of the banking sector as a result of interest rate liberalization is actually intuitive in nature. Shaw's argument about an expansion of the banking sector as a result of interest rate liberalization is actually intuitive in nature. Kapur pushes forward with an in-depth analysis by considering the transmission. This is done by building on the insights from Levahri and Patinkin regarding working capital as mentioned earlier and developing a mathematical equation of the McKinnon and Shaw analysis to provide a better understanding of the framework.

Considering that there is unused fixed capital in the economy, Kapur focuses on working capital, which to him is the obligatory link between finance and output. Kapur makes a simplifying assumption that all bank credit is used to finance a fraction of working capital while the remaining fraction is self-financed<sup>52</sup>. Another simplifying assumption is that there is no currency in circulation and the public holds only deposit money. The fraction of working capital financed by bank lending can be split into two parts, namely:

(a) Funding of additions to real working capital.

(b) Funding increased costs of replacing depleted working capital due to a rise in the price level.

The Kapur model is given as

$$\gamma = \mu \frac{M}{P.Y} \cdot \frac{\sigma q}{(1 - \alpha)} - \pi \theta \quad \text{Growth equation 2.1}$$

where,

$$\gamma = \text{Economic growth } \frac{\Delta Y}{Y}$$

$$\mu = \text{Rate of monetary growth } \frac{\Delta M}{M}$$

$$\frac{M}{P.Y} = \frac{\text{Money Stock}}{\text{Nominal GDP}} \quad \text{i.e the reciprocal of income velocity of money}$$

$$\sigma = \frac{\text{Output}}{\text{Capital}} \quad [\text{From Harrod-Dumar Aggregate Production}$$

Function  $Y = \sigma.K$  ]

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<sup>52</sup> i.e From retained corporate earnings.

$q$  = Ratio of loans to money stock

$\pi$  = inflation  $\frac{\Delta P}{P}$

$\theta$  = Fraction of capital  $K$  financed by bank credit. (*The remaining being self-financed*)

$1 - \alpha$  = Proportion of total capital  $K$  which is used as working capital

Equation (2.1) shows that:

(i) The rate of economic growth  $\gamma$  is positively related to money growth  $\mu$ , the capital/output ratio  $\sigma$ , the ratio of loans to money stock  $q$  and the ratio of utilised fixed capital to total utilised capital  $\alpha$ , consequently the ratio of utilised fixed capital to working capital.

(ii) A higher required reserve ratio reduces the ratio of loan to money stock  $q$  and so lowers economic growth.

(iii) Economic growth is reduced by an increase in the velocity of circulation<sup>53</sup>  $\frac{P.Y}{M}$ .

Kapur uses a variant of Cagan's (1956) money demand function, namely:

$$\left(\frac{M}{P}\right)^d = Y e^{a(d-\pi^e)} \quad \text{Equation 2.2}$$

Where  $\left(\frac{M}{P}\right)^d$  represents the desired holding of real money balances;

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<sup>53</sup> Measured by the ratio of nominal GDP to money to show how many times money circulates on average in one year.



$\pi^e$  = expected inflation and

$d$  = deposit rate.

Dividing equation (2.2) by  $Y$ ,

$$\left(\frac{M}{P.Y}\right) = e^{a(d-\pi^e)} \quad \text{Equation 2.3}$$

Adjusting equations (2.1) and (2.3) gives;

$$\gamma = \frac{\mu \sigma \cdot q}{1 - \alpha} \cdot e^{a(d - \pi^e)} \quad \text{Equation 2.4}$$

This equation shows that a faster rate of monetary growth  $\mu$  can have both a positive and a negative effect on economic growth. The direct effect through  $\mu$  being positive and the indirect effect by a reduction in  $\left(\frac{M^d}{P.Y}\right)$  caused by higher inflation is negative. The presence of an exponential function shows that there is a unique value of rate of money growth,  $\mu$ , which maximises the value of economic growth  $\gamma$  assuming that the deposit rate  $d$  is fixed. Kapur argues that in a financially repressed economy,  $\mu$  is above this equilibrium and economic growth  $\gamma$  is reduced. In fact, a higher rate of money growth is inflationary. More money goes to finance increases in nominal working capital and less real credit is left for financing capital stock accumulation. A smaller size of real banking sector leads to a lower rate of capital accumulation and a lower rate of growth. The model also shows that an increase in the deposit rate  $d$  will increase real money demand and hence the supply of bank credit.

The policy implication is then to raise nominal deposit interest rate towards the free market rate. This promotes growth via an increase in the quantity of investment.

### **2.5.2 The Galbis Model**

Galbis (1977) developed a model of investment efficiency showing that the policy of financial liberalisation promotes growth by improving the quality of investment. Financial repression allows low yielding investment to become feasible and crowds out higher quality investment.

A two-sector model is proposed by Galbis, one being a traditional self-financed sector with low yielding investment and the other being a modern technologically advanced sector with a higher rate of return on investment. The savings of individuals in the traditional sector is channelled to physical capital in the same sector but part of it also goes to the modern sector. Investment in the modern sector comes from that sector's savings plus some savings from the traditional sector. The co-existence of old and modern sectors is very common in developing economies. Under financial repression, the interest rate is set at a level below equilibrium by the monetary authorities and this is likely to have an adverse impact on the modern high yielding sector. This is so because many individuals in the traditional and low yielding sector will refrain from saving in the form of bank deposits as they can get better returns from their own self financed investment. The supply of funds for investment in the modern high yielding sector then contracts

creating a financial disequilibrium because demand for loans in the technologically advanced sector expands rapidly. In addition to this crowding out of investment in the modern sector, the quality of investment suffers. This is because the absence of a risk premium caused by the interest ceiling leads to investment that would have been undertaken at a higher interest rate to be sacrificed for low yielding investments that are safer.

Investors in both the traditional sector and the modern sector and society at large thus incur avoidable opportunity costs: -

(a) In the traditional sector investors lose because with a low interest rate set below the market rate they will invest in ventures generating less return than the market equilibrium rate on deposits.

(b) Investors in the modern sector get less loanable funds and can invest in fewer ventures.

(c) The resulting fall in producer surplus is lost to the whole society.

Galbis' prescription is to allow interest rates on deposits to rise freely until demand and supply of investment funds are equalized. In Galbis' analysis financial liberalisation brings about a transfer of resources from the traditional sector to the modern sector. What takes place is a redistribution of savings between the two sectors. Savings in the traditional sector will be channelled to investment in physical capital and the rest becomes bank deposits. In a competitive banking system, bank deposits by the traditional sector will supply resources for investment in the modern sector. Investment in the modern sector is thus financed by both its own savings and

also by deposits from the traditional sector. Although the arguments from Galbis are plausible they somewhat overstate the true outcome for two reasons:

1. Monetary mismanagement as well as institutional factors can cause real interest rigidity and prevent an equilibrium in the supply of and demand for investable resources
2. The economy might not be able to take full advantage of a potential increase in physical capital in the technologically advanced sector because of a possible mismatch in the labour market due to occupational mobility of labour at least in the short run.

The Galbis model, though relevant to most developing countries, does not have a large application to the Mauritian situation and to many small island economies where there has historically never existed an indigenous economy in clash with an imported and more advanced one. In Mauritius, there existed no indigenous population as such before colonisation. The question of a capitalist sector expanding and drawing labour and surplus finance from the non-capitalist sector does not arise.

Nonetheless, Mauritius has been facing some form of financial dualism marked by:

(i) Gaps in interest rates charged to the business sector being significant between large and very small enterprises. The small sectors of the economy often being choked-off from finance due to lack of collateral.

(ii) A non-uniform regulatory regime, with some sub sectors like friendly societies not being regulated. This question will be considered again in Chapter 5.



### **2.5.3 Open Economy with Capital Mobility: The Mathieson Model and Keynesian Reservations.**

Mathieson (1979) examines the influence of capital flows on the financial liberalisation process after capital account liberalisation in the context of fixed or managed exchanged rates.

Mathieson links up interest rate liberalisation to the insights from the Mundell-Fleming model<sup>54</sup> (Mundell, 1963; Fleming, 1962) and argues that financial liberalisation and exchange rate policy are interdependent. Such a relationship exists because as the domestic rate of interest rises, not only do domestic savings rise but equally national savings rise due to a surge of foreign capital inflows in a process of arbitraging.

Inflows of foreign capital are beneficial to the host country in several ways:

(a) The increased supply of savings eases any previous or current financial constraint and supply of loanable funds is increased.

(b) Capital inflows go to the private sector in the form of equity capital and much less to the public sector as debt. The direct impact is on output growth and standard of living. The inflows also contribute to the broadening and deepening of domestic financial markets. Present and future consumption are also increased. Additional competitive pressure is forced upon domestic firms and financial institutions leading to more efficient and profitable allocation of savings and

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<sup>54</sup> IS-LM model in a context of open economy with capital mobility.

investment. Since a proportion of the inflows is in the form of F.D.I., transfer of technology also follows.

However, capital inflows put an upward pressure on the exchange rate and the monetary authorities must supply the domestic currency to maintain the exchange rate. The domestic monetary base then expands while output remains unchanged and inflation follows rapidly. The monetary base then becomes endogenous within a fixed or managed exchange rate regime. Subsequently, the accompanied upward pressure on the exchange rate will affect a country's external competitiveness and translate into a deterioration of the current account. Expectations about future depreciation will encourage speculative outflows. Clearly then the exchange rate becomes a policy instrument and has to be coordinated to offset any adverse effect of capital inflows on the balance of trade. Sharp increases in interest rates pushing towards a rapid exchange rate appreciation damaging the real sector is a sort of conflict which Sachs (1998) refers to as the 'competition of instruments'. This means that the proposition that the big bang approach to internal and external liberalisation is excluded by Mathieson.

Mathieson then postulates that internal liberalisation and external liberalisation policy changes need coordination and that an optimal policy mix is obtained through a two-phased programme. Initially the programme comprises the following measures:

- (i) Increases in deposit and loan rates , and
- (ii) An over depreciation of the exchange rate<sup>55</sup> and also

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<sup>55</sup> Depreciation over the long-term equilibrium.

(iii) A decline in the rate of growth of the domestic component of the monetary base.

An increase in the deposit rate fosters an increase in deposits and a higher supply of loans improves the flow of working capital. The initial over-depreciation of the exchange rate produces the expectation of subsequent appreciation. Thus the yield on foreign assets is reduced and there is a substitution towards domestic assets and savings from foreign sources increase. An over-depreciation of a currency will also improve domestic competitiveness and create a higher level of aggregate demand for domestic goods and hence maintain the rate of growth above its steady value. It will however also lead to a higher domestic inflation rate. Further, increases in domestic money supply via higher capital inflows associated with increased exports will exceed the demand for money in spite of the higher depreciation rate. The domestic component of the monetary base must then be reduced to combat inflation and sustain balance of payments equilibrium.

The next phase of the liberalisation programme comprises the following elements:

- (i) Gradual appreciation of the exchange rate.
- (ii) Gradual reduction in nominal loan and deposit rates.
- (iii) Gradual increase in the rate of growth of the domestic component of base money.

The transmission is as follows: A trade surplus in the first phase will force the exchange rate upwards and move it back to its longrun equilibrium. Increases in

output in response to higher international competitiveness in the first phase coupled with subsequent reduced demand for imports will reduce domestic inflation and inflationary expectations. This then allows a fall in nominal and deposit rates. Subsequently foreign savings no longer enter the economy and the domestic component of money supply can be allowed to increase to maintain the equilibrium deposit-income ratio. The economy then comes to rest at a higher level of growth.

The Mathieson open-economy model then suggests that financial liberalisation is a phase of gradual changes in policy instruments. In the 1980s, in a context of debt crisis, the IMF stabilisation and liberalisation of trade and capital policies were built upon these ideas. One weakness in the Mathieson model is that just like all other neoclassical models is its assumption of exogenous money supply implying that interest rate change does not affect money supply. But if money were to be considered endogenous then changes in interest rate has a cost-push effect. Increased inflation leads to higher demand for credit and a self-reinforcing dynamic takes place in future time periods. Keynesians have for long rejected the classical belief in a robust efficient free international financial market. Tobin (1972, 1978) argues that speculation in the international financial markets is a fundamental source of destabilization with devastating consequences on the real economy. Bhagwati (1998) argues that because of imperfect markets, free capital mobility encourage risk taking and can lead to major costly crises. In order to reduce the ability of financiers to undermine full employment policies Tobin proposes to bring more stability to the financial market by imposing some restrictions on international

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currency transactions through a 0.5% international currency transaction tax (the Tobin Tax).

This tax on cross border financial transactions can be easily applied on transactions registered through the SWIFT<sup>56</sup> international clearing mechanism, (BIS Lamfalussy Report, 1990). With electronic technology the logistical hurdles for the implementation of the Tobin Tax can easily be overcome (Henderson, 1996). The Tax is expected to act as a financial stabilizer that drastically prevents speculative build-ups towards financial volatility and crises. The profitability of quick round trips<sup>57</sup> to take advantage of small interest differentials across currencies and to speculate on exchange rates would be squeezed<sup>58</sup> while returns on long round-trips like trade and FDI would be hardly affected as an important share of trading between branches of transnational corporations does not involve currency conversion. Further, reduced uncertainty associated with wild day-to-day fluctuations in exchange rates would improve international trade and bring welfare gains. The French National Assembly has in February 2001 incorporated the Tobin Tax into a law that will not come into force until after its adoption by the other European parliaments. The tax has also been voted in Belgium in July 2004. The difficulty with the Tobin tax is that it is not effective if implemented by only one or few countries.

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<sup>56</sup> Society for Worldwide Interbank Financial Telecommunications, a Belgian company providing international bank communication network. It connects around 3000 banks and processes more than 2 million transactions daily.

<sup>57</sup> Buying and quick resell.

<sup>58</sup> A tax of 0.1% increases the interest of a 30-day bill will need an additional divergence of 2.5 % before interest arbitrage become profitable.

It must be observed that while China has not opened its market to short-term capital flows it has been able to attract a substantial amount of FDI<sup>59</sup>. Such empirical evidence supports the reservations to the New Classical argument that countries will not be successful at attracting FDI unless their economy is open to portfolio flows.

It is therefore desirable to differentiate between Foreign Direct Investment (FDI) and Portfolio Flows because they behave differently. While FDI is of a long-term illiquid nature, short-term capital flows are highly volatile and quick reversal of flows can produce devastating effects on the real economy. Worst still, crisis is often spread to other economies. The Tequila<sup>60</sup> contagion from Mexico to other Latin America countries in 1994, the contagion from Thailand to other S.E. Asian economies in 1997, the Russian contagion<sup>61</sup> to Latin America and to the ex USSR countries and to some eastern European countries in August 1998 show evidence of consistent spread of financial crises in emerging economies. With the liberalisation of short-term capital flows, banks increasingly invest in foreign assets and also issue short-term foreign denominated liabilities. Investors (speculators) shift money around the global economy in search of quick profits. Eichengreen, Rose, and Wyplosz (1996), argue that trade links are the dominant channel for contagion. Argentina, Chile, Columbia and Philippines were not important trading partners of Mexico but were yet hit by the Tequila effect. Often as currency instability develops

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<sup>59</sup> UNCTAD figures reveal that China attracted 86% of the total FDI to low-income countries in 1995.

<sup>60</sup> The reference to contagion (Tequila effect) in the Mexican crisis is because inflows of large amounts of capital without adequately preparing the economic groundwork causes problems just like drinking Tequila on an empty stomach leads to disastrous results. The drinking as such is not to be blamed, but the excess.

<sup>61</sup> The Russian financial crisis was itself partly influenced by the S.E Asian contagion.

in one country, investors tend to dump the assets of other emerging economies causing the monetary authorities to either raise the domestic interest rate or to spend their foreign reserves to preserve their own exchange rate. Van Rijckeghem and Weber (2001) find that it is bank lending or “common lender effect” rather than trade linkages that explain financial contagion. The effects of contagion following an individual crisis are discussed in section 4.4.2

The table below gives evidence to the speculative and volatile nature of portfolio flows as compared to FDI in the S.E Asian countries. While Portfolio flows dropped spectacularly in 1998 FDI changes were more modest.

**Table 1.2**

**Five Asian Economies: Capital Flows (bnUS \$)**

	1994	1995	1996	1997 e	1998 f	1999 f
Direct Equity, Net	40.7	40.9	50.8	60.5	60.9	70.4
Portfolio Equity, Net	70.6	11.0	11.6	-6.8	10.1	-0.9
Equity Investment, Net	12.3	15.9	17.4	-0.3	80.0	60.5

*Source: IFF; e = estimate; f = IFF forecast.*

*Published in Arestis and Demetriades, 1999. Financial Liberalisation: The Experience of Developing Countries.*

Another counter policy to the Mathieson model is the Chilean tax, which shares the same stabilizing goal as the Tobin tax. For some years in the mid-1990s anyone bringing capital in Chile had to keep it in the country for at least one year and

to deposit 30% of the loan at the central bank. This unremunerated reserve requirement<sup>62</sup> on capital inflows has not been very effective in increasing Chile's monetary independence in a world of capital mobility but it has succeeded to extend the maturity of Chile's foreign debt without negative impact on FDI. It also dampened the contagion effect of the Mexican crisis.

However, during a crisis, this form of "market friendly" substitute to direct control on capital inflows remains inadequate as a crisis management tool as it can not prevent holders of short-term positions from running on the currency whenever an incentive is present. In such situations, many Keynesians prefer the adoption of a temporary curative control on capital outflows as suggested by Krugman during the recent South East Asian crisis, (Krugman, 1999a, b). Malaysia, for example is an export-oriented country and uncertainty in the exchange rate was undermining business confidence. The decision of the Malaysian government to institute control during the crisis (1998-1999) caused an immediate turn around in the stock market and the exchange rate stabilised in spite of the disaster predicted by many western analysts. This suggests that temporary capital control in a crisis is feasible and should not be ignored just because of market ideology. It gives time to government to restructure the financial sector and can be easily dismantled once the economy is back on track.

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<sup>62</sup> Equivalent to a tax.



## **2.6 Summary**

In this chapter, we discussed the pre-financial liberalisation Keynes-Tobin growth models that favour government intervention in price and allocation of credit. The first discussions in the literature about the finance-growth nexus have been presented. The McKinnon and Shaw hypothesis against financial repression policies have been discussed and some first generations models showing the positive impact on growth following improved financial intermediation after deregulation have also been examined. The Kapur model has shown that financial liberalisation enhances growth by improving the quantity of investment. The Galbis Model has shown that financial liberalisation promotes growth by improving the quality of investment. The Mathieson model proposes a rapid phased liberalisation programme where both internal and external changes are co-coordinated. The old Keynesian reservations concerning destabilizing speculation in the current international financial system, the Tobin tax, the Chilean tax and capital control policies have also been examined. The next chapter will focus on the nature of financial markets as well as some refinements brought to the initial financial liberalisation arguments in the light of empirical evidence.

## **Chapter 3**

# **INSTITUTIONAL ASPECTS, EMPIRICAL EVIDENCE** **AND THEORETICAL REFINEMENTS**

### **3.1 Introduction**

As pointed out in Chapter 2, during the 1950s/60s Gurley, Shaw and Goldsmiths had argued that financial markets have a key role in economic activity. In the 1970s McKinnon and Shaw added the element of financial liberalisation to the finance growth-nexus. These models explain how savings, investment and level of income are affected by financial development. They do not however examine the impact of financial development on self-sustained growth without exogenous technical progress. The first generation models (Kapur, 1976) and (Galbis, 1979) examined the impact of liberalisation on productivity and growth but lacked focus on mobilisation of savings and on the nature of the financial markets *per se*. Later, some macroeconomists developed the “second generation” supply-leading financial growth models to show how the development of financial intermediation in well-developed financial systems may enhance long-run growth. In sections 3.2 and 3.3 below specific arguments in relation to this institutional dimension are discussed.

### **3.2 Banking Intermediation**

Boyd and Prescott (1986) highlight the role of banks in weakening information frictions and improving resource allocation. Bencivenga and Smith (1991) model the effect that intermediaries can have on growth by encouraging a shift in savings from unproductive liquid assets to productive illiquid assets.

In the absence of banks, individuals have to choose between adopting investment in a firm or unproductive assets in the form of consumer goods or commodity money to maximise their expected utility. A certain amount of commodity money is needed against unforeseen liquidity needs. As discussed in Chapter 2, every individual normally adopts his own portfolio of productive and unproductive assets (money) depending on the extent to which he is a risk taker or risk averter, Tobin (1965). Investment in a firm is illiquid but may provide greater returns than what is obtainable with a stock of goods or currency. However, there is a long delay, referred to as the slow cycle of production (Cameron, 1967) between the investment expenditure and the receipt of profits from capital. During these delays there is always a risk that capital investors face unpredicted liquidity needs which will cause either additional delays to further capital expenditure or liquidation of existing investment thereby rendering the past productive investment worthless or significantly reduced in value. With the existence of banks, individuals can hold deposits and earn interest. The banks will then invest mainly in productive capital but also in commodity money.

Bencivenga and Smith (1991) extend the arguments of Gurley and Shaw (1955) about the role of financial intermediaries in transforming securities issued by

firms (shares and bonds) into liquid securities demanded by investors (deposits) and in the process the services of divisibility and risk transformation are provided. Because banks have a large number of depositors, the volume of withdrawal demand becomes fairly predictable with experience and they need not as such have high liquid reserves<sup>63</sup> that make no contribution to capital accumulation. By providing liquidity, banks allow every individual to adopt an improved portfolio with less unproductive assets since they have now less need to protect themselves from unforeseen liquidity need. Additionally banks reduce the need for self-financing of capital investment and so drastically reduce the possibility of productive investment becoming worthless through unwarranted premature liquidation. A higher level of savings is thus channeled to investments as the liquid reserve holding of the economy as a whole is substantially reduced. By their dynamic role in providing liquidity and promoting capital investment the intermediaries improve information, lower transaction costs and foster efficient resource allocation hence influencing positively the rate of economic growth.

Greenwood and Jovanovic (1990) specifically stress the role that intermediaries play in collecting and analysing information in the process of migration of funds described by Goldsmith (1969). The two analysts argue that financial deepening improves the allocation of savings to productive investment projects and highlight the following:

(1) In a preliminary stage of development, the economy's financial market is almost non-existent especially as the setting up of organisational structures is costly.

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<sup>63</sup> The principle behind fractional banking.



Growth provides the money needed for the financial structure to develop and a feedback effect is obtained from the financial structure that in turn enhances growth since the savings rate rises and investment is then more effectively undertaken.

(2) Very poor agents are likely to remain outside the intermediated sector for some time. Consequently, Greenwood and Jovanovic argue that initially there will be an increase in inequality across the very rich and the very poor segments of the population. Subsequently as development matures, more and more people in the low-income group participate in the financial intermediation process and income inequality declines.

King and Levine (1993a, b) developed an endogenous growth model showing that better financial systems improve the probability of successful innovation and thereby accelerate economic growth. Similarly financial sector distortion reduces the rate of innovation.

King and Levine also argue that if the financial system is heavily taxed, explicitly and implicitly, the full cost of innovation is raised. Consequently, improved financial sector efficiency following liberalisation will deliver higher growth rates.

Their cross-country study shows evidence of a positive relationship at 1% significance level between the banking intermediation variables and growth and that countries endowed with a more sizable credit sector experienced faster growth. In Chapter 9 the analysis of finance and growth in Mauritius will be based on this model.

### 3.3 Stock Market Development

The first stock market in the world was developed in Holland in the early 17<sup>th</sup> century when directors of the United East India Company<sup>64</sup> refused to implement the provision about buying back of the shares from holders in need of liquidity once every ten years. A secondary market then developed in Amsterdam for company members in need of liquidity. Subrahmanyam (1975) develops theoretical arguments in favour of an integration of stock markets from emerging countries with those of the developed world showing that international capital market integration is Pareto-optimal. By the end of the 1980s, alongside the 'de-repression' measures in the banking sector, financial liberalisation policies pushed for the development of stock markets and their external liberalisation. There has been a rapid expansion of stock markets around the world, especially in developing countries. World Stock markets capitalisation has increased from \$2trillion in 1982 to \$36 trillion in 1999 (World Stock Market Fact Book 2000). The number of exchanges in Africa increased rapidly from eight in 1988 to nineteen in 2000, most of these being in Sub-Saharan Africa. Emerging markets capitalisation grew from 4% to 14% of total world capitalization between 1982 and 1993, (Demirgüç-Kunt and Levine, 1996; Singh, 1997). The expansion of stock markets in emerging economies has been exceptionally fast in recent years. While it took 85 years (1810-1895) for the US capitalization ratio to rise from 7 % to 71% of GDP, in Taiwan the ratio rose from 11% to 74% in only 10 years (1981-1991). As from the early 1990s both the privatization process and

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<sup>64</sup>It is through this company, chartered in 1602, that Amsterdam merchants pooled resources to equip voyages to the East Indies and to distribute the profits.

financial liberalisation have accelerated the development of the capital markets in developing countries.

With the development of endogenous growth models discussed in Chapter 2, it is generally accepted that stock market activity affects the economy positively by raising saving ratios, as well as the quantity and quality of investments. Marone (2003) suggests that a higher rate of return from the stock market can reduce pressure on the financial system since it is no longer necessary to maintain high domestic interest rates to retain savings in the economy. Stock markets then can contribute to the lowering of the cost of borrowing. Diamond and Verrechia (1982) link managerial compensation to stock prices. They argue that well-developed stock markets are expected to enhance corporate control by reducing the principal-agent problem, making managers strive to maximise firms' value. The agency problem is hence minimized. Errunza (1997), and Henry (2000a, b), basing themselves on the CAPM Model, <sup>65</sup>suggest that stock market liberalisation can lead to a fall in the cost of equity for three reasons:

1. An increase in foreign capital inflows induces a reduction in the risk-free rate.
2. External liberalisation allows foreigners to acquire domestic shares and this facilitates risk sharing that reduces the equity premium.
3. Capital inflows improve the market liquidity and hence reduce the equity premium.

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<sup>65</sup> Under the CAPM the cost of equity has two elements, the equity premium and the risk-free rate of return.

Cho (1986) argues that a well-functioning stock market is a crucial complement to banks in the credit market for financial liberalisation to be complete and successful. This is so because unlike bank borrowing, equity finance is not subject to adverse selection and moral hazard. Allen and Gale (2000) argue that stock markets mitigate the inefficient monopoly power of banks and that their competitive nature encourages innovative and growth-enhancing activities as opposed to the conservative approach adopted by banks.

Atje and Jovanovic (1993) go even further suggesting that whilst stock markets positively affect growth, raising it by a huge 2.5% p.a., banks have little influence on growth. As regards stock market liberalisation, which is one specific aspect of capital account liberalisation, Levine (1996, 2001) argues that it will improve stock market liquidity<sup>66</sup> and channel more savings to corporations and show empirical evidence concerning 38 countries that greater stock market liquidity is associated with faster rates of capital accumulation and hence faster economic growth. Levine and Zervos (1998) found a strong positive correlation between stock market development and economic development.

*“stock market liquidity and banking development are both positively correlated with contemporaneous and future rates of economic growth”*

[Levine and Zervos, 1998, pp. 554]

This does not however settle the question of causation. Using a cross-country regression covering 41 countries in the period 1976-1993, Levine and Zervos found that stock market liquidity, measured in various ways, is a robust predictor of real per

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<sup>66</sup> Easiness to buy and sell.



capita gross domestic product growth, physical capital growth and productivity growth.

Capital accumulation is improved under liberalisation of the stock market via reduced cost of equity under certain assumptions (Henry, 2000a,b). Using a panel of 27 countries Fuch-Schünde, and Funke (2001) show that growth tends to be higher if certain institutional reforms precede the liberalisation of the stock market. Such reforms relate to the consolidation of legislations regarding property rights<sup>67</sup> and improved contract enforceability.

However, the virtues of market liquidity are sometimes disputed. Improved liquidity advantage allows speculators to adjust their portfolios to changes in moods and overbid market assets making them diverge from underlying fundamentals and pushing firms to borrow and divert funds from productive activity to gambling for quick gains (Keynes, 1936; Minsky 1986). Improved liquidity might not in such a situation lead to economic improvement.

Increased market liquidity may also reduce the incentive for shareholders to monitor managers and this may weaken corporate governance and lead to less efficient allocation of resources, (Shleifler and Vishny, 1986). Bencivenga and Smith, (1991); Japelli and Pagano, (1994) argue that the desire for a higher level of liquidity works against the propensity to save. Further, Zhu, Ash and Pollin (2002) replicate the Levine and Zervos model but conclude that the findings are not robust and that outliers in their model drive their results.

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<sup>67</sup> Lower risk of nationalization.

Kumar and Tsetsekos (1998) highlight that there are reinforcing feedback effects between real output, growth and stock market development and also that for the equity market to perform efficiently, legal aspects concerning enforcement of contracts, good accounting standards, communication technology and a good banking system providing transaction services form the necessary infrastructure.

In relation to the argument about increased volatility accompanying the liberalisation of capital flows Levine considers that:

*“This should not be of much concern in the long run.....if policy makers have the patience to weather some short-term volatility, liberalisation offers expanded opportunities for long-run economic growth”,*

[R.Levine, 1996, p10].

It can be argued that Levine implicitly recognises the short-term costs in terms of B.O.P problems, growth and unemployment. Levine however fails to consider the effects of short-term volatility on long-term growth.

Some commentators are quite skeptical about the effective contribution of stock exchanges to the economic and financial development of developing countries. Singh (1993, 1997, 1999) considers that stock market development is not a necessary natural progression of a country's financial development. Singh observes that in the post World War II period, countries such as Germany, Japan, Italy, Korea and Taiwan achieved their economic miracle with little assistance from the stock market and that in India there has been no significant increase in aggregate savings and investment and what actually occurred was a substitution from banks to tradeable securities. In these countries, unlike the USA, banks dominate the financial sector.

Singh suggests that a negative relationship between stock market development and economic growth may be more pronounced in developing countries than in industrialised countries. Bhide (1993) argues that stock markets do not actually improve the allocation of resources by the same magnitude as banks do. Singh (1997) considers that the development of stock markets in African countries at their current level of development is costly and irrelevant. He suggests that some African countries should preferably use their scarce resources to develop their banking sector and that stock market development is likely to undermine the existence of “group-banking” systems which have proved useful in several countries.

Portfolio capital has been recommended to developing countries by the I.M.F. as it is supposed to be less vulnerable to external interest rates shocks than debt. However, as observed by Singh,

*“these inflows have proved to be just as destabilising. As Akyuz (1993) points out, external liberalisation through opening stock markets to non-residents leads to close links between two inherently unstable markets even when the capital account is not fully open - the stock and currency markets. Faced with an economic shock the two markets may interact with each other in a negative feedback loop to produce even greater instability for the markets and the whole financial system. Moreover, the gyrations in these markets may discourage aggregate investment through various channels, e.g. depressing business expectations because of greater uncertainty; greater instability in aggregate consumption because of wealth effects caused by large fluctuations in stock market prices. These factors contribute to the instability of the real economy and may reduce long-term growth.”*

[Singh, 1997, pp.771-782]

Using data on the U.S.A., U.K, France, Germany and Japan, for the period 1972 to 1996 to explore the long-run relationship among stockmarket volatility, stockmarket development, the banking system and output levels, Arestis, Demetriades and Luintel (1999) conclude that bank-based financial systems such as Germany, Japan and to some extent France are more capable of promoting long-term growth than in the market-based Anglo-Saxon system.

Responding to the historical debate opposing supporters of bank-based financial system to market-based one Laporta et al (1999a,b) suggest that such a competing theory debate is not very useful since what really matters is a legal environment that supports adequately the right of both equity and debt investors and allows efficient enforcement. However, Rajan and Zingales (1998) argue that bank-based promotes growth in countries having a weak legal system while market-based would be more advantageous when a country's legal system improves. Apart from the recent legal-based view the literature is also enriched with a financial services view which focus on the provision of better risk management, improved liquidity, enhanced capacity to mobilization of savings and these are actually relevant to both banks and capital markets. Levine and Zervos (1998) in fact show evidence of the joint independent relevance of both banks and capital markets for growth. The empirical evidence supports the strong link between financial development and economic growth. Improvement in the amount and quality of provision of financial services is thus likely to promote future growth, technological innovation and an



improved standard of living. There are also some microeconomic studies that support the macroeconomic growth regressions. Demirgüç-Kunt and Maksimovic (1998) and Rajan and Zingales (1998) give evidence of faster development of firms and industries in conditions where financial systems are well-developed.

Rousseau (1998) studies the long-run sources of financial deepening by examining intermediation and financial deepening in the U.S.A from 1872-1929. Rousseau argues that technology enhances intermediation and financial deepening. King and Levine bring empirical evidence about the U.S economy with respect to the impact of technology on intermediation.

*“Technological improvements in the intermediation sector can affect financial depth by influencing interest rate setting decision of lenders and the application decision of loan searchers. Specifically, an increased ability to monitor loan recipients eases the burden of default for lenders and allows them to lower interest rates on loans.”*

[King and Levine, 1998, pp. 420.]

The findings of the study are that there is a permanent reduction of 1% in the spread of New York banks associated with increases in financial depth that range from 1.7 to 4%.

Such evidence revamps the call for policy towards improvement in the provision of financial services in order to promote technological innovation, future growth and an improved standard of living.

The question of direction of causality as questioned by Robinson, (1952) remained unclear as the various studies only revealed that the level of financial development could be a leading indicator rather than an underlying cause of growth. Levine, Loayza, and Beck (2000) provide a major contribution to the issue of causality using the Granger causality framework (Granger, 1969) by adopting two methods:

(i) A pure cross sectional estimator averaging data for 71 countries over the period 1960-1995.

(ii) Panel data exploiting the cross country and time series dimension of the data.

Both methods confirm that the development of financial intermediaries exert a large causal impact on economic growth.

*“the estimated coefficient suggests that if Argentina had enjoyed the level of financial intermediary development of the average developing country during the 1960-1995 period they would have experienced about one percentage point faster real per capita GDP growth per annum over this period”.*

[Levine, Loayza, and Beck, 2000, pp31-37.]

An interesting approach adopted by Levine et al in the study to ensure that the econometric results do not reflect the effect of a third variable, which is not included in the “regression”, and hence invalidate the findings, is the use of conditioning variables such as government size, inflation openness to trade, political stability.

$$(Growth)_i = \alpha_1 * (Finance)_i + \alpha_2 * (conditioning\ set) + random\ error$$

An amended approach will be used in chapter 9 when dealing with the Mauritian case.

In that same study, apart from the causality issue, Levine et al also examine causes. They investigate whether cross country differences in the legal right and accounting system standards help explain cross country differences in the level of financial intermediary development. Their finding is that:

*“countries that efficiently impose compliance with laws tend to have better developed financial intermediaries than countries where enforcement is more lax ..... Countries where corporations publish relatively comprehensive and accurate financial statements have better developed financial intermediaries”.*

[Levine, Loayza, and Beck, 2000, pp31-37.]

In a study covering China and nine OECD countries<sup>68</sup> Shan, Morris and Sun (2001) find no evidence of one way causality from financial development<sup>69</sup> to economic growth. They find evidence of reverse causality in some countries and bidirectional causality in other countries. The mixed evidence is in line with the argument that the relation between financial development and economic growth is country specific and that the importance of the financial sector has been overstated, (Demetriades and Hussein, 1996, Arestis and Demetriades, 1997).

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<sup>68</sup> Australia, Canada, Denmark, France, Italy, Japan, New Zealand, UK and USA

<sup>69</sup> As measured by bank credit to GDP ratio.

The McKinnon and Shaw models and the pro-financial liberalisation literature that followed are all based on the efficient clearing market classical analysis. The literature actually directs an attack on government failure<sup>70</sup> and does not provide for any possibility of coexistence of both market and government failures in a financially repressed economy as the two are treated as mutually exclusive. In Chapter 4 such coexistence will be discussed.

### **3.4 New-Classical Refinements**

The ex-ante financial liberalisation thesis rests on some unrealistic assumptions. Perfect information, profit-maximising competitive behaviour of commercial banks and institution-free analysis actually constitute the implicit assumptions behind the thesis and these are unlikely to be met in reality (Arestis and Demetriades, 1999).

Various experiences<sup>71</sup> of financial liberalisation in the 1980s and 1990s ended with widespread banking failures, currency crises and had not produced more efficient financial systems. The “New-Classicals” suggest that financial liberalisation pitfalls in developing countries were caused by the unfavourable environment in which these financial reforms were undertaken. They maintain that the only road to successful development for developing countries remains financial liberalisation. They nevertheless incorporate some New-Keynesian<sup>72</sup> insights about asymmetric information and institutional elements while rejecting any form of government

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<sup>70</sup> Government intervention in the financial markets leading to restricted growth prospects.

<sup>71</sup> e.g Argentina, Chile, Uruguay and Turkey.

<sup>72</sup> This body of literature will be dealt with later in Chapter 4.



intervention in the pricing and distribution of credit considering such policy as government obstructionism. Their most important recent recommendations comprise the development of transparent and resilient financial systems by strengthening regulatory frameworks and by adopting well-specified liberalisation programmes with proper timing.

### **3.4.1. Macroeconomic Instability**

The new-classicals identify macroeconomic instability, especially large fiscal imbalances, as an obstacle for the smooth implementation of financial liberalisation reforms (Hanson and Neal, 1985). In many developing countries embarking on the reforms, the B.O.P. and fiscal deficit were far from being moneyable. The early 1980s were characterised by deteriorating terms of trade, international recessions and debt burden all putting pressure on the B.O.P of many developing countries that were ultimately forced to devalue their currencies to promote exports. However, after devaluation many firms importing inputs for producing final goods for the domestic market became unprofitable and had difficulty to repay loans. This is an additional factor causing a high level of non-performing loans and contributing to fragilising the financial sector of developing countries before liberalisation. Other factors influencing the level of non-performing loans will be considered in section 3.4.2. In S.E.Asian countries, macroeconomic imbalances had generally been eliminated before financial reforms were initiated. This is in contrast with countries like Sri Lanka, Ghana, Zambia and other African countries where the financial liberalisation

process was initiated in an environment of very high inflation<sup>73</sup> rendering it difficult to attain positive real interest rates and was accompanied by considerable loss of government revenue.

*“... fiscal problems, including those emerging from loss of tax revenues must be resolved. Liberalisation will not in itself improve the fiscal position of the government. In general, no liberalisation scheme is likely to work if it is accompanied by increasing inflation rates that results from reduced ability to tax financial intermediation”*

[Dooley and Mathieson, 1987, 34]

The fiscal imbalance created high and variable inflation rates in many countries (Snowden, 1987). In order that the financial reforms succeed in increasing the supply of loanable funds to investors, higher and variable nominal interest rates are required and this gives rise to adverse selection and moral hazard as explained earlier.

De Grawe (1987) argues that high variable inflation rates encourage high debt accumulation in the more inflationary sectors of the economy since inflation represents a net transfer of resources from lenders to borrowers and the volume of debt increases. With a sudden adverse movement in prices, projects with large debt exposures become insolvent. This has spillover effects in the financial sector.

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<sup>73</sup> Ghana, above 20%; Zambia, above 100% inflation.

Villanueva & Mirakhor, (1990) observe that macroeconomic instability creates uncertainty affecting the future cost of funds. This acts as a deterrent to a bank's engagement in long-term risk sharing.

McKinnon (1993) revisiting his initial thesis recognizes that the interest rate is more likely to be volatile in a liberalized system and that such volatility is likely to be greater if financial liberalisation is adopted before macroeconomic stability. He further suggests that full liberalisation of banks during a high and variable inflation is not warranted and that problems with prudential regulations over the banking sector loans portfolios become magnified when the central bank is trying to impose tight monetary control in order to disinflate successfully.

The new-classicals stress fiscal responsibility as an important pre-condition to successful liberalisation. Fiscal discipline as per this analysis implies maintaining control over public expenditure so as to keep the budget deficit below 2% or 3 % of G.D.P. The idea is not only to keep inflation under check and to avoid subsequent B.O.P problems. Fiscal discipline also avoids the crowding out of private investment whether it be because of subsequent increases in taxation or rises in interest rates. The New-Classicals then contend that government should get the fiscal deficit under control and establish macro economic stability before scaling down the directed credit program and adjusting the level and pattern of interest. The IMF has now developed a set of macroeconomic indicators as part of its surveillance work in order to promote financial stability.

An interesting point to note is that while initially financial liberalisation was considered as one component of the IMF prescribed stabilisation policies<sup>74</sup>, the arguments about macroeconomic instability contributing to financial distress actually show that the McKinnon and Shaw paradigm (1973) of financial liberalisation is condemned to failure unless stabilisation has been reasonably achieved. Much later McKinnon (1986) looking at financial liberalisation in retrospect suggests that macroeconomic stabilisation policies must precede the deregulation of banks and other financial institutions.

### **3.4.2. Sequencing**

Dooley and Mathieson (1987) argue that goods and financial markets do not adjust at the same speed. Trade liberalisation will move the economy from an import-substitution orientation to an export oriented one. Both imports and exports will increase but because of production lags in the process of resource transfer from import substitution to the export sector, the trade balance will initially face a deficit and depreciate the currency. If there is no capital inflow depreciation can in fact favour the export industries. However, if financial liberalisation is undertaken simultaneously, large inflows of capital will offset this effect and cause exchange rate appreciation that is harmful to the economy's export competitiveness. Additionally, trade liberalisation implies a fall in tariffs meaning reduced government revenue. Fiscal problems must be adequately resolved, as de-repression

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<sup>74</sup> Policies in favour of opening the economy so as to improve the allocation of resources increase competition and productivity so as to obtain sustainable growth.



measures in the financial sector will equally cause loss of government revenue. The World Development Report 1989 suggests that in the absence of macroeconomic stability internal flows can magnify existing domestic instability. Trade liberalisation should then precede financial liberalisation.

Blejer and Sagari (1987) suggest that for reasons related to the potential destruction of the domestic banking sector, this sector should be liberalised internally before liberalising the capital account of the B.O.P.

If capital controls are removed, foreign banks do not automatically and immediately enter the domestic market. The market structure of the banking sector is far from being one of perfect competition. It is then very likely that a few large borrowers (probably the banks only) will get access to the international loan market while the majority of the borrowers are excluded from carrying out transactions at international interest rates because of costly and imperfect information (Blejer and Sagari, 1987). Because of the monopolistic nature of the domestic banking industry and the absence of arbitrage, the spread between domestic deposit and lending rates as well as between domestic and international lending rates remains high. Financial liberalisation then fails to bring about financial deepening since the attractiveness of deposits is not improved. Further, different aspects of economic liberalisation may work at cross-purposes. Abrupt changes in interest rates may cause rapid appreciation of exchange rates and cause disruption to the real economy.

Blejer and Sagari suggest that liberalisation could begin from the internal side by eliminating entry barriers for new domestic players and encouraging competition

so as to weaken the market power of banks. The immediate entry of foreign banks could have an impact on the level of competition; however this move should be delayed as domestic banks would lose substantial market share due to the superior technology and the lower costs of operation of the foreign competitors. To maintain a large and profitable domestic banking sector it is necessary to begin with liberalising the banking system internally first so as to allow the domestic banks<sup>75</sup> to start adopting competitive behaviours, develop new instruments and new banking practices.

Once the banking sector has been reformed, the second step would be to give freedom of entry to foreign banks so as to render the banking sector still more competitive and to give an impetus to arbitrage pressures and hence supply the market with cheaper credit.

Mehrans and Laurens (1997) suggest that to achieve a better allocation of credit, policy makers need to decide when to start the liberalisation of interest rates and how fast to move. It is premature to consider financial liberalisation in countries with serious macroeconomic imbalances and lacking regulatory and supervisory frameworks or interest controls need to be re-introduced. Mehrans and Laurens propose the following sequence:-

First, liberalise interest rates on wholesale transactions in the inter-bank market. Then liberalise lending rates and lastly deposit rates.

Wholesale transactions in the inter-bank market do not affect the public directly and so do not represent a very disruptive starting process. Sequencing

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<sup>75</sup> Prior to liberalisation, they operate in a protected and restricted environment.

liberalisation of lending rates before deposit rates prevents too fierce competition that could affect the profitability of commercial banks and also gives them time to strengthen their operations and financial structure. This also gives government enough time to debate and pass solid legislation concerning collateral and bankruptcy. It is also pointed out that if liberalisation of deposit rates is delayed completely until all lending rates have been fully liberalised, this could lead to some unstable deposit flows between banks. Therefore, once the lending rates have been partially liberalised, the liberalisation of some deposits, especially wholesale deposits by large firms, may be started and liberalisation of retail deposit rates would come last. An earlier liberalisation of wholesale deposits by large firms is also useful as it facilitates the development of an inter-bank market and competition with Treasury bills or repurchase agreements. This is particularly useful if the size of the secondary market is small compared to the central bank's open market operations and requirements.

Fisher (1993) suggests that before opening to international markets, reforms in favour of competition among banks and consolidation of prudential regulation and supervision should be completed. Excessive level of non-performing loans remains a third area to be addressed by liquidation or by recapitalization before external liberalisation. Otherwise, domestic interest rate will fail to converge with world interest rates.

A study (Caprio, Atiyas and Hanson, 1994) covering many developing countries concludes in favour of:

(1) Managing the reform rather than adopting a laissez-faire stance.

(2) Gradual sequencing with attention paid to the initial macroeconomic stability conditions.

The steps followed in Mauritius with respect to liberalisation of interest rates will be considered in Chapter 6.

### **3.4.3 Institutional Legacy, Regulation and Supervision**

Several institutional arrangements inherited from past financially repressed systems constitute a fertile ground for financial distress. Past policies of directed credit in a protected environment had undermined financial development. Banks were not able to develop the skills of assessing credit risk and monitoring borrowers efficiently. Poor lending decisions in terms of pricing of loans affected the profitability of banks adversely. Such poor decisions also come from substantial joint ownership of financial, industrial and commercial firms. In such cases, after liberalisation, banks found it difficult to adjust rapidly to market rates especially if the “connected” borrowers had for a long time been receiving favourable treatment under the previous interest ceiling policy, Dooley and Mathieson (1987). Financial liberalisation then created opportunities for banks to make poor lending decisions. Deregulation pushed banks towards assuming greater risk and increased their vulnerability. Interest rates had then been set free to rise towards market equilibrium and deposits increased in an environment where borrowers had greater information about their own default risk than do bankers (Villanueva and Mirakhor, 1990).



Severe asymmetric informational problems gave rise to adverse selection and moral hazard. Improvement of the risk evaluation capability of bankers through training then becomes a priority in the newly liberalized economy.

Another inherited factor is that just prior to the reform regulators were confined to only ensure that the banks are not engaged in fraud, and that they conform to government's guidelines on credit expansion (Dooley and Mathieson, 1987). Under the pre-liberalisation directed credit programme, government-owned banks were forced to lend to public enterprise and priority regions/sectors even when the borrowers were consistently unprofitable. Earlier in section 3.4.1 it was reported that devaluation had contributed to the build-up of non-performing loans. The World Development Report 1989 highlights that when liberalisation started in developing countries some private banks got into the dilemma of continued lending to bad borrowers to avoid their own bankruptcy<sup>76</sup>. When liberalisation started, many banks were already overburdened with non-performing loans inherited from the directed credit programme policy. In many countries, for financial and political reasons these loans were not written-off in a process of balance sheet restructuring and banks remained dependent on subsidized credit from the central bank after liberalisation. In such conditions, banks' lending decisions remain largely subject to some form of government discretion and there is only little improvement in the allocation of resources.

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<sup>76</sup> This is discussed in chapter 4 under Minsky's financial instability hypothesis

Equally inherited in many African countries<sup>77</sup> is the monopolistic power of banks. Such market imperfection has been exploited by banks. In a context of abolition of interest rate control, the market power of banks allowed them to widen their interest spread. Domestic savers have not really found bank deposits more attractive and financial deepening has been very weak.

The early liberalisation thesis before the disasters in latin America ignored several institutional aspects such as the legal system, the enforcement of contracts and bankruptcy procedures. Reference in the literature to banking prudential regulation and supervision was rather scarce and not comprehensive. Benston and Marlin (1974) analyse the usefulness of substandard loan data. Gutentag and Herring (1984) examine the regulatory disposition in cases on insolvency of financial institutions.

According to recent literature, abolition of direct government intervention in banking credit decisions should not be interpreted as free or unregulated banking but as a change in the financial system architecture which is the set of standards, rules and regulations governing the various interactions in the financial system. Intervention should continue in the form of a comprehensive set of prudential regulation coupled with supervision to achieve the goal of stabilizing the banking system. Unfortunately it has been observed that in many developing countries because of high level of corruption and poor institutional quality, regulation does not work satisfactorily (Demirgüç-Kunt and Detragiache, 2002).

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<sup>77</sup> E.g Kenya, Malawi.

The fact that banks provide liquidity services within a system of fractional reserve banking exposes them to runs that are very costly to the economy. A bank run is triggered either by (i) actual poor performance or (ii) by panic caused when some depositors observe a large withdrawal and they do not know whether this is for early consumption or due to the action of informed depositors who hold information about poor performance (Chari and Jaganathan, 1988). Further a run on one bank may trigger contagion runs on other banks via the interbank market (Calomiris, C and Gorton, (1991). The risk of systemic crisis and the inability of depositors in general to monitor banks warrant the regulation of the banking sector. The dangers of overly leveraged insufficiently regulated banks and bad loans have been brought to light again in the last South East Asian crisis. Access to credit reflected “crony capitalism”<sup>78</sup> and banks were weakened by increasing the level of non-performing loans<sup>79</sup>. The traditional way of minimising potential risks to financial institutions and promoting financial stability has been through both regulation of capital and through prudential supervision. In the absence of adequate regulatory and supervisory mechanisms, various market failures such as adverse risk selection promoted by deposit insurance and moral hazard<sup>80</sup>, oligopolistic pricing<sup>81</sup>, interlocking ownership and lending exacerbate the problems associated with structural deregulation Diaz-Alejandro(1985) and Velasco, (1996). Supervision aims, inter alia, at detecting a weakening of the portfolio of the financial institutions and at limiting banks’

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<sup>78</sup> The favouring of enterprises controlled by friends or relatives of people holding political power

<sup>79</sup> The favoured borrowers knew that they would not be sanctioned in case of default because of political ties.

<sup>80</sup> Adverse selection and moral hazard will be discussed in the next chapter.

<sup>81</sup> Sometimes banks associations unofficially fix the interest rates - (cartelized action).

commitment of funds to risk concentration. Capital Adequacy Requirements (CARs) and prudential supervision protect individual institutions from failure and ultimately avoid systemic failure.

A risk weighted capital ratio is a measure of a bank's capital in relation to its credit exposures. When a bank has an adequate capital base it can easier absorb a reasonable level of losses before becoming insolvent. This requirement then serves as a cushion or front line of defence against bad debts<sup>82</sup> and other risks<sup>83</sup> and promotes the stability of the financial system. Depositors then receive a certain protection and as confidence is improved, increased intermediation and higher efficiency result in the financial system. The Basel<sup>84</sup> Accord of 1988, rendered fully operational in 1993 (i) defines a bank's capital in three elements, (ii) establishes a minimum capital requirement for banks and (iii) proposes a formula to determine the amount of capital a bank should have based on the riskiness of its assets<sup>85</sup>. At least 8% of a bank's asset, weighted for risks, should be held as capital base consisting of three elements: tier 1<sup>86</sup>, tier 2<sup>87</sup>, and tier3<sup>88</sup> capital. The different components of a bank's capital have different capacities to absorb losses. Tier 1 is permanent capital

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<sup>82</sup> E.g following the collapse of large corporate clients.

<sup>83</sup> Exaggerated by the narrowing of interest spread; increased competition arising from structural deregulation and causing loss of market share.

<sup>84</sup> The Basel Committee on Banking Supervision of the Bank for International Settlements (BIS) represents the central banks, regulatory and supervisory authorities of the major industrialized countries (G10). It promotes international standards and ensures supervision of banks on a global basis.

<sup>85</sup>  $\frac{\text{Net Capital}}{\text{Risk Weight Assets}}$  . (The assets in the balance sheets are assigned weights according to the level of riskiness and the total weighted balance value of the assets is compared with the bank's capital). E.g cash and loans to government are weighted at 0% while mortgage loans are weighted at 50%.

<sup>86</sup> At least 50% of a bank's capital must be tier1 (core capital – equity plus disclosed reserves)

<sup>87</sup> This supplementary capital includes revaluation revenues, unrealized gain on securities, undisclosed reserves, hybrid debt instruments and subordinated long-term (over 5years) debt.

<sup>88</sup> Short-term subordinated debt (over two years)



readily available to absorb losses without causing a bank to stop trading. Tier 2 capital can absorb losses in the event of a winding up and thus provide a lower protection to depositors. In terms of liability in the event of a winding-up, depositors fund actually rank in priority before capital in the event of a winding up. The Basel Accord constitutes a move towards an international convergence of capital standards and reduces competitive inequalities by creating a level international playing field. By measuring the amount of a bank's capital expressed as a percentage of its risk weighted credit exposures the actual risk weighted capital ratio provides an indication of the capacity of the institution to face shocks to its balance and so reveals its robustness<sup>89</sup>. The numerator in the capital ratio measures the absolute value of capital and is thus inversely related to failure. The denominator is a proxy for the absolute level of risk of the institution. With the risk weighting system, banks have to charge more capital for riskier assets and this acts as a disincentive to holding risky assets.

It must be noted that Off-Balance-Sheet contracts such as guarantees, foreign exchange and interest contracts also carry credit risks. A credit conversion factor is multiplied to the principal value of these contracts to derive a credit exposure equivalent, thus extending capital requirement to Off-Balance-Sheet positions.

However, the capital ratio methodology is not fully accurate since each loan is unique and evaluating the credit risk of a bank's assets is not simple. It reveals nothing about the quality of assets, which can be hampered by a high level of non-performing loans. This can adversely influence the solvency of financial institutions.

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<sup>89</sup> Stability and capacity to absorb losses; i.e. resilience.

Further by classifying assets in four different weightings for calculating riskiness, a “one-size-fits-all” approach is being adopted. This does not provide a strong incentive for banks to improve on risk management in order to save on capital. The New Basel Capital Accord<sup>90</sup> (BIS, 2002) proposed by the Basel Supervision Committee suggests rewarding stronger and more accurate risk management<sup>91</sup>. Still another weakness to be highlighted is that when an institution’s situation starts deteriorating, this is reflected in the capital ratio only with a time lag.

The performance of weighted capital adequacy ratio as a predictor of bank failure is less good over the long run and empirical evidence<sup>92</sup> suggests that banks that were adequately capitalised have failed some years later. However, generally failing banks begin to show signs of weaknesses two to three years before they are being closed by supervisors (Estrella, Park and Peristiani, 2000). Capital adequacy ratio remains only one element in measuring the strength of a bank and if taken in isolation can be a misleading indicator of strength.

Chiuri, Ferri and Madjoni (2001) underscore the credit crunch effect of stricter enforcement and stiffening of CARs on intermediation in less developed financial systems. This is an illustration of the fallacy of composition. On studying the situation of 16 emerging economies<sup>93</sup> in which increases in capital requirements were enforced during the 1990s, Chui et al observed three main results:

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<sup>90</sup> Also called Basel II.

<sup>91</sup> The New Accord will be finalized by mid-year 2004 and will be implemented year-end 2006. It also puts emphasis on supervisory review and the efficient use of market discipline.

<sup>92</sup> E.g. the New England banking crisis, 1989-93.

<sup>93</sup> Argentina, Brazil, Chile, Costa Rica, Hungary, India, Korea, Malaysia, Mexico, Paraguay, Poland, Slovakia, Thailand, Turkey, and Venezuela.

(i) Enforcement of capital adequacy requirement as per the 1988 Basel standard dramatically curtailed the credit supply over a multi-year horizon.

(ii) Such adverse impact is not limited to countries enforcing CARs in the aftermath of a currency/financial crisis.

(iii) Foreign-owned banks suffer less such adverse impact. This, according to Churi et al, suggests that the opening up to foreign investors may be an effective way to partly protect the domestic banking sector from negative shocks.

The conclusion from Churi et al's observations is that the phasing in of higher capital requirements, especially for countries that mostly rely on bank credit, has to be cautiously managed so as to avoid a credit supply retrenchment leading to a recession. Actually in countries with weak alternative financial channels to the banking system, the curtailing of bank loans has potential long-lasting adverse effects on the economy (Greenwald and Stiglitz, 1993). Faced with the Basel Committee Consultative paper about the stiffening of CADs, it is indeed legitimate to question whether such a proposal actually addresses the needs of developing countries or whether the international bodies setting regulatory standards should not adopt a differentiated options approach catering for a smoother process of phasing in and stiffening of capital regulations in developing countries. The stiffening of capital requirements also poses a problem to banks in economies facing a stock market crisis in the sense that a dip in stock prices renders it difficult for banks to issue new shares, as has been the case in Japan in the 1990s. It must be observed that Capital adequacy requirements do not apply to highly leveraged non-bank financial institutions like hedge funds and this is a source of concern.

In recent years, with structural deregulation, there has been a change in the regulatory mix with a move towards more structured official regulation. Over the last two decades structural deregulation, more specifically the removal of binding portfolio constraints, has allowed financial institutions to engage in specialised markets where they have less expertise and also to adopt more risky investment and loan portfolios. In many countries banks have been providing an imprudent level of credit to the property and equity markets to offset the lower profit margins and declining market shares in their traditional activities following increased competition. Actually in many countries with developed financial systems, banks have lost their predominant role as deposit takers and lenders to companies. A broader spectrum of firms (NBFIs and non-financial corporates) is now providing such banking services or simply credit card facilities. Competition between banks and NBFIs is now asymmetric since the non-financial firms can easier diversify into the banking industry (usually in the more profitable segment) than vice versa<sup>94</sup>. Further, banks, now being authorised to hold equities in non-financial business, have granted loans to firms belonging to the same conglomerate albeit at high leverage and high risk of concentration. They have an incentive to do so, just to protect their own capital. Even in situations not relating to connected lending there exists the Ponzi Finance problem which is elaborated in Chapter 4.

Traditionally, it has been considered that the financial system can remain in good health only by protecting individual institutions from failure through regulation

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<sup>94</sup> It is easier for instance for a furniture trader to give consumer loans than for a bank to start selling home appliances.



of capital and prudential supervision. Innovation in recent years, more specifically securitisation<sup>95</sup>, has weakened supervisory efficiency. Banks can now unbundle the total risk of an asset into its component parts and transfer combinations of these component parts to those willing to bear the risk. This has helped to improve the quality of the balance sheet by increasing the liquidity of the assets. However, such active portfolio management can, if not properly managed, expose the institution to huge losses. Increased trading in fact increases the risk of failures due to volatility of asset prices. In addition to credit risk, banks are also exposed to interest rate risk, operational risk<sup>96</sup> and reputational risk. Inadequate internal control systems can lead to losses due to fraud. Huge losses can also be made on foreign currency trading. Clearly, the new environment under financial liberalisation characterised by greater diversification both geographically and functionally warrants stronger prudential regulation and supervision.

While liberalisation is expected to lead to higher economic efficiency, over the last two decades the stability of the financial sector has often deteriorated and several developing economies experiencing financial liberalisation have shown evidence of a higher frequency and severity of financial crises (Lindgren, Garcia and Saal, 1996).

Recent history of financial turmoil show evidence that in the days of integrated global financial markets, financial instability also comes from abroad and

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<sup>95</sup> A process where previously non-tradeable claims are transformed into tradeable ones e.g. Mortgage loans being converted into negotiable securities and sold to other depository institution or non-bank investors.

<sup>96</sup> This can be due to Fraud, money laundering, legal problems, natural disaster, execution errors, IT problems etc.

improved information and communication technology allows speedy contagion. An IMF study on financial soundness (IMF 1996) raised concern about the large fiscal deficit in dealing with crises. This view was further reinforced with the S.E. Asian crisis in 1997/98. In 1999 the international community took the initiative to create the Financial Stability Forum (FSF<sup>97</sup>) to discuss an improvement of the international financial architecture through both the development of internationally agreed standards and improving information exchange among the institutions responsible for promotion financial stability in different countries. A compendium of 12 key standards internationally accepted as important for sound, stable and well functioning financial systems has been developed. To improve the international monitoring aspect of standards, the Financial Sector Assessment Programme<sup>98</sup>(FSAP) was launched jointly by the IMF and the World Bank in May 1999 to identify strengths and weaknesses in financial systems and propose remedial measures to reduce the likelihood and severity of crises. A set of macroprudential indicators<sup>99</sup> (MPIs or FSIs) was therefore developed to monitor the soundness and vulnerabilities of financial systems (2000, 2001a, b). The FSIs to-day are basically an adaptation of an initial set of six categories of aggregated microprudential

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<sup>97</sup> The FSF groups international regulatory and supervisory groupings, international financial institutions and senior representatives of national financial authorities the G7 countries and four countries with important financial centres, namely Hong Kong, Singapore, Australia and the Netherlands.

<sup>98</sup> The FSAP assesses a country's practice on a voluntary basis against five benchmarks: (1) IMF code of Practices on Transparency in Monetary and Financial Policies (2) The Basel Core Principles of Effective Banking Supervision (3) The Committee for Payment and Settlement System's Core Principles for systemically Important Payment Systems (4) The International Organisation of Securities Commission's Objective and Principles of Securities Regulation. (5) The International Association of Insurance Core Principles. Participation in the FSAP is on a voluntary basis for countries that are members of the IMF and of the World Bank. Around 60 countries have until now participated in the FSAP.

<sup>99</sup> Also called Financial Soundness Indicators (FSIs).

indicators within the CAMELS framework (Capital adequacy, Asset quality, Management soundness, Earnings, Liquidity and Sensitivity to market risks)<sup>100</sup> combined with some macroeconomic indicators. These initial MPIs are summarized in Appendix 2.

It is recognized that today the source of crises can also come from the equity market, the derivatives market and the foreign exchange market and it then impacts on pure banking activities. During the S.E.Asian crisis the collapse of nonbank financial intermediaries (NBFIs) contributed to the crisis. In Indonesia for instance where regulators limited banks' ability to borrow short in foreign currency and to lend long to buy non-tradable assets, corporations and non-financial institutions borrowed directly in the international markets and two thirds of the external debt was owned by the non-bank private sector. Banks and NBFIs often have both ownership and investment linkages. The near failure of a large hedge fund (LTCM) in 1998 highlighted the risk of systemic failure coming from NBFIs. Therefore, a set of broader Financial Soundness Indicators (FSIs), as a key component of the FSAP process are currently being examined to take into account the non-bank sectors as well but maintaining a core element of banking indicators as banks remain the core in financial systems. The FSAP has shown evidence of the need for regulatory/supervisory/institutional and budgetary independence of the agency responsible for regulation and supervision. Das, Quintyn and Taylor (2002) argue that avoiding political interference in the supervision process enhances the credibility

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<sup>100</sup> The CAMEL Framework is a regulatory rating system as an early-warning system to assess the health of individual banks and to take actions against banks' management whenever warranted.

of the agency and reduces moral hazard. Bankers then know that they cannot anymore lobby to keep an insolvent bank open and face a bigger pressure to behave prudently than when politicians can interfere. Independence however does not imply complete absence from political control and the independent agency should be accountable to those who delegated their responsibility to them but also to the public at large.

The “ex-post” financial liberalisation theories advocating macroeconomic stability, adequate prudential regulations and independent bank supervision, transparency, a better legal framework and an appropriate sequencing were expected to put an end to some poor empirical record concerning financial liberalisation in developing and emerging countries. Ironically, only a few months before the recent South East Asian financial turmoil, these countries were being quoted by the I.M.F as possessing strong institutional frameworks conducive to economic growth and in most of them the macroeconomic conditions<sup>101</sup> were actually favourable. Thailand was one of the least publicly indebted countries of the world in 1997 according to the TDRI<sup>102</sup>. In its 1997 annual report, the IMF directors strongly praised Thailand’s remarkable economic performance and the authority’s consistent record of sound macroeconomic management. They also praised Korea’s continued impressive macroeconomic performance and praised the authorities for their enviable fiscal record. The financial crises that unfolded just after cast serious doubts about the

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<sup>101</sup> Macroeconomic variables such as fiscal balance, inflation, savings, investment and growth.

<sup>102</sup> Thailand Development Research Institute.



legitimacy of liberalisation of short-term capital in general and not simply in the cases of Korea and Thailand.

Stabilizing measures have accompanied the financial liberalisation process, yet growth has not been superior to pre-reforms decades as promised. Further, unemployment has not improved in spite of greater labour market flexibility. Countries like Chile and China that have adopted the liberalisation policies only selectively and at their own pace have been performing relatively well while many who adopted the liberalisation path blindly and hastily are still waiting for the benefits to come.

### **3.5 Summary**

This chapter has introduced the second generation models, showing the contribution of the financial system in improving the informational frictions, the shifting of savings from unproductive assets (money) to productive illiquid assets and the reduction in the cost of innovation. The bank-based versus capital market-based debate has been examined as well as the legal-based and the financial services views. The empirical literature has been summarized in a table in appendix 3. The refinements brought to financial liberalisation canons in the light of empirical evidence following implementation of financial liberalisation policy in various developing countries have also been discussed. These concern macroeconomic stability, sequencing, prudential regulation and supervision. Initiatives to improve the international financial structure have also been discussed. In Chapter 6 and 7 these institutional aspects of financial liberalisation policy in Mauritius will be discussed.

The unfolding of economic events after liberalisation in many countries shows that the “ex-post” financial liberalisation paradigm might not tell the whole story and remains subject to further revision. Further attention should therefore be given to theoretical insights from other schools of thought. These will be discussed in chapter four.

## **Chapter 4**

### **SOME ALTERNATIVE SCHOOLS**

### **AND SOME RELATED ISSUES**

#### **4.1 Introduction**

By the end of the 1970's, most developing countries were severely affected by debt due to the oil crisis, continued weakness of prices of many primary commodities, increased interest rates in financial markets and the impact of recession on international trade. Private commercial banks engaged in lending to governments of developing countries showed concern about credit-worthiness and started getting involved in country risk analysis to determine the borrower's ability to generate enough foreign exchange to be able to service their debts (Meir, 1995). Soon access to world capital markets became difficult and these countries had little choice than to contract concessional loans from the I.M.F. Such loans were granted subject to adoption of a stabilising programme<sup>103</sup>. The stabilisation package included a component of financial liberalisation with a view to improve access to the international capital markets. Even countries that were not under the financial adjustment regime adopted the policy advocated by the IMF. Unfortunately, in many countries (e.g. in Latin America) adopting the financial liberalisation path, non-financial corporates as well as banks became insolvent and the financial system in these economies faced systemic failure. Caprio and Klingebiel (1996) surveyed 96<sup>104</sup>

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<sup>103</sup> Devaluation of rate of exchange, reductions in growth of wages and money supply, reduction in PSBR, freeing of interest rates

<sup>104</sup> The list does not include the transitions economies.

countries with banking crises since the late 1970s. Higher real interest rates also blew up government debt. Disappointing results of the early financial liberalisation experiments pushed governments in some developing countries<sup>105</sup> to reintroducing the pre-liberalisation policies, (Cho and Khakate, 1989; Diaz-Alejandro, 1985). These events reinforced the development of new emerging bodies of literature on the subject of financial liberalisation.

#### **4.2.1 The New Structuralists<sup>106</sup>**

The New Structuralists consider that financial liberalisation<sup>107</sup> in developing countries is growth-impeding rather than growth-promoting. Their opposition to the New -Classical thesis of financial liberalisation is based on two arguments.

The first line of attack concerns availability of loanable funds and the role played by the unofficial money market<sup>108</sup> (UMM) as highlighted in the McKinnon and Shaw models (see chapter 2). In the 1970s, developing countries were characterised by a low level of monetisation<sup>109</sup> and by financial dualism with the money market being split into:

(i) An official organized market<sup>110</sup> under the control of the monetary authority.

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<sup>105</sup> E.g. Korea, 1972; Argentina, 1982

<sup>106</sup> Represented by S. Van Wijnbergen, L. Taylor, E. Buffie, A. Kohsaka and others

<sup>107</sup> Both old and new versions.

<sup>108</sup> Curb Market is another appellation for unofficial money market in the literature.

<sup>109</sup> much payment was in kind (e.g. livestock in rural areas, labour services)

<sup>110</sup> Commercial banks, co-operative banks, development banks, Central banks, insurance companies etc.,



(ii) A fairly large unofficial money market, with money lenders providing credit to borrowers without marketable collateral<sup>111</sup> and pawn brokers providing credit to borrowers with marketable collateral. The market also included indigenous financial institutions like rotating savings and other credit associations which satisfy not only households as is commonly believed but also small firms' credit needs. The curb market operated outside the control of the monetary authority, with flexible transactions and higher interest rates than in the official money market (OMM).

In the Van Winjbergen model (1985) there is a Tobin-type portfolio framework. Households allocate their real wealth between currency, time deposits in the OMM and direct loans to the business sector in the UMM. Using a macroeconomic model with Korean data to estimate the effect of a change in deposit rates, Van Wijnbergen observes that time deposits are actually a closer substitute to UMM loans than to narrow money, M1. The transmission mechanism is that a rise in the deposit rate ( $r_d$ ) in the OMM following liberalisation can cause people to substitute from UMM market loans into time deposits. Further, the total supply of loanable funds falls because the reserve requirements in the OMM represent a leakage from the financial intermediation process and credit availability is reduced. Reserve requirements do not exist in the UMM where all savings are efficiently intermediated into investment. The supply of credit to firms then contracts and this impacts adversely on aggregate supply and growth. There can also be some substitution from currency into time deposits giving rise to an increase in the supply

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<sup>111</sup> While banks define collateral as real estate, pawn shops accept any object, e.g jewellery, musical instruments.

of loanable funds. However, this effect is offset by the loan substitution effect, which is the dominant effect. Van Winjbergen suggests that aggregate supply will fall by a larger extent than aggregate demand and inflation will follow. Erosion in the international competitiveness of firms then deteriorates the current account of the balance of payments and leads to reduced growth in spite of an increase in the savings ratio. It is only in the long term that the savings ratio effect offsets the adverse influence of the portfolio substitution from UMM loans to deposits. Therefore a liberalisation process where the OMM expands at the expense of the UMM as a result of a rise in the interest rate is a dangerous path.

The second argument concerns a vicious cycle of stagflation by considering the cost-push effect of capital finance in the link between the financial and real sectors of the economy as advocated by Taylor (1983). According to Taylor, working capital is used for input payments prior to the receipts of inflows from sales. This is generally financed by both banks and UMM credit. In fact control of money supply, in the context of a Structural Adjustment Programme<sup>112</sup>, will push many firms into the UMM which is taken to be the dominant market. Increased demand for credit in the UMM drives the UMM interest rate up, and creates cost-push inflation effects with adverse effects on investment and employment. Taylor introduces a cumulative effect in the process. In the medium term the reduction in net worth leads to reduced aggregate demand and the inflation rate is lowered. However, real wages will rise

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<sup>112</sup> Introduced by the World Bank in many countries in the 1970s and 1980s.

because of a time lag in wage responses and high wages will cause a reduction in the employment level and lower economic growth.

Buffie (1984) revisits the ambiguous portfolio substitution behaviour following a rise in the deposit rate in the financial sector liberalisation process and takes a less categorical position than Van Winjbergen and Taylor. The ambiguous behavior is between:

(i) People substituting from the UMM market loan to time deposits and the end result being a fall in total loanable funds because of reserve requirements; and

(ii) People substituting from currency and foreign bonds to deposits.

Buffie recognises that the net effect will be a reduction in output and employment in the short run considering the dynamics of increases in deposit rates. The savings effect through greater holdings of UMM loans and deposits will lead to a contraction in import expenditure. This is however offset by reduced exports due to the working capital cost push effect on international competitiveness. The resulting current account deficit leads to a fall in the exchange rate and hence reduces the stock of financial wealth. This will reduce actual asset holdings below desired levels and drive up interest rates in the UMM. The whole process repeats and the stable adjustment path will eventually lead the savings effect to dominate the negative output effect. The resulting current account surplus will appreciate the currency and the stock of real wealth grows. The UMM interest rate then falls causing positive output effects.

Buffie points out that increased savings due to financial liberalisation will eventually bring economic growth but we should expect a transition period marked by a fall in output and a rise in unemployment levels.

In short, the new-structuralists ideas consider that a program of financial liberalisation reduces the supply of loanable funds, creates a vicious circle of stagflation and hinders growth.

#### **4. 2.2 Weaknesses of the New-Structuralists Arguments**

On account of important weaknesses undermining their theoretical foundations, the new-structuralists failed to impose themselves as a major challenging body to the McKinnon and Shaw school. The key weaknesses are presented below.

Owen and Solis-Fallas (1989) exposed what they consider to be a misconception of the workings of the UMM. They argue that it is not correct to treat the UMM as a perfectly efficient market achieving 100% one-to-one intermediation. Lenders in the UMM are quasi-monopolistic occupying small-scale spatial sub-markets which prevent maturity transformation of funds, economies of scale and risk-pooling activities. It is in fact a segmented market for short-term loans and exists because of problems relating to asymmetric information.

Other weaknesses of the UMM are that it is characterized by poor accounting systems, nepotism in financial transactions, absence of intermediation, low financial innovation, absence of secondary markets for financial assets and a prevalence of hoarding. Given the greater efficiency of the banking system than the UMM, an



increase in the deposit rate would be expansionary because of a larger supply of loanable funds.

Upon lending, the UMM does not benefit from redeposits as is the case in the banking system. The UMM does not operate on the fractional reserve banking principle and the amount of credit never exceeds the amount of initial funds with the credit multiplier simply being equal to one. Consequently, when the deposit rate rises, any substitution from currency to the OMM will lead to an increase in the amount of loanable funds in the economy.

Kapur (1992) for his part launches an attack on the aspect of reserves requirements in the banking system. Kapur argues that the existence of reserves allows banks to mobilise a larger amount of resources than the UMM because it allows depositors to minimise their holding of money balances for transactions and yet be able to meet unexpected contingencies.

#### **4.3 New-Keynesianism and Financial Liberalisation**

During the 1970s and 80s the dominating Neo-Classical-Keynesian synthesis<sup>113</sup> came under the attack of New Classical criticisms of the absence of a convincing microeconomic foundation for the Keynesian price and wage stickiness arguments and the fact that these rigidities are due to government interference. New-Keynesianism then developed as a body of literature focussing on the consequences of information imperfections preventing competitive equilibrium and provided the

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<sup>113</sup> IS-LM model is the centerpiece of the Neo-Classical-Keynesian Synthesis. The conclusion of the IS-LM model is Keynesian (unemployment equilibrium) in the short-run but Neo-Classical (full employment equilibrium) in the long-run.

micro foundation of Keynesian macroeconomics to explain why the economy amplifies shocks and why there may be unemployment and credit rationing. New-Keynesianism challenges the competitive equilibrium analysis and maintains the Keynesian tradition concerning support to significant government intervention when market failures arising out of externalities, the “public good” nature of some commodities and widespread monopoly are considered.

In the area of financial markets, New-Keynesianism adopts a microeconomic analysis of credit market failures. It links the problem of asymmetry of information with adverse selection and moral hazard. These are considered to be more acute in a context of corporate limited liability and also when the legal framework is weak and inadequate with respect to enforcement of contracts and bankruptcy provisions. Asymmetry of information is present in all economies but in LDCs, because small or even medium sized firms lack proper accounting records and all the financial documentation<sup>114</sup>, the problem is more severe. Banks would find it more difficult and costly to assess creditworthiness and would prefer lending to the large established firms.

Stiglitz et al (1993) and Stiglitz (1994) argue that the complete elimination of financial repression in developing countries is a fundamentally erroneous policy. While admitting that various cross-sectional and time-series studies have confirmed a positive relationship between interest rates and growth, he argues that there is a need to differentiate between a small and a large financial repression. There is recognition that large repressions with high negative interest rates have adverse effects on the

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economy as shown by empirical evidence and verified through econometric studies. However, when the countries with negative real interest rates were excluded from the sample of countries in the econometric studies, higher real interest rates seem to be associated with lower rates of growth. Regarding the mobilization of savings, Stiglitz highlights the following:

*“Japan’s postal savings banks paid relatively low interest rates and yet were able to raise huge amounts of money, suggesting that other factors (such as convenience and safety) may far outweigh interest rates in determining the level of savings”*

[Stiglitz, Jaramillo-Vallejo, Park, 1993]

In a similar vein, Demetriades and Liuntel (1996) show that the imposition of a loan interest ceiling had positive effects in India and it successfully addressed market failures. It can be argued that it is possible for positive externalities and the crowding-in effect to overcompensate the cost of a mild financial repression policy.

Although financial repression creates a scarcity (since some potential borrowers will not get the credit they want at the interest being offered), government can intervene by setting up criteria allowing those who perform well (as measured by, say exports) to get more access to credit. The Korean economy was able to avoid much of the inefficiency problem affecting growth to the extent claimed in the anti-repression literature because export performance was the main criterion for bank loans. Firms that compete and succeed internationally are likely to be more efficient than those that operate in regulated and sheltered domestic markets, and most of the

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<sup>114</sup> E.g Bank statement, audited accounts, title deeds of proposed collateral.

loanable funds were in fact allocated to these firms, (Park, 1993). More generally, some restrictions on certain categories of loans (i.e some form of directed credit policy) may be desirable as lenders will tend to focus only on their expected private returns and might not allocate funds to projects for which social returns are sometimes higher. Vittas and Cho (1994) suggest that based on the experience of countries like Japan and Korea, directed credit programmes can promote investment and growth. To a large extent directed credit influenced the export sector in Mauritius although it must be pointed out that the industries concerned have been operating in sheltered markets via the Lomé Convention.

With respect to the credit rationing debate, New-Keynesians consider that lenders can only know about the probability distribution of risk /return of the average borrower for different categories of projects and will thus charge an interest rate<sup>115</sup> that suits the average quality of the loan portfolio. This level of interest inflicts an externality on many safe borrowers whose projects then become less viable. These 'sensible' borrowers who are not prepared to undertake high risk/high yielding projects are thus excluded from credit facilities. The higher cost of borrowing therefore leads to a deteriorated pool of loan applicants, from which lenders have to select randomly. Adverse selection<sup>116</sup> (Akerlof, 1970) then occurs before a loan transaction takes place. Higher interest rates raise the probability of moral hazard<sup>117</sup>

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<sup>115</sup> Interest rate is free to move upwards in a context of financial liberalisation as there is no more ceiling.

<sup>116</sup> Adverse selection refers to a situation where the individuals that are attracted to the transaction are those that are more likely to produce an adverse outcome for the other party.

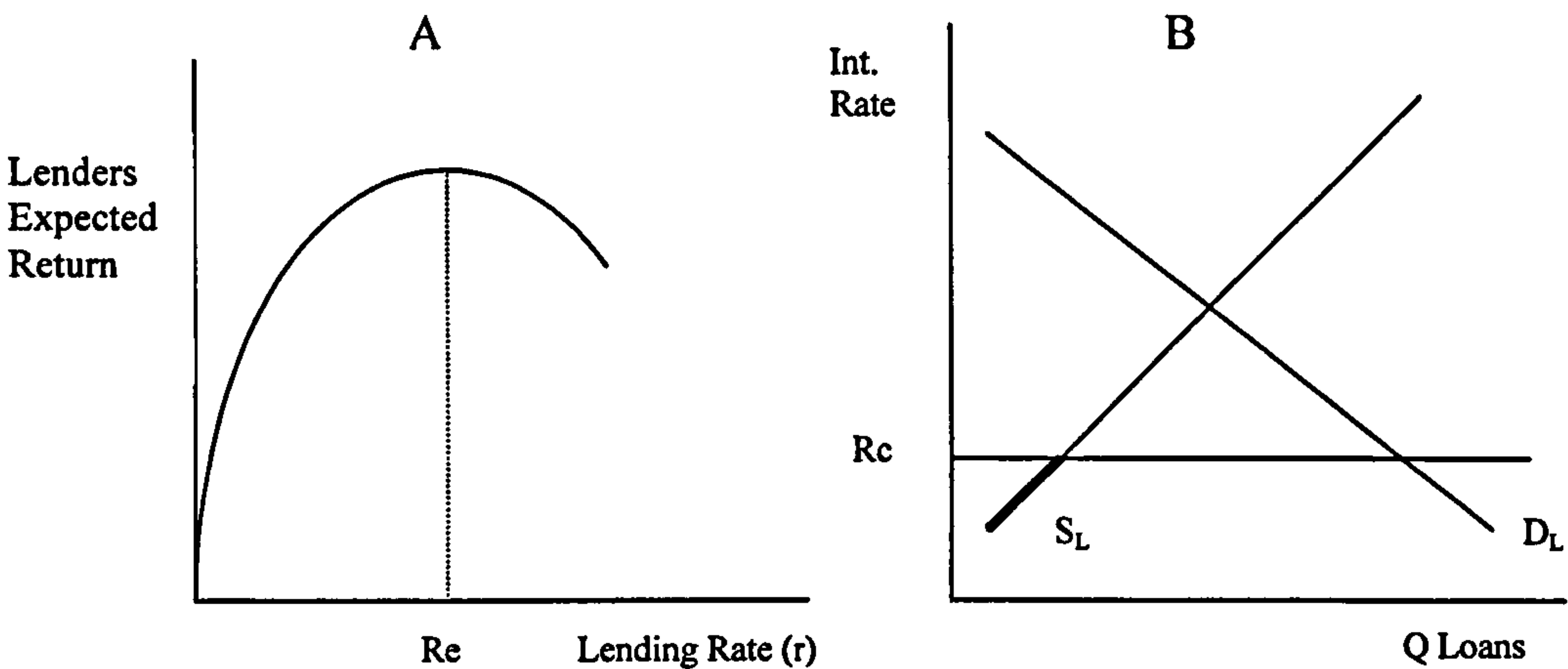
<sup>117</sup> Moral hazard refers to anything that might encourage risky behaviour.



as borrowers are encouraged to take more risky projects to pay for the higher cost of borrowing.

Because of adverse selection and moral hazards resulting from imperfections in information, banks will not allow interest to rise beyond a critical value  $R_c$  as shown in figure 1.4 (panel A) below. They will develop a risk averse position and adopt credit rationing (Jaffee and Russel, 1976; Stiglitz and Weiss, 1981; Guttentag and Herring (1984); Myers and Majluff (1984)).

**Fig 1.4**  
**Credit Rationing**



Therefore, in an attempt to maximise profit the banking system will display interest rates below the “Walrasian market clearing” rate. Even if there is excess demand (See Figure 1.4, panel B), lenders will not raise interest rates. Equality between demand and supply is reached by quantitative rationing rather than by interest rate adjustment to equate loan demand ( $D_L$ ) and loan supply ( $S_L$ ). Such

equilibrium is a credit rationing equilibrium rather than a competitive market equilibrium.

Credit rationing causes a number of projects with positive net present values to remain unfunded. Lending volume then remains below the social optimum and the level of investment is not maximised as advocated by the New -Classical model of financial liberalisation. This model of credit rationing illustrates that capital markets often do not clear. This is a case of market failure and warrants some form of government intervention in the credit market.

There is a presumption that financial markets will not, in general be competitive, especially because of imperfect information and also probably because of incompleteness.

Stiglitz (1993) defines a taxonomy of seven major market failures that provide a rationale for properly designed government intervention to make financial markets function better and improve the performance of the economy.

1. Monitoring: Information for monitoring of solvency, managers and board of directors is non-rival and almost non-excludable<sup>118</sup> in nature and, like any impure public good, is likely to be undersupplied. Because managers know that they are not being adequately monitored, they may take inappropriate risks and attempt to divert funds to their own use. Because of the principal-agent problem, investors cannot fully rely on the financial institutions and are dissuaded from depositing money in banks. Fewer resources are then allocated through the institutions.

2. Externality: The externality argument builds from the bank run rationale.

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<sup>118</sup> Or excludable at very high cost.

(a) Whenever a bank fails, loss in depositors' confidence can lead to a run on other banks as depositors suspect that other banks have similar portfolios as the failed bank (Diamond and Dybvig, 1983). This may lead to a systemic failure.

(b) Calomiris and Gorton (1991) model a bank run on the basis of information problems. Whenever depositors get some information that makes them believe that their bank could be insolvent they will attempt to withdraw before the possible failure.

In any case a bank run imposes an important negative externality on the payment system and on the flow of credit to firms and households. A financial disruption has a cascade of effects on the real economy as witnessed in the great depression and in the last S.E. Asian crisis<sup>119</sup>. Lenders do not take into account social returns/cost when rating real estate loans and credit is not allocated in a socially efficient manner.

4. Missing and Incomplete Markets: While classical analysis is based on the assumption of the existence of a complete set of markets, Akerloff (1970) highlights that markets may be thin or absent because of information asymmetries. Even in developed countries, the equity market is weak and does not work well. Certain key markets (e.g those insuring a variety of risks) are missing and this has an influence on the functioning of other markets. In many countries, their existence was the direct result of government actions. In Mauritius for instance, the setting up of the Sugar Insurance Fund to insure cane growers against losses due to vagaries of climate or against pests represents such an example. The role played in Mauritius by the

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<sup>119</sup> The last important financial crisis being the S.E Asian one, it is fully discussed in appendix 4

Development Bank in the early 1980s towards small enterprises and the recent development of micro-credit support the case for government intervention to fill credit gaps in incomplete markets. More recently government has set up a one-billion rupee equity fund through the Development Bank of Mauritius to invest massively in certain priority sectors<sup>120</sup>. Government expects that its initiative will be followed by the setting up of private equity financing to both listed and non-listed companies to facilitate their expansion and restructuring.

In many LDCs where both economic growth and development are associated with higher productivity in agriculture and where women have an important role to play, private banks are reluctant to provide credit to small farmers<sup>121</sup> and to women because of absence of collateral. Even prior to reforms these countries were affected by capital flight. With capital account reforms, rather than being affected by inflows of capital as in the case of emerging economies, LCDs face outflows of capital. A contraction in the monetary base further weakens the credit markets. Capital account liberalisation might thus be premature.

5. Imperfect Competition: In most countries competition in the banking sector is limited. In the loan market, borrowers face a limited number of suppliers. Further, a customer of bank A can be considered as a good borrower due to a good track record but is unknown to bank B and his project is judged riskier by bank B and bank competition is restricted.

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<sup>120</sup> E.g ICT, biotechnology, cotton spinning mills, textile and garments.

<sup>121</sup> This is a paradox if compared to developed countries where agriculture has been subsidized for several decades.



6. Pareto Inefficiency: There is widespread belief that competitive markets lead to a Pareto efficient allocation of resources. However according to the imperfect information paradigm, in the credit market, those willing to pay the most might not be those whose expected returns are highest and this leads to credit rationing as described earlier.

Further, lenders focus on their expected returns while the social returns on certain projects might be higher than the private returns. For instance, the social returns from a manufacturing borrower are higher than returns from someone borrowing for real estate speculation.

Credit markets are therefore rarely Pareto efficient. Market failures are omnipresent and there is scope for government intervention that can make all individuals better off. Cho (1986) suggests that in a credit market with imperfect information, the removal of the interest rate ceiling and directed credit would not, in the absence of well-developed equity markets in developing countries, lead to full allocative efficiency of capital. Government may then be forced to choose a second-best approach in which government maintains some controls on the banking sector until a well-developed securities market is in place to provide finance to productive firms that are excluded because of credit rationing. Intervention may increase allocative efficiency by forcing banks to lend to borrowers who would otherwise be rationed out and also by taxing borrowers profit and transferring the revenues to depositors. Another justification for government intervention towards Pareto efficiency is the less pro-cyclical nature of credit from state banks. This has been observed in Latin America where state banks benefit from a more stable deposit base

because depositors consider that such banks are safer than private bank, Micco and Panizza (2004).

7. Uninformed Investor: Market economies are characterised by a high degree of imperfections. Small degrees of information imperfections can have large economic consequences. Information disclosed is not always clear and timely and investors do not process these properly. Government can impose clear disclosure requirements so that financial institutions do not take advantage of uninformed customers.

As discussed in Chapter 2, the revised version of the financial liberalisation policy has adopted some ideas connected with imperfect information namely the strengthening of financial institutions through transparency<sup>122</sup>, market discipline, exposure limits, oversight and other stronger prudential regulations and supervision to avoid financial crisis. However, these are insufficient and policies bringing private risks in line with social risk are needed.

*“Let me be clear: Improved regulation, and increased transparency are clearly desirable. But we should not underestimate the difficulties or overestimate the effectiveness of these measures. Those who think that regulation and transparency are all that are needed are looking for cheap and easy solutions to a complex and serious international problem. Or alternatively, they seek solutions that*

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<sup>122</sup> Transparency did not save Scandinavia from banking-cum-currency crisis in the end of 1980s and beginning of 1990s.

*are ideologically compatible with the belief in “free markets”- in spite of the evidence of the importance of market failures...”*

[Stiglitz, 1999 pp.1514]

As regards external liberalisation, the New-Keynesian literature highlights that countries that actually attract international capital are generally not the low-income ones but emerging economies that have reached certain strength and a relatively good level of savings. These additional capital flows do not necessarily go to productive sectors and the money is misallocated increasing the vulnerability of the economy, (Stiglitz, 1999a, b, c). Before succumbing to the doctrine of financial liberalisation, Thailand for instance, had imposed limitations on bank lending to the real property (speculative) market and credits were directed to productive activities. In the case of the S.E Asian crisis (1997-98), Collyns and Senhadji (2002) show evidence of a strong relationship between bank lending and real estate bubbles and their subsequent bust<sup>123</sup>. Delong and Summers (1990) argue that there is a strong positive correlation between investment in machinery and economic growth. This suggests that favouring investment in creating factories certainly provides better foundations for a growth strategy than building empty office space in a period of bubbling<sup>124</sup> of property prices. Potential high externalities are imposed on the economy when the real estate markets bubbles collapse just as in the case of the Dutch tulip mania (1634-1637), the stock market boom and crash of the 1920s and

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<sup>123</sup> The effect is related with the strength of the banking regulation.

<sup>124</sup> Large upward deviations in prices from fundamental value. This is caused by irrational exuberance and is followed by crashes.

the recent financial crises in emerging economies. The fact that private decisions of firms to channel credit to the property market and to adopt high debt equity ratios in periods of growth euphoria make the economy more vulnerable to shocks favours massive outflows of international capital. It also suggests that the problem was one of too little government rather than one of too much government. Government reduced its role by moving away from directed credit programmes but failed to put in place the legal regulatory structure required for bubbling capital markets. Governments in the USA, Europe and Japan also failed in their role towards the creditor firms in their countries from overlending to their S.E. Asian debtor counterparts.

Financial stability can be regarded as a global public good. To improve the efficiency of the financial markets, Stiglitz (1989) and Summers, (1989, 2000) suggest an extension of the concept of the Tobin Tax to the domestic financial market. They suggest a small ad-valorem tax on global financial transactions to deter short-term speculative transactions and “cool hot money”. They consider that such a tax will not discourage long-term asset holders who are rational market participants and who base their trading on fundamentals and are willing to wait a long time to realise a return, (Stiglitz, 1989). A reform to the bankruptcy law to differentiate between an individual bankruptcy and a systemic bankruptcy is also proposed (Stiglitz 1999 b, c). The idea is to transfer the burden of proof on the creditors who have to establish that there was persistent mismanagement of a firm’s assets. This allows unnecessary stripping of assets and production continues. In the case of systemic bankruptcy the management is maintained and the capital is restructured to



turn the creditors into equity holders. Bankruptcy law then acts as a circuit breaker leading to a standstill. In Mauritius the existing legislation in case of corporate insolvency is biased towards liquidation and financial institutions have important preferential creditor rights. The New-Keynesian approach aims at reducing the volatility of capital flows, reducing the discrepancy between private and social return and bringing private risks in line with social risk.

The market imperfection argument also applies to external liberalisation and can, in a context of capital account liberalisation, lead to financial instability. Banking crises in recent years have not been on the liability side with bank runs as per the Diamond and Dybvig model but on the asset side with deterioration of banks' assets. Because of asymmetry of information hot money is likely to continue flowing in an economy affected by a high level of non-performing loan and contribute to financial fragility. When much later current account deficits are perceived as unsustainable<sup>125</sup> with relatively low foreign reserves to defend the exchange rate a currency attack is triggered. Massive outflows then weakens the exchange rate considerably and banks face an increased foreign currency debt creating a twin crisis, banking-cum-currency, a phenomenon that has been found to be very common in financially liberalised emerging economies, (Glick and Hutchinson, 1999).

Stiglitz (1999a) argues that in S.East Asia because of asymmetry of information investors could not distinguish between healthy firms and financial

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<sup>125</sup> Current account deficit in Thailand rose from 5.7% to 8.4%GDP in 1995. In Korea the change was from 1.5% in 1994 to 4.6% in 1996. In Malaysia current account deficit reached 8.8% GDP in 1995.

institutions and those that are not. Consequently healthy firms could not retain access to credit.

Collier and Mayer (1989) argue for a form of sequencing that takes into account market failures and their evolution in undeveloped financial systems. At an early stage Collier and Mayer argue that government should assist in the creation of intermediaries to provide access to a broader set of domestic sources of finance. At this stage interest-rate ceilings and capital controls should be imposed. Liberalisation is to start when a significant number of firms of high repute have been established. Control can then be lifted and competition between financial institutions encouraged. Finally when the country has established an international reputation, capital account liberalisation can start. Along similar lines, the Tarrapore Committee (1997) suggested that capital account convertibility in India needed to be preceded by the establishment of a liberalised, well-supervised domestic financial system. Rodrik (1998) shows evidence that countries without capital account control do not grow faster.

New-Keynesian economics highlights that in the modern economy availability of credit is important as most transaction is by credit. In economic downturns as in the S.E. Asian crisis the use of restrictive monetary policy as suggested by the IMF to Thailand to attract back hot money or reduce its outflows proved to be ineffective. It is unlikely that a depressed economy will attract capital inflows through high interest policies. Worse, it pushed highly leveraged firms to bankruptcy and plunged the economy into a deep recession. Given that many firms get credit from other firms and give credit to still others, a shock to one can lead to a

cascade of bankruptcy leading to bank failure as firms are unable to service their loans. Focus should then be on maintaining the level of credit, avoiding higher interest rate charges to firms, adopting debt-stills and corporate financial restructuring and stimulating the real economy. In the case of S.E.Asia, recovery has been facilitated by Japan's Miyszawa initiative providing billions in trade credit.

Contrary to the McKinnon and Shaw paradigm, the New-Keynesian micro-economic based analysis considers that the existence of market failures arising from asymmetric information provides a rationale for government intervention in financial markets. It is even suggested that in developing countries, a small financial repression rather than the traditional large repression can influence growth positively, reduce prospects of bankruptcy, volatility and direct more credit to the real economy.

The New-Keynesian literature does not associate instability with the existence of a highly uncertain future as in the pure Keynesian tradition. A hybrid framework is adopted comprising a Neo-Classical methodology of rational expectations but enriched with the concept of asymmetric information and other forms of market imperfections. This contributes to erode the belief in the Walrasian vision of private markets. The Neo-Classical prescription of reducing the role of the state in the financial markets to one of levelling the playing field is also rejected. A role is defined for the state in dealing with market failures, to avoid crises since capitalist economies without a strong government role are prone to frequent crises, (Stiglitz, 1999b).

In spite of virulent attacks from some Post-Keynesian quarters labelling new-Keynesianism as bastard Keynesianism<sup>126</sup> betraying the true Keynesian thinking, there could exist some complementarity between the two schools in terms of policies. Fazzari and Variato (1994) argue that although the New-Keynesians share some methodological basis with the Neo-Classicals, they do not share substance.

#### **4.4 Post-Keynesianism: Domestic and International Instability**

The Post-Keynesian school draws on three main traditions;

1. Stress on uncertainty, from Marshall, (1891)
2. Stress on the role of effective demand but making the distribution of income the starting point for effective demand failure from M. Kalecki (1950).
3. Stress on the role of various uncertainty reducing institutions<sup>127</sup> as a response to the absence of information the market cannot provide. This reveals the influence of institutionalist thinking from Veblen (1899).

##### **4.4.1 Uncertainty and Domestic Instability**

Building on Myrdal's banking principle<sup>128</sup>, the Post-Keynesian body of literature assumes money supply to be endogenous, responding to credit needs. Post-Keynesians also highlight the importance of profit expectations and cost-push factors in causing changing credit needs and consider the independent ability of

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<sup>126</sup> The label is from J. Robinson.

<sup>127</sup> E.g wage contract, debt contract, trade agreements, administered prices.

<sup>128</sup> Myrdal (1939) observes that changes in economic activity alter the credit needs of industrial firms and hence alter the amount of credit created by the banking system and, by extension change, the money supply.



financial institutions to fulfill the demand for credit and create money. Increased lending to meet credit needs is accompanied by increased deposits, which require a higher level of reserve requirements. To avoid liquidity and solvency problems to spread through the financial system, the central bank has to permissively supply the necessary reserves by granting access to the discount window and by open market operations. This stabilising function denies the central bank the possibility of controlling the monetary base and this will be again discussed in relation to Minsky's argument later in this chapter.

In spite of the development of revised versions of the financial liberalisation argument (Chapter 2), Post-Keynesians suggest that financial liberalisation in itself could be a cause for greater fragility in developing and emerging economies. Akyuz and Kotte (1991) show evidence that a high interest rate policy can result in lower aggregate savings when the effect of income distribution, tax treatment of interest payment and corporate financial distress are taken into account. Arestis and Demetriades (1999) suggest that its theoretical foundations are weak, and that even where necessary preconditions, such as effective supervision or macroeconomic stability, exist, financial liberalisation could still become the main source of financial crises. Crotty and Lee (2002) argue that in Korea the demise of a well-working state-led, bank-based and closed system<sup>129</sup> led to a change in the power-relationship between government and domestic and international capital which resulted in financial crisis in 1997 and threatens Korea's long-term rate of capital accumulation. Post-Keynesians also argue that the incorporation of the New-Keynesian insights of

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<sup>129</sup> Closed capital account.

asymmetry of information does not salvage the case for financial liberalisation that is considered as ultimately growth-distorting. Further, while New-Keynesians consider borrowers as having perfect knowledge and uncertainty as being asymmetric and falling on the supply side, Post-Keynesians consider uncertainty to prevail symmetrically on both sides of financial markets.

The Post-Keynesian analysis opposes the rational expectations approach that keeps a focus on a world where events are driven by some independent and relatively stable stochastic process. In such a framework, expectations do not affect the real world. Uncertainty is treated as in gambling where statistical inferences allow predicting the future on the basis of an unchanging population. It is then assumed that a stationary stochastic process produces realisations that are equivalent to random sampling with replacement. The Post-Keynesian framework is based on endogenous expectations and economic events are produced by non-stationary, non-ergodic<sup>130</sup> processes making it implicit that the standard theory of statistical inference does not apply, Davidson (1982). Unlike gamblers in a casino, individuals taking decisions in the real world cannot specify fully the population of all possible outcomes and the capital development of a country is not to be taken as the activities of a casino as argued by Keynes (1936).

Davidson (1998a, b) argues that lenders do not, in a probabilistic sense, have knowledge of the functional relationship between loan interest and the composition of projects available for financing. Lenders' assessment of current interest rates and future default rates cannot be reliably predicted from past behaviour as per the

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<sup>130</sup> A process where agents realise that the future cannot be reliably predicted on the basis of any given existing data.

rational expectations principle of the New-Classical economics. The Post-Keynesian analysis rests on Keynes' explanation of the existence of speculative activity. Economic events are time dependent and even if past probability distributions are constructed, these are non-stationary and thus not objective and as such can but provide only limited insights into the future. Keynes (1936) argued that even though we do not know the information needed to make optimal and safe decisions, we have a psychological need to behave in a manner which “saves our faces” as rational economic men. Keynes suggests that people develop a collective conventional process of expectations and confidence formation based on habit, tradition and instinct. Two key conventions according to Keynes are that:

1. We assure that the past is a more service guide to the future than a candid examination of past experience would show it to have hitherto been.

2. Knowing that an individual judgement is worthless, we endeavour to fall back on the judgement of the rest of the world, which is perhaps better informed.

However, conventional wisdom is not static and the evaluation by agents about whether investment is reasonable or not changes with “feeling” over time. Ideas about the future are marked by waves of optimism and pessimism and investors actions are driven by animal spirit<sup>131</sup> rather than rational expectations. Post-Keynesian models, unlike Neo-Classicals and New-Keynesian models embody non-ergodic stochastic processes. They are thus characterised by systemic risk or uncertainty and consider that any event can trigger ‘bandwagon behaviour’. No one

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<sup>131</sup> Whims or spontaneous urge to action related to profit expectations.

can guarantee that a depression or hyperinflation or a collapse of financial asset prices will not take place at some future date. Uncertainty cannot be eliminated as such but can only be reduced by asset diversification by borrowers and lenders and by the process of conventional expectations formation<sup>132</sup>.

*"What may appear to the agent ex ante as a highly diversified (and therefore relatively risk-free) portfolio may in fact experience significant ex post losses when the boom comes to an end".*

[Crotty, 1996 pp.333]

Today, derivatives transactions render risks more complex. Although large hedge funds offer some players a protection against certain risks others players take these risks. The near collapse in 1998 of LTCM, one of the biggest players in the world's future exchanges both in equity and debt instruments, shows the dangers of high leverage, over-reliance on theoretical market-risk models<sup>133</sup> and reminds us of the limits of the rational expectations framework.

Hyman Minsky (1963, 1967, 1978, 1992) developed the financial instability hypothesis arguing that the financial system evolves naturally from a stable to an unstable position and that stability is ephemeral and destabilising. Apparent stability generates changes in expectations. Minsky considers that the real problem of economic units is the question of liquidity for survival rather than maximising profit or utility within a budget constraint. Because cash inflows from productive assets

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<sup>132</sup> In normal times the expectations of the majority of agents is centered around a consensus forecast, thereby creating a high degree of expected covariance among assets and most assets are expected to do well

<sup>133</sup> There was an assumption that the portfolio was sufficiently diversified across world markets to produce low correlation



inevitably fall short of outflows from time to time, firms inevitably issue financial assets to trade future cash flows. Although it eases the liquidity issue, debt-finance leads to the “upward instability” of capitalism. During growth periods entrepreneur’s expectations about future returns are optimistic and firms’ robust position make them increase indebtedness dramatically relative to inside capital and adopt a financial leverage position that cannot be validated should the events prove to be less favourable. A hedge (robust) position exists when firms have a positive net cash flow and can meet financial obligations and firms are then considered financially safe even though profitability may be low. However, should events prove to be less favourable than expected as in the case of a recession, firms move to a speculative (fragile) position with expected net cash flow being for a certain period of time positive while realised cash flow being negative. Firms will then seek additional credit to meet obligations. As expectations are disappointed, financial arrangements are disrupted. From a speculative position firms are pushed to a Ponzi position, which is a situation where expected cash flows are negative and firms’ commitments are chronically above projected cash flows. Firms are then forced to increase their outstanding borrowing to meet financial obligations. A Ponzi finance posture increases the risks of systemic breakdown because of interrelated financial obligations and firms have to sell assets to pay loans. Further, the disposal of assets may lead to a drop in asset prices making the adjustment harder and sometimes “Ponzi” firms turn bankrupt. Such shifts from safe to weak positions can be due to various reasons, some of which are: -

(a) Refinancing on less favourable terms because either lenders become more concerned about their position or the central bank is adopting a tighter monetary stance to head off perceived inflation.

(b) Any exogenous shock, e.g. an oil price shock.

(c) Some expected income flows are not forthcoming for any number of reasons.

The above arguments reflect an endogenous view of money responding to the credit needs of the economy. Minsky's financial instability hypothesis is in fact institutional in nature and deals with the financial institutional arrangements and the evolution of behaviour in a world of uncertainty. It shows that the free market system is not inherently stable as per the orthodoxy but that it is subject to explosive oscillations because growth over the cycle affects behavioural patterns in a way that promotes instability. This analysis enriches the traditional Keynesian multiplier-accelerator analysis. The Ponzi trap is a dilemma because on the one hand firms face higher costs of debt servicing and on the other hand costs are higher due to increased size of debt over time. As debts accumulate, firms are no longer borrowing to finance higher output levels, but just to maintain solvency. Minsky argues that in a Ponzi-boom situation, banks tend to persist in lending because of self-interest. They actually want to ensure that borrower firms do not face bankruptcy as this represents a threat to their own solvency. Eventually banks' loan portfolios deteriorate with an accumulation of non-performing loans and this contributes to the instability of the banking sector.

The shift from a “Hedge” to a “Speculative” and subsequently to a “Ponzi” posture is independent of financial liberalisation policies and applies to any developed capitalist economy. However, the accompanied development of long-term finance<sup>134</sup> and more immediately the rise in interest rate following liberalisation make the analysis relevant to the developing countries undergoing liberalisation. Higher interest rates following financial liberalisation increases the cost of debt contracted under a previous set of expectations. Higher payments obligation often put a constraint on production as firms reduce consumption. Subsequently, lower sales receipts and higher debt servicing push firms into a Ponzi game.

Further, as financial deepening follows liberalisation, new instruments are created transforming ownership of claims into easily traded ones with the new institutions and technology available today. This liquidity position allows any investor to react to changes in mood and rumours by shuffling ownership among the various competing assets of his portfolio with a view to realising immediate large gains. The investor does so by anticipating future sentiments of other market players. The economy benefits from the advantages of liquidity but the cost is short-sighted speculation. In their chase for higher returns, firms may divert resources from their primary activities to financing speculative activities. In various countries there has been an increase in interest rates underpinned by a growth in demand for loans. At firms’ level there has been high borrowing for financing mergers, acquisitions, purchase of privatised assets, and acquisition of equity shares for portfolio diversification. At the household level as well there has been rising debt leverage for

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<sup>134</sup> Otherwise the Minskian’s transformation to fragility posture does not occur.

acquisition of financial assets. Such moves have very often resulted in run-ups in stock and real estate price indices and growth of Ponzi activities while short-termism pushes players to focussing on rapid increases in share values to the detriment of long-term productivity and employees' interests.

Minsky argues that the endogeneous instability breeding dynamics can be interrupted by institutional interventions acting as circuit breakers and restarting the economy on a new path with new initial conditions. He suggests that through its willingness to intervene and to provide liquidity whenever there is pressure for "firesales" of assets that would cause prices to plummet the central bank places a floor on asset prices.

Therefore according to the Post-Keynesian analysis institutional intervention serves as a counter-cyclical policy. The Central Bank should stand ready to inject the reserves needed to accommodate the credit needs of the Ponzi boom to avoid a systemic panic. In downswings monetary policy should therefore provide liquidity and prevent an interest rate rise. Minsky considered it more appropriate for the central bank to provide the reserves by a greater use of the discount window than by open market operations as this allows the central bank to reward prudent bank practices with more favourable terms. Minsky also suggested that the discount window could be opened to other financial institutions such as life insurance companies.



In the case of the LTCM which had taken long positions in illiquid securities and short positions in more liquid securities<sup>135</sup> a consortium of banks acted as lenders of next-to-last resort and bailed it out and the Fed (central bank) stood behind the banks ready to provide liquidity until the market became more calm. Many commentators were surprised by the indirect bailing out of a hedge fund by the central bank. Had the central bank behaved in a traditional manner and refrained from bailing out, the forced liquidation of LTCM highly leveraged bond, equity, and derivatives positions would have had dramatic effects. Because the operations of the LTCM as a market-maker was very closely entangled with those of other security dealers the central bank was therefore refinancing the market-making system.

Not all Post-Keynesians adhere strictly to the argument that the central banks must always accommodate the desired reserves to avoid financial crisis. Jao (1989) argues that Central banks will be more accommodative if the economy is not fully employed and the inflation rate is low.

The elimination of the source of a Ponzi boom and reduction of short-run welfare losses warrants intervention. The monetary authorities can actually reimpose interest rate ceilings and firms can be subjected to capital restructuring with write-off by banks of significant amounts of non-performing loans. These non-performing loans can then be managed under a fund operated by the central bank. As compensation, banks get easy access to the discount windows with the central bank acting as a lender of 1st and last resort. Such a policy is however considered by the

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<sup>135</sup> LTCM was taking a position on international level whenever there was a liquidity spread with the intention of capturing the spread over some time horizon.

New-Classicals as unwarranted obstructionism causing market distortions and sending wrong signals to investors both domestically and internationally. A non-accommodating position is in line with a liberalisation policy, which reduces access to the discount window by greater use of open market operation so as to influence the liquid position of banks and foster the development of primary and secondary markets.

A deficiency of accommodation may however lead to a debt deflation as firms being unable to meet their obligations divest or go bankrupt. A non-accommodating policy can therefore put an end to the Ponzi boom and restore price stability but at the cost of very high loss in output, employment and more generally public welfare.

Governments also engage in Ponzi financing. One of the objectives of liberalising the capital account in Turkey was to facilitate the financing of the public sector deficit without crowding out the private sector. This led government to offer high interest debt instruments (bills and bonds) to attract international capital. In Turkey, interest payment on debts absorbed less than 20% of the tax revenue by the end of the 1980s while by the end of the 1990s this figure rose to 75%<sup>136</sup> showing that new debt instruments were needed to meet existing obligations.

Da Costa E Silva (2002) adopts Minsky's Cycle in an open macroeconomic context by taking a country as a large company and shows how a sound emerging economy receiving increased capital inflow resembles a firm taking more credit in the pursuit of profit opportunities similar to a firm as per Minsky's domestic approach

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<sup>136</sup> PSBR rose from 7% to 24% of the GDP over the same period.

for firms. Capital inflow and growth of a country leads to a self-reinforcing process, causing an increase in the fragility of the country and in the probability of currency crisis.

#### **4.4.2 Post-Keynesianism and External Liberalisation**

Today, industrial countries have largely liberalised their capital accounts while many developing countries retain various controls over capital flows and there is mixed evidence that capital account liberalisation promote long-run growth. Some commentators observe that all crises from the mid 1990s onward (Mexico, South East Asia, Russia, Brazil, Argentina and Turkey) have in fact been capital-account dominated, (Leite, 2001). There is still no consensus in the literature on this issue.

When the Bretton Woods agreement was designed, with the fixed exchange regime, the dominant economic thinking was that free capital mobility is incompatible with free multilateral trade and full employment. Capital control was an embedded element of the articles of the I.M.F under the influence of Keynes. Keynes' preference for capital control originates from his belief that:

*“Footloose flow of capital assumes that it is right and desirable to have an equalisation of interest rate in all parts of the world. In my view the whole management of the domestic economy depends upon being free to have the appropriate interest rate without reference to the rates prevailing in the rest of the world. Capital control is a corollary to this”*

[Keynes, Volume 25, p149]

After the oil shocks in the 1970's and the stagflation that followed, the Neo-Classical efficient-market hypothesis gained momentum. It became widely accepted that floating exchange rates and free capital mobility would improve welfare benefits by reducing the cost of capital globally, curbing domestic policies that distort factor prices, offering possibilities for risk diversification and promoting financial development. These are supposed to facilitate capital accumulation in developing countries and accelerate their economic development.

*“To the extent that international financial integration represents an improvement in financial intermediation, ..... [perhaps] because institutions involved in the transfer of capital across jurisdictions improve efficiency with which capital is allocated, it offers a potential significant increase in economic efficiency”*

[Summers, 2000 pp.3]

However, unregulated capital flows could facilitate the occurrence and spreading of currency crises and as argued by Bhagwati (1998), substantial gains from capital controls have been asserted, not demonstrated.

Post-Keynesians consider that flexible exchange rates coupled with liberalisation of capital accounts provide an incentive for gains through currency speculation. Grabel (1995) argues that financial liberalisation leads towards speculation-led economic development characterized by risky investment practice and unsound financial structures. Weller (2001) argues that after financial liberalisation as greater liquidity is used increasingly for unsustainable, speculative expansions emerging economies become more vulnerable to both currency and



banking crises. Additionally, financial liberalisation is growth distorting to the extent that under such a regime firms tend to get involved in short-term directly unproductive profit-seeking activities to the detriment of real sector economic growth.

In the Keynesian perspective, the volatility of financial markets is largely endogenous and is generated by bandwagon overbidding and herd-like dumping of financial assets under uncertainty. In the foreign exchange market too players adopt similar strategies after the removal of capital control. Deregulated stock markets also turned these countries and other emerging economies into attractive places for “hot money” before the 1997/98 crisis.

*"With the removal of all restrictions on international capital flows in a world of flexible exchange rates, the international financial transactions have grown thirty times as fast as the growth in international trade. Today international financial flows dominate trade payments and exchange rate movements reflect changes in speculative position rather than changes in trade patterns"*

[Davidson, P. 1998 – 639-662]

The average daily turnover in the global forex market was estimated to be at 1.88 trillion US\$ in April 2004 as compared to 1.12 trillion US\$ in April 1995, (BIS 2004). While three decades back 80% of all forex transactions were related to trade and investment, today above 80% of these transactions are for unproductive speculative short-term interest/exchange rate speculation. Enormous portfolio flows

to the Latin American economies helped to generate a stock market boom and leaving aside short-term fluctuations, Mexico's share index rose from 250 in 1989 to around 2500 in 1994. But as pointed out by Krugman (1995), these portfolio flows to Latin America were not responding to fundamentals but represented a misplaced euphoria and a herd instinct. It is to be observed that in spite of the huge capital flows to Mexico, the rate of economic growth during the 1990-1994 period was only 2.5% which was almost the same as the population growth. Stock markets have been playing a crucial role in the speculative process.

Felix (1997, 2000, 2001) observes that speculation creates two inconveniences:

(1) The power of Central Banks to counter-speculate collectively against unwanted exchange rate movements has been dramatically weakened.

(2) A second consequence is that the Neo-Classical predicted savings on foreign currencies, as countries would no more have to protect the rate, did not materialise. In fact after the removal of capital controls, the ratio of official reserves to exports has increased because of requirements in trying to defend against volatility of capital flows.

Felix further observes that with increased volatility, hedging exchange risk has become an important innovative activity. However, he argues that hedging apart from involving a cost, equally promotes a new vehicle for speculation by MNCs and financial institutions involved in the 'big gamble'. While individuals attempt to protect their position through hedging, the process renders exchange rate volatility self-generating and affects trade and investment adversely. According to Felix, in an

era of capital control whenever market players anticipate higher inflation from a monetary expansion, holders of long-term bonds can only shift to domestic equities or to short-term bonds. This move then reinforces the effort of the monetary authority to lower short-term rates. With liberalisation of the capital account, portfolio investors rapidly move from domestic into foreign securities and interest arbitrating across currencies by financial institutions will partly nullify the Central Bank's effort to reduce short-term interest. Financial globalisation then renders the manipulation of monetary aggregates ineffective.

Capital flows in fact inflate asset prices that in turn boost imports and inflation in a speculative climate of euphoria. Financial institutions increase lending and contribute to the bubbling of assets<sup>137</sup>. But as usual the bubble sooner or later busts as speculators lose their nerves and turn against the currency which then overshoots in the opposite direction:

*“The moment foreign investors loose their nerve, which only requires a small shock, or negative development, 'hot-money' will disappear into safer heavens. In the process asset prices will collapse. Companies that were involved in speculative activities will find themselves bankrupt as a result of the collapse of asset prices. Financial institutions which hitherto were solvent and liquid, will find themselves not only illiquid but also insolvent because many of their loans become doubtful overnight, a view that is close the Minsky's “Financial instability” hypothesis*

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<sup>137</sup> Even the traditionally prudent institutions join the speculative movement in fear of loosing market share.

*(Minsky 1982). Their problems would be compounded if they also happen to have unhedged foreign liabilities in their balance sheets, as a result of the collapse of the exchange rate.”*

[Arestis and Demetriades, 1999, pp. 441]

Da Costa E Silva (2002) argues that evidence suggests that the various currency crises related with capital movements are in fact Minskian in nature with capital inflows preceding them and creating the condition to subsequently trigger the crises.

The recession effect of the collapse of the bubbles does not only involve a private cost but equally a high social cost. Government often pays the depositors partly or in full regardless of the existence of a formal system of deposit insurance. The cost to the taxpayers has been very high in several crises - 8%GDP in Finland, 1991-93; 13.5% in Mexico, 1995; 34.5% in Indonesia, 1997-98 (Caprio and Klingebiel, 1996 and World Bank 1999); 13% GDP in Venezuela in 1995 (Sundararajan, 1996). The 1994 Mexican crisis led to a 7% contraction in real G.D.P in Mexico in 1995. In the S.E. Asian Crisis in 1998, the Indonesian GDP contracted by 18% and around 11 million people lost their jobs. In Turkey around 500 000 jobs were lost in the 2001 crisis and several companies cut wages by 30-40% to be able to remain in business and retain their workforce. Additionally, the economic slump leads to lower tax revenue and governments are forced to cut back on social and welfare programmes. The boom-bust financial cycle warrants some regulations of international capital flows so as to prevent a feast or famine situation leading to international or regional systemic crises.



The Post-Keynesian school generally<sup>138</sup> supports the Tobin Tax approach although Davidson expresses reserves about its effectiveness. Davidson, (1987,1998b) cast doubts about the effectiveness of a weak 0.01% tax as a deterrent to short-run round trip speculation on exchange rate movements while a 0.5% tax would have an important tariff effect on trade.

*“Under the current flexible exchange rate system, there may be four or more hedging financial transactions involved in any single arms-length international trade transaction. This exceeds the two financial transactions implicit in a proverbial short-term speculative (non-hedged) round-trip. That Tobin’s tax advocates use to promote support for their tax. If this 2 to 1 ratio is anywhere near correct, a 0.5 percent Tobin’s Tax could be equivalent to instituting an additional 2 percent universal tariff on all goods and services traded in the global economy. It would appear that a Tobin transaction tax might throw larger grains of sand into the wheels of international real commerce than it does into speculative hot money flows.*

[Davidson, 1998, pp.639-662]

Davidson therefore suggests an alternative solution in the form of an international clearing union providing for capital control and a credible social buffer-stock institution acting as market maker capable of assuring portfolio managers that exchange rates will remain stable over time. By announcing that it will “swim against any developing consensus view of a changed market psychology” the market maker modifies the uncertain environment, provides an anchor for market

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<sup>138</sup> The debate being in the macroeconomic area, some differences of appreciation are bound to exist.

psychology and prevents any bandwagon tide leading to disruptive speculation and allows firms to firmly face uncertainty. This implies a new form of fixed but adjustable exchange rate mechanism where unlike the Bretton Woods arrangement, the burden of adjustment is on the surplus nation to create the international liquidity necessary of continued stability and growth. That is just another type of institution needed by capitalist economies as per Minsky's arguments to provide floors and ceilings on expectations of asset prices and hold back instability.

*"If the majority of market participants believe in the market makers' buffer-stock approach, the only speculators that could exist would be fools, that is, a small group of offsetting bulls and bears who disagree with the vast majority of market participants but whose actions cannot affect market movements."*

[Davidson, 1998, pp. 639-662]

The market maker idea just the Tobin Tax approach aim at addressing the volatile characteristic of the forex market and its adverse impact on real variables. A very interesting aspect of Davidson's market maker is that its application is not restricted to the foreign exchange market but is relevant to the overall financial market which needs an "anchor" to prevent the inherent destabilizing bandwagon tide which is a natural behaviour in a non-ergodic stochastic system. The market maker plays a much more active role than a lender of last resort. It intervenes as soon as the market starts becoming "disorderly".

Empirical evidence shows that the case for freely flowing short-term capital has not been made especially as the international financial system has until now been

unable to respond rapidly to short-term liquidity crises which in many cases ended in solvency crises. The debate for the creation of an institution capable of taking up this challenge as well as the debate about the re-introduction of some form of capital restriction remains on the agenda.

As pointed out by Arestis and Demetriades (1999), time has come to “*drop the utopian assumptions altogether and work within real-world constraints, rather than insists that the world should change to fit theoretical models, biases and preconceptions. In theoretical terms this means developing models that take into account institutional weaknesses, information related problems and such.*”

[Ibid, 441-447.]

The idea of a market maker institution is indeed very ambitious but practically infeasible at this stage of economic integration. This idea is in line with Keynes’ initial “bancor” plan<sup>139</sup> and the creation of a supranational central bank as proposed at the Bretton Woods conference<sup>140</sup>. In respect to very long-term solutions that can not be implemented at this stage it is appropriate to refer to the New-Keynesian writer Blinder’s remarks:

*“Grandiose schemes involving elaborate international institutions tend to get nowhere fast. Regardless of its merits, no world central bank will be created in my lifetime. Even establishing a global financial super-regulator, a far modest step,*

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<sup>139</sup> A common world currency.

<sup>140</sup> The final agreement rejected this but retained the basic idea of not allowing any nation to surrender control of its banking and fiscal policy.

*would require an implausible surrender of national sovereignty. And an international bankruptcy court would require coordination among nations that have very different bankruptcy laws. Better to stick with more modest plans that require little or no institution-building. The world's poor cannot wait for grand edifice to be built."*

[Blinder, 1999 pp.31].

Blinder stresses the need to look for some shorter-term reforms that protect innocent poor people, who do not contribute to the speculative excesses but yet bear the burden of a financial collapse. It is however important to pave the way for a more stable long-term solution.

## **4.5 Summary**

Different alternative schools of thought on financial liberalisation, growth and the volatility issue in both stock and currency markets have been discussed. In Chapters Two and Three the theoretical backing to the growth promoting financial liberalisation process was discussed. In Chapter Four the New-Structuralist growth impeding argument of financial liberalisation reducing the availability of loanable funds as well as the maintenance of an important presence of government in the financial sector in developing countries as professed by both New-Keynesian and Post-Keynesian schools of thought have been examined. The conflicting benefit and



cost effects of financial liberalisation have been reviewed, the thesis will now move towards presenting the financial liberalisation process in Mauritius.

## Chapter 5

### THE MAURITIAN FINANCIAL SECTOR

#### 5.1. An Overview

Prior to the mid 1980s, the financial sector was composed mainly of commercial banks, Insurance Companies, the Sugar Insurance Fund<sup>141</sup>, the National Pension Fund and several small friendly societies such as co-operative credit unions, provident/benevolent funds and other mutual aid associations. The mutual friendly societies provide micro uncollateralised credit to their members mainly for the purchase of consumer durables and housing renovation.

As part of the modernisation of the Mauritian economy after the stabilising programme phase, that started by the end of the 1970s, financial reforms were undertaken nearly one decade later. In conformity with a supply-leading approach<sup>142</sup> several new institutions offering new products were established as from the end of the 1980s. Some of the new institutions created were the Stock Exchange of Mauritius, leasing companies, collective investment institutions, venture capital fund and offshore Banks and offshore business entities. Transparency of banks' operations has in recent years undergone a process of improvement<sup>143</sup>. Adequate and reliable telecommunication network covering the whole island has allowed the adoption of technology in the banking industry. Modernization of the national payment system has followed not only with increased electronic funds transfer point-of-sale terminals

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<sup>141</sup> The SIF provides insurance cover to sugar planters against cyclone, drought or outbreak of crop disease. The Insurance Act does not apply to the Sugar Insurance Fund Board.

<sup>142</sup> Patrick's debate, 1966 – see chapter 2.

<sup>143</sup> This is discussed in chapter 7 (Disclosures to the central bank and to the public)

for retail transactions but also with the development of a real-time gross settlement system (RTGS) for high value interbank payments. The Mauritius Automated Clearing and Settlement System (MACSS)<sup>144</sup> links all domestic banks and the ministry of finance<sup>145</sup> to the BOM through a reliable international payment system infrastructure, the SWIFT. Around 70% of total interbank settlements are made by electronic means through the real-time gross settlement and so the liquidity management of customers has improved due to the reduced uncertainty associated with cheque presentation and delayed clearing. New legislations governing payment systems and taking into account electronic means of payment have been adopted and banking supervision strengthened<sup>146</sup>. Interbank clearing of “low-value” cheques at the Port Louis Automated Clearing House<sup>147</sup> (PLACH) is done twice daily on a net basis and settlement is through the accounts that the banks maintain at the BOM using the MACSS. Mauritius has participated in the joint IMF/World Bank Financial Sector Assessment Programme (FSAP) and the report<sup>148</sup> observes a high level of compliance with international norms and practices and considers that overall the financial sector is currently in good health with short-term stability risks being modest. Today, the financial industry in Mauritius, with below 9000<sup>149</sup> direct jobs and just below 10% share of the GDP, provides a blend of services through different institutions as illustrated in the chart below.

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<sup>144</sup> MACSS is owned and operated by the central bank.

<sup>145</sup> The ministry of finance uses the MACSS platform for collecting revenues (Income tax, customs and excise duty) as well as National Pension Fund Contributions.

<sup>146</sup> Strengthening of supervision is being examined in section 4.3 of this chapter.

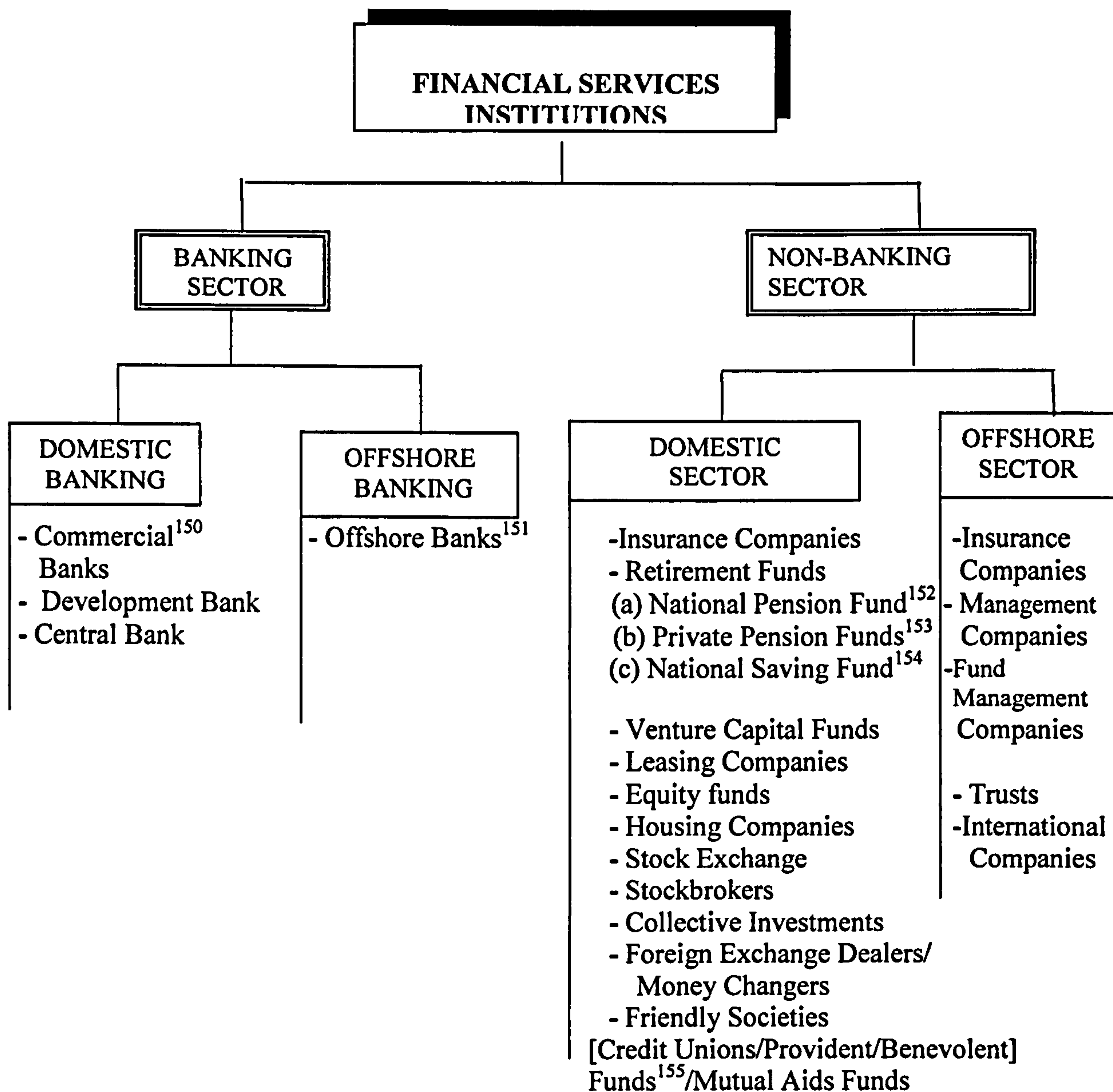
<sup>147</sup> The Port Louis Clearing House is part of the BOM. The standardization of cheques by the use of Magnetic Ink Character Recognition (MICR) technology now allows automation of the cheque clearing process.

<sup>148</sup> The FSAP mission completed its report in September 2002.

<sup>149</sup> Below 2% of the labour force.

**Figure 1.5**

**Financial Sector in Mauritius**



<sup>150</sup> Now defined as Category 1 banks under the Financial Services Development Act 2001.

<sup>151</sup> Now defined as Category 2 banks under the Financial Services Development Act 2001.

<sup>152</sup> A compulsory contributory defined benefit scheme providing monthly pension to private sector employees only.

<sup>153</sup> 95% of the occupational pension funds are administered/insured by insurers. The remaining ones are self-administered.

<sup>154</sup> A compulsory non-contributory (only employers contribute) defined contribution scheme set up in 1994 and providing a lump-sum to all employees.

<sup>155</sup> These funds are in most cases mutual organisations providing a lump sum upon retirement.



The network of financial services has been significantly improved over the last 15 years. The changes look similar to what have taken place in developed economies with insurance companies, mutual funds, pension funds and other financial institutions/instruments competing increasingly with banks for national savings.

However, the domestic banking sub-sector remains dominant with total assets of amounting to Rs160 billion as at December 2003 as compared to Rs35bn for the insurance sector, the second largest sub-sector. The size of the financial sector is estimated at around Rs490bn<sup>156</sup> and a break down is shown below.

**Table 1.5**

**Assets of Major Financial Institutions – Dec 2003**

		<b>Assets (Rm)</b>	<b>% GDP</b>
<b>Banks</b>	Category 1 Banks	160,986	102.6
	Category 2 Banks	188,253 <sup>157</sup>	119.9
	Development Bank	13,185	8.4
	Post Office Savings bank*	1,811	1.2
	Central Bank	44,402	2.8
<b>NBFI</b>	Insurance Companies	32,592	20.8
	Occupational Pension Schemes	18,239	11.6
	Leasing Companies	8,479	5.4
	Fund/Investment/Portfolio Management	1,705	1.1
	National Pension Fund	25900	16.4
	National Savings Fund	4170	2.6

Source BOM, FSC,  
\* June 2003

<sup>156</sup> This figure is arrived at by offsetting for double counting caused by ownership of most leasing companies by banks and insurance companies and also because some 70% of occupational pension assets is actually insured schemes.

<sup>157</sup> The balance sheet figures are in foreign currency and this figure is therefore subject to fluctuations due to changes in exchange rate.

The above table gives an indication of size and depth of both banks and NBFIs. Category 1 banks constitute around 33% of the sector as compared to 14% for contractual savings institutions<sup>158</sup>. Category 1 Banks and Insurance together form 40% of the sector and the combined size of these two sub-sectors relative to the economy<sup>159</sup> has been stable over the last few years with some improvement in the insurance sector as shown in table 2.5

**Table 2.5**

**Changes in Relative Size of Banks and Insurers**

<b>Year</b>	<b>Bank Assets (% of GDP)</b>	<b>Insurance Assets (% of GDP)</b>
2000	101	18
2001	99	18
2002	101	18
2003	102	21

*Source: Bank of Mauritius as Annual Report, Various issues;  
Report of The Controller of Insurance, FSC.*

The rest of this chapter will introduce the domestic banking, insurance sector offshore sector and the security market. A deeper picture of banking development and stock market development will be considered in Chapters 6 and 7.

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<sup>158</sup> Pension & insurance institutions.  
<sup>159</sup> As measured by GDP at current price.

## **5.2. Introducing the Domestic Banking Sector<sup>160</sup>**

A brief history of banking in Mauritius from 1810 to 1980s and showing the quasi-monopoly position of the MCB (Mauritius Commercial Bank) that was finally diluted with the arrival of the SBM (State Bank of Mauritius) appears in Appendix 5. Today the Mauritian population gets good access to banking services that are widely spread across the island with 10 Category 1 banks<sup>161</sup> operating 145 branches, 257 ATMs and 6 Internet sites. Around 70% of the transactions at the two big banks are fully automated through different channels like EFTPOS, ATM, internet and phone banking. The sector has also been upgraded with the opening of 11 offshore banks. The legal framework for banks<sup>162</sup> is embodied in the “Banking Act 2004” and banks have to abide by the Code of Banking Practice and are therefore expected to act fairly in their dealings with customers.

While concentration is now lower than before the arrival of the SBM, the market is a new duopolistic one with MCB and SBM as the two big players. The 3-firm concentration ratio is actually around 80% and the table below provides information on the two-firm concentration ratio (CR2).

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<sup>160</sup> Domestic Banks are now classified as class 1 bank under law.

<sup>161</sup> Five of them being local banks, four being branches of foreign banks and one being foreign owned but locally incorporated.

<sup>162</sup> Since 2004 banks have a single licence for both domestic and offshore banking activities, (Banking Act 2004).



**Table 3.5**

**Market Share of MCB & SBM - [CR2]**

	Year Ending June	Deposits		Loans		Total Assets	
		Amount (Rm)	% of Banking Sector	Amount (Rm)	% of Banking Sector	Amount (Rm)	% of Banking Sector
MCB	2000	38113	45.5	35821	57.9	48791	42.4
	2001	41077	44.5	40143	56.1	50090	42.3
	2002	46899	45	44475	59.4	58909	43.7
	2003	51465	44.3	48411	56.4	65019	42.1
SBM	2000	21762	25.9	19762	31.8	27340	23.7
	2001	23383	25.3	20493	28.5	29417	24.9
	2002	24631	23.6	20875	27.8	33931	24.5
	2003	27045	23.3	20657	24	38904	23.8
MCB & SBM	2000	59875	71.4	55583	89.7	76131	66.1
	2001	64460	69.8	60636	84.6	79507	67.2
	2002	71530	68.6	65350	87.2	92840	68.2
	2003	78510	67.6	69068	80.4	103923	65.9

*Source: Annual reports (MCB, SBM & BOM)*

The table confirms the duopolistic nature of the industry and also that the MCB remains the leader. The concentration seems to be weakening over the last four years though the biggest bank is less affected than its close rival.

Interestingly, the existence of a concentrated market has not slowed down the banking innovation process in Mauritius. In fact, the two big banks have been spearheading innovation and some smaller ones have had difficulties to follow due to the high cost of electronic infrastructure. It is sometimes argued that concentration in small markets can lead to technical efficiency<sup>163</sup> since big banks are usually more technically efficient. On the other hand concentration can lead to lower access to credit for small firms, as bigger banks tend to be “cherry pickers”. Cetorelli and

<sup>163</sup> Input being measured in terms of assets and number of employees while output can be measured in terms of loans and advances.



Gambera (1999) find international evidence of a general deadweight loss in concentrated credit markets resulting in a reduction in the quantity of loanable funds as expected by conventional wisdom regarding market structure theories.

Banking Concentration varies widely across the world and does not seem to be related to the level of economic development as shown by CR3 ratios in table 4.5

**Table 4.5**

**International Bank Concentration Ratios CR3 Yr 1998**

Country	CR3	Country	CR3
S.Africa	69	U.K	50
Zimbabwe	78	U.S.A	15
Kenya	59	France	28
Malaysia	44	Germany	27
Korea	28	Sweden	71
India	40	Australia	60
Pakistan	71	New Zealand	77
Mexico	40	Denmark	74

Source: Cetorelli and Gambera, (1999)

The gradual drop in CR2 (table 3.5) reveals that the revocation of the banking licenses of some small operators<sup>164</sup> in recent years has not influenced depositors' psychology and the latter do not seem to hold on to the two big banks. However, MCB and SBM still benefit from the loyalty of an important proportion of

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<sup>164</sup> e.g MCCB, BCCI, Delphis Bank

depositors who believe in the “too big to fail” doctrine and they remain in a position to exert an undue influence on the determination of interest rate and liquidity. The higher fixed costs associated with the electronic payment infrastructure and higher capital requirements make it more difficult for small players of domestic origin to penetrate the market or for an existing small domestic player to challenge the two big banks. The concentration ratio in the banking sector suggests an oligopolistic market. Because the banking sector has an important impact on capital accumulation, it does matter whether the industry structure is competitive or concentrated. However, concentration is a limited measure of competitive conduct. If a market is contestable structure does not reflect conduct.

Contestable market theory (Baumol 1982) suggests that low entry/exit<sup>165</sup> cost turns concentrated markets into contestable ones with threat of hit-and-run competition from potential competitors making existing players keep price at a level where only normal profit is earned. Further, whenever a contestable market exists, concentration does not necessarily affect the conduct of firms. In the case of the Category 1 banking, given the size of the market, it is very unlikely for technology to contribute to make markets more contestable in the short-run. It is only in the long-term and if the financial sector develops further in size and in depth that several foreign players will find it attractive to settle and compete with the two big banks. It must be highlighted that the license delivered to the Caisse D’Epargne<sup>166</sup> in January 2004 to operate the Banque Internationale des Mascareignes Ltée as a category 1

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<sup>165</sup> High sunk costs constitute a major exit barrier.

<sup>166</sup> Caisse D’Epargne is the No.3 top Bank in France. Since 1991 that bank was operating in Mauritius as a Category 2 bank under the name of Banque International des Mascareignes Ltée.

bank and the acquisition in April 2005 of a 51% equity stake in the small Mauritian retail bank IOIB whose current market share is around 8% by the State Bank of India<sup>167</sup> show that international banks, specially those that were already operating as category 2 banks, have started to develop an interest in domestic banking activities in Mauritius. This entry of foreign banks coupled with the recent expansion of Barclays Bank in 2003 through the acquisition of the BNPI as well as the appearance of a new bank, the Mauritius Post and Co-operative Bank<sup>168</sup> following the merging of the New cooperative bank with the Post Office Saving Bank in 2004 set the scene for a less concentrated market as well as the threat of new entry in future. It is not just a matter of rendering the requirements for licensing less stiff because very often and perhaps more importantly in LDCs informational barriers contribute in preventing the banking sector from turning into a contestable market.

Additionally since September 1995 some weak competition, has come from outside the domestic banking sector, as the financial sector is moving towards integration<sup>169</sup>. Various non-bank financial institutions have been authorized to carry on deposit taking business<sup>170</sup> and to issue certificate of deposits. In the loan market, offshore banks are now authorized to grant loans in foreign currencies to domestic players.

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<sup>167</sup> The State Bank of India is a top bank in India and it has a declared strategy of penetrating Asia and Africa through acquisitions. IOIB will become a subsidiary of SBI International which has in the past been operating as a category 2 bank in Mauritius.

<sup>168</sup> While the Post Office Saving Bank did not offer a full-fledge banking service and the New Cooperative bank did not have any branch apart from its head office in Port-Louis, the new bank will allow cooperatives to conduct transactions in the 70 outlets of the Mauritius Post Ltd.

<sup>169</sup> Prior to liberalisation, structural regulation had contributed to the segmentation of financial markets.

<sup>170</sup> Mauritius Housing Company Ltd (mortgage lending) and various leasing companies.



The banking concentration issue in Mauritius is compounded by the relatively weak level of democratisation of the economy with implications in terms of credit exposure to single borrowers. The sector also faces sector-wise credit portfolio concentration as shown below.

**Table 5.5**

**Sectorwise Credit Distribution to Private sector**

**(November 2004)**

<b>Sector</b>	<b>% Credit</b>
Agriculture	6.2
Manufacturing <sup>171</sup>	13.4
Tourism	15
Construction	15.9
Traders	14.4
Finance & Business	10.7
Personal	9.3
Others	15.1

*Source: BOM*

Sectorwise credit concentration is related to the degree of diversification of the economic base and is yet another factor that could contribute to a potential fragility of the banking industry should some sectors of the economy face a lean period.

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<sup>171</sup> Of which 45% goes to the Textile & Garment sector.



Under the Banking Act, banks in Mauritius get a license from the BOM for banking business only, i.e. accepting deposits and making loans and advances. However, in the wave of liberalisation and the removal of binding portfolio constraints the big domestic banks can now invest in listed companies subject to certain restrictions. They have also developed subsidiaries/affiliates engaged in various activities including merchant banking, offshore banking, leasing, stock broking, fund management, insurance agency, and trusteeship. Rather than adopting the universal banking route domestic banks have moved towards becoming financial conglomerates providing integrated financial services not only in Mauritius but also in the region. Such a shift from pure bank to financial supermarkets having deposit taking and lending activity as core business warrants stronger supervision. Both the MCB and the SBM are among the 10 largest banks in Africa. As clearly spelt out by the SBM group, its vision is “to be the leading Provider of Premier Integrated Financial Services in the region” (Annual report 1999, p29). Regional expansion actually provides an important opportunity for growth of banks since they are constrained by the narrowness of the domestic sector. Regional expansion also contributes to diversify the earning base of the domestic banks but at the same time expose them to other risks<sup>172</sup>.

Banks occupy a central position in financial intermediation across the world due to their role as providers of liquidity and monitoring services. In Mauritius, the sector contributes to around 7% of the GDP and the level of financial intermediation measured by banking sector claims on the private sector as a percentage of GDP has

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<sup>172</sup> In the some African countries operational risk, credit risks, political risk and foreign exchange

more than doubled, from 27% pre-liberalisation period<sup>173</sup> to 58% in the year 2003. This is very good by African standards but still weak compared to countries with developed financial sectors as shown in the table below.

**Table 6.5**  
**BANKING SECTOR CLAIMS ON THE PRIVATE SECTOR**  
**(% of GDP, Dec 2003)**

Mauritius	S.Africa	Botswana	Malawi	Mada-gascar	New Zealand	Singapore	United Kingdom
58	85	Below 20	N.A	Below 10	122	112	148

Source :IFS 2004

It is to be noted that as a client the Mauritian government does not have a dominant role in the financial sector. The claims of commercial banks on government represent around one fifth of the claims on the private sector. Further, as an owner, government never had a major role, as is often the case in developing countries. This presence has been further weakened with the privatisation of the SBM and its listing on the stock exchange. As at June 2003 government directly or indirectly controlled only 35% of the voting rights of the SBM - [Government of Mauritius: 5%; State Insurance Company of Mauritius Ltd: 15% and National Pension Fund: 15%].

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risks are more important than in Mauritius.

<sup>173</sup> Before 1985.

The monetary reforms affecting the banking sector as well as changes at regulatory and supervisory level will be examined in chapter 6.

## 5.3 The Insurance Sector in Brief

### 5.3.1. An Overview

Insurance business started in Mauritius in the 1950s and in 1960 the first law concerning Insurance business was passed<sup>174</sup>. The situation with respect to the institutions and categories of business is summarised in the following table.

**Table 7.5**

**Insurers by Category as at June 2003**

	Local	Foreign	Total
Long Term Insurance Business Only <sup>175</sup>	3	1	4
General Insurance Business Only	5	2	7
Long Term and General Insurance Business	12	0	12
Total	20	3	23

*Source: FSC*

Life insurance dominates over general insurance and is associated with 60% of the total gross premiums. Long-term insurers also administer and or insure above 95% of the pensions schemes established by private sector entities. The insurance sector, just like the banking sector, is highly concentrated with SICOM Ltd & Anglo-Mauritius as the two big players as shown below:

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<sup>174</sup> This legislation has now been replaced by the Insurance act 1987 with effective date, 30<sup>th</sup> June 1988.

<sup>175</sup> Life insurance, pension schemes and permanent health business.

**Table 8.5****Share of Assets among Insurers\* (%)**

	2001	2002	2003
SICOM	36.5	37.1	38.1
Anglo Mauritius	26.5	26.5	25.8
British American Insurance -BAI	9.9	9.4	10.3
Mauritius Union	5.2	5.2	5.3
Life Insurance Corporation of India – LIC	3.9	4.1	3.9
Albatros	3.2	3.0	3.0
Swan	2.7	3.1	2.6
Others	12.1	11.6	11

*Source: FSC*

*\* Both short and long-term insurance combined.*

The table reveals a high CR2 and CR3 of 64% and 74% respectively for year 2003 and no major change over the last few years. The dependence on reinsurance is shown below.



**Table 9.5****Gross Premium and Reinsurance (Yr 2002-2003)**

		2002	2003
Short-Term Insurance	Gross annual premium (Rm)	2443	2729
	Reinsurance Premium (Rm)	1241	1398
	Net premium (Rm)	1201	1330
	<b>Reinsurance as a % of Gross premium</b>	<b>50.7</b>	<b>51.2</b>
Long-Term Insurance	Gross annual Premium (Rm)	3760	4142
	Reinsurance (Rm)	136	160
	Net Premium (Rm)	3624	3982
	<b>Reinsurance as a % of Gross premium</b>	<b>3.6</b>	<b>3.8</b>

*Source: FSC*

The above table reveals a high degree of dependence on reinsurance for short-term insurance. While the overall percentage of short-term reinsurance is 51%, some companies<sup>176</sup> are involved in reinsurance to as high a level as 73%. Short-term insurers prefer insurance protection and assume only a small part of the risk of the insurance policy they underwrite. It must be noted that many small insurers have weak financial ratios and face delays as regards the settlement of claims. If only long-term insurance is considered to keep the focus on financial intermediation, the share of gross premium<sup>177</sup> among insurers as shown in table 10.5 again reveals a high concentration ratio with CR2 47.5% and CR3 79.6% respectively.

<sup>176</sup> E.g Big short-term insurers like Albatross and SICOM exceed 70%. Reinsurance at SWAN, the largest general (short-term) insurance is at the level of 63%.

<sup>177</sup> The most important source of income.

**Table 10.5****Share of Gross long-term Premium (%)**

	2002	2003
SICOM	30.0	26.9
Anglo-Mauritius	22.3	20.6
BAI	30.5	32.1
Mauritius Union	4.6	4.6
LIC	5.1	4.7
Albatros	3.1	3.6
Others	4.4	7.5

*Source: FSC.*

There has been an important deepening in the sector during the 1990s with gross premium income (long-term business) increasing from 1.6% GDP in 1990 to 2.6% in 2003<sup>178</sup>. It must be pointed out that income tax relief on contributions to individual pension, health schemes and other insurance premiums has considerably contributed to the development of intermediation by the insurers and has therefore had a positive effect on the mobilisation of savings. However, the lack of long-term financial assets in the economy affects the matching of assets and liabilities by adding some reinvestment risks.

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<sup>178</sup> The Insurance industry (short-term and long-term) has a penetration of around 4% of the GDP. This is comparable to Singapore.

The insurance sector has always been ranked second after the banks in the mobilisation of domestic finance but is quite far behind banking in terms of contribution to the intermediation process as shown in table 11.5.

**Table 11.5**

**Contribution to the Intermediation Process**

	Annual Premium on Long-Term Insurance* in GDP %	Deposits** (Banks) in GDP %
1990	1.6	48.4
1991	1.6	52.5
1992	1.7	55.4
1993	1.7	58.7
1994	1.8	58.2
1995	2	64.5
1996	2.1	62.6
1997	2.2	66.2
1998	2.2	63.7
1999	2.2	68.7
2000	2.3	68.5
2001	2.5	68.1
2002	2.6	70.7
2003	2.6	70.6

*Source: IFS; Annual report of the Controller of Insurance/FSC*

\* General Insurance (Fire, Motor, Personal, Transport) are not considered here since they do not really represent an act of intermediation

\*\* Demand deposits do not reflect intermediation and so are not included. Only Time, Savings and foreign currency deposits are being considered.

### 5.3.2. Regulation and Supervision of the Insurance Sector

Insurers are regulated under the Insurance Act 1987. Under this legislation, there are various provisions to ensure that insurance companies remain solvent and are able to discharge their obligations to the public. Every insurer must have a



deposit of Rs8m with the Financial Services Commission<sup>179</sup> and a paid-up capital of not less than Rs25m as from 1st July 2001. There is no risk-based capital requirement imposed on insurers yet. However, insurers must also have adequate reinsurance arrangements and must maintain a margin of solvency. In the case of an insurer carrying long-term insurance business, a margin of solvency implies that the amount of the admitted liabilities<sup>180</sup> in respect of policies issued does not exceed the amount of long-term insurance funds<sup>181</sup> as certified by the insurance actuary. In the case of general insurance business, the value of the admitted assets<sup>182</sup> should exceed the amount of the admitted liabilities by no less than Rs 1 m or 10% of the premium income, net of reinsurance premiums, in the preceding financial year, whichever is greater. In the case of insurance business that carries both long-term business and general insurance business, insurers have to maintain a separate margin of solvency in respect of the two types of business. This separation, as well as separation of accounts for the two types of businesses, represents a very important shield against contagion from one activity to another in case of insolvency in one of the two activities. The Insurance Act also imposes an obligation on long-term insurers carrying long-term business to have an actuarial investigation of their financial position every three years and the report is to be submitted to the supervisory authority.

Supervision implies a close scrutiny of the financial reports, maintenance of statutory deposits, reserve funds, margin of solvency, and proper reinsurance

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<sup>179</sup> With the Office of the Controller of Insurance until 2001.

<sup>180</sup> Liabilities not including the share capital and reserves.

<sup>181</sup> All monies received in respect of long-term insurance business.

<sup>182</sup> Does not include intangible assets, loans to directors/agents of the insurer/related corporation



arrangements. The FSC is a member of the International Association of Insurance Supervisors (IAIS)<sup>183</sup>. Despite this international membership, supervision in the insurance sector had for long been of a low standard compared to the banking sector. This is due to understaffing and lack of training. This shortcoming will gradually be addressed within the new integrated supervisory framework discussed in section 5.6.

#### **5.4. Introducing the Securities Market**

Brokerage activities started in Mauritius as early in 1771 under French rule when the first broker was appointed. However, the securities market has been very opaque and inactive until a stock exchange was created in 1989 under the Stock Exchange Act 1988. Only 5 companies were listed when the stock exchange started operations in July 1989 as compared to 42 companies in year 2003. Initially the stockbroking firms held 100% of the ownership of the Stock Exchange of Mauritius (SEM). This capital structure has now been open to non-stockbroking companies and the stockbroking firms hold only 48% of it. This demutualisation process has not only allowed a diversification of the shareholder base<sup>184</sup> but has allowed the splitting of the owner function from the user function and given rise to an improved form of governance. The SEM has a two-tier structure for trading in two markets. Tier 1 is for the forty listed companies meeting all the criteria for listing as per the listing rules and the eighteen listed debentures and since November 1997 trading takes place

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<sup>183</sup> This is the international organization responsible for setting standards for insurers as to improve the strength of the financial sector. It was established in 1994 and is based in Basel, Switzerland.

<sup>184</sup> Out of 25 member companies of the SEM Ltd, 11 are stockbroking companies.

on all weekdays<sup>185</sup>. Tier 2 is the over-the-counter market for the seventy-five quoted companies that do not meet all the criteria and trading is twice weekly. No tax is imposed on dividends or capital gains for shares listed on the official market.

Circuit breakers were introduced in the USA after the 1987 stock market crash to protect investors and markets in extreme situations in line with the recommendations of the Brady Commission, (Presidential Taskforce on Market Mechanism, 1988). Greenwald and Stein (1991) suggest that such circuit breakers<sup>186</sup> are beneficial and can play a useful role in reducing transaction risk. Such a circuit breaker represents the type of institutional intervention suggested by Minsky (Chapter 4) to constrain instability arising from high incentive to proceed with “firesales” of assets to protect asset value. Other academics argue that circuit breakers could have the perverse effect of increasing price variability by forcing agents to advance their trades, Subrahmanyam (1994). An experimental study by Ackert, Church and Jayaraman (1999) confirms that participants have the tendency to accelerate trade whenever trading interruption is imminent but show that market closures and temporary halts do not have any perverse effect on price deviation from the fundamental values.

As regards trading restrictions in Mauritius, section 28(7) of the Stock Exchange Act and section 3.9 of the listing rules 2000 of the SEM provide for a temporary suspension of trading of individual stocks in certain crisis situations. Such restriction has been applied in the past in cases of takeovers and more recently in a

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<sup>185</sup> When the SEM started its activity in 1989 trading was done only twice weekly.

<sup>186</sup> In American exchanges for instance, circuit breaker regulation was introduced in the year following the 1987 crash and was triggered for the first time in October 1997 when the Dow Jones Industrial Average fell by 554 points, i.e by 7.2%.

case of a massive financial fraud at the level of one major bank<sup>187</sup>. The trading of the bank's shares was temporarily suspended for one week to enable the shareholders and investors to trade on an informed basis and to maintain a fair and orderly market. As regard a temporary halt<sup>188</sup> or a market closure<sup>189</sup> in case of sudden plummeting of stock, the Financial Services Development Act confers on the FSC<sup>190</sup> the power to order a temporary closure of the stock exchange for a period of 3 days (renewable for another 5 days) whenever prevailing circumstances<sup>191</sup> may prevent orderly trading<sup>192</sup>. There are however no rules regarding pre-defined percentage drops leading to temporary interruption or to market closure.

Another trading restriction at the SEM concerns a  $\pm 20\%$  <sup>193</sup>price limit per trading session. While this provision aims at moderating volatility, it also limits stock exchange arbitrage and stock market activity.

The Stock Exchange of Mauritius (SEM) is a founder member of the African Stock Exchange Association (ASEA), a member of the SADC Stock Exchange Association, a member of the South Asian Federation of Stock Exchanges and a full member<sup>194</sup> of the World Federation of Exchanges<sup>195</sup>. The SEM was until December 2001 regulated and supervised by the Stock Exchange Commission (SEC), a full

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<sup>187</sup> A fraud that went on undetected for many years and amounting to roughly R880m (\$30m) was discovered at the MCB in February 2003 and it had to be accounted as a loss. Given that MCB is a blue-chip on the SEM a plummeting of MCB share price could intensify the bearish direction that the all-share price index had been taking for some years.

<sup>188</sup> Trading is stopped for some minutes/hours for all listed shares.

<sup>189</sup> Trading is shut down and does not resume until the next market period.

<sup>190</sup> The FSC supervises daily trading on real-time basis via computer terminals.

<sup>191</sup> E.g Natural disaster in Mauritius, economic or financial crisis in Mauritius or elsewhere.

<sup>192</sup> The automated trading system now in place has been designed to render possible this possible.

<sup>193</sup> 6% until in recent years.

<sup>194</sup> The previous status was one of an affiliate.

<sup>195</sup> Previously called Federation Internationale des Bourses des Valeurs (FIBV).

member of the International Organisations of Securities Commissions (IOSCO)<sup>196</sup>. The regulatory and supervisory functions have been transferred to the Financial Services Commission<sup>197</sup>. These memberships illustrate the willingness to adhere to international standards.

In this respect, the stock exchange has in recent years adopted a modern infrastructure to improve the quality of the services it offers in two areas:

(1) Open outcry floor-based trading disappeared in June 2001. Screen based automation of trading via workstations located at each of the 11 existing stockbroking firms and linked to the SEM trading server makes it now possible to effect on-line trading and to follow market evolution on a real-time basis. The Stock Exchange of Mauritius Automated Trading System (SEMATS) has rendered trading more efficient<sup>198</sup> and transparent. With information transmitted to all market participants without discrimination and in a timely manner the price discovery process has been enhanced. This will ultimately facilitate the process of integration underway in the SADC region since the automation infrastructure offers the possibility of linking the SEM with other exchanges.

(2) Manual delivery and payment of securities has, in 1997, been replaced by an automated central deposit clearing and settlement system (CDS<sup>199</sup>) and shares certificates were immobilised. Under the Companies Act 2001 share scrips of listed

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<sup>196</sup> The organization responsible for setting international standards in the industry.

<sup>197</sup> Refer to Integrated regulation and supervision in chapter 5.

<sup>198</sup> The quality and flow of stock market information has improved.

<sup>199</sup> Central Depository and Settlement System. The system is operated by the CDS Ltd, a subsidiary of the SEM Ltd, and since July 1999 it has extended its services to companies on the over-the Counter market.



companies have been dematerialised<sup>200</sup>. The CDS now provides participants with on-line access in full harmonisation with international standards. Automated clearing and settlement system has not only facilitated daily trading as mentioned earlier but has also allowed a major improvement in the settlement cycle from T+21<sup>201</sup> to a T+5 delivery versus payment, with the Bank of Mauritius acting as clearing bank making irrevocable transfers of funds<sup>202</sup>. In September 2001, the settlement cycle has been further reduced to a T+3 day basis putting the SEM on the same footing as several important markets. This shorter cycle improves the liquidity of holders who can now sell their securities only three days after buying.

The CDS has also a guarantee fund used to guarantee the settlement of transactions in the event of a default by a participant and ensure the integrity of the market. However, to avoid moral hazard, no participant is authorised to trade beyond a settlement limit<sup>203</sup> unless additional cover is provided as a cash contribution and letter of credit. ,

The stock exchange is expected to contribute to capital market development through various channels:

- (1) Broadening of share ownership.
- (2) Facilitating the issue of capital through new issues, rights issues and debenture issues.

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<sup>200</sup> Shares are issued and traded without a physical certificate but through entries in the electronic register of the CDS Ltd.

<sup>201</sup> T is the transaction date.

<sup>202</sup> In respect of payment fee and of the obligations of participants towards the CDS Ltd.

<sup>203</sup> Based on the moving average of cumulative liability over the past 12 months.

(3) Facilitating the ongoing privatisation process by providing a benchmark for the pricing of government assets and providing an exit for holdings in privatised companies.

(4) Attracting foreign capital. Automation of trading has created greater scope for that.

Insider trading is a breach of good corporate governance as they violate the principle of equitable treatment of shareholders trading. Appropriate legislations have been adopted to prevent any such fraudulent practices and to enhance stock market activities.

Two stock indices are used to depict market price trends:

(1) SEMDEX<sup>204</sup>, the all-share index, was launched at the start of the exchange in July 1989. The weighting of the different stocks are relative to market capitalisation.

(2) SEM-7<sup>205</sup>, the index for the seven largest listed eligible shares measured in terms of market capitalisation, liquidity and investibility. It was launched in 1998 and the composition of the SEM-7 changes periodically.

The graphical representation below illustrates the changes in SEMDEX over time.

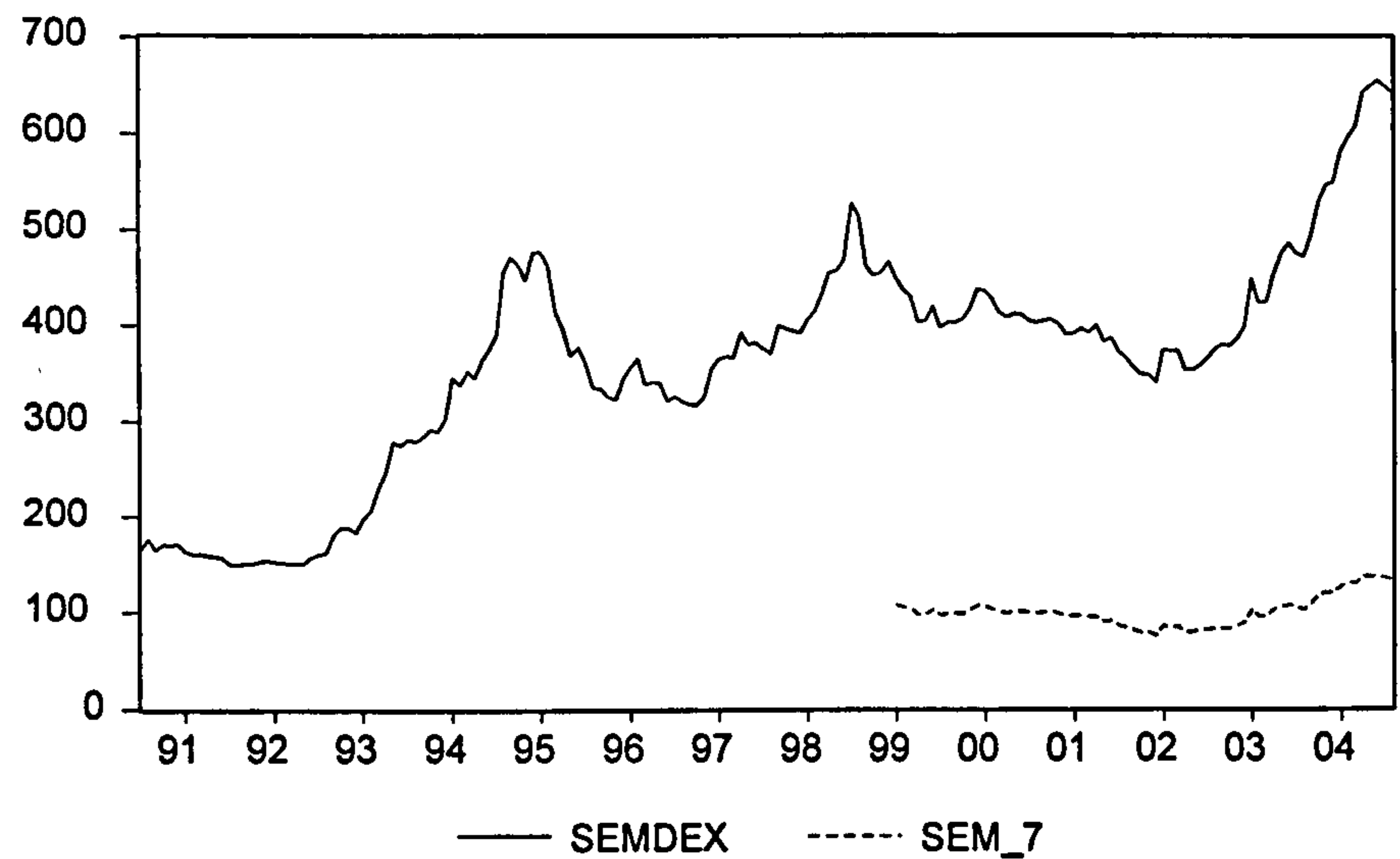
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<sup>204</sup> 
$$\text{SEMDEX} = \frac{\text{Current Market Value of All Listed Shares}}{\text{Base Market Value of All Listed Share}} \times 100$$

<sup>205</sup> Only shares which meet certain liquidity and investibility criteria are eligible for inclusion in SEM-7

**Figure 2.5**

**SEMDEX & SEM-7 (Jul. 1990 to Aug. 2004)**



*Source: SEM Fact Book, Various Issues.*

The security market has displayed a bearish character for a period as long as from mid 1998 to mid 2002. It has now picked up again and at August 2004 SEMDEX stood at 642. A glance at the chart also reveals that SEM-7 has been generally less volatile than SEMDEX.

**Table 12.5**

**Descriptive Statistics: SEMDEX & SEM-7 (Jan 1999 to Aug 2004)**

	SEMDEX	SEM_7
Mean	436.3612	99.32265
Median	405.2100	97.57000
Maximum	655.0900	137.2700
Minimum	340.9200	74.65000
Std. Dev.	83.33212	15.99882

Using standard deviation as a formal measure of volatility (table 122.5) a big difference can be observed in the stability of the seven most important shares compared to the remaining ones. Both SEMDEX and SEM-7 capture only the market price of stocks and do not reflect overall return<sup>206</sup> on listed stocks. Table 13.5 shows that SEMDEX had considerably worsened between 1999 and 2001 in spite of a higher dividend yield in recent years and did not actually provide a good indication of overall performance of the listed stocks.

**Table 13.5**

**Average Dividend Yield and Change in Stock Price Index – 1996-2003**

	1996	1997	1998	1999	2000	2001	2002	2003
Dividend Yield (%)	3.97	4.3	4.03	5.54	6.84	8.7	9.8	5.74
Change in SEMDEX (%)	2.62	10.65	19.04	-6.4	-10.46	-12.61	17.11	37.65

*Source: SEM Fact Books*

In order to reduce information imperfection, in October 2000 the SEM introduced a Total Return Index, the SEMTRI, which captures both capital gain/loss and gross dividend on stocks of the ten top<sup>207</sup> companies listed and enable financial investors to better evaluate market performance and makes it available on line. The methodology employed for the calculation of SEMTRI is explained in Appendix 6. Faster dissemination of information to participants coupled with electronic trading allow price to adjust rapidly to new information and should over time contribute to

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<sup>206</sup> Yield + capital gains.

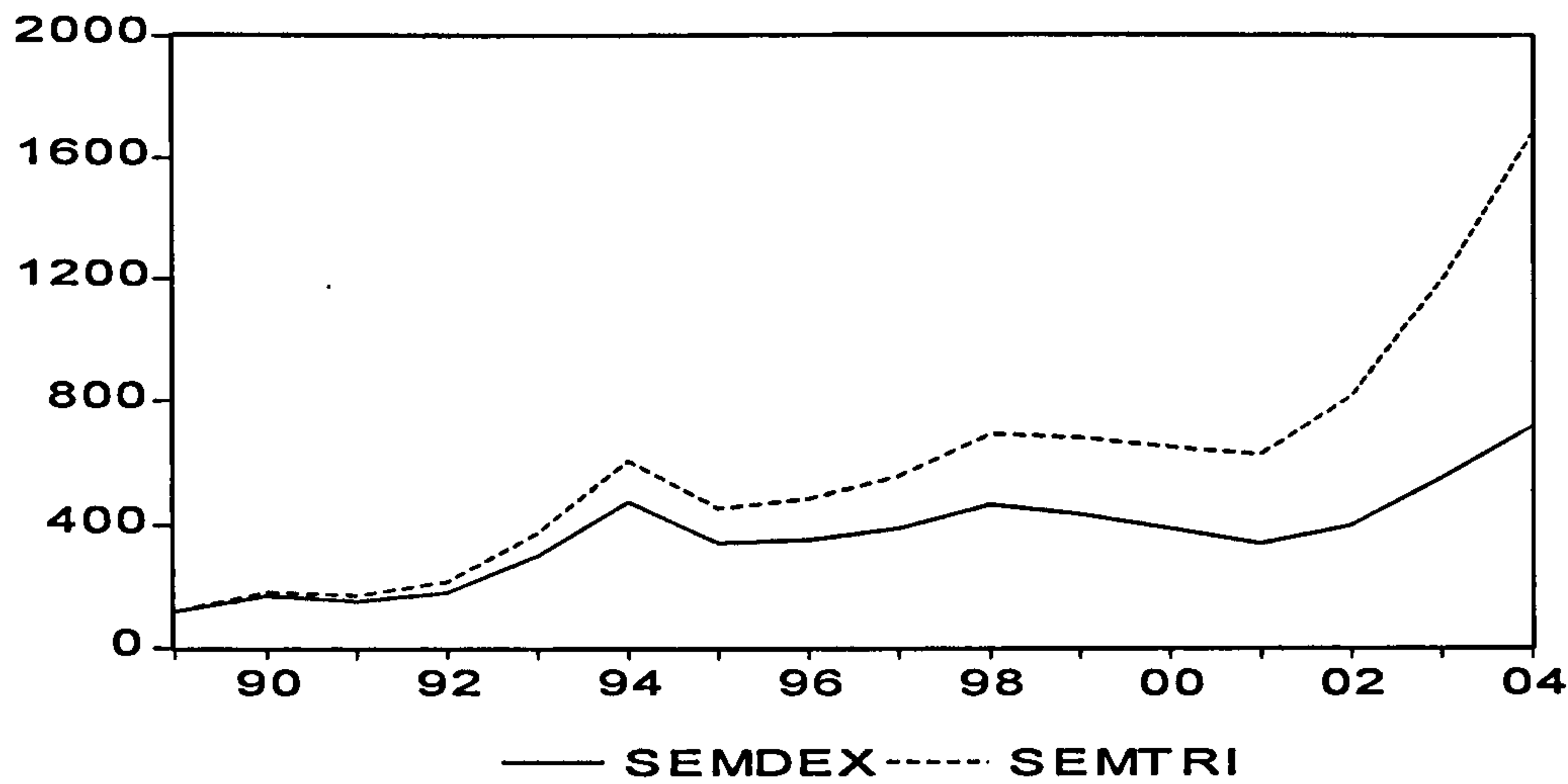
<sup>207</sup> Top in terms of capital gain and dividend payment.



the development of a more efficient market. The efficient market hypothesis will be discussed in Chapter 7.

**Figure 3.5**

**Movements in SEMDEX and SEMTRI (Dec. 1989-04)**



Source: SEM

SEMTRI indicates an improved overall market performance<sup>208</sup> since the dividend component is now integrated in the index. The SEM expects that improved information will facilitate the investment decisions of market participants and attract more of the pension funds, which by the long-term nature of their liabilities can increase the amount of shares they hold as assets.

<sup>208</sup> The difference between the two indices should be less important when the PER rises. In the last three years it has been falling.

## **5.5 The Offshore Sector (Global Business)**

Offshore business is basically business in Mauritius owned by non-residents providing services primarily to non-residents and conducted in foreign currencies. Offshore activities started in the Bahamas in 1936 to provide management services to wealthy international clients. The main reasons for making use of offshore financial centres nowadays are:

1. Tax Planning. Investments are managed to minimise tax liabilities and maximise confidentiality. Many multinational firms route transactions through offshore financial centres to minimise total taxes through transfer pricing. Individuals also set up offshore trusts to benefit from favourable tax regime.
2. Asset Protection. Clients use an international jurisdiction different from their own residence for protection of income and asset protection from political, fiscal and legal risks. This can be the case for clients from countries with risk of collapse of banking and currency crisis and exchange control. Further, facing unlimited liability in their home jurisdiction they may restructure their ownership in the form of offshore trust to protect these assets from domestic lawsuits.
3. Estate Planning. Administration of assets is done in the most favourable legal and fiscal jurisdiction.
4. Regulations and Supervision. Low reserve requirements and capital standards make it attractive for banking and insurance business. Further supervision and reporting requirements are light.

Establishing an offshore financial centre is considered beneficial not only to the development of the financial services sector and the development of high value-added jobs. There are also several spillovers to other sectors such as the hotel and restaurant sector and upgrading of telecommunications. The marketing of the centre can also attract additional foreign investment in the economy. The size of the offshore business is estimated at US \$10- 12 trillion and is expected to grow at an annual rate of 15%, (Higgins, J.K, 2000). Therefore a small part of the industry could mean a lot to a small country with an important offshore centre. On the other hand, offshore activities can make the domestic financial system vulnerable to changes in international capital flows. Further, confidentiality facilitates money laundering since the true sources of funds are concealed.

In Mauritius, the launching of offshore business banking and offshore business non-banking activities<sup>209</sup> was a major development in the early 1990s. Since then it has been the declared policy of government to develop the financial services sector as a fourth “pillar” of the economy so that Mauritius becomes an international centre for financial intermediation in the Southern and Eastern African region. This move imposed an obligation on Mauritius to raise itself to international standards. Consequently, a series of new legislations have been introduced/revised. The Financial Intelligence and Anti-money Laundering Act 2002 incorporates the basic tenets of the forty recommendations laid down by the OECD Financial Action Task Force<sup>210</sup> (FATF) set up by the G7 countries and provides for reporting to the

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<sup>209</sup> Offshore Business is now referred to as Global Business in Mauritius under the Financial Services Development Act 2001.

<sup>210</sup> This is an inter-governmental body initially set up by the G-8 countries but that now has the full OECD as its membership. It is the main force spearheading the movement against money laundering

Financial Intelligence Unit<sup>211</sup> of suspicious transactions by financial institutions which warrants investigation. This illustrates the political willingness to pay attention to the development of a “clean” financial sector with low “reputational risk”. The authorities are very concerned about sending a good signal to the international community particularly because it is widely recognised that money laundering is facilitated by offshore financial centres. The FATF estimates that some financial centres are tax havens<sup>212</sup> involved in harmful tax competition and are “non-cooperative”<sup>213</sup> in the fight against money laundering. Mauritius was one of the countries in the “Naming and Shaming” list of the preliminary FATF in February 2000 but following advanced commitments made by government regarding eliminating tax practices regarded as harmful, Mauritius escaped “blacklisting” and was excluded from the Final report in June 2000<sup>214</sup>.

A new Trusts Act 2001 has been adopted regarding the recognition of Trusts to enhance offshore business activities. A new agency, the Financial Services Promotion Agency (FSPA) has also been created with the phasing out of the MOBAA<sup>215</sup> to act as a one-stop-shop on all matters relating to global business activities<sup>216</sup>.

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internationally. Since September 11 2001 events the mandate of the FATF has been extended to include developing international standards to combat terrorist financing.

<sup>211</sup> Financial Intelligence Units in countries where they exist play an essential role in combating the use of the financial system by criminals. With the creation of the F.I.U detection is separated from gathering of intelligence and investigation.

<sup>212</sup> In a tax haven tax is very low or nominal, there is lack of transparency, no effective exchange of information and there are incorporated businesses with no substantial real activities.

<sup>213</sup> i.e they have not taken the steps needed to address shortcomings in legislations, regulatory and supervision areas as far as combating money laundering is concerned..

<sup>214</sup> Mauritius does not appear in the latest list of tax havens dated April 2002

<sup>215</sup> Mauritius Offshore Business Activity Authority (MOBAA) was the regulator.

<sup>216</sup> E.g Work and residence permit, visa application, immigration formalities facilities for non-residents coming for global business activity, tax resident certificates.



While offshore banks in Mauritius are involved mainly in wholesale banking to non-bank customers, offshore businesses are categorised as either Category 1 or category 2 global business license companies. 68% of these companies are Category 2 companies and they are not considered as residents for tax purposes. Having no physical presence in Mauritius, Category 2 global business entities are difficult to supervise and monitor. They<sup>217</sup> are the ones that could represent the dangers in terms of money laundering and financing terrorists. Category 1 global business corporations undertake activities in various areas such as aircraft financing and leasing, assets management, consultancy services , employment services, financial services, funds management, information and communication technology, insurance, licensing and franchising, logistics and or marketing, operational headquarters, pension funds, ship and ship management and trading. Mauritius has poised itself to become an efficient tax-planning jurisdiction via Category 1 global business companies which can take advantage of a network of double taxation avoidance agreements<sup>218</sup> and which benefit from an incentive tax rate of 15% as compared to the normal 35% corporate tax. However, this rate may be reduced to 3% following request for foreign tax credit. Various international firms therefore use Mauritius to route their funds to emerging economies like India, Indonesia, China and South Africa. The investors obtain a tax benefit when repatriating their profits from the country where they have invested. India remains the main country receiving inward investment through Mauritian Global Business Companies 1. In 2003 around 50% of

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<sup>217</sup> Some were licenced before Mauritius had strong identification requirements in place.

<sup>218</sup> 26 Treaties have been ratified and more are being negotiated.

the total investment representing US\$ 17.6bn has flowed from the rest of the world to India via the Mauritian conduit. Most of the investment comes from the USA (25%), Singapore (20%) and the British Virgins islands (19%). However, the recent exemption (20%) from long-term<sup>219</sup> capital gains announced in the 2003-2004 Indian Budget raises concern about the neutrality of this measure on investors' behaviour as many investors might consider that the incentive to use the Mauritian offshore sector has been watered down.

**Table 14.5**  
**Offshore Companies in Mauritius**

Date	No. of Global Business Companies (Categories 1 &2)
June 98	7264
June 99	9227
June 00	12542
June 01	16264
June 02	19349
June 03	21414
June 04	23595

*Source: FSC.*

The number of offshore entities has significantly increased since early 1990s as shown above. However this number is minute when Mauritius is compared with

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<sup>219</sup> In India assets held for more than 3 years are long-term but listed shares, units, bonds and debentures are considered as long-term if held for more than 12 months.

the centres like British Virgin Islands and Bahamas where according to KPMG the number of entities in 2001 were 316,566 and 101,107 respectively<sup>220</sup>. Even in the area of offshore banking specifically, Mauritius, with 11 institutions, is very weak compared to Cayman islands the biggest offshore banking centre with 450 offshore banks.

## **5.6 Recent Institutional Changes at the Regulatory and Supervisory Level in the Financial Sector**

In the past regulations were industry-based and this had contributed to financial market segmentation. The wave of liberalisation blowing over the financial services industry has after some years reduced the binding portfolio constraints of the specific institutions rendering the distinction increasingly blurred between banks and non-banking financial institutions. Banks and Insurance companies have developed into financial conglomerates offering integrated services through various subsidiaries and affiliates. However, during that same time period, regulation and supervision had remained product-based. The situation was that different segments of the industry were facing different levels of supervision and there had not been any important prudential reforms outside the banking sector. Still worse, some sectors were either not regulated or partly regulated and not supervised. These sectors were the Post Office Savings Bank, Leasing Businesses, Venture Capital Funds, the Sugar Insurance Fund<sup>221</sup>, Fund Management Companies, Pension Funds (except those

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<sup>220</sup> Most of these being international business companies.

<sup>221</sup> S.I.F did not fall under the purview of the Insurance Act 1982. As such it remained outside the jurisdiction of the Insurance Controller.

managed by Insurance Companies), Commercial Credit Institutions and the friendly societies. Some of these are high-risk sectors to both depositors and investors where failure can affect the stability of the financial system. One important lesson from the LTCM case (see Chapter 4) is that systemic failure can start off within the NBFIs sector.

In recent years, this uneven degree of supervision within the Mauritian financial sector has been identified as a severe weakness responsible for various problems: -

1. It provided room for regulatory arbitrage.
2. It exposed some sub-sectors to fraud and malpractice<sup>222</sup> with potential failures of certain institutions accompanied by the risk of contagion in some otherwise sound sub-sectors.
3. Reputational risk prevented the development of certain new sub-sectors with high growth potentials such as asset management and fund management activities. It was considered that only a high standard of regulation and supervision could improve public confidence in soundness of these activities and in the guarantee of receiving a fair treatment in dealings (Steering Committee Report 2001). Improved confidence was seen as essential for higher mobilisation of savings through investment portfolios. Already some transfer of domestic savings out of Mauritius into global markets had been identified and it was considered that only a high level of regulation and supervision in such business areas could reverse this

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<sup>222</sup> E.g misuse of clients' assets.



movement as well as attracting world-class operators that are generally sensitive about their reputation.

A strategy of developing a framework of cohesive regulations covering all prudential and market conduct regulations, integrating all sub-sectors to reduce the risk of individual failure as well as systemic risks and ensure market integrity was to be put in practice via the adoption of a unified approach to regulation and supervision (Government of Mauritius 2001). This model has been initiated successfully in Scandinavian countries, Taylor and Fleming (1999). Regulations and supervision now adopt a risk-based approach with a view to achieve the objective of enhancing the protection of both financial investors and consumers of financial services. It was recognised in 2001 that the Bank of Mauritius had already gained the status of an internationally strong regulator and supervisor. As such it was imperative to learn from the experience acquired in the banking sector and develop a high degree of regulation and supervision for the whole industry while at the same time avoid banking supervision being diluted with the teething problems in the non-banking sector.

Consequently, it was decided that the Bank of Mauritius should be the anchor around which the unified regulatory authority should be built. However, rather than moving directly to a single licensing, regulatory and supervisory body the reform was designed to take place in two distinct stages so as to be both effective and efficient.

1<sup>st</sup> Stage: The Financial Services Commission was created by mid 2001 under the FSD Act<sup>223</sup> to bring all non-bank financial services under one licensing, regulatory and supervisory umbrella. The FSC took over the responsibility of all previous regulators (SEC<sup>224</sup>, MOBAA<sup>225</sup>, and the Office of the Controller of Insurance) except that of the Bank of Mauritius and it equally held the responsibility for the hitherto unregulated activities<sup>226</sup>. The supervision<sup>227</sup> task is carried by both Off-Site monitoring of financial statements and by On-Site inspection. To facilitate the anchor role of the Bank of Mauritius, the Managing Director of the BOM has been assigned the task of chairing the FSC which also uses the infrastructure and logistics of the bank. In the meantime, the BOM continues to license, regulate and supervise the domestic and offshore banking sector as well as the deposit-taking activities of the non-bank financial institutions, moneychangers and foreign dealers.

2<sup>nd</sup> Stage: It was initially planned that at the end of phase I, and in the light of a review exercise carried out in the beginning of January 2003, full integration of the BOM and the FSC would be implemented. It has now been considered that the reform proposals were too optimistic and that banking and NBFIs supervision integration is not likely to happen before 2007.

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<sup>223</sup> Financial Services Development Act 2001

<sup>224</sup> Stock Exchange Commission.

<sup>225</sup> Mauritius Offshore Business Activities Authority.

<sup>226</sup> E.g. leasing, Mutual funds, unit trusts, pension funds, equity funds, cooperative credit union.

<sup>227</sup> Revocation of license is possible in case of serious violations of regulations.

## **5.7 Summary**

Chapter 5 has provided a description of the Mauritian financial sector brushing the development of some of its sub sectors namely banking, insurance business, offshore activity and security market. It has shown that the intermediation sector is dominated by banking activity and insurance comes next. It also reveals that both the banking and the insurance sectors are highly concentrated but that the some merging, acquisitions and appearance of new foreign players in banking sector is likely to bring more competition in the future.

This chapter has also shown evidence of a country where intermediation has been boosted through government direct action. However, rather than adopting the traditional and quite often ineffective route followed by many African countries after independence through nationalization of the banking sector, government here in Mauritius simply created a new bank which stimulated non-price competition for market share.

The modernisation process has been examined in relation to (i) the security market-trading infrastructure for a more transparent and efficient market, (ii) the legal framework to minimize financial crime, (iii) the changes from an industry-based regulatory and supervisory framework to an integrated one.

Chapter 6 will focus exclusively on the domestic banking sector and will attempt to shed light on the monetary policy reforms, the impact on bank performance, interest spread and banking crisis.

## Chapter 6

# LIBERALISATION AND THE BANKING SECTOR IN MAURITIUS

### 6.1. Introduction

The McKinnon and Shaw paradigm suggests that if developing countries adopt the market determination of price and allocation of credit, the attractiveness of holding claims in the banking system will increase. It must be pointed out that in the early 1970s Mauritius, unlike many developing countries, was not characterised by vast rural areas with an important part of payment being in kind. The narrow money supply as a proportion of the GDP in Mauritius highly exceeded that of several African countries and it compared with Singapore and the USA.

**Table 1.6**

#### **Narrow Money Supply as a Percentage of GDP (1971)**

Niger	Nigeria	Uganda	Senegal	Zambia	Mauritius	Singapore	USA
6.4	8.9	10.8	11.5	14.1	22.4	25	23.8

*Source: IFS*

When the liberalisation policies were adopted in the early 1990s, Mauritius was therefore already a highly monetised economy with a weak unofficial money market and a long banking history. Financial intermediation proxied by the quasi-money collection had already reached 52% of the GDP in 1991 as compared to 24 % in 1971.



Until the mid 1980s, the engines of growth had been sugar, textiles and tourism. By then it was clear that the economy had emerged from convalescence<sup>228</sup> but would not stay long on the path of high growth unless these sectors were to be modernised and the economic base further diversified (Government of Mauritius, 1987, 1988). A switch to this new direction implied undertaking reforms in the financial system to satisfy higher investment requirements and access to a competitive market for long-term funds. The supply of loanable funds had to be substantially improved by better mobilisation of savings. In the mid 1980s, private sector credit from the banking sector was at a low level of 27% of GDP compared to 68% for the USA.

The table below shows that financial liberalisation was initiated in Mauritius against a background of improved macroeconomic conditions following the structural adjustment that started in early 1979.

**Table 2.6**

**Pre-Liberalisation Macroeconomic Indicators**

Year	1979	1980	1981	1982	1983	1984	1985	1986
Inflation Rate	14.5	42	14.5	11.4	5.6	7.4	6.7	1.6
Budget Deficit*	11.6	10.3	12.6	11.8	7.6	4.5	3.5	1.8
B.O.P	-94.6	-27.9	-129.7	-60.1	-31.4	-43.6	-2.6	121.5
Overall Balance**								

*Source: IFS Yearbook (Various Issues)*

*\* Deficit as a % of GDP; \*\* US\$ m*

<sup>228</sup> By the end of the 1970s the economy faced severe internal and external imbalances and like many other third world countries it adopted the stabilization and structural adjustment programmes.

The process of financial liberalisation in Mauritius has to a large extent adopted the path suggested in the ex-post financial liberalisation literature reviewed in Chapter 2. Reforms in favour of a broadening and a deepening of the financial sector were undertaken with a focus on market orientation and internationalisation in two areas: -

1. Monetary policy
2. Strengthening of supervision and prudential regulation at the level of both banking and non-bank institutions.

The rest of this Chapter deals with these two issues and the analysis is restricted to category 1 banks only.

## **6.2. Internal Reforms**

### **6.2.1. Directed Credit and Reserve Requirement**

Unlike Mexico where freeing of interest rates, abolition of directed credit programmes and the drastic reduction of the reserve requirement was achieved within a very short time (1998-1999), in Mauritius, the whole process of internal liberalisation was sequenced over a period of four years.

However prior to the mid 1980's the monetary policy measures in Mauritius reflected a regime of financial repression characterised by the following: -

- A policy of minimum interest rate on savings deposit and maximum rate on lending.
- Interest rate determined yearly by government.

- Credit growth ceilings for advances to the private sector, introduced in 1973 to limit deposit expansion.
- Credit-deposit ratio at 61%.
- Credit allocation on a ratio of 3:1 shared between priority sectors<sup>229</sup> at a subsidised rate and non-priority sectors.
- Until 1990, the directed credit ceiling favoured the export processing zone (EPZ) sector. Banks had to direct 50% of their credit to the EPZ firms and other producers in key sectors (category 1). Loans to traders and other non-preferential customers (category 3) could not exceed 25% of the ceiling and the remaining credit went to category 2 borrowers. Additionally, non-sugar export firms (EPZ) benefited from refinancing of bills of exchange (post shipment)<sup>230</sup> at a preferable rate of 12.25% and these were not included in the commercial banks' credit ceiling.
- The banking system was heavily taxed with high reserve requirements at 37% in 1978.
- Banks facing a money deficit had automatic direct access to the central bank refinancing facility without seeking out accommodation from other banks having surplus liquidity. The central bank was acting more like a lender of first than last resort.

Such direct means of monetary control had proved to be very useful in the early days of Independence at a time when financial resources were very scarce and economic diversification weak. It ensured the flow of credit to specific sectors in line

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<sup>229</sup> Agriculture, manufacturing and tourism sectors.

<sup>230</sup> Not applicable to pre-shipment working capital loans for exporters.

with the economic growth strategy of the government and in an embryonic financial market it facilitated the control of the monetary authority on overspending and inflation. With the economy changing rapidly by the mid 1980's, the authorities decided that there was a need to remove the rigidities in the banking system so as to allow resources to be directed to a variety of sectors and to rapidly shift from the less profitable to the more profitable areas. Indirect monetary control by the central bank on the monetary base was adopted to allow banks the freedom of allocating credit according to market forces. Reorientation of the monetary policy stance has been a gradual process lasting around a decade.

In order to facilitate the availability of credit to different productive sectors, bank ceilings were gradually abolished as per the following sequence. In 1991 credit to productive sectors was allowed to increase by 17% while a ceiling to non-priority sectors was maintained at 18%. In 1992, the credit ceiling to priority sectors was abolished and the same applied to non-priority sectors in 1993.

The main sectors of the economy now getting access to banking credit are the Manufacturing, Tourism, Trading, Construction, Agriculture, Finance and Business and Personal sectors. The share of credit between these sectors is shown below.

**Table 3.6**

**Distribution of Banking Credit to the Private Sector**

	1983	2002	2003
Manufacturing	44	17.0	15.4
Tourism	7	14.8	16.4
Traders	7.5	14.2	14.4
Construction	4.6	14.0	13.5
Agriculture	21	9.4	9.8
Finance and Business Sector	0.4	9.0	8.9
Personal	11.3	7.8	9.6

*Source: B.O.M*



It can be observed that with the elimination of directed credit policy some sectors like tourism, traders, construction and finance have gained access to a larger share of credit allocation.

For prudential reasons the credit-deposit ratio was temporarily raised from 61% to 65% but subsequently phased out. As far as the liquid reserve ratio is concerned, the minimum non-cash liquid ratio was at 25% in 1978 coupled with a cash ratio of 12%. The minimum non-cash liquid asset ratio was reduced to 20% in July 1996 and was completely phased out in July 1997. The cash ratio<sup>231</sup> has faced successive reductions until it reached 5.5%<sup>232</sup> of total deposit liabilities in July 1998. Such changes have been made to reduce the leakage or tax effect of the reserve requirement in the intermediation process. With a higher credit multiplier, there was an inevitable expansion of the balance sheet of the domestic banks and this added to the already consistent credit expansion that started with the long period of expansion of the economy beginning in the mid 1980s. Further the high reserve requirement damaged competition between domestic and offshore banks or even NBFIs.

**Table 4.6**

**Credit to the Private Sector as a % of GDP**

As at June	1983	1993	2003
Credit as a % of GDP	21.9	38.3	56.3

*Source: BOM Annual Reports, several issues*

<sup>231</sup> Cash ratio deposits denominated in both domestic and foreign currencies are considered. The assets satisfying liquidity are cash in vault and balances with the central bank in non-interest bearing accounts.

<sup>232</sup> 5.5% of total deposits is a minimum weekly average cash ratio.

As banks competed for offering loans, they relaxed their lending standards. At the same time, the high growth rate of the Mauritian economy began to slow down. Soon the amount of non-performing loans increased and the asset quality of banks deteriorated. As a percentage of total advances, non-performing loans went up from 7.8% in 1996/1997 to 9% in 1998/99. Figures for individual banks are not available but some banks were certainly more affected than others. By the end of the 1990s banks being burdened with non-performing loans chose to limit the amount of loans they granted. There was therefore no situation of credit crunch as many then suggested since demand for loans did not exceed the lending capacity of banks *per se* but credit was rationed because of unwillingness of banks to lend following a deterioration of the credit quality after liberalisation, (Basant Roi, 2001). “Unavailability” of credit distorted the transmission of the monetary policy and also forced the central bank to provide bridging finance for the restructuring of the Sugar Industry and facilities to firms in the EPZ by the end of the 1990s.

Liberalisation of interest rates started in the early 1990’s and just as in the case of removal of ceilings, it was done through stages. Before the reforms, government fixed the bank rate every year and Treasury bills were issued at a pre-determined rate. There was no fixed time for these irregular issues that were made for the twin purposes of managing the national debt and giving banks and other financial institutions (mainly the National Pension Fund) a short-term investment outlet for their surplus liquidity.

### **6.2.2 Shifting to Indirect Monetary Policy Instruments.**

As a first stage, open market operations started in November 1991 in the primary market only, and treasury bills were no more being issued on tap but on tender. The BOM started issuing BOM bills and the auctioning of Treasury bills on a weekly basis and subsequently on a bi-weekly basis, whenever required. Around 60% of the bids received for the primary auctions came from the banking sector. Such regular issues facilitated the withdrawal of cash reserves from the banking system and acted as a check on credit expansion as compared to the previous direct method of credit ceilings.

In 1992, the central bank revised its refinancing policy and stopped making regular advances to commercial banks. Those facing a shortage of liquidity were to obtain funds from the selling of BOM/Treasury bills to those with excess cash and vice versa. This process facilitated a redistribution of available liquidity in the banking sector and it gave rise to the emergence of an interbank secondary bill market<sup>233</sup>. The inter-bank market is dominated by transactions on call (overnight) money and short money<sup>234</sup> while term money<sup>235</sup> transactions are still negligible. As mentioned in chapter three, a run on one bank may trigger contagion runs on other banks via the interbank market. The interbank market being still very thin at this stage, the magnitude of possible contagion from problem banks is then low.

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<sup>233</sup> An interbank market for financial assets

<sup>234</sup> Up to 7 days.

<sup>235</sup> above 7 days.



The start of open market operations in November 1991 and the development of an inter-bank market represent two decisive moves in the shift to indirect methods of monetary control.

With the issue of bills on tender in the primary market, the interest rate was henceforth influenced by the interplay of market forces namely:-

(i) The supply of bills, related to government's need in connection with the management of national debt; and

(ii) The demand for bills, related to the commercial banks' reserves and investment need.

Initially the bank rate represented the overall weighted average on Treasury/BOM bills of different maturity<sup>236</sup> at auctions for the preceding twelve weeks plus a margin of one percentage point. In 1995, the twelve-week period was reduced to one week (i.e. the last auction's figures) and the one percentage point margin reduced to 0.25% before being completely phased out. These gradual measures rendered the bank rate closer and closer to the prevailing market conditions. Given that the bank rate served as a benchmark for commercial banks to set their interest rate structure<sup>237</sup> and also for central bank's lending to government, it can be considered that liberalisation of interest rates had effectively been achieved by 1995. With market-based borrowing there is no more scope for government getting access to artificially cheap finance and fiscal discipline is improved. Although the

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<sup>236</sup> 91-day, 182-day, 364-day, 364-day and 728-day Treasury bills.

<sup>237</sup> Inclusive of various deposit as well as loan rates.



bank rate had become market-based, it moved like wreckage, unable to send a specific signal to the money market.

However, it was several years later, in December 1999, when a reasonable number of banks and non-bank holders of government securities had been established that it became possible for the central bank to influence the monetary base in an effective manner and improve liquidity management through open market operations. As the secondary market became relatively active, it became possible to enhance banks' liquidity management by shifting to a second phase of open market operations with flexible two-way operations (repurchase/repo transactions) in existing securities<sup>238</sup>. In line with its liquidity forecasting framework for a given monitoring week the central bank takes the initiative between weekly primary market auctions of treasury bills to increase/decrease<sup>239</sup> the short-term liquidity of the domestic money market.

By buying eligible securities from any commercial bank the central bank increases liquidity under a contract that also allows the resale of the securities at a specified future date and price. Banks tender for the central bank's fund under the umbrella of a Master Repurchase Agreement between BOM and commercial banks. In cases of excess liquidity the central bank gets involved in reverse repurchase (reverse repo) by selling securities with an agreement to rebuy these at a specified

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<sup>238</sup> i.e in the secondary market.

<sup>239</sup> e.g if the central bank considers that the interbank market cannot redistribute liquidity due to shortage in the whole system, repurchase transactions are undertaken to inject the necessary liquidity in the system

date and price. The broad monetary aggregate M2<sup>240</sup> which is the intermediate target is subsequently influenced in the direction wished by the monetary authority. The repurchase rate<sup>241</sup> is normally above the inter-bank market rate. Repurchase transactions are conducted at rates closer to the Lombard rate whenever the central bank wants to tighten monetary policy while in the case of a loosening of the monetary stance the repurchase transactions are conducted at rates closer to the inter-bank rate.

Under the new refinancing framework, individual commercial banks now get access to a standing overnight facility - the Lombard facility at the Lombard rate, which represents a penalty premium over the inter-bank market overnight rate. This new accommodation policy encourages individual banks that have liquidity problems to get the reserves first from those that have a surplus in the interbank market before seeking refinancing from the central bank. While repo transactions are conducted at the initiative of the central bank to change the liquidity of the banking system, the Lombard facility operates at the request of any bank facing a liquidity shortage. Such overnight loans are collateralised by government security (treasury bills or other bonds acceptable by the BOM) and the Lombard rate represents the highest rate in the short-term money market. Refinancing is now at the discretion of the central bank both in terms of rate and volume. Each bank is allowed to draw down part of the full amount of the facility allowed to it to meet unexpected overnight shortages. As the interbank market and the repo transactions develop, there is less active

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<sup>240</sup> In Mauritius there are only two monetary aggregates. M1 is the narrow money composing of currency and sight deposits while M2 consists of M1 plus savings and all types of time deposits.

<sup>241</sup> Repo rate is a weighted average rate of the bids.

reliance on central bank refinancing and this has allowed the central bank to shift from a previous position of a lender of 1<sup>st</sup> resort to becoming effectively one of last resort in recent years. There is therefore a consolidation of the process of developing indirect monetary control. Periodic changes in the Lombard rate are made by the central bank to send the desired signal about monetary stance to the banking sector for self-adjustment of their interest rate structures and subsequent transmission to the rest of the economy. Changes in monetary policy are now transmitted to the various sectors of the economy more effectively and faster than in the initial stage when the key rate was the Bank rate. To further improve the connection between the Lombard rate and the money market some changes will be made late this year when the Lombard rate will be replaced by the repo rate as the key interest rate signaling the monetary instance for transmission to the economy.

### **6.2.3 Changes in Interest Rate**

The theory<sup>242</sup> discussed in Chapters 2 & 3 predicted that financial liberalisation would lead to an initial increase in real interest rates following the de-repression measures. This would be accompanied by higher rates of savings. Later when external liberalisation follows greater access to foreign savings would push towards lower interest rates. Both stages actually would favour a higher level of investment. The real deposit rate is now examined for different time periods.

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<sup>242</sup> McKinnon and Shaw and the various refinements.



**Table 5.6**

**Changes in Real Interest Rate before and After Liberalisation**

	Year (June)	Nominal Deposit Rate	Inflation Rate	Real Deposit Rate		
				Year (June)	Period Average	Standard Deviation
Pre- liberalisation Period A <sup>243</sup>	1975	4	20.6	-13.76	-8.4	6.2
	1976	4	14.7	-9.33		
	1977	4.5	9.6	-4.65		
	1978	6.5	10.1	-3.27		
	1979	7.5	8	-0.46		
	1980	9-9.5	33	-17.86		
	1981	9-9.5	26.5	-13.64		
	1982	9	13.4	-3.88		
Pre- liberalisation Period B <sup>244</sup>	1983	9	7.5	1.40	2.3	3.9
	1984	8.5-8.75	5.6	2.87		
	1985	8.5-9.0	8.3	0.42		
	1986	8.5-9.0	4.3	4.27		
	1987	8	0.7	7.25		
	1988	8	1.5	6.40		
	1989	10	16	-5.17		
	1990	12	10.7	1.17		
Liberalisation Period	1991	12	12.8	-0.71	0.99	3.5
	1992	10	2.9	6.90		
	1993	7	8.9	-1.74		
	1994	8	9.4	-1.28		
	1995	8	6.1	1.79		
Post- liberalisation Period	1996	8	5.8	2.08	1.32	0.96
	1997	8	7.9	0.09		
	1998	8	5.4	2.47		
	1999	9	7.9	1.61		
	2000	6.5-8.5	5.3	2.49		
	2001	7	4.4	0.19		
	2002	6.5	6.3	0.86		
	2003	6	5.1	1.61		

Source: B OM

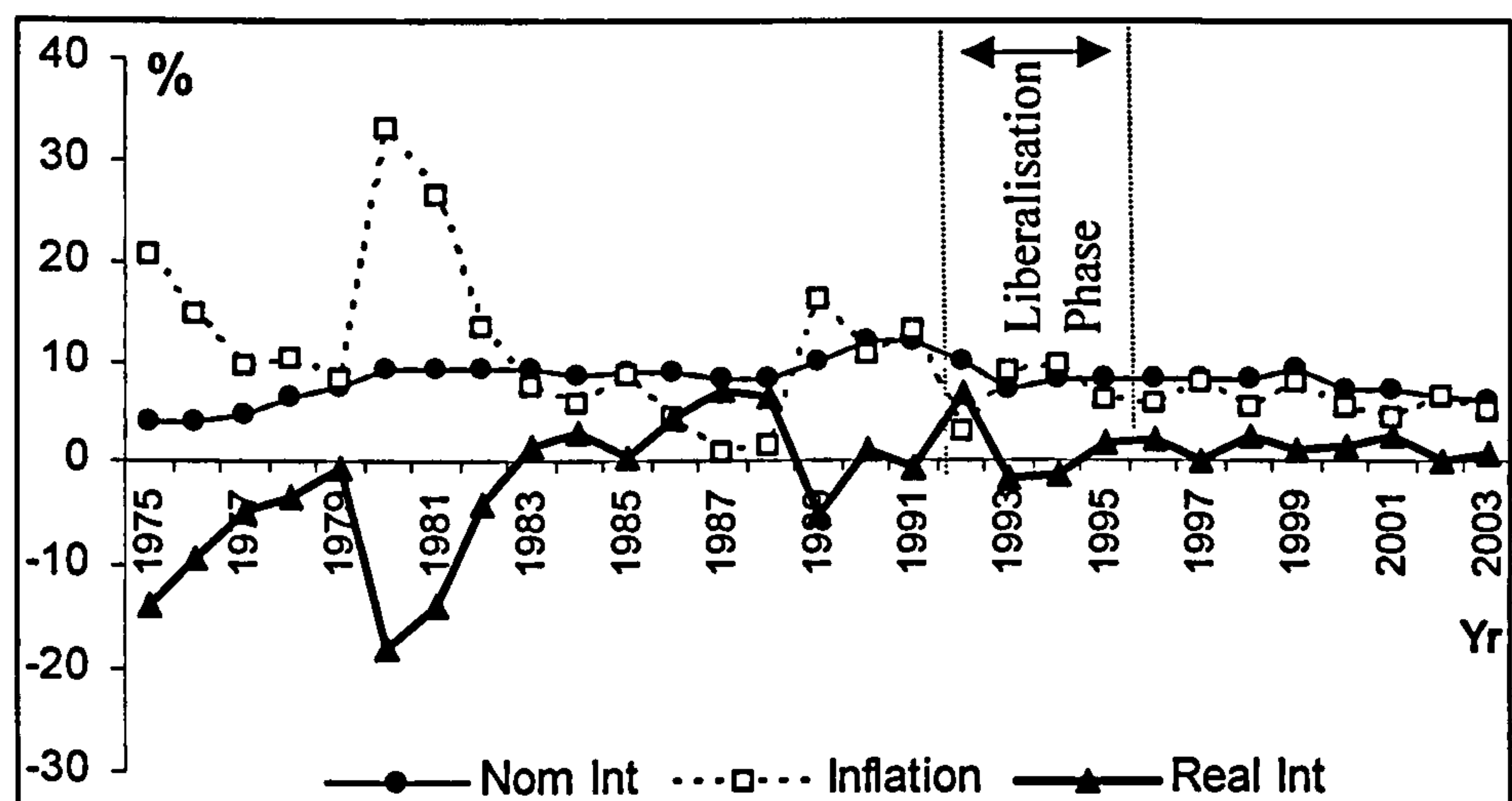
<sup>243</sup> Period A is defined as the pre liberalisation period during which the real interest rate was negative due to high inflation rate.

<sup>244</sup> Period B is defined as the preliberalisation period during which the real interest rate went positive following macroeconomic corrective policies adopted.



**Figure 1.6**

**Real Interest Rates on Savings Deposit and Inflation Rate  
(June 1975-2003)**



*Source: BOM Annual Reports – Several Issues*

Table 5.6 and Figure 1.6 reveal that the real deposit rate has not gone higher but more stable after the liberalisation process as expected. Such behaviour has also been observed in other developing countries (Turtleboom, 1991). More interestingly, they reveal that:

1. The real interest rate was negative at the beginning. This was due to high inflation caused by the expansionary economic policies of government in the early 1970s, the oil shocks and the devaluations in October 1979 and September 1981<sup>245</sup> respectively.
2. The real interest rate had already turned positive after the structural adjustment period.

<sup>245</sup> 30% devaluation in 1979 and 20% in 1981.

3. The real interest rate on savings has not moved upward after the liberalisation phase has been completed.

4. The interest rate has been less volatile after the completion of the liberalisation reforms

The empirical evidence therefore does not support the McKinnon and Shaw hypothesis about upward movement of the savings interest rate following de-repression measures.

#### **6.2.4 Stimulating Savings**

In the past both the debenture market and the banking sector had shown rigidity concerning an upward adjustment of interest rates to surplus units. To increase competition and allow interest rates to adjust rapidly as well as to diversify the availability of savings instruments in view of financial deepening, financial institutions were in 1996 authorised to issue certificates of deposits. Further, the authorities adopted an array of gradual steps to develop a secondary market for government securities.

In December 1998 both the non-financial corporate sector and individuals were authorized to purchase treasury bills over the counter. That was a first step towards allowing financial investors first experience with treasury bills.

To boost secondary money market activity in government securities and enhance its liquidity in the absence of a well-informed investor base, the BOM

established a primary dealer system in February 2002 with four banks<sup>246</sup>. Existing eligible bidders at the weekly primary auctions were eliminated and required to purchase treasury bills on the secondary market. The four appointed primary dealers got the specific privilege of participating in primary weekly auctions for treasury bills and the privilege of bidding for third parties at primary auctions. In return they agreed to act as market makers in the secondary market by continuously quoting two-way prices for the trading of second hand treasury bills, secondary transactions with non-bank financial institutions as well as individuals<sup>247</sup>. Holders in need of cash could at any time before maturity sell back their bills in this market. The fact that only four specific players have been selected could give rise to market structure issues. However, at this early stage market size could be considered as too small to support a large number of primary dealers to operate on a profitable basis and without subsidies. A system of rotation of primary dealers based on performance, as in Mexico, could have been envisaged for fairness and a motivation to efficiency.

A turning point was reached in December 2003 with the trading of treasury bills on the SEM through stockbrokers. While the primary dealers would continue with their involvement in weekly auctions, all other financial, non-financial institutions and individuals now have to purchase treasury bills on the secondary market. The final move will take place in the near future with the introduction of long-term government securities on the SEM. Then onwards it will be possible to establish a yield curve through regular issues of long-term government bonds. Such

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<sup>246</sup> The Barclays Bank, the HSBC, the MCB and the SBM.

<sup>247</sup> The secondary market cell then stopped its OTC sales that started in December 1998 to the non-bank institutions and to individuals.



regular issues while promoting long-term savings will also reduce the current roll-over risk arising out of its short maturity profile of domestic public debt. Moreover, the reinvestment risk issue raised in Chapter 5 regarding long-term insurers will be addressed. The yield curve will constitute a benchmark for financial investors in their decisions regarding their funding operations and also for banks as regards deposit and lending rate policies. Additionally, the yield curve will act as an information gap-filler facilitating the detection of overpriced and underpriced equities and debentures in a process of reducing market imperfections.

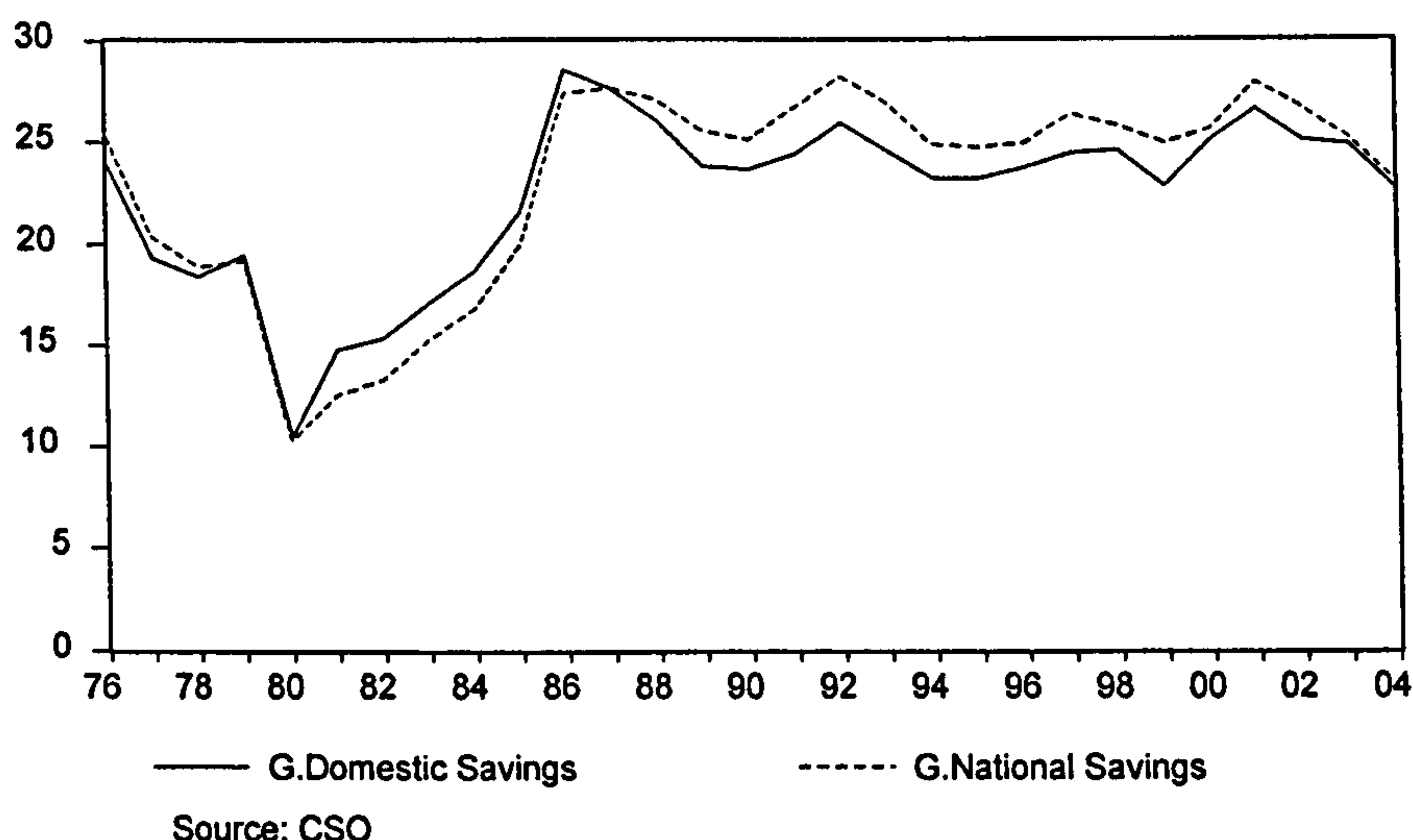
The development of an active secondary market for treasury bills became essential following the removal of the obligations on banks to absorb government debt. It will allow easier sterilisation of any massive foreign reserves inflow. The secondary market for treasury bills now and eventually for longer-term government security is expected to contribute to the stimulation of savings in the context of the emergence of a multi-layered financial system with capital markets playing a more important role alongside the banking sector.

In spite of liberalisation of interest rates and other measures taken to stimulate savings until now these measures have not yielded the expected results. The evidence does not support the theory as shown by the curves depicted in figure 2.6.



**Figure 2.6**

**Savings Ratio 1976-2004**



### 6.3. External Reforms.

As for the international aspect of financial liberalisation, constraints were first relaxed on trade-related flows before starting to ease restrictions on long-term direct investment inflows/outflows. Premature capital account liberalisation led to problems such as capital flight or disruptive capital inflows in Korea in the 1960s and Chile in the 1970s (Fry, 1978). The relevance of sequencing in this area is fully debated in Dooley and Mathieson, (1987), De Grawe (1987), Blejer and Sagari (1987) and McKinnon (1993). When Mauritius embarked on the financial liberalisation path in the early 1990s, the foreign exchange regime was a fixed<sup>248</sup> and partly convertible one. Liberalisation of exchange control actually started at current account level in July 1987 with the partial lifting of restrictions on overseas travel allowances and cash gift allowances. Subsequently the waiving of import

<sup>248</sup> Pegged with a weighted basket of currencies of the major trading partners of Mauritius.

permits/licenses added competitive pressures on local producers to improve both the price and the quality of their products. In 1992, exporters were allowed to operate foreign exchange accounts<sup>249</sup> with their commercial banks and were thus able to exchange one currency for another without having to convert into rupees, thus saving in terms of transaction cost<sup>250</sup>. Full convertibility of domestic currency into foreign exchange for current account transactions had been reached.

As far as outward capital movement is concerned, the situation in the 1980s was as follows:

1. Non-bank residents were allowed to transfer to any country a reasonable amount of capital subject to permission, on payment of a 45% stamp duty. That constituted a barrier to F.D.I outward and to regional co-operation.

2. Non-residents were subject to similar limitations except that the payment of stamp duty amounted to a lower level of 35%.

3. Repatriation of capital by foreign companies was tax-free up to the amount of the original investment. Capital gains were therefore blocked and released only subject to investment in Mauritius or for transfer abroad for payment of a 35% stamp duty.

4. Emigrants were entitled to transfer the equivalent of one hundred thousand Mauritian rupees from their Mauritian assets and the balance of their funds were credited to a blocked account with possibility of release, subject to payment of a 45% stamp duty.

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<sup>249</sup> The yield to residents being the foreign nominal interest rate plus the depreciation of the domestic currency.

<sup>250</sup> Conversion fees paid only once instead of twice

All these indicate the high level of control on capital account transactions. The first liberalisation measure was announced in the June 1991 budget speech (Government of Mauritius, 1991). Provision was made for domestic banks holding foreign currency balances of foreign companies in their correspondent banks abroad or with offshore banks to be exempted from the 15% payment of stamp duty on outward capital transfers<sup>251</sup>. In 1992 all foreign investors were authorised to repatriate their capital, including capital gains without the payment of 15% capital transfer tax and without prior approval from the Bank of Mauritius. As for local residents, the capital transfer tax in the case of outward movement of capital<sup>252</sup> was initially reduced to 5% with prior approval of the Central Bank and finally by July 1994 the capital account was fully liberalised with the lifting of controls on portfolio investment and Mauritius acceded to IMF Article V111<sup>253</sup>. There are no more blocked accounts for non-residents and exchange control has been suspended on both current and capital account transactions. This new framework has opened the door of the London interbank market to Mauritian institutions willing to buy investment instruments. Foreign exchange accounts are now permitted in the banking sector with no distinction between accounts of residents and non-residents. Any resident may hold accounts in foreign currency with both domestic and offshore banks. This has allowed

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<sup>251</sup> Outward transfers faced a higher restriction in the 1980s when the stamp duty on outward transfer of capital was at a level of 45%.

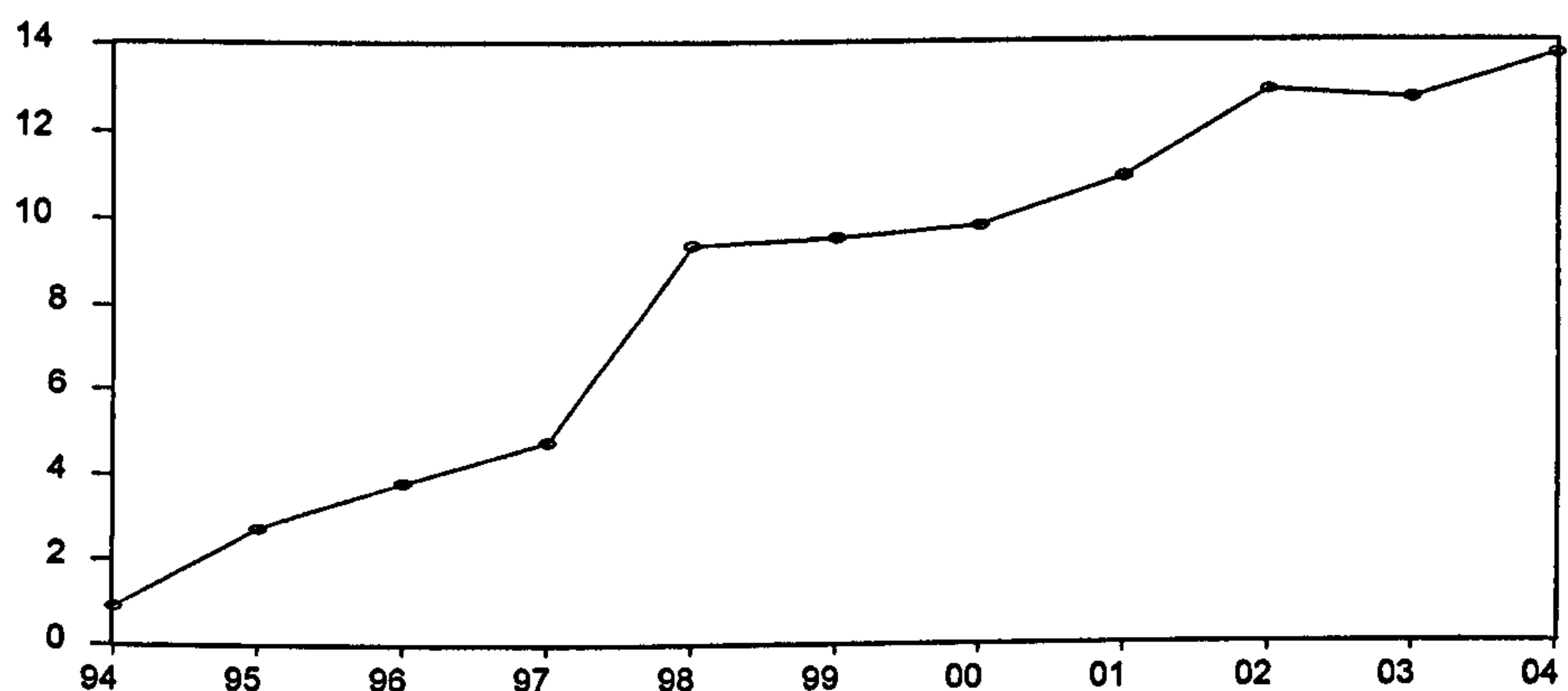
<sup>252</sup> Promoting FDI outward especially in the context of regionalisation in the Southern & Eastern African region.

<sup>253</sup> Article V111 is not a compulsory requirement for IMF country members.

some corporate bodies to borrow directly abroad in foreign currency to take advantage of interest differences and their actions complemented domestic savings for investment purposes. Loans and advances in foreign currency has now reached a level of 9% of total credit and foreign borrowings by some firms also sometimes create a problem of excess liquidity in the domestic banking sector. Figures 3.6 and 4.6 reveal that important changes have taken place in commercial bank foreign liability after the liberalisation of the capital flows.

**Figure 3.6**

**Foreign Currency Deposits as a % of Total Deposits**



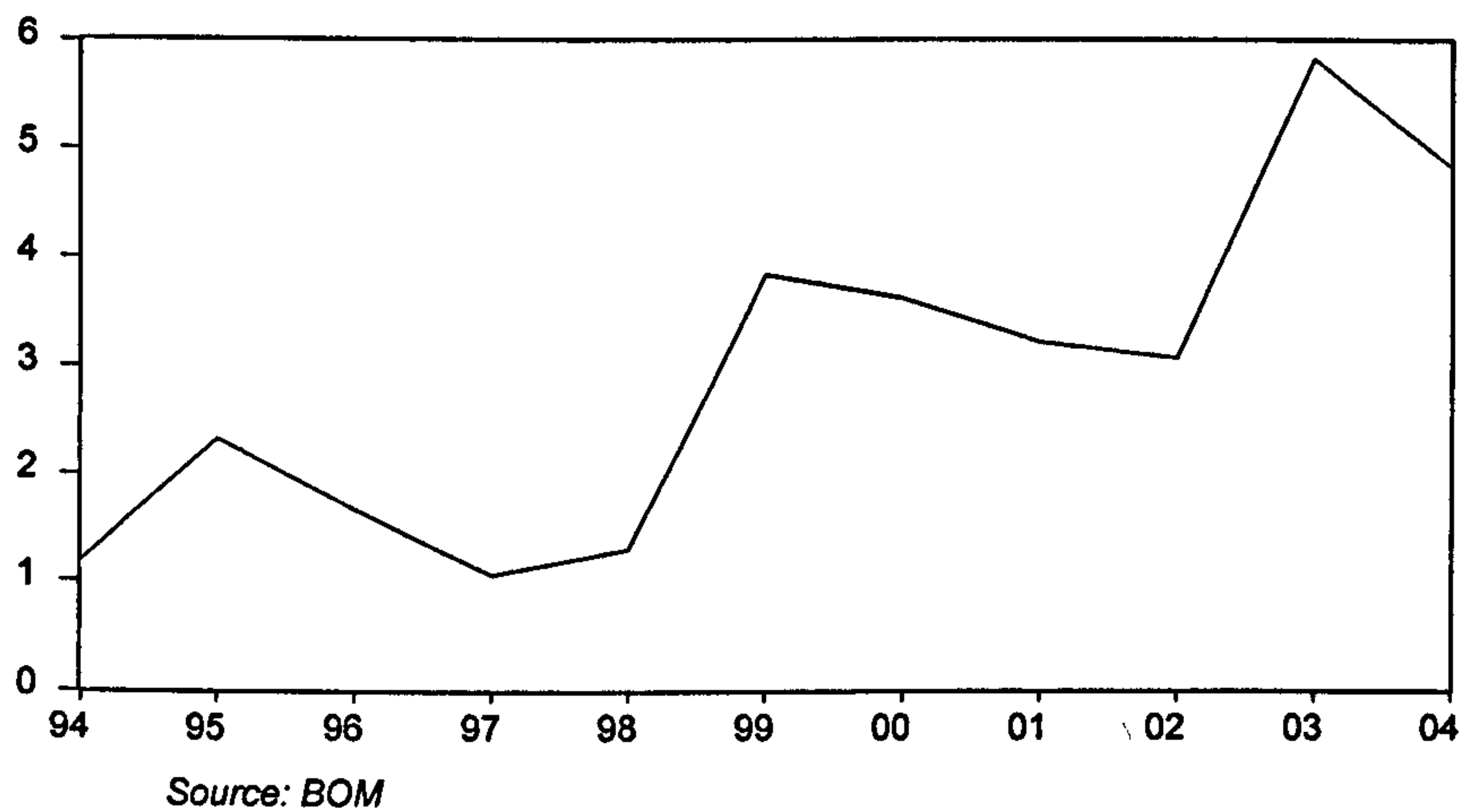
Source: BOM

The rise in foreign currency deposits is also due to a certain extent to a fall in the Treasury bill rate. That has led financial investors to shift from domestic denominated assets to foreign denominated assets. In future as participants who have international transactions change their mind set and start getting



involved in hedging to minimise the impact of any adverse currency movements, they would use foreign deposit accounts more often. At this stage, the proportion of total deposits in the banking system in the form of foreign currency is still very low as compared to above 75% in many European countries where banks are involved in a lot of hedging.

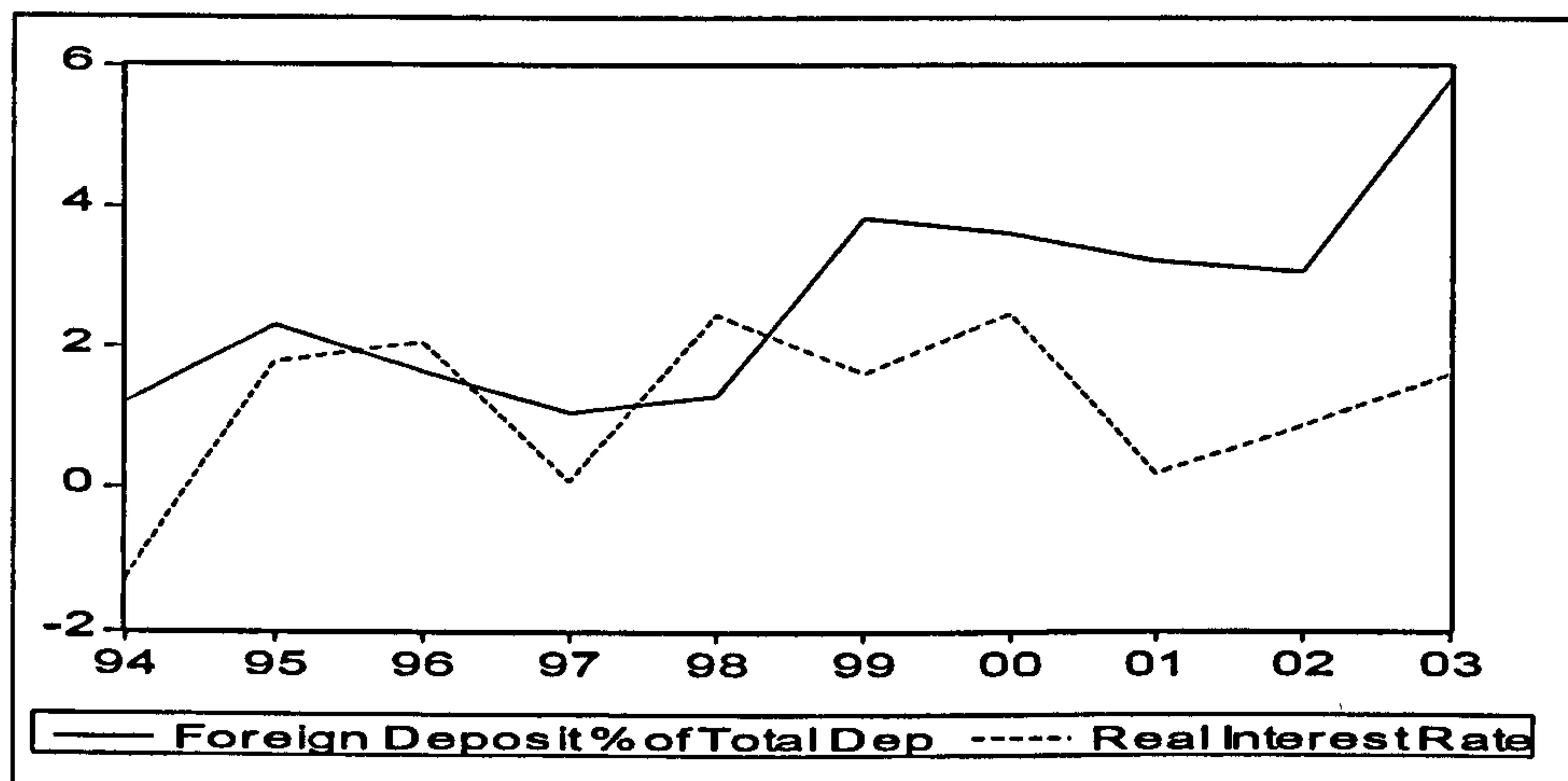
**Figure 4.6**  
**Banks' Borrowings From Abroad as a % of Total Deposits**



There is definitely a greater access to foreign savings in the last few years. The authorities expect that external liberalisation will gradually integrate the domestic economy into the global financial market and will facilitate capital mobility in a process of efficient allocation of global financial resources. The relationship between commercial banks' borrowing from abroad as a percentage of total deposits and real interest rate is examined below. With greater access to foreign savings one could have expected that the domestic interest rate would go down. However, figure 5.6 shows that it was not the case and a regression is run between the foreign deposit ratio and interest rate to examine the relationship between the two variables.

**Figure 5.6**

**Banks' Borrowings from Abroad and Real Interest Rate**



**Table 6.6**

**Regression Output**

Dependent Variable: REALINT  
Method: Least Squares  
Date: 10/14/04 Time: 23:24  
Sample: 1994 2003  
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.541441	0.830840	0.651679	0.5329
FORDEPRAT	0.239257	0.270518	0.884440	0.4023
R-squared	0.089070	Mean dependent var		1.191000
Adjusted R-squared	-0.024796	S.D. dependent var		1.213493
S.E. of regression	1.228446	Akaike info criterion		3.426233
Sum squared resid	12.07264	Schwarz criterion		3.486750
Log likelihood	-15.13117	F-statistic		0.782234
Durbin-Watson stat	2.089709	Prob(F-statistic)		0.402257

The low  $R^2$  obtained shows the limitation of changes in the foreign deposit ratio to explain changes in the interest rate. It also suggests that there are some other variables missing in the equation. However, the objective here is not to find out about the strength and significance of other possible variables. We do however note

there is no evidence that greater access to foreign savings is a significant explanatory variable to a drop in the real interest rate.

As regards the foreign exchange regime, the Mauritian rupee moved from pegging with a basket of currencies<sup>254</sup> to a managed floating regime in mid 1994. A foreign exchange market in US\$ was established in Port-Louis through a page in Reuters Screen in July 1994 to enhance the flow of information between domestic commercial banks for the purpose of the inter-bank foreign exchange operations and hence improving the efficiency of the forex market. In a context of liberalisation of exchange control, the BOM has gradually changed its role in the forex market from that of a market maker to one of a market player. Initially, the Mauritius Sugar Syndicate (MSS) continued surrendering all sugar proceeds to the central bank in exchange for the rupee equivalent being credited to their accounts held in commercial banks. In July 1996, the MSS had to surrender only 75% foreign currency receipts from the sugar proceeds to the BOM and the remaining 25% was released directly to the inter-bank foreign exchange market through the auction process. Similarly, all companies having foreign currency reserves<sup>255</sup> were required to sell 25% in the free market. In July 1999, the MSS was allowed to manage all of its foreign exchange earnings though there is a voluntary arrangement whereby the MSS surrenders a minority share of its proceeds to the BOM. The proportion surrendered in the financial year 2001-2002 was 36%<sup>256</sup>. Trade is now boosted in the inter-bank foreign exchange market and both domestic and offshore banks are

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<sup>254</sup> A weighted basket of Mauritius's major trading partners.

<sup>255</sup> Mainly textiles firms and hotels

<sup>256</sup> The IMF has, in 2002, urged the government to stop exerting a moral suasion on the MSS in this connection.

allowed to trade foreign currencies. The participation of the offshore banks has been made possible by authorizing them to invest the rupee counterpart of any sale of foreign currency in treasury bills. A few enterprises from the EPZ and tourism sectors have set up their own dealing rooms. Broader participation in the foreign exchange market allows the exchange rate to be fully market determined. From a managed floating regime where the central bank intervenes actively to influence the BOP position and exchange rate, although with no commitment to a pre-announced path, the country finally moved to an independent floating regime. The exchange rate is now essentially market determined but the BOM maintains some intervention aiming at smoothing undue short-term fluctuations having adverse impacts on the EPZ or on the tourism sector. The intervening currency for the BOM is the US dollar while the other currencies face cross rate adjustments.

The shift to an essentially market-oriented approach by the central bank fits in a global financial reform. The central bank is currently targeting the broad monetary aggregate M2 as its intermediate target but is informally undertaking some inflation targeting. The BOM is considering moving to a formal inflation-targeting framework, which will require a better understanding of the monetary policy transmission mechanism (IMF 2002). This will render the monetary authority more accountable. Although Mauritius adopted gradualism in the abolition of directed credit, interest control and exchange rate control, liberalisation of the banking sector did not precede that of the capital account as per the sequencing path proposed in the literature (see chapter 3). A table summarizing the various liberalisation stages appears in appendix 7.



## **6.4. Regulation, Supervision and Performance**

With financial liberalisation, the banking sector is exposed to greater instability. Apart from its basic function of controlling inflation, the central bank has to ensure financial stability so that the general public maintains confidence in the banking system.

Risk-management<sup>257</sup> is now indispensable in Mauritius and is the responsibility of not only banks but also that of the central bank. The quality of the regulatory environment is based on risk management and this influences the resilience of the financial sector to shocks<sup>258</sup>. The high CR2 (see Chapter 5) compounded with sectorwise credit concentration warrants strong supervision since the failure of a big bank could have a systemic impact. The BOM sets out prudential regulations and carries out both off-site and on-site surveillance. It has endorsed all of the 25 Basel Core Principles for Effective Supervision. To ensure that banks harmonise business practices to conform to international standards the BOM has issued guidelines in several areas as listed in appendix 8. The performance of banks is constantly assessed based on the following various criteria namely, capital adequacy and availability, concentration of risk and large exposure, foreign exposure, non-performing advances and provisions, profitability and Liquidity management. Bank capitalization and asset quality are discussed below.

### **A. Bank Capitalisation**

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<sup>257</sup> The policies, practices and procedures regarding timely measurement, control and monitoring of risks so as to minimize any potential adverse impact.

<sup>258</sup> The magnitude of the shock is also another important determinant.

### Capital Base

To tighten prudential requirements the minimum capital was increased from Rs 25m to Rs 50m in January 1997 then to Rs 75m in January 1988 and to Rs 100m as from January 1999. Raising the minimum capital requirement also guaranties a minimum size for all banks in a small country and avoids the proliferation of too small banks<sup>259</sup>, which, because of inability to achieve economies of scale in areas such as maturity transformation and risk pooling, might be tempted to adopt risky behaviour. In order to ensure diversification of ownership, no single individual or related party is authorised to owe more than 15% of a bank's capital.

### Capital Adequacy Ratio (Solvency Ratio)

Banks assets are classified into four categories of risk weights as shown below.

**Table 7.6**  
**RISKINESS OF ASSETS**

Risk Weights %	Assets
0	Cash, Treasury Bills
20	Inter-bank loans
50	Loan to individuals <sup>260</sup>
100	Other loan & overdrafts to firms

*Source: BOM*

Risk Weights %	% of bank's total on-balance sheet assets at different weights.		
	June 2001	June 2 002	June 2 003
0	23.6	27	31.5
20	8.8	8.6	7.9
50	5.7	4.0	4.1
100	61.9	60.5	56.5

*Source: BOM*

<sup>259</sup> Taiwan is facing a banking glut with adverse impact on the banks' efficiency and their capacity to compete in the South East Asian region.

<sup>260</sup> Totally secured by 1<sup>st</sup> rank mortgaged.

It can be observed that the amount of assets in the 100% risk weight is declining while a higher figure is registered in the 0% risk category. This suggests that banks are moving to a lower risk profile.

In 1993, the target ratio of capital base to risk asset was set at 8% as per the Basel provision. For the purpose of calculation, some deductions<sup>261</sup> are made from the capital base. However the Basel figure represents only a minimum standard and many banks in Latin America adhering strictly to this figure have been in trouble in recent years. This has led several countries to tighten the prudential requirement so as to be in a better position to absorb any unforeseen shock. Argentina for instance has raised it to 11.5% while in Mauritius the figure has been changed from 8% to 9% and subsequently to 10%<sup>262</sup> in July 1997. It is to be observed that in case of winding up, depositors do not lose money if the loss is lower than the bank's capital since depositors' funds are ranked before capital. So a higher ratio gives a higher protection to depositors. This inspired the BOM to pitch the ratio at a level still higher than international standards.

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<sup>261</sup> E.g. investments in subsidiaries and associates, lending of a capital nature including subordinated loan capital to subsidiary and associated banks, and holdings of other banks' capital instruments in Mauritius.

<sup>262</sup> i.e In Mauritius a bank's capital is 10% of the size of its credit exposures.

**Table 8.6**  
**Changes in Capital Ratio (June 1996 – 2004)**

As at End of June	1996	1997	1998	1999	2000	2001	2002	2003	2004
Required %	8	8	10	10	10	10	10	10	10
Average for Banking sector (%)	12.35	12.96	12.49	12.93	12.24	13.1	13.4	12.6	14.6
Low	N.A	N.A	N.A	N.A	N.A	N.A	13	12.3	12.6
High	N.A	N.A	N.A	N.A	N.A	N.A	13.4	13.5	15.0
Range for All Banks (%)	9.11 to 25.03	10.21 to 38.81	10.5 to 49.30	10.64 to 69.06	10.56 to 61.00	10.8 to 70.6	11.1 to 63.6	N.A	N.A

*Source: Bank of Mauritius*

The table reveals that capital adequacy ratio for the industry satisfies the international requirements (8%) and the higher domestic requirements. The range shows that the ratio varies widely among banks but that no bank is undercapitalized. The Basel provision regarding core and subsidiary capital is reproduced in appendix 9. In Mauritius, the ratio of tier 1 (core capital) to tier 2 as shown in the table below is stable and well above 50% reflecting high prudence by international standards.

**Table 9.6**

**Proportion of Core and Subsidiary Capital**

<i>As at end of June</i>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Core Capital % of total Capital	84.3	84.3	84.8	84.2	81.1	83.6	83.4	84.2	81.4	81.8
Subsidiary Capital % of total Capital	15.7	15.7	15.2	15.8	18.9	16.4	16.6	15.8	18.6	18.2

*Source: Bank of Mauritius*

The ratio core capital to deposits indicates the extent to which shareholders have committed their own resources into the bank in comparison to funds made available by depositors. This ratio as examined in table 10.6 has been fluctuating



very narrowly around 10% showing that bankers have been injecting adequate capital in their business<sup>263</sup>.

**Table 10.6**

**Core Capital as a proportion of Total Deposits**

<i>As at end of June</i>	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Core Capital (Rbn)	4.5	5.1	5.8	7.0	8.1	9.3	10.5	11.9	12.9	13.0
Total Deposits (Rbn)	44.8	51.9	56.8	66.6	75.8	84.3	92.4	104.2	116.3	132.7
%	10.0	9.8	10.2	10.5	10.7	11.0	11.4	11.4	11.1	9.8

*Source: BOM*

**B. Asset (Credit) Quality**

To facilitate the depicting of any potential downgrading of assets, loans are now classified by risks<sup>264</sup> in four categories (Standard credit, Sub-standard credit, doubtful credit and irrecoverable loans) with specific provisions in banks' income statements (see appendix 10).

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<sup>263</sup> A figure above 8% is generally considered good.

<sup>264</sup> i.e related to the probability of their being serviced. Classification as "current" or in "arrears" is no longer acceptable to the BOM as in the past.

**Table 11.6****Non-Performing Loans<sup>265</sup> Ratios (1997 to 2003)**

As at June	Total Loans & Advances of Banks (A) Rsm	Capital Base (C)	Non- Performing Loans (NPL)	NPL % of A	NPL % of C
1997	34629	N.A	2717	7.8	N.A
1998	40698	7092	3496	9.0	49.2
1999	52795	8627	4774	9.0	55.3
2000	61836	9255	5172	8.1	55.9
2001	71507	10704	5570	7.8	52.0
2002	74715	12174	5987	8.0	49.2
2003	85391	12543	6860	8.0	54.8
2004	89037	15248	7464	8.4	48.9

*Source: BOM, Annual Reports – Several Issues*

The NPL ratio<sup>266</sup> is high but not alarming<sup>267</sup> in spite of a small rise during the last three years. Fortunately, banks in Mauritius are adequately-capitalized as discussed in the previous section and the exposure of banks capital to erosion seem to be going down (except for year 2003) as indicated by the ratio NPL to capital base. The provisions made are below 50% of the non-performing loans level.

<sup>265</sup> A loan is defined as non-performing whenever the principal or interest on past due accounts are due and unpaid for 90 days or more.

<sup>266</sup> Ratio NPL to Loans.

<sup>267</sup> In Dec 2001 the NPL ratio of the largest bank in China was 29.8%. In Dec 2004, the NPL ratio of the 16 largest banks in China had been brought down to 13.2%. Government policy in an emerging economy like Taiwan is to reduce the NPL ratio to below 5%. The ratio in USA during the last 2 decades has been below 3%.

**Table 12.6**

**Ratio Provisions for Bad Debts to NPL (1997-2004)**

	1997	1998	1999	2000	2001	2002	2003	2004
<b>PFBD*</b>								
<b>% of NPL</b>	<b>46.7</b>	<b>50.3</b>	<b>38.4</b>	<b>31.1</b>	<b>30.8</b>	<b>35.2</b>	<b>42.2</b>	<b>44.8</b>

*Source: BOM Annual Report – Several Issues*

*\* Provision for Bad Debts*

This low proportion has not posed any problem to banks as they benefit from a preferential creditor rights in the liquidation exercise and they generally achieve full recovery from collateral. Personal loans are generally not collateralized but are guaranteed by two persons<sup>268</sup> whose monthly salaries are credited to deposit accounts at the lending bank. It is only recently in an attempt to compete with the two big banks that that Barclays Bank has started providing personal loans even without guarantors. However this is restricted to small loans of below R10000<sup>269</sup>.

### **C. Profitability**

Profits contribute to the capacity of banks to absorb losses. Interest for loans and advances remains by far the most important contributor to domestic banks' profits as shown below.

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<sup>268</sup> Jointly and in solido.

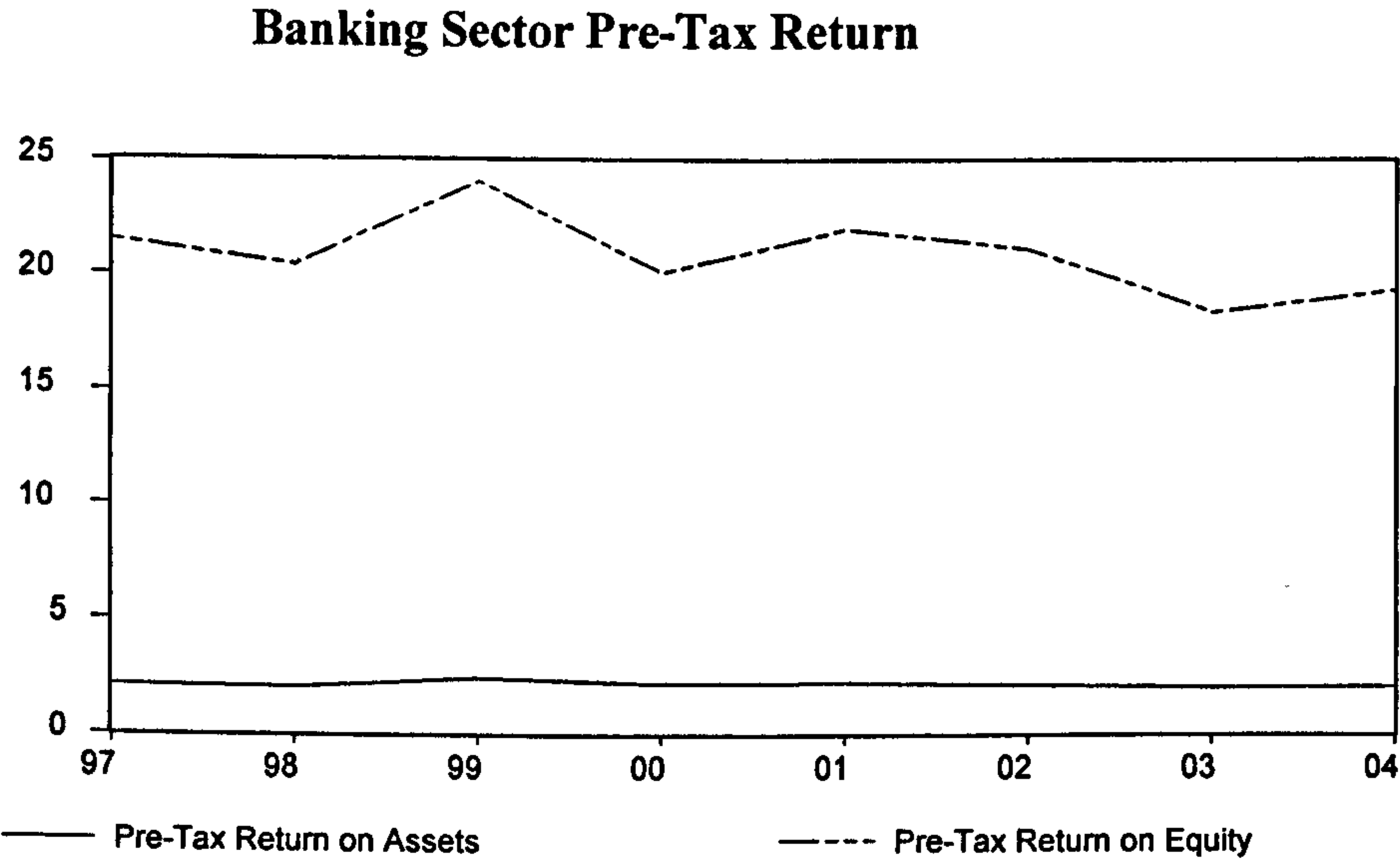
<sup>269</sup> R10000 is below the average wage in the public sector.

Table 13.6

Components of Banks' Income [June 01 to 04]				
Income (%)	Item Share of Banks'			
	June 2001	June 2002	June 2003	June 2004
Interest on Loan and advances	66	66	64	72
Interest on Investment in Treasury bills and Government Securities	15	14	17	8
Others <sup>270</sup>	19	20	19	20

Source: Bank of Mauritius Annual Report

Figure 6.6



Source: BOM

Figure 6.6 reveals that there has not been any important change after liberallisation in the degree to which banks' assets have been utilised in realizing profit as indicated by a stable return of around 2%. In so far as return on equity is concerned a slight downward trend can be observed. However, the current level of

<sup>270</sup> Profit from foreign exchange transactions, fees and commission receivable, non-interest income.



profitability (above 18%) still compares favourably with the top non-financial corporate entities in the country whose pre-tax return on equity border on 13%<sup>271</sup>.

## **6.5 Market Discipline in The Banking Sector**

Strong prudential regulation and supervision can minimize the risk of bank distress and failure but will never eliminate such risks completely. To promote a sound and efficient financial system, many countries are calling for greater market discipline as a complementary approach. Regular and timely public disclosure by banks to market participants rather than only to supervisors increases accountability of bank managers and directors. Whilst the ordinary depositors might not be able to interpret the disclosed information correctly<sup>272</sup> and might thus not show much interest at reading these, the financial analysts, advisers and fellow bankers<sup>273</sup> will do so. It is sometimes argued that when a bank discloses a loss or a severe deterioration in asset quality, the bank faces liquidity pressure exacerbating its problems. To this Brash (1997) counter argues that in the absence of disclosure requirements market speculation about a bank's financial position may lead to a reaction that is more adverse from depositors. Further, a bank knows in advance that it will be making adverse disclosure and it can mitigate potential hostile reactions by taking remedial steps and mentioning these in the disclosure.

In Mauritius, bank directors as well as officers are legally liable to fine and imprisonment for erroneous or misleading information to the central bank. Apart

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<sup>271</sup> Calculated from the figures available in the SEM Fact Book.

<sup>272</sup> In New Zealand the central bank has reduced informational imperfection by preparing a user guide to assist depositors' understanding of bank disclosure.

<sup>273</sup> Fellow bankers will have a close monitoring because of inter-bank deposits.

from six monthly audited accounts banks have to submit monthly statements of assets and liabilities as well as any information concerning their operations and those of their affiliates whenever required by the BOM. There is however no obligation on banks to publish regular statements for the general public<sup>274</sup>. The latter gets access only to annual financial statements that are in a format that does not allow comparison in the industry. External auditors have to submit a copy of their report to the central bank and are legally required to report any case of misconduct by managers or directors. However, no legal action is provided for against external auditors by the central bank in cases of negligence.

## **6.6 Reforms and Interest Spread**

### **6.6.1 Changes Observed**

The objectives of the policy of liberalisation is that after government determination of interest rates has been replaced by market determined ones, increased competition should lead to improved efficiency causing a narrowing of the interest spread. As a matter of fact some banks in Mauritius do offer the same interest rates on deposits and this could be hastily interpreted that there is cartelization. Nonetheless the general picture observed by the supervision department of the BOM is that deposit and lending rates, fees and commissions do vary from bank to bank, (Basant Roi 2004).

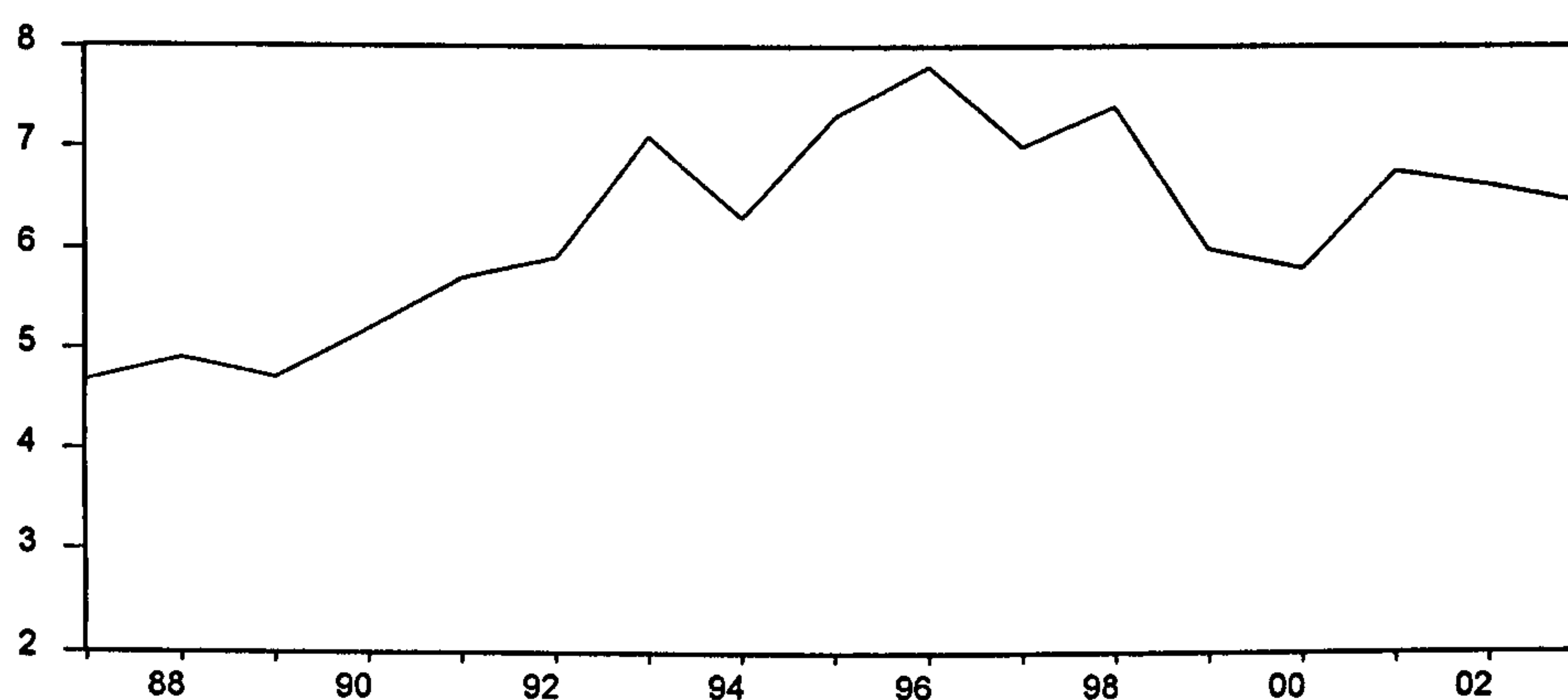
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<sup>274</sup> In New Zealand for instance, banks are required to publish a disclosure statement on a quarterly basis. A user guide is prepared by the central bank to improve readership.

Interest spread is examined over a 16-year period to find out what changes have been observed after liberalisation. The interest spread has been calculated as the difference between a weighted average lending and deposit rate.

**Figure 7.6**

**Bank Interest Spread 1987-2003**



Source: BOM

The observation is that interest spread has been widening up from 1992 to 1996 and from then onwards it has started to narrow down. Taking into account that the interest rate liberalisation started in 1991 and ended in 1995 it then appears that the shift to market-oriented monetary instruments has, after an adjustment period, led to a continuous reduction in the cost of intermediation. This could suggest that some competitive forces are at work and that government determination of interest rates has not simply been replaced by collusive oligopolistic actions of banks. However, it is to be noted that the spread today has not yet reached its pre-liberalisation level.

### 6.6.2 Reforms and Banking Crisis

In Chapter 4 reference was made to several financial sector crises following liberalisation. There has not been any bank run or any other easily identifiable crises in Mauritius yet. Nonetheless, an attempt is made here to define banking crisis with respect to certain quantitative criteria and to find out whether the banking sector in Mauritius has faced a crisis as per these criteria. Banking crisis is defined here as a period of significant decline in deposits. Such periods are made more visible using an adapted version of CMAX for the banking sector. CMAX is actually a widely used variable by equity practitioners<sup>275</sup> and will also be used in Chapter 7. CMAX is defined here as follows:

$$\text{CMAX Deposits} = \frac{\text{Aggregate Banking Deposit at Time } t}{\text{Maximum Aggregate Banking Deposit for the Period up to Time } t}$$

The denominator in the above ratio represents a previous historical maximum. Two levels of crisis are identified using trigger levels of 1.5 and 2 standard deviations below the mean of the CMAX series. The first level is considered as a mini crisis and the second one a crisis. Using such criteria crises are identified below. The decline in deposit during a crisis situation is measured by the percentage drop from the pre-crisis level to the one at the trough of the crisis.

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<sup>275</sup> See MSCI, a monthly publication of Morgan Stanley.



**Figure 8.6**

**Bank Deposit CMAX Crises - Jan1985 to Dec 2004**

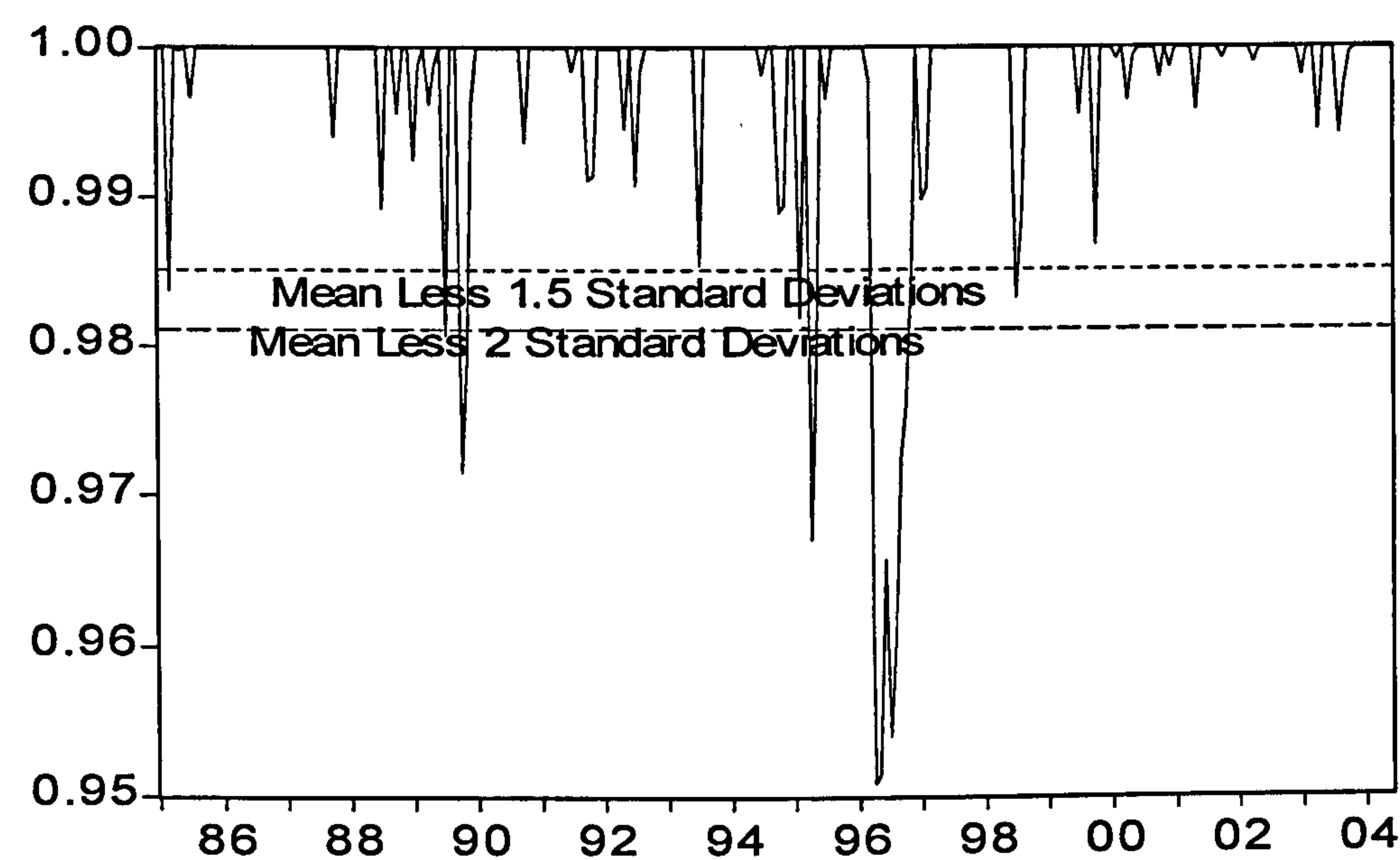


Figure 10.6 reveals a generally stable situation over the last two decades with seven episodes of crisis, four of them being mini-crises, and three crises. The profile of these crises is exhibited in the table below.

**Table 14.6****Bank Deposit Crisis and Characteristics**

<b>Crisis No.</b>	<b>Trough Date</b>	<b>Duration</b>	<b>Type</b>	<b>% Drop in Deposit</b>
1	Mar. 1985	1 month or less	Mini Crisis	1.6
2	Jul. 1989	1 month or less	Mini Crisis	1.9
3	Oct. 1989	2-3 months	Crisis	2.9
4	Feb. 1995	1 month or less	Mini Crisis	1.8
5	Apr. 1995	1 month or less	Crisis	3.3
6	Apr. 1996	8-9 months	Crisis	4.7
7	Jul. 1998	1 month or less	Mini Crisis	1.7

Although the April 1996 crisis is the most important episode based on magnitude of decline in deposits and duration of crisis it is nonetheless still far from a bank run situation where deposits would most likely have dropped by a much larger

proportion. Identification of these crises could lead to future research about whether these were caused by bad banking or a bad operating environment of a macroeconomic nature.

## **6.7 Summary**

Chapter 6 has covered the major monetary reforms that have taken place since the end the 1980s to the end of the 1990s. It has shown that there has been an adjustment in the distribution of credit in the economy following the elimination of directed credit programme. On the internal front reforms have led to a shift from direct to market oriented monetary control mechanisms rendering price and allocation of credit more market determined. Externally, there has been a gradual lifting of exchange controls and the exchange rate is now basically market determined. In spite of a gradual liberalisation Mauritius proceeded with both internal and external liberalisation side by side and did so successfully. There is neither any evidence of an increase in real interest rate just after liberalisation nor any improvement in domestic savings as suggested by the liberalisation theories. Further the greater access to foreign savings following external liberalisation has not led to a drop in real interest rate.

The regulatory and supervision framework adopted by the BOM to maintain the stability of the financial system as well as some aspects of banks' performance have been examined. The general picture is that banks in Mauritius adhere to the requirements and are prudently managed. The level of non-performing loans has not been improved over the last few years but is not alarming especially because banks

are adequately capitalized and have full recovery from collaterals. Information flow has also improved with accounting standards, disclosure requirements, external auditing and credit rating being now under scrutiny.

As for the effects of liberalisation on interest spread, the study has shown that this initially widened but is now gradually narrowing. The study also shows that banking crisis has not been a major issue in the Mauritius. From the seven episodes of crisis identified, the most serious one was earmarked by a drop in aggregate deposits of only 4.7% and lasted eight to nine months.

Although the banking sector is very dominant, the strategy of developing a multi-layered financial system with a stronger influence of the capital markets than at present justifies an examination of the impact of liberalisation on the stock market in the next Chapter.



# Chapter 7

## STOCK MARKET DEVELOPMENT AND LIBERALISATION IMPACT IN MAURITIUS

### 7.1 Stock Market Development in Mauritius

The methodology employed in measuring stock market development uses four indicators following Demirgüt-Kunt and Levine (1996) and Levine and Zervos (1998).

- 1. No. of listed companies
  - 2. Market Capitalisation/GDP
  - 3. Turnover (traded value)/Market Capitalisation - *Reflecting Market Liquidity*
  - 4. Turnover /GDP - *Reflecting Market Activity.*
- } *Reflecting Market Size*

During the 1990s, various policies have been reviewed in order to consolidate the stock market. Some of the new policies are the opening of the market to foreign portfolio investors, the adoption of new listing rules<sup>276</sup> in line with international standards to facilitate cross-border listing and a changeover to electronic trading. Yet, the figures displayed in table 1.7 do not indicate significant improvement in market size, liquidity or activity.

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<sup>276</sup> Listing Rules 2000.

**Table 1.7**

**Stock Market Development Indicators in Mauritius (1989-2003)**

<b>Year</b>  <i>(At Dec)</i>	<b>No, of Listed Entities</b>		<b>Market Capitalisation to GDP (%)</b>	<b>Turnover to Capitalisation (%)</b>	<b>Turnover to GDP (%)</b>
	<b>Equity</b>	<b>Equity &amp; Debt*</b>			
<b>1989</b>	<b>6</b>	<b>6</b>	<b>4.32</b>	<b>0.97</b>	<b>0.04</b>
<b>1991</b>	<b>19</b>	<b>20</b>	<b>10.97</b>	<b>1.67</b>	<b>0.18</b>
<b>1993</b>	<b>29</b>	<b>30</b>	<b>26.39</b>	<b>4.64</b>	<b>1.22</b>
<b>1995</b>	<b>39</b>	<b>41</b>	<b>39.58</b>	<b>4.43</b>	<b>1.75</b>
<b>1997</b>	<b>42</b>	<b>46</b>	<b>41.92</b>	<b>8.11</b>	<b>3.40</b>
<b>1999</b>	<b>43</b>	<b>48</b>	<b>38.73</b>	<b>4.74</b>	<b>1.84</b>
<b>2001</b>	<b>40</b>	<b>46</b>	<b>31.1</b>	<b>5.52</b>	<b>1.72</b>
<b>2003</b>	<b>39</b>	<b>44</b>	<b>24.33</b>	<b>10.24</b>	<b>2.49</b>

*Source: SEM Fact Books - Several Issues.*

*\* Debt: Debentures & Treasury Bill*

The figures reveal that the market is not very active. Market size grew rapidly just after trading started in 1989 and stabilized in the mid 1990s. Since then there has been no significant improvement. Market capitalization ratio went down on account of ‘bearish’ market conditions. Insufficient liquidity can affect the interest of security holders should they face a liquidity shock. Given that listed companies and their subsidiaries benefit from 15% corporate tax rather than the 25% normal rate, there is

a possibility that companies are being listed primarily for fiscal advantages but this requires further investigation. The low activity could be an indication that the investors have a stronger tendency to adhere to Malkiel's preaching about long-term buying and holding of a broad-based portfolio rather than chasing capital gains from the best individual security, (Malkiel, 1973). Such passive strategy of investors also reflects the insufficient presence of managed funds in the capital market. In developed financial centres, collective investment schemes play a crucial role in directing savings to the stock market and are active in security trading. In developing countries the capacity of the branch network of these institutional investors to reach the dispersed small and medium sized investors is often constrained by geographical remoteness (Calamanti, 1983). However, difficulty of access to such financial institutions is not an issue in Mauritius given the size of the country and the adequate communication network<sup>277</sup>. Yet the popularity of savings in the form of collective investment is still very low amongst small investors. People from the industry over-emphasize savings capacity as a reason for low share ownership (directly or through collective investment schemes). This could be one of various determinants that need to be identified. Table 2.7 shows that although the gross national savings rate in Mauritius is weak compared to South East Asian emerging markets, still it compares favourably with South Africa, and Zimbabwe, USA and UK. The security markets in these four countries are nonetheless highly capitalized and very liquid. It must however be remembered that these are highly internationalized ones.

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<sup>277</sup> Road transport and telecommunication.

**Table 2.7**

**Gross National Savings Rate  
December 2002**

Mauritius	27.0
South Africa	15.5
Zimbabwe*	7.9
Kenya	9.3
Botswana	30.9
Tanzania	10.2
Ghana	21.3
Nigeria	14.7
South Korea	27.2
Malaysia	30.9
Singapore	42.0
USA	15.0
UK	14.7

*Source: World Bank*

Some possible reasons for low share ownership could inter alia be family-based business tradition, lack of public stocks, and a thin spread between risk-free return on Treasury bills and stock portfolio return<sup>278</sup>.

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<sup>278</sup> Stock returns before and after liberalisation are examined at section 7.2.4 of the chapter.



The factors responsible for low exposure to share ownership in Mauritius remain an area of study for future research. Changes in market sentiment due to stock crises in S.E Asia in 1998 and the bearish NASDAQ market between 2000 and 2002 <sup>279</sup> contributed to the moroseness on the Mauritian stock market between 1998 and 2002 but the indicators have picked up since mid 2002. Stock market crisis will be examined at the end of this chapter.

Table 3.7 reveals that the stock exchange in Mauritius can be considered as the third most important exchange in Sub-Saharan Africa after South Africa and Zimbabwe.

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<sup>279</sup> From 11th March 2000, over a 640 days period, NASDAQ declined by about 70%. This drop is comparable to the Dow Jones drop that started on September 3<sup>rd</sup>, 1929.

**Table 3.7****Comparison with Sub-Saharan Africa (December 2002)**

	Date of Establishment	Date of Liberalisation	No.of listed Companies	Market Capitalisation Ratio (%)	Turnover Ratio (%)
S.Africa	1887	1995	450	144.2	49.6
Zimbabwe	1896	1993	76	188.2	21.1
Kenya	1954	1995	57	18.4	3.0
Nigeria	1960	N.A	195	12.6	8.4
<b>Mauritius</b>	<b>1988</b>	<b>1994</b>	<b>40</b>	<b>26.9</b>	<b>4.5</b>
Botswana	1989	1994	18	29.3	3.9
Ghana	1990	Yes	24	12.6	1.5
Swaziland*	1991	Not Yet	6	10	0.3
Namibia	1993	N.A	13	6.1	0.9
Zambia*	1994	1999	12	8.1	1.0
Malawi*	1996	Yes	7	7.4	5.9
Uganda*	1998	Not Yet	2	N.A	N.A
Tanzania*	1998	Not Yet	4	3	19.4
Mozambique	1999	Not yet	N.A	N.A	N.A

*Sources: Standard & Poors; World Bank; COMESA, SEM fact Book; Liquidafrica.com*

*\* For these countries only year 2000 figures are available*

In Mauritius stock market development is not constrained by unfavourable macroeconomic conditions, political instability, an unfavourable tax regime and a

very low level of income, as is the case in several Sub-Saharan countries. Yet, it is still weak in terms of both market size and liquidity. South Africa exhibits an exceptionally high level of development but this is a country with a sophisticated equity market and a well-established securities exchange created in 1886.

**Table 4.7**

**Selected Country Comparison of Stock Market Size with Banking Sector Size  
(December 2002)**

	StockMarket Capitalisation in GDP %	Bank Asset in GDP %	Credit* to Private Sector in GDP %
Mauritius	26.9	91.7	58.1
S.Africa	144.1	91.2	74.5
Zimbabwe	188.2	121.9	63.7
Kenya	18.4	124.8	105.3
Nigeria	12.6	294.3	128.3
Botswana	29.3	31.9	19.2
Ghana	12.6	39.9	12.1
Swaziland**	6.1	24.0	14.4
Namibia	6.1	51.3	41.4
Zambia	8.1	24.3	5.9
Malawi	7.4	13.6	4.1
Tanzania	3	18.7	6.3
Japan	53	151.2	102
Indonesia	17.3	63	21.8
Malaysia	N.A	142.2	97.7
Thailand	36.6	115.4	81.0
U.S.A	105.6	60.5	51.9
U.K	120	293.5	141.7

*Source: Standard & Poors, International Federation of Stock Exchanges, IMF, World Bank.*

*\* Deposit Bank Credit to Private Sector; \*\* Year 2000 figures*

The above figures reveal that both stock market capitalisation and banking intermediation in Mauritius and in most Sub-Saharan African countries are still far

below the level reached in developed financial markets and in some important emerging markets.

Although the stock market in Mauritius has contributed to the improvement of the financial environment, balance sheet examination of some listed companies reveal that most corporate physical investment in Mauritius is still being financed from retained earnings and to a lesser extent by loans. Corporate financing will be further examined in Chapter 8 through an econometric analysis.

**Table 5.7**

**Annual Investment Changes, Share Capital, Equity & Debt (Rsm)**

**Some Listed Companies (1990 to 2001)**

Companies	Gross Physical Investment	Average Increase in Share Capital	Average Increase in Shareholders Fund	DEBT*
HAREL FRERES	3.4	0.24	15.3	37.1
MDA	17.6	0	3.5	7.1
UBP	60.6	8.6	27	3.7
MOROIL	13.9	10.4	19	1.3
COURTS	22.2	8.5	8.6	0.3
MSM	22.6	0.9	13.4	3.3
ROGERS	252	9.6	60	52
MOUNT	3.5	0	2.1	3.6
SWAN	8.6	-0.1	28.5	0
MTMD	16.9	11.3	145.7	10.4
SAVANAH	20.6	0	25.2	13.4

*Source: Annual Reports.*

*\* Average of change between highest & lowest level for the period*

The contribution of new issues to the financing of private fixed capital formation is still low, despite dividend yield, which provides a rough approximation



for the cost of raising capital by new issues, being consistently lower than the cost of bank borrowing.

**Table 6.7**

**Average Dividend Yield and Lending Rate 1990-2001**

	1990	1992	1994	1996	1998	2000	2002	2003*
Average Dividend Yield <i>of listed Companies</i>	6.2	6.0	3.32	3.97	4.03	6.84	9.8	5.74
Lending Rate	18	17.13	18.92	20.81	19.92	20.77	14.7	14.3

*Source: SEM ltd Fact Book, IFS, BOM*

*\* 2004 Average dividend yield will only be published in the forthcoming SEM Factbook 2005*

Even if the lending rate were to be adjusted downward to capture the tax advantage aspect of borrowing, still the cost of bank borrowing<sup>280</sup> would be higher than the cost of raising capital by new issues. The lack of preference for equity financing could then be an indication that the stock market is not strong. This could suggest that most of the private companies that have gone public during the last fifteen years have maintained their family-based tradition and are not very willing to offer shares to the public beyond the minimum requirement per the listing requirements.

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<sup>280</sup> Cost of debt = Bank interest on loans (1-Tax Rate), while marginal tax rate is 25%.

## **7.2 Stock Market Liberalisation**

### **7.2.1 Transactions by Foreigners**

The decision to allow foreigners to buy shares on the SEM was taken after the other reforms such as interest rate liberalisation and trade liberalisation had been implemented. As far as capital inflows are concerned, following the lifting of exchange controls in July 1994, foreigners can invest freely on the SEM subject to two restrictions<sup>281</sup> pertaining to the portfolio nature of the capital flows:

1. Acquisition of shares must not aim at controlling interest in the company.
2. Foreigners can hold a maximum of 15% of voting rights of a company in the sugar sector.

As for capital outflows, all foreign capital repatriation is fully authorised. The same fiscal incentives apply to foreigners and to local investors. Dividends, interest on bonds as well as capital gains are tax-free for both residents and non-residents.

The International Finance Corporation (IFC) now includes Mauritius in its frontier index and international investors can therefore compare with other markets. The SEM now acts as a channel for portfolio capital inflows.

The removal of barriers to cross-border flows is expected to enhance integration in world capital markets and to bring domestic share prices in line with prices abroad. Firms wishing to get access to portfolio capital inflows have to improve their disclosure of information, accounting systems as well as their performance.

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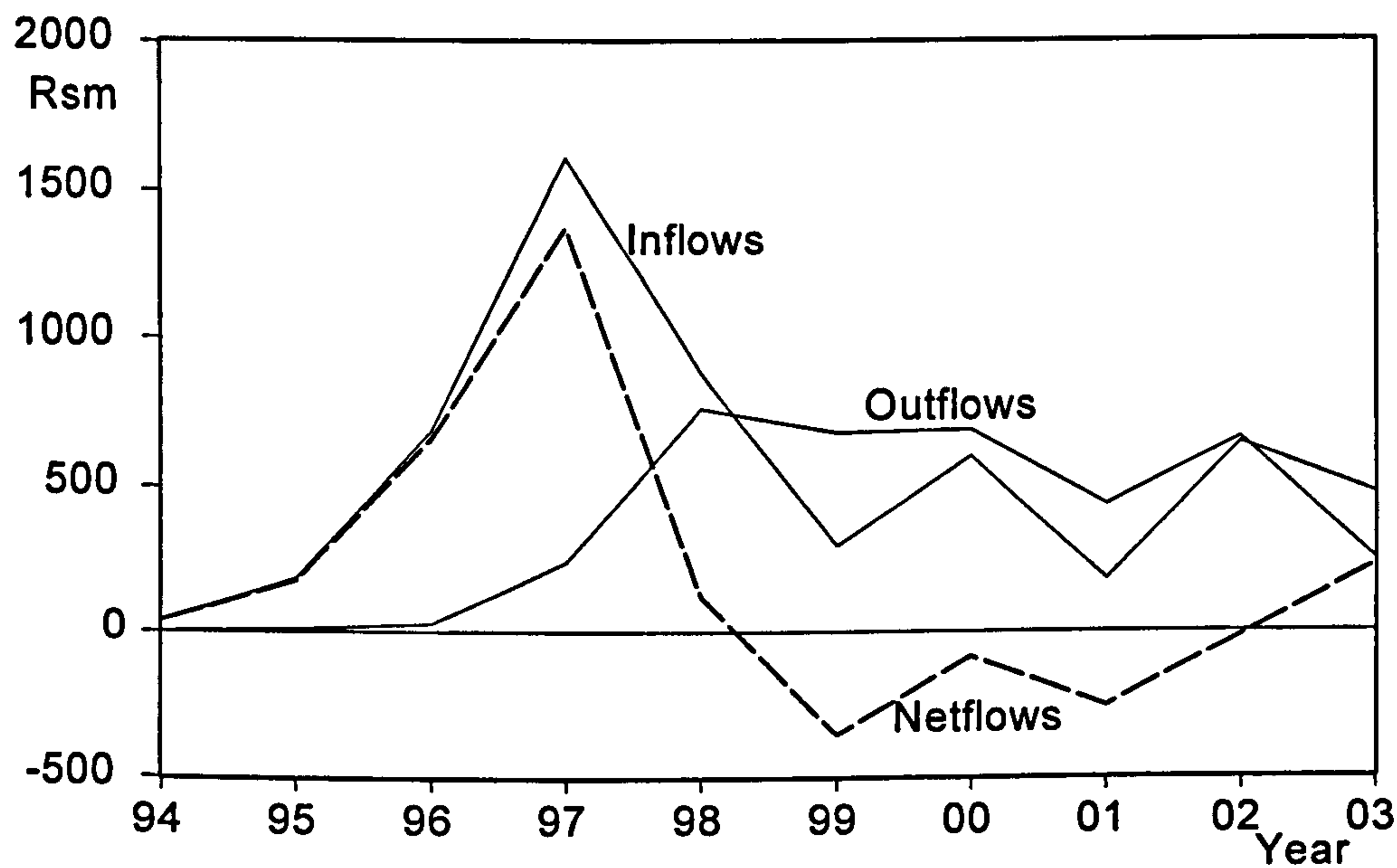
<sup>281</sup> A foreigner may however be granted an exempt status and hence does not face the two restrictions.

External liberalisation also brings the Mauritian stock market infrastructure under international scrutiny as discussed in Chapter 5.

Before 1994, access to Mauritian financial securities by foreigners could only be through the Mauritius Fund, a closed-ended fund listed on the London Stock Exchange. Since the opening of the SEM to foreign investors the market has generally contributed to inflows of short-term capital but since 1998 there has been an important reversal of flows as shown in figure 1.7 and this has had the effect of reducing the accumulated foreign investment as depicted in figure 2.7.

**Figure 1.7**

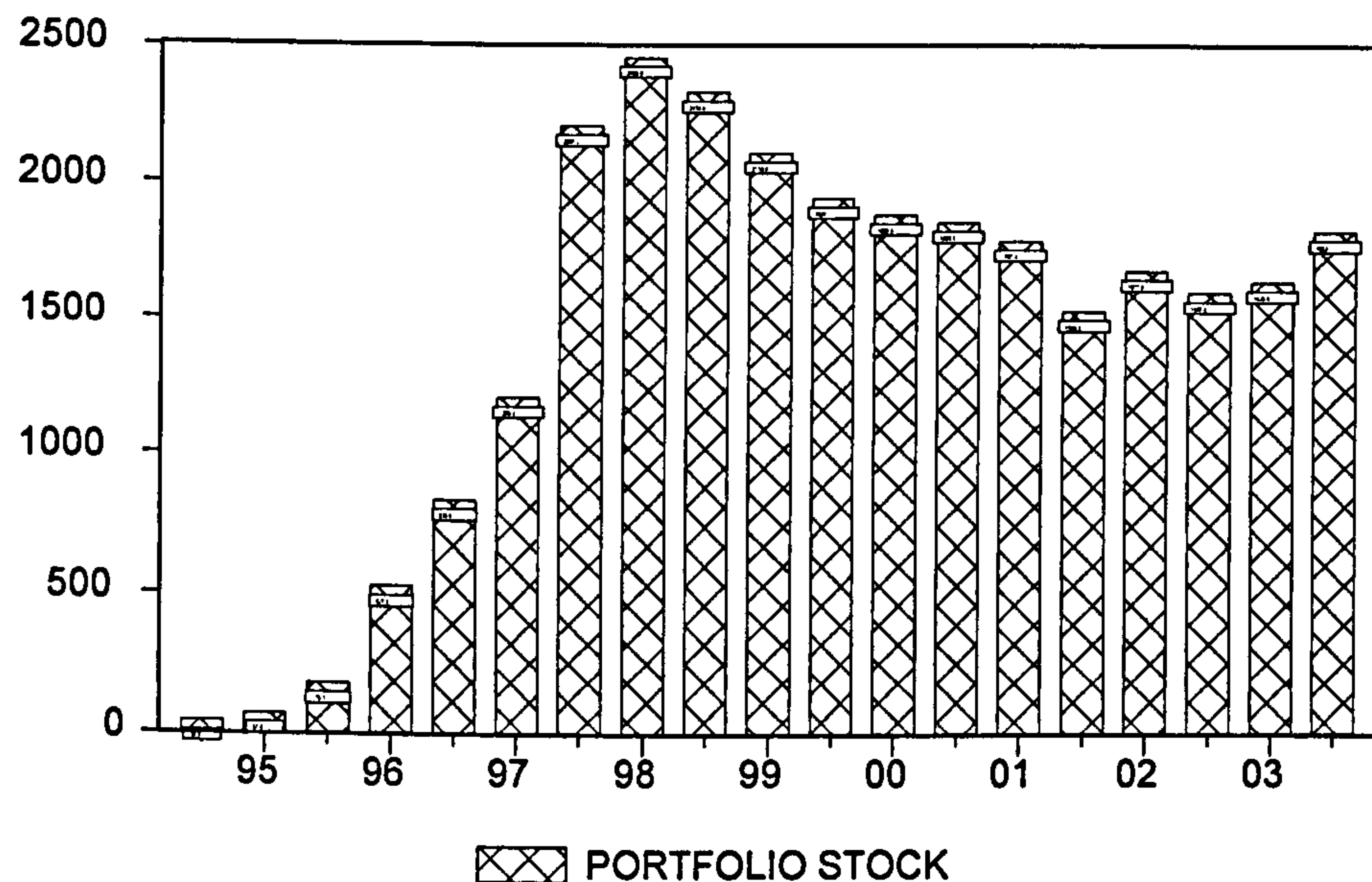
**Foreign Portfolio Flows on the Stock Exchange of Mauritius: 1994-2003 (Rsm)**



*Source: SEM*

**Figure 2.7**

**Accumulated Foreign Portfolio Investment on the SEM (Dec 94-03)**



*Source: SEM Fact Book*

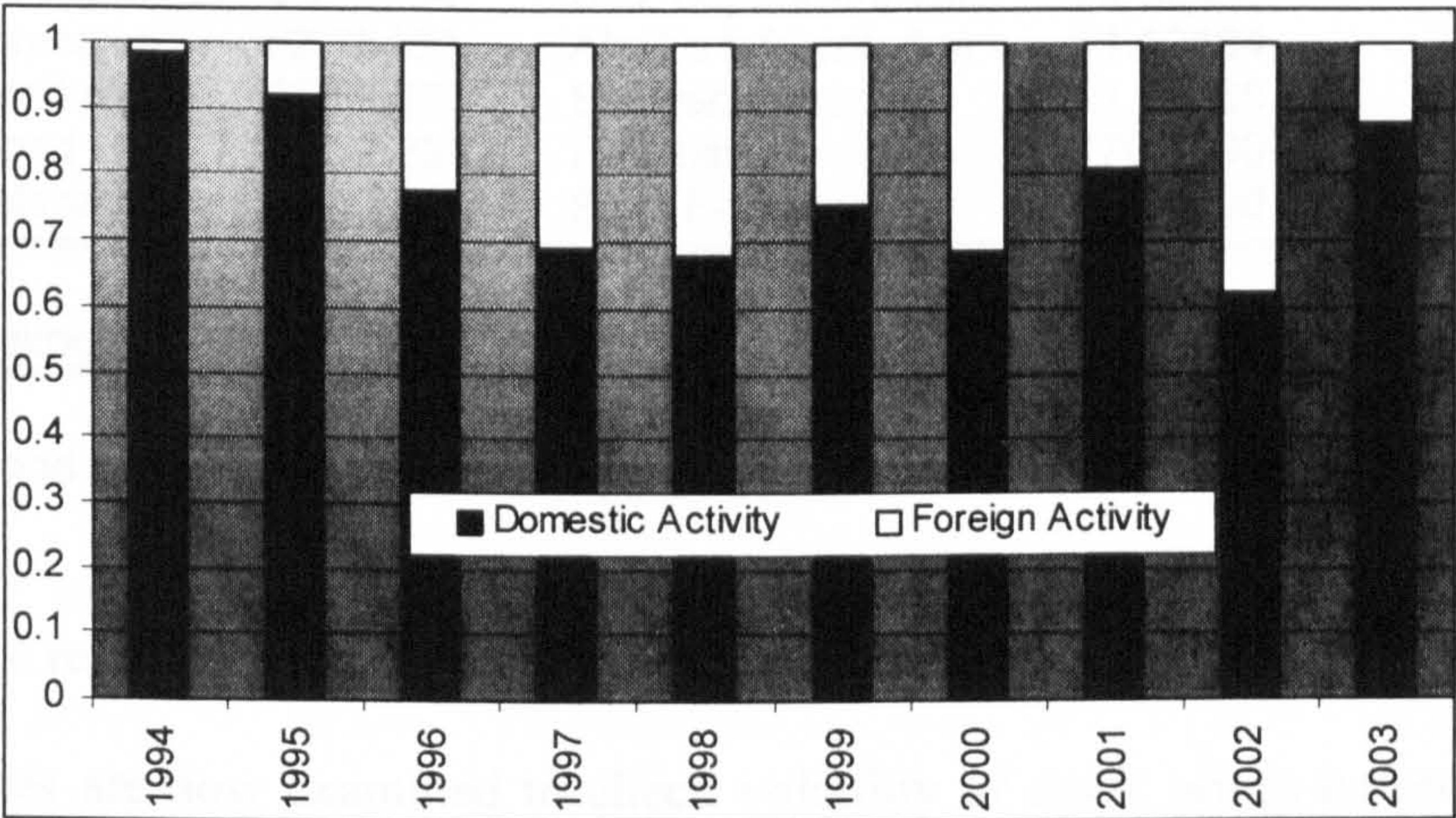
The exceptionally high inflow in 1997 (Figure 1.7) is due to a one-off event. This was because of the sales of SBM shares under the NEDCOR-SBM alliance and which accounts for Rs960 million (50% of the inflows) while those in 2000 are due to a better price earnings ratio. The huge outflows in 1998-99 resulted from loss of confidence in emerging markets following the S.E.Asian crisis. Another reason attributed in SEM “circles” to foreign disinvestment is that sticky stock prices do not provide large scope for international speculators. It must also be recalled that the willingness of foreigners to invest is influenced by the exchange rate. A persistent depreciation of the Mauritian rupee against the major currencies is a disincentive as foreign investors loose upon switching their investment back.



A comparison between domestic and foreign activity on the SEM as measured by traded value in Figure 3.7 reveals that after ten years of liberalisation, the integration of the domestic equity market in the world capital market is still at an infant stage.

**Figure 3.7**

**Share of Domestic and Foreign Turnover (1994-2003).**



*Source: SEM Fact Book*

### 7.2.2 Liberalisation and Stock Prices

As indicated earlier, with foreigners getting free access to transaction in shares listed on the SEM, a realignment of share prices was expected. A Chow-test is run with semdex for 200 trading sessions before and 200 sessions after the liberalisation date to identify any structural change.

$$H_0 : \beta_1 = \beta_2 \text{ [Same Slope Coefficient]}$$

$$H_1 : \beta_1 \neq \beta_2$$



**Table 7.7**  
**Stability Test with Break Point in the Liberalisation Year, 1994.**

Dependent Variable: SEMDEX  
Method: Least Squares  
Date: 03/02/04 Time: 11:54  
Sample: 1 400  
Included observations: 400

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YEAR	0.355198	0.027178	13.06939	0.0000
C	282.7063	6.288220	44.95808	0.0000
R-squared	0.300292	Mean dependent var		353.9235
Adjusted R-squared	0.298534	S.D. dependent var		74.93931
S.E. of regression	62.76433	Akaike info criterion		11.12164
Sum squared resid	1567866.	Schwarz criterion		11.14160
Log likelihood	-2222.328	F-statistic		170.8090
Durbin-Watson stat	0.003207	Prob(F-statistic)		0.000000

Chow Breakpoint Test: 201

F-statistic	1866.000	Probability	0.000000
Log likelihood ratio	937.6537	Probability	0.000000

The results show that the null hypothesis of no structural change is rejected. Stock prices are now examined to check volatility of stock prices before and after liberalisation. Two samples of SEMDEX value, one for the two hundred trading sessions held just before August 1994 and one for the next two hundred sessions are examined to determine whether stock prices are more variable after liberalisation than before.

**Table 8.7**

**Equality Test for Variability**

F-Test Two Sample for Variances		
	<i>BEFORE LIBERALISATION</i>	<i>AFTER LIBERALISATION</i>
Mean	309.27405	398.5729
Variance	4013.326217	3239.51587
Observations	200	200
df	199	199
F	1.238866046	
P(F<=f) one-tail	0.065844719	
F Critical one-tail	1.263340543	

After liberalisation higher variability could be expected due to integration with in the world capital market and the consequential alignment of domestic stock prices. However, the results from these two samples reveal lower variability with variance 3239 as compared to 4013 for the period before liberalisation.

NullHypothesis  $H_0 : \sigma_1 = \sigma_2$

Upper one-tailed test.

Alternative Hypothesis  $H_1 : \sigma_1 > \sigma_2$

At 5% significance level, the F-test statistic value does not exceed the upper critical F-value. It can therefore be concluded that the sample does not provide enough evidence to reject the null hypothesis that variability of stock prices before and after are equal.

### 7.2.3 Random Walk of Stock Prices

If investors can choose any security in a world where price reflects all available information then asset prices represent accurate signals for the stock market to allocate the capital stock in the economy and the market is considered to be an efficient one. Fama (1965, 1970) argued that if important current information is almost freely available and the stock market is flooded with a large number of rational profit-maximisers competing actively, the market is likely to be an efficient<sup>282</sup> one with prices responding rapidly to new information<sup>283</sup>. In the extreme case of a perfectly efficient market it is pointless to waste time trying to identify undervalued stocks to buy or overvalued stocks<sup>284</sup> to sell. Buying and selling then become a fair game of chance and stock prices move as random walks over time and are serially independent. Under such conditions, historical pattern of price is of no use in predicting future stock prices, and the present value of market price is the best predictor of future price with a stochastic<sup>285</sup> error having an expected value of zero. It is worth noting that this belief is in opposition to Chartism (Technical Analysis) which considers that share prices and volumes move in trends which are determined by the fundamental factors like changing attitudes of investors towards economic, political and psychological factors and that these trends are predictable to a certain extent (Prince, 1985). Chartists examine daily/weekly patterns from charts indicating high, low, closing prices and volume and consider that the emerging bullish and

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<sup>282</sup> Informationally efficient.

<sup>283</sup> Information relates to events like merging, stock splits, firm's dividend policy.

<sup>284</sup> If price responds rapidly to information there is in the extreme case no possibility of having overvalued or undervalued stocks.

<sup>285</sup> Unpredictable.



bearish patterns are useful for building an investment strategy. It must be pointed out that under the random walk hypothesis even if asset prices exhibit trends over time, the fluctuations away from the trend should be unpredictable. If we cannot predict the changes in stock prices then the random walk model of stock prices implies that the net change in a stock price is, on average, equal to zero. In mathematical terms:

$$P_t = a + P_{t-1} + \varepsilon_t$$

$$\Delta P = a + \varepsilon_t \quad E[\varepsilon] = 0$$

The real world cannot be totally efficient and often it has been observed that fund managers have been outperforming the market by devoting resources to uncovering information. Warren Buffett, the world's greatest stock market investor, has actually made millions by an investment strategy based on undervalued stocks. Supporters of the efficient market hypothesis however argue that because of anomalies in the market, prices may be overvalued or undervalued only in random occurrences and strategies to beat the market cannot be a consistent phenomenon.

Under this analytical framework, Fama (1970) defined three categories of efficient market with respect to the extent to which information is reflected in market prices:

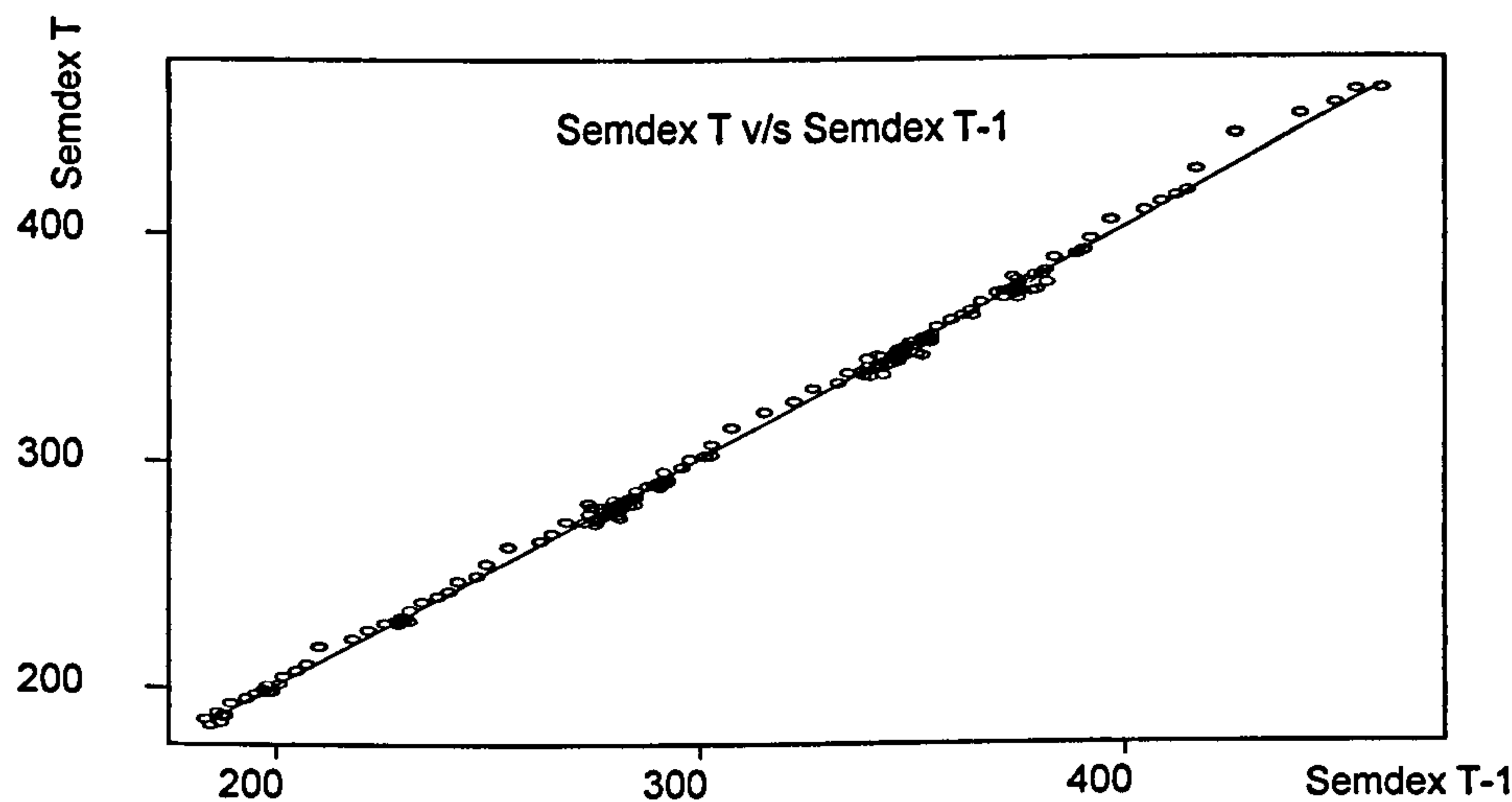
- (i) Strong form of efficiency: all information in the market is incorporated in stock prices;
- (ii) Semi-strong efficiency: all public information is accounted for in stock prices;
- (iii) Weak efficiency: all past prices are reflected in to-day's price.

Kawakatsu and Morey (1999) and Maghyereh and Omet (2002) find no evidence of improved informational efficiency after liberalisation in emerging markets. The earlier discussion in this Chapter suggests that the stock market in Mauritius is characterized by lack of participants and presence of participants adopting the passive buy-and-hold strategies. This justifies the need to investigate the random walk movement of SEMDEX before and after liberalisation and market efficiency. In respect to this a variety of approaches is adopted below.

In order to get a first insight of the empirical evidence in Mauritius, the stock prices for two samples each representing two hundred observations, one before and one after liberalisation are regressed against their lagged values (order1) below.

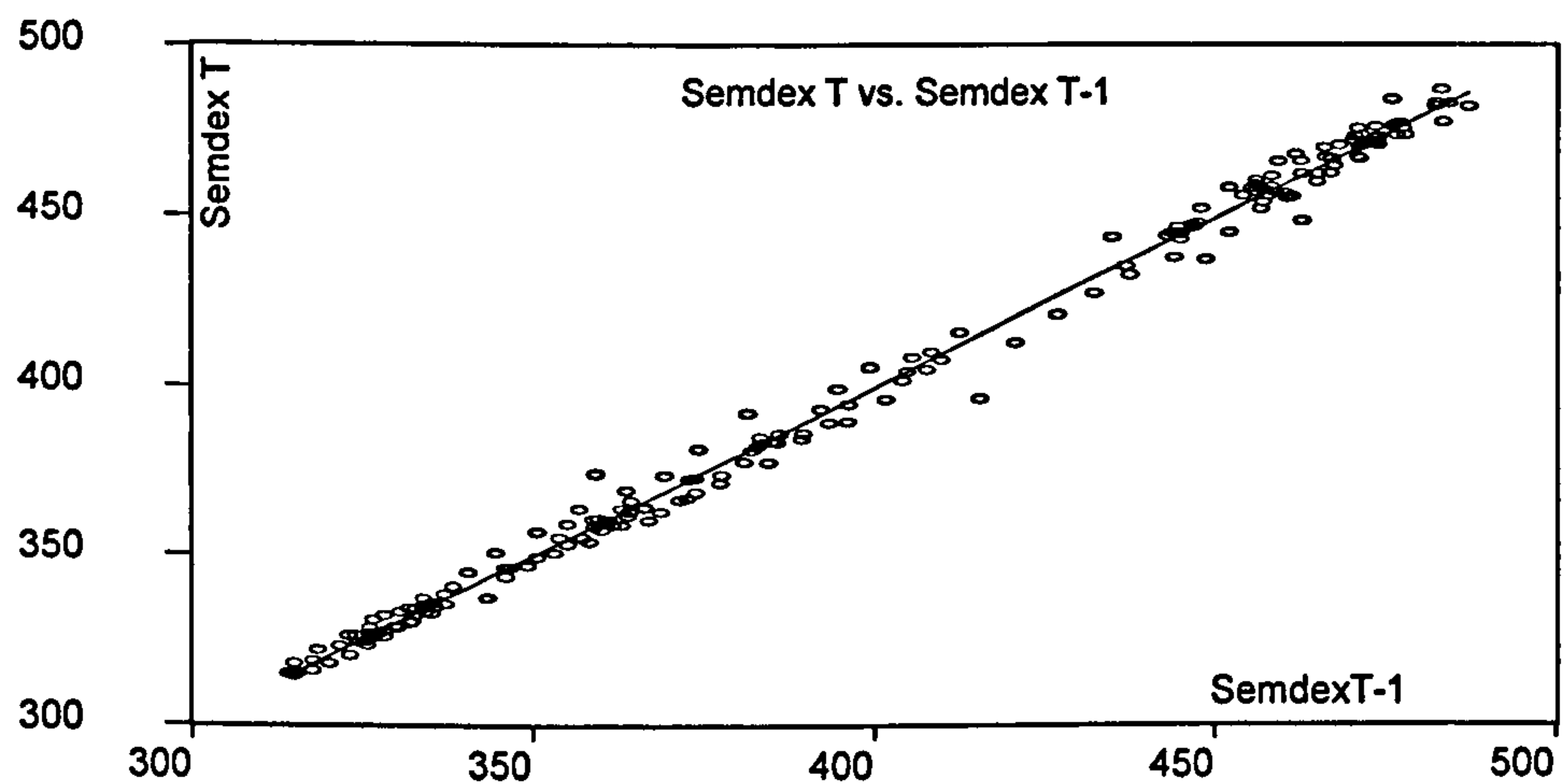
**Figure 4.7**

**Stock Prices Lagged One Trading Session  
200 Sessions before Liberalisation**



*Computed from SEM figures*

**Figure 5.7**  
**Stock Prices Lagged One Trading Session**  
**(200 Sessions after Liberalisation)**



*Computed from SEM figures*

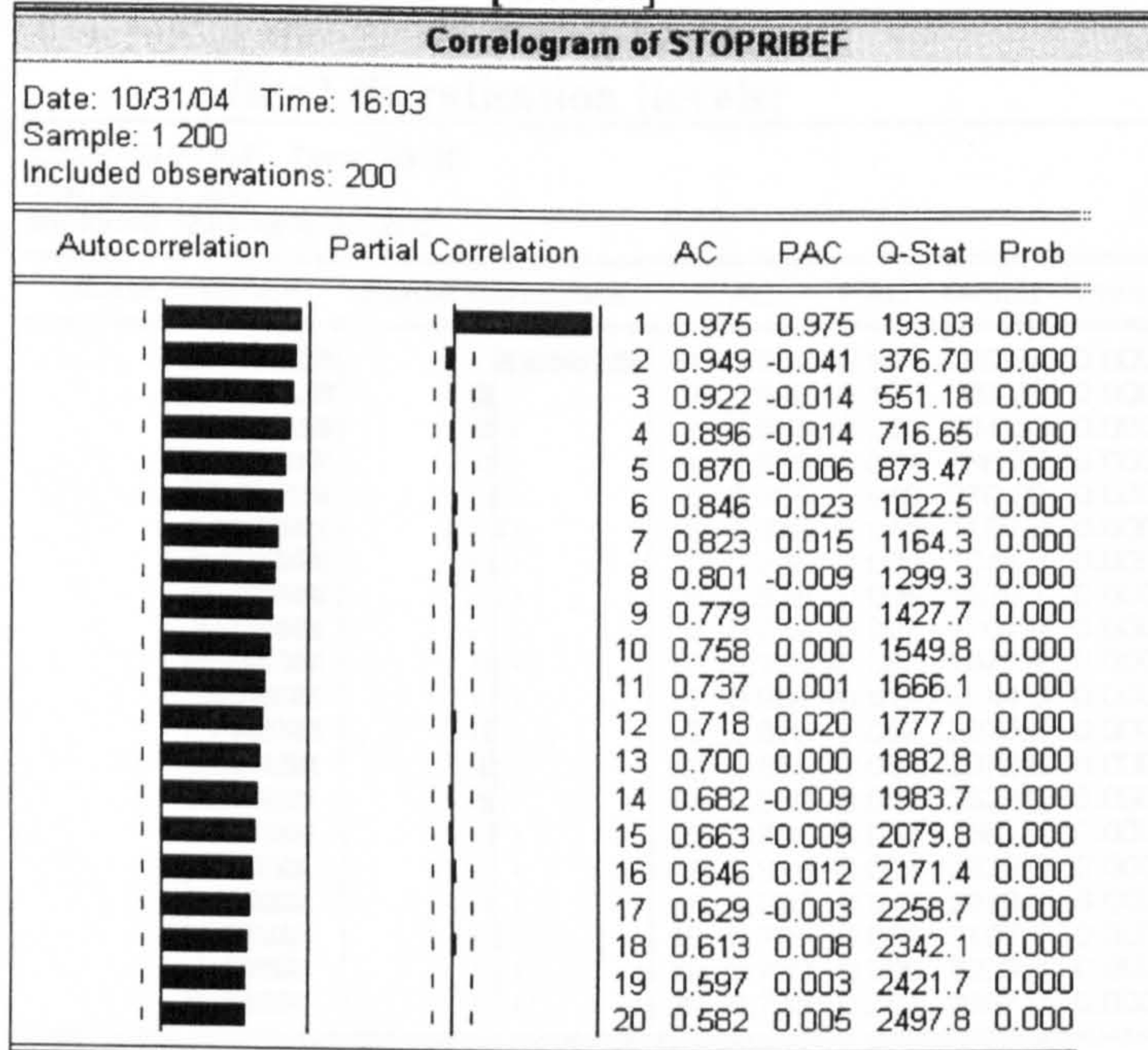
It can be observed that both before and after the liberalisation period the plots are tightly scattered about the trend line. This is a first indication that both before and after liberalisation, stock price at trading session  $t$  is nearly perfectly predicted by price at session  $t-1$ . The stock prices do not therefore contain any other predictable component and tend to follow a random walk.

Further indication is obtained by examining the correlograms below.



Figure 6.7

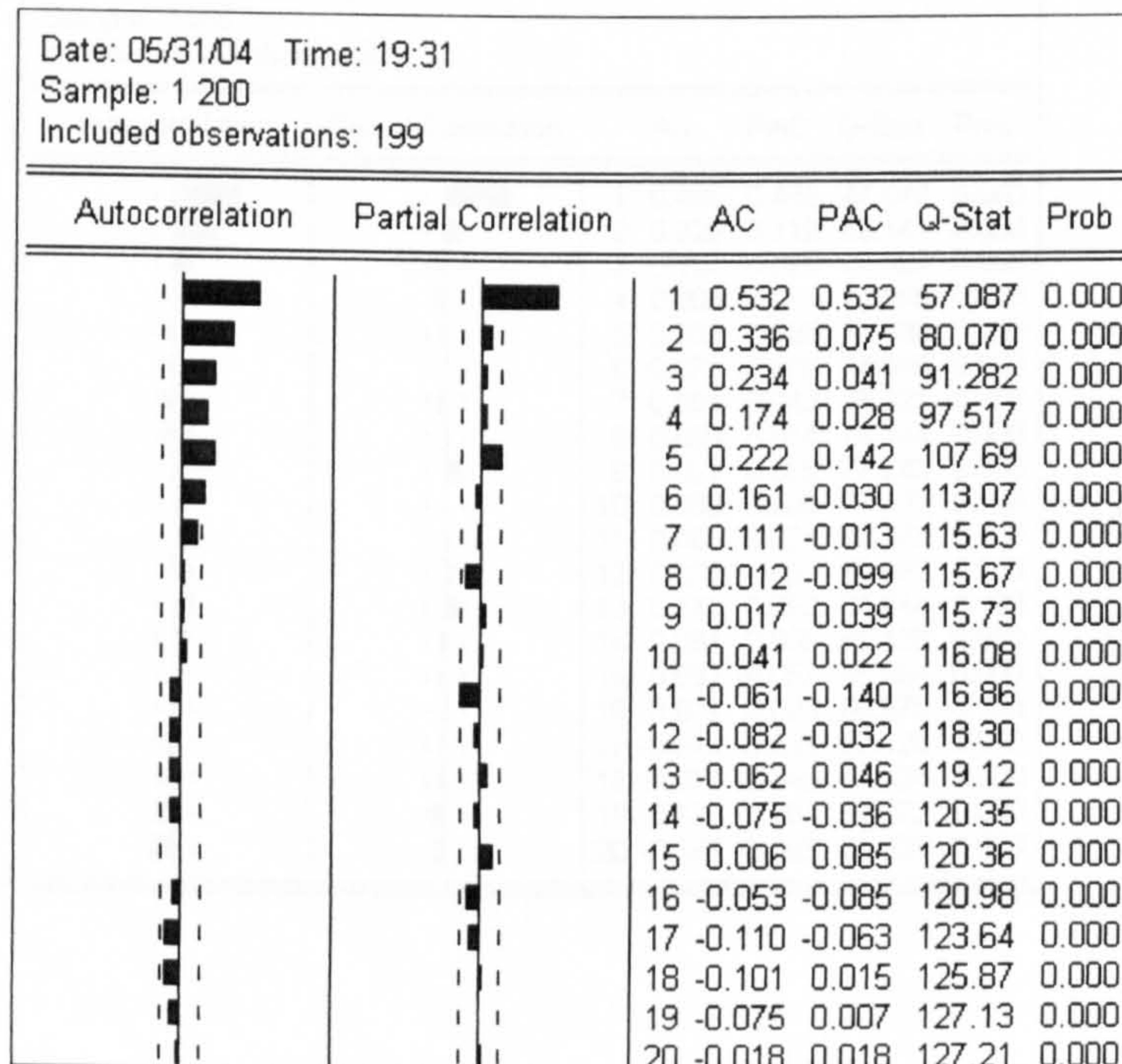
**Correlogram: 200 Trading Sessions  
Before Liberalisation [Levels]**



The slow decline of the correlogram is an indication of Nonstationarity.

Figure 7.7

**Correlogram: 200 Trading Sessions  
Before Liberalisation [1<sup>st</sup> difference]**

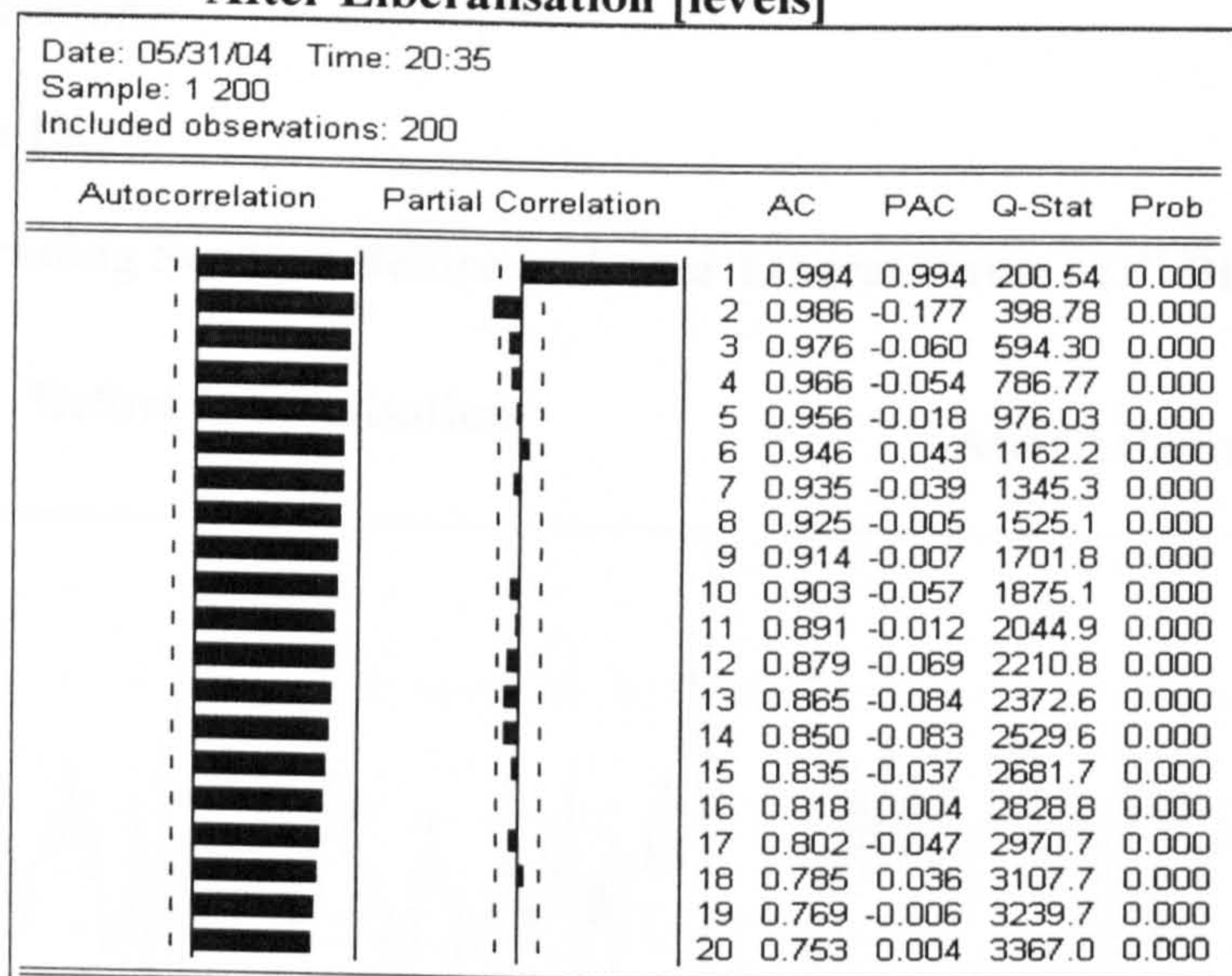


When testing the first difference of the time series the correlations cut off after some lags, indicating stationarity.



**Figure 8.7**

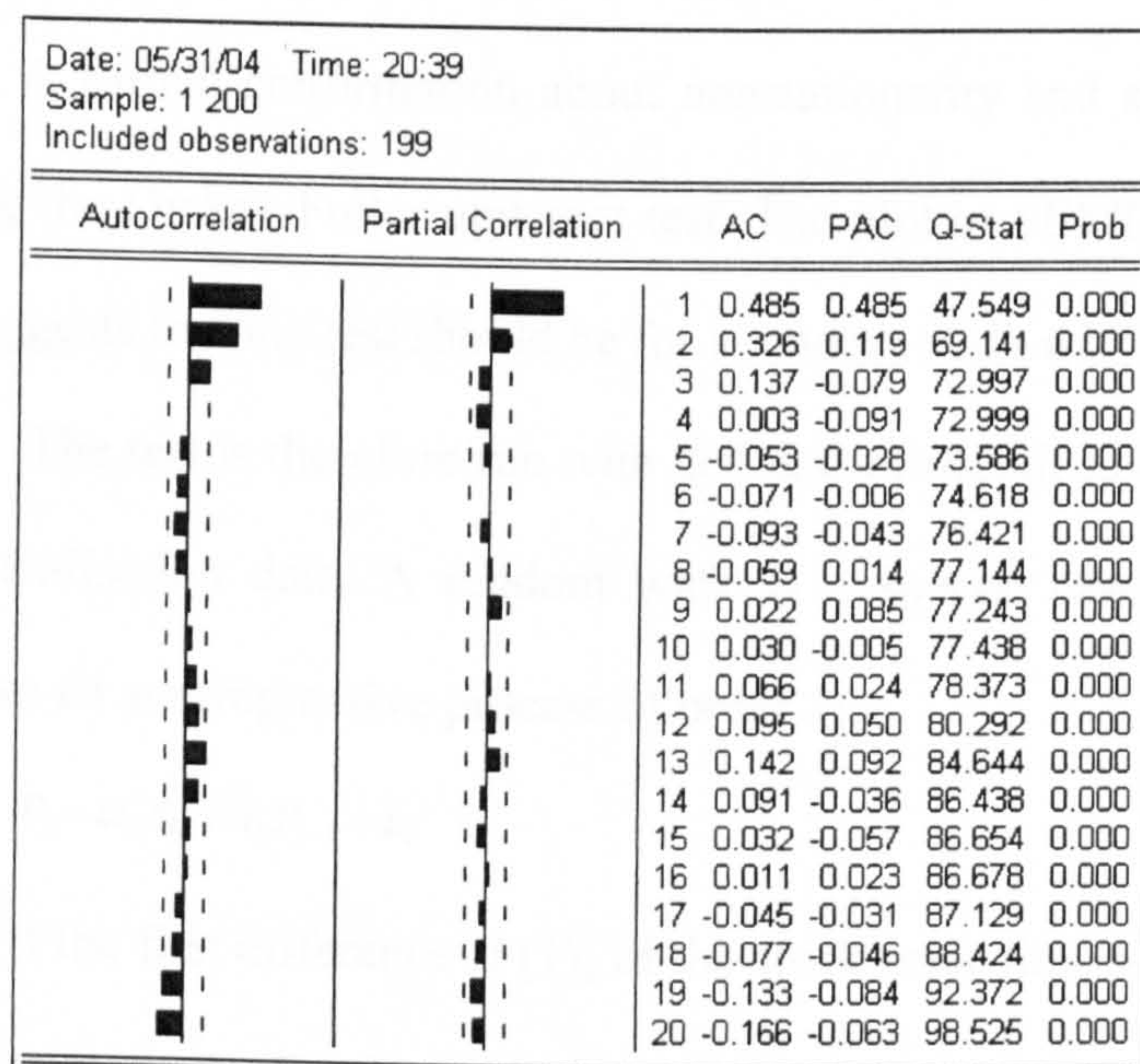
**Correlogram: 200 Trading Sessions  
After Liberalisation [levels]**



After liberalisation,  
As well there is an  
indication of  
nonstationarity of the  
time series of level of  
stock prices.

**Figure 9.7**

**Correlogram: 200 Trading Sessions  
After Liberalisation [1<sup>st</sup> difference]**



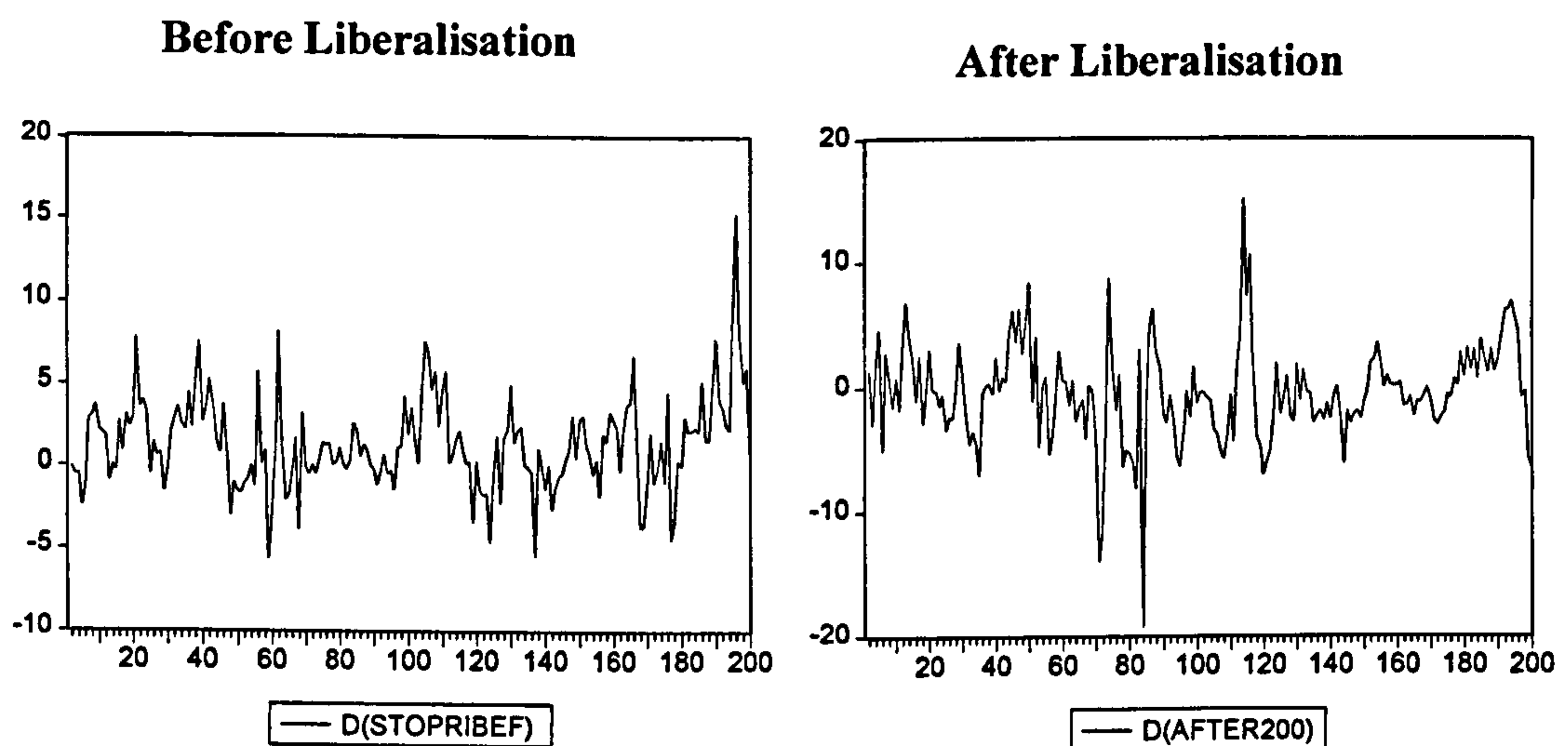
Again, with the  
first difference of  
the time series  
there is indication  
of stationarity.



A visual display of the plot of the first difference of stock prices shows that the adjusted series looks approximately stationary both before and after liberalisation.

**Figure 10.7**

**200 Trading Sessions Before and after Liberalisation - (1<sup>st</sup> Difference)**



A formal confirmation about nonstationarity and stationarity is obtained by running the Dickey-Fuller unit root test. The plot of SEMDEX in Chapter 5 (Figure 2.5) suggests that the test should be for a random walk with drift.

The test is therefore run with 200 end-of-month stock prices before and after the liberalisation date. A random walk is a special case of a unit root process. Consider an autoregressive process of order 1:

$$P_t = \alpha_0 P_0 + \alpha_1 P_{t-1} + \varepsilon_t$$

If the first difference [I (1)] of the stock price time series is stationary and not autocorrelated, stock prices can be described by a random walk model with each value being a random step away from the previous one.

Unit root test for differenced [I (1)] series.

$$\Delta P_t = P_t - P_{t-1}$$

$$\Delta P = \beta_0 + \beta_1 P_{t-1} + \gamma$$

$$H_0 : \beta_1 = 0 \text{ (Nonstationary)}$$

$$H_A : \beta_1 < 0$$

The test will be carried out first with levels of stock prices for 200 observations for consecutive trading sessions before liberalisation.

The OLS report of the Dickey-Fuller test contains the Durbin-Watson d statistic but this figure is biased towards 2 because of the presence of the lagged dependent as explanatory variable. DW test is then invalid and the Breush-Godfrey test for serial correlation in the residuals is first run to determine the number of lagged variables to be introduced in the equation.

```
Estimation Equation:
=====
STOPRIBEF = C(1)*STOPRIBEF(-1) + C(2)

Substituted Coefficients:
=====
STOPRIBEF = 1.004434481*STOPRIBEF(-1) + 0.005888444817
```

H<sub>0</sub>: No Serial Correlation  
H<sub>A</sub>: Serial Correlation

Table 9.7

Breusch-Godfrey Serial Correlation LM Test 1:			
F-statistic	74.90205	Probability	0.000000
Obs*R-squared	55.02176	Probability	0.000000

The probability value of the test statistics (Obs\*R-squared) indicates that we should reject the null hypothesis.

The equation is adjusted for an autoregression of order 2 with lagged residuals set to zero.

**Estimation Equation:**

=====

$$\text{STOPRIBEF} = \text{C}(1)*\text{STOPRIBEF}(-1) + \text{C}(2)*\text{STOPRIBEF}(-2) + \text{C}(3)$$

**Substituted Coefficients:**

=====

$$\text{STOPRIBEF} = 1.530144031*\text{STOPRIBEF}(-1) - 0.529412603*\text{STOPRIBEF}(-2) + 0.4253386469$$

**Table10.7**

**Breusch-Godfrey Serial Correlation LM Test 2:**

F-statistic	1.100759	Probability	0.295405
Obs*R-squared	1.117117	Probability	0.290540

Now the null hypothesis of no serial correlation in the error term can be accepted and the lag length for the ADF test is therefore two.

Only the upper section of the OLS report is reproduced hereunder.

**Table 11.7**

**Augmented Dickey-Fuller Test on STOPRIBEF**

	-	1%	
ADF Test Statistic	1.907578	Critical Value*	-4.0074
		5%	
		Critical Value	-3.4336
		10%	
		Critical Value	-3.1404
*MacKinnon critical values for rejection of hypothesis of a unit root.			

The test reveals that we should accept the null hypothesis of nonstationarity.

The same process is now repeated with the first difference of the time series.



**Estimation Equation:**

=====

$D(STOPRIBEF) = C(1)*D(STOPRIBEF(-1)) + C(2)*D(STOPRIBEF(-2)) + C(3)$

**Substituted Coefficients:**

=====

$D(STOPRIBEF) = 0.4902485626*D(STOPRIBEF(-1)) + 0.07575128467*D(STOPRIBEF(-2)) + 0.6089643878$

**Table 12.7**

**Breusch-Godfrey Serial Correlation LM Test 3**

F-statistic	0.454988	Probability	0.500783
Obs*R-squared	0.463325	Probability	0.496074

The null hypothesis of no serial correlation can be accepted

**Table 13.7**

**Augmented Dickey-Fuller Test on D(STOPRIBEF)**

ADF Test Statistic	-5.449985	1% Critical Value*	-3.4650
		5% Critical Value	-2.8763
		10% Critical Value	-2.5746

The null hypothesis of nonstationarity is rejected for the first difference of the stock price series. The presence of a unit root leads to the conclusion that before liberalisation stock prices followed a random walk in conformity to the efficient market hypothesis. The post liberalisation period is now examined.

**Estimation Equation:**

=====

$AFTER200 = C(1)*AFTER200(-1) + C(2)$

**Substituted Coefficients:**

=====

$AFTER200 = 0.9961755701*AFTER200(-1) + 1.045399498$

H<sub>0</sub>: No Serial Correlation

H<sub>A</sub>: Serial Correlation

Table 14.7

Breusch-Godfrey Serial Correlation LM Test 4:

F-statistic	61.66499	Probability	0.000000
Obs*R-squared	47.62515	Probability	0.000000

The probability value of the test statistics (Obs\*R-squared) indicates that we should reject the null hypothesis. The equation is adjusted for an autoregression of order 2 with lagged residuals set to zero.

Estimation Equation:

=====

AFTER200 = C(1)\*AFTER200(-1) + C(2)\*AFTER200(-2) + C(3)

Substituted Coefficients:

=====

AFTER200 = 1.487333235\*AFTER200(-1) - 0.4916416969\*AFTER200(-2) + 1.448850745

Table 15.7

Breusch-Godfrey Serial Correlation LM Test 5:

F-statistic	2.850212	Probability	0.092969
Obs*R-squared	2.866860	Probability	0.090421

Now the null hypothesis of no serial correletion can be accepted.

Table 16.7

Augmented Dickey-Fuller Test on AFTER200

ADF Test Statistic	-2.374057	1% Critical Value*	-4.0074
		5% Critical Value	-3.4336
		10% Critical Value	-3.1404
*MacKinnon critical values for rejection of hypothesis of a unit root.			

The test reveals that we should accept the null hypothesis of nonstationarity.

The same process is now repeated with the first difference of the time series.

Estimation Equation:

=====

AFTER200 = C(1)\*AFTER200(-1) + C(2)\*AFTER200(-2) + C(3)

Substituted Coefficients:

=====

AFTER200 = 1.487333235\*AFTER200(-1) - 0.4916416969\*AFTER200(-2) + 1.448850745

**Table 17.7**

**Breusch-Godfrey Serial Correlation LM Test 6:**

F-statistic	2.850212	Probability	0.092969
Obs*R-squared	2.866860	Probability	0.090421

The null hypothesis of no serial correlation is accepted.

**Table 18.7**

**Augmented Dickey-Fuller Test on d(AFTER200)**

ADF Test Statistic	-6.032041	1% Critical Value*	-4.0077
		5% Critical Value	-3.4337
		10% Critical Value	-3.1404

The null hypothesis is rejected. It can be concluded that after liberalisation as well, stock prices levels continue to follow a random walk in conformity with the efficient market hypothesis. The regression output for the lagged equations before and after is now examined for the weak form of efficiency.

**Table 19.7**

**AutoRegression Output before Liberalisation**

Dependent Variable: D(STOPRIBEF)				
Method: Least Squares				
Date: 06/03/04 Time: 21:39				
Sample(adjusted): 4 200				
Included observations: 197 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(STOPRIBEF(-1))	0.490249	0.071904	6.818127	0.0000
D(STOPRIBEF(-2))	0.075751	0.072358	1.046902	0.2964
C	0.608964	0.195165	3.120254	0.0021
R-squared	0.286284	Mean dependent var		1.390660
Adjusted R-squared	0.278926	S.D. dependent var		2.818274
S.E. of regression	2.393168	Akaike info criterion		4.598224
Sum squared resid	1111.087	Schwarz criterion		4.648222
Log likelihood	-449.9251	F-statistic		38.90834
Durbin-Watson stat	1.997123	Prob(F-statistic)		0.000000

**Table 20.7**

**AutoRegression Output after Liberalisation**

Dependent Variable: D(AFTER200)				
Method: Least Squares				
Date: 06/03/04 Time: 21:44				
Sample(adjusted): 4 200				
Included observations: 197 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AFTER200(-1))	0.434095	0.071275	6.090429	0.0000
D(AFTER200(-2))	0.122516	0.071561	1.712055	0.0885
C	-0.225425	0.247511	-0.910771	0.3635
R-squared	0.251966	Mean dependent var		-0.475939
Adjusted R-squared	0.244254	S.D. dependent var		3.962531
S.E. of regression	3.444772	Akaike info criterion		5.326704
Sum squared resid	2302.093	Schwarz criterion		5.376702
Log likelihood	-521.6803	F-statistic		32.67322
Durbin-Watson stat	1.959382	Prob(F-statistic)		0.000000

Chapter 5 pointed out the expectation that the introduction of the electronic trading and TRI would improve the informational imperfections and so allow quick response of prices to information. The empirical evidence illustrates a somewhat weaker form of efficiency after liberalisation supported by a slightly weaker  $R^2$ . This suggests that there are some more anomalies that need to be investigated. A possible cause is that before liberalisation the stock market was in its infant stage and the variability of returns was higher. Investors then considered that the expected profit from their strategy would easier exceed the transaction costs than to-day. This has policy implications regarding a review of transaction costs to help correct misalignment of asset prices and hence sending more accurate signals for a more efficient investment and consumption decisions.



### 7.2.4 Stock Market Liberalisation and Returns

Figure 11.7

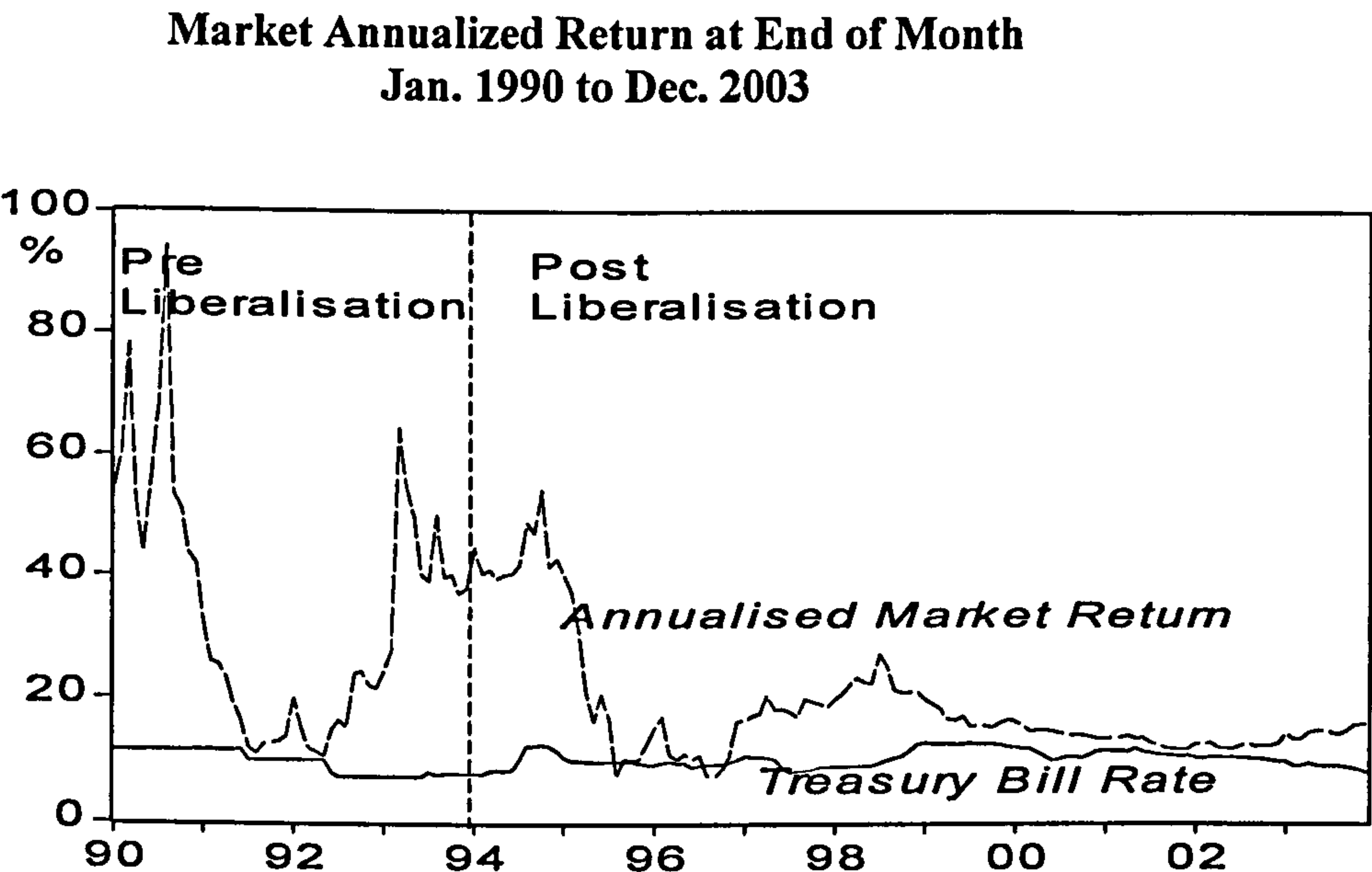


Fig 11.7 plots annualized returns calculated at the end of each month. These figures have been calculated from the total return index (TRI) for each asset on each trading session. TRI figures were obtained from the SEM. From the TRI the annualized return for each asset was calculated and the market return is taken as a weighted average based on market capitalization. Usually as soon as a security is listed there is some overshooting of its price. To moderate these inconsistent excesses, the security is introduced in the portfolio as from the end of the month nearest to three trading sessions after its listing date. The chart shows that overall market returns have been very close to the Treasury bill rate during the last five years. An investor holding a well-diversified portfolio would therefore be earning a return close to the risk-free one. This could be an indication that the stock market prices were not overpriced or underpriced. The plotted values also indicate higher

mean and higher variability of returns before than after liberalisation. Equality test of means and variances are run for inferential purposes and the results shown below.

The mean of the annual return at the end of every 6 months from December 1990 to 1994 is now compared with the mean for the period December 1995 to December 2003 to find out whether they are statistically different.

**Table 21.7**

**Test for Equality of Means**

t-Test: Two-Sample Assuming Unequal Variances		
	<i>BEFORE LIBERALISATION</i>	<i>AFTER LIBERALISATION</i>
Mean	36.36400816	14.16395892
Variance	176.4128276	24.34774178
Observations	11	18
Hypothesized Mean Difference	0	
df	12	
t Stat	5.323556563	
P(T<=t) one-tail	9.06215E-05	
t Critical one-tail	1.782286745	
P(T<=t) two-tail	0.000181243	
t Critical two-tail	2.178812792	

The samples means show higher average returns before liberalisation.

NullHypothesis  $H_0:\mu_1=\mu_2$

Alternative Hypothesis  $H_1:\mu_1>\mu_2$

The t-value for a one tailed test is much greater than the critical value. So the null hypothesis that the returns before and after liberalisation are equal is rejected..

Test for equality of variance is carried out below

NullHypothesis  $H_0: \sigma_1 = \sigma_2$

Upper one-tailed test

Alternative Hypothesis  $H_1: \sigma_1 > \sigma_2$

Table 22.7

Test for equality of Variances

F-Test Two-Sample for Variances		
	BEFORE LIBERALISATION	AFTER LIBERALISATION
Mean	36.36400816	14.16395892
Variance	176.4128276	24.34774178
Observations	11	18
df	10	17
F	7.245551934	
P(F<=f) one-tail	0.000210841	
F Critical one-tail	2.449915826	

The F value is in the critical region. The null hypothesis is rejected, suggesting that higher volatility before liberalisation is not due to chance. The period before liberalisation much overlaps the introduction stage and this probably explains the higher volatility.

### 7.2.5 Stock Market Liberalisation and Non-Diversifiable Risk of Listed Shares

The Capital Asset Pricing Model [CAPM] (Treynor, 1961; Sharpe, 1964; Lintner, 1965) suggests that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat the required return then the investment should not be undertaken.

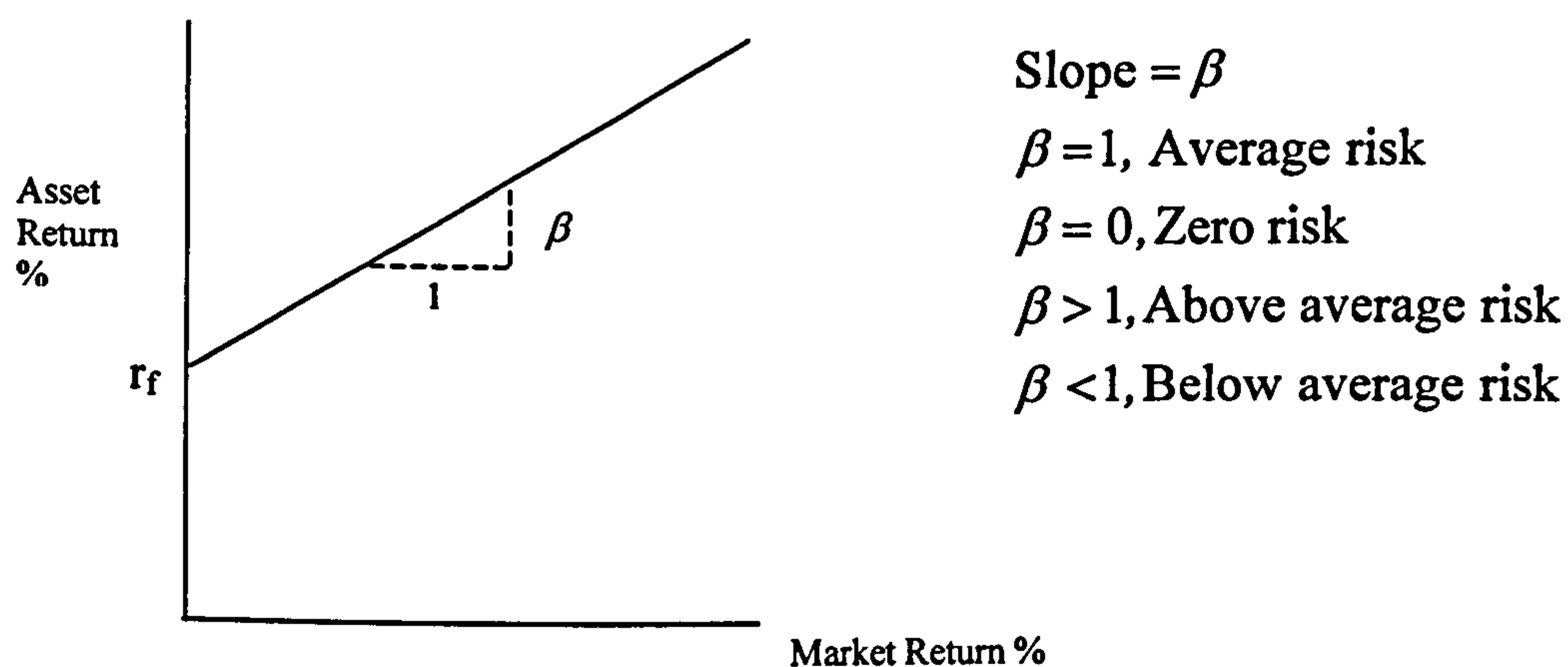
The model considers total risk on holding shares as comprising two components:

1. Unsystematic risk<sup>286</sup> – (Unique to an individual asset; is diversifiable)
2. Systematic Risk<sup>287</sup> – (Risk of holding the market portfolio; is non-Diversifiable)

The market pays a premium on systematic risk only since it is non-diversifiable. The theory provides a framework for measuring the systematic risk of an individual asset and relates it to the systematic risk of a well-diversified portfolio. The Security Market Line diagram developed from the CAPM considers the equilibrium relationship between an asset's required return and its associated risk and is expressed as follows:

**Figure 12.7**

### Security Market Line



<sup>286</sup> These arise from uncertainties specific to the individual asset e.g the company faces an important management change, or loses an important contract.

<sup>287</sup> Market risk e.g Increased Taxation affects all shares; Adverse political/social events affect the whole economy



In notation form, the above is given as:

*Return on Asset = Riskfree Return +  $\beta$ (Market Return – Riskfree Return)*  
*For each individual observation,*

$$r_i = r_f + \beta(r_m - r_f)$$

Where,

$\beta$  = Beta of the security

$$\beta = \frac{\text{Covariance Between Asset Return and Market Return}}{\text{Variance of Market Portfolio}}$$

$$\beta = \frac{\text{Cov}(r_i, r_m)}{\sigma^2(r_m)}$$

The above equation suggests that beta alone accounts for differences in returns<sup>288</sup> among securities. The market does not reward for holding stocks with lots of diversifiable risk and only beta as a measure of systematic risks matters. Given an expected future price and a beta for a specific stock, a financial investor will bid current price up or down to ensure that the equation is satisfied. This makes the equation an asset-pricing model. The model assumes a simplified world with a maximizing behaviour of market participants, zero taxes (transaction costs), same perceptions from investors regarding expected returns and volatility of available risky investments.

Using the above formula, the Beta as a measure of non-diversifiable risk for the different shares in a portfolio of all listed companies has been calculated by

---

<sup>288</sup> risks

working out each asset return at the end of each month from TRI<sup>289</sup> as at each trading session date. Every 12-months asset and market returns are then used to determine the yearly beta with a view to track changes in beta for some listed firms and determine whether there is greater variability in non-diversifiable risk after liberalisation.

**Table 23.7**  
**Betas of listed Companies**

Date	MCB	MDIT	MSM	MTMD	UBP	MCFI	MDA
1990	0.344	0.177	-0.057	0.698	0.126	0.000	1.686
1991	1.089	0.306	-0.184	0.729	0.911	0.092	1.354
1992	0.677	0.619	0.851	0.346	0.157	1.182	-0.696
1993	0.062	0.143	0.179	0.216	0.006	0.419	-0.059
1994	0.277	-0.154	-0.498	0.436	0.084	-0.188	0.877
1995	0.287	0.376	0.222	0.335	0.391	0.298	0.360
1996	0.342	0.573	0.463	0.353	0.302	-0.017	0.513
1997	0.047	-0.626	-0.370	-0.259	0.038	-0.411	-1.112
1998	0.465	0.056	0.129	0.307	0.197	0.054	0.567
1999	0.706	0.026	0.375	0.586	0.623	0.028	0.630
2000	1.063	-0.154	0.303	1.268	0.254	0.945	0.836
2001	0.559	0.145	0.052	-1.000	-0.236	-0.709	-0.734
2002	1.452	0.307	-0.261	1.578	0.020	0.530	0.390
2003	0.561	0.465	1.218	0.290	0.802	0.811	1.347
	SAVANAH	MOR	ROGERS	GIDC	COURTS	SWAN	MOUNT
1990	1.709	-0.258	3.846	0.481	-0.001	N.A	N.A
1991	1.214	0.066	0.087	0.272	-0.911	-0.009	-0.321
1992	0.035	0.463	0.700	0.409	1.617	0.937	0.063
1993	0.010	0.015	0.266	-0.145	0.085	0.067	0.126
1994	0.680	-0.371	0.911	0.051	0.013	-0.073	0.842
1995	0.281	0.126	0.634	0.685	0.829	0.235	0.170
1996	0.384	-0.212	0.513	0.943	0.477	0.208	0.535
1997	-0.139	0.072	0.267	-0.857	0.018	0.113	0.140
1998	0.378	-0.040	0.447	0.698	0.164	0.199	0.080
1999	1.069	0.319	0.154	1.125	0.217	0.897	0.457
2000	0.781	-0.208	-0.104	0.722	2.098	0.523	0.875
2001	-0.487	0.440	1.713	0.885	0.541	-0.102	-0.197
2002	-0.159	0.101	0.022	0.217	1.674	0.223	-0.829
2003	-0.483	0.561	0.290	1.463	2.495	0.553	0.960

<sup>289</sup> TRI was obtained from the SEM

Date	HFr	HMal	CMPL	CMPL	UDL	POLICY	SUN
1990	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1991	0.141	3.442	1.407	N.A	N.A	N.A	N.A
1992	0.401	-0.475	2.641	3.477	1.387	N.A	N.A
1993	0.089	0.128	0.361	0.295	-0.063	1.312	3.899
1994	1.356	0.604	-0.364	0.620	0.079	1.091	0.514
1995	0.259	0.662	0.770	0.675	0.629	1.065	0.929
1996	0.343	0.426	0.835	0.693	0.527	1.075	0.193
1997	0.441	-0.970	0.027	2.403	-0.824	-0.096	0.879
1998	-0.103	-0.058	-0.043	0.230	0.100	0.163	0.482
1999	0.944	0.109	0.153	0.138	0.214	1.480	0.419
2000	1.790	0.946	0.558	-0.095	0.267	1.511	0.478
2001	0.070	0.035	-0.182	-0.531	-0.270	-0.363	1.680
2002	-2.010	0.484	0.090	0.544	-0.184	0.130	1.425
2003	0.614	0.965	0.705	0.985	1.174	1.563	-0.451
	<b>BAI</b>	<b>LIT</b>	<b>PBL</b>	<b>PIM</b>	<b>NIT</b>	<b>MUA</b>	<b>MEI</b>
1990	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1991	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1992	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1993	-0.202	-0.341	3.581	-0.034	-0.129	N.A	N.A
1994	1.418	-0.847	1.211	-0.480	1.382	-2.526	1.825
1995	0.599	1.033	0.936	0.415	1.126	0.661	0.125
1996	0.523	0.765	0.406	0.890	0.916	0.142	0.280
1997	-0.590	-0.944	0.396	-0.422	-1.058	0.332	0.202
1998	0.123	0.215	0.283	0.584	0.383	0.503	0.344
1999	0.529	0.361	1.474	-1.404	-0.025	0.952	0.400
2000	0.551	-0.170	1.275	-0.196	-1.905	0.325	0.147
2001	0.571	1.042	-0.024	-3.714	0.849	-0.893	0.538
2002	-0.069	0.127	0.437	-0.122	0.812	0.863	-0.143
2003	0.725	1.383	1.188	1.146	1.368	0.812	1.284
	<b>BMHL</b>	<b>IBL</b>	<b>FINCORP</b>	<b>ASL</b>	<b>GAMCIVIC</b>	<b>AIRM</b>	<b>SBM</b>
1990	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1991	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1992	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1993	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1994	1.399	-1.796	20.381	0.000	N.A	N.A	N.A
1995	0.970	-0.726	3.061	-0.633	-0.574	0.196	0.110
1996	1.551	0.444	1.060	0.259	0.311	-0.044	0.521
1997	-0.664	2.247	-0.568	1.176	-0.243	-0.299	0.820
1998	0.138	0.984	0.008	-0.003	0.085	0.869	1.994
1999	0.110	0.013	0.910	0.513	-1.229	-0.363	1.667
2000	-0.695	-0.275	0.978	-0.384	0.419	-1.588	1.711
2001	-0.282	1.611	-0.477	-0.337	-0.851	0.783	3.272
2002	-0.016	0.676	0.541	0.521	0.392	-0.040	1.038
2003	1.375	0.769	3.307	1.662	0.850	2.430	1.600

	<b>PAD</b>	<b>HWF</b>	<b>NMHL</b>	<b>CAUDAN</b>			
1990	N.A	N.A	N.A	N.A			
1991	N.A	N.A	N.A	N.A			
1992	N.A	N.A	N.A	N.A			
1993	N.A	N.A	N.A	N.A			
1994	N.A	N.A	N.A	N.A			
1995	N.A	N.A	N.A	N.A			
1996	1.064	1.666	5.576	N.A			
1997	0.600	0.969	3.046	N.A			
1998	0.294	-0.026	1.708	N.A			
1999	0.056	0.326	1.942	N.A			
2000	1.067	0.754	3.511	N.A			
2001	-2.544	1.568	2.335	N.A			
2002	0.093	0.559	-0.732	9.302			
2003	2.471	-0.376	1.310	2.306			

While the beta for all listed companies have been calculated, only some shares were listed before the liberalisation year. To be able to compare variability in beta before and after the liberalisation year only the securities that were already listed in December 1989 are considered below. The tests are run for 5 years before liberalisation and 9 years after liberalisation.



**Table 24.7**

**Test for equality in variances for Beta Before and After Liberalisation**

F-Test Two-Sample Variances						
	<b>MCB</b>		<b>MDIT</b>		<b>MSM</b>	
	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>
Mean	0.4898	0.609111	0.2182	0.129778	0.0582	0.236778
Variance	0.16091	0.180316	0.078559	0.133628	0.256104	0.212425
Observations	5	9	5	9	5	9
df	4	8	4	8	4	8
F	0.892374		0.587889		1.205617	
P(F<=f) one-tail	0.489253		0.319121		0.379467	
F Critical one-tail	0.165534		0.165534		3.837854	
	<b>MTMD</b>		<b>UBP</b>		<b>MCFI</b>	
	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>
Mean	0.485	0.384222	0.2568	0.265667	0.301	0.169889
Variance	0.049747	0.574366	0.136952	0.100134	0.290872	0.292035
Observations	5	9	5	9	5	9
df	4	8	4	8	4	8
F	0.086612		1.367681		0.996017	
P(F<=f) one-tail	0.015843		0.326467		0.537343	
F Critical one-tail	0.165534		3.837854		0.165534	
F-Test Two-Sample Variances						
	<b>MDA</b>		<b>SAVANAH</b>		<b>MOR</b>	
	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>
Mean	0.6324	0.310778	0.7296	0.180556	-0.017	0.128778
Variance	0.983322	0.585327	0.549155	0.29296	0.105428	0.072737
Observations	5	9	5	9	5	9
df	4	8	4	8	4	8
F	1.679953		1.874506		1.44943	
P(F<=f) one-tail	0.246565		0.208399		0.302964	
F Critical one-tail	3.837854		3.837854		3.837854	

The samples reveal greater variability in beta for MCB, MDIT, MTMD and MCFI after liberalisation. In the case of MCB and MDIT and MCFI, the F-statistics were in the critical region suggesting that we can reject the null hypothesis of equality of variances before and after liberalisation for these stocks. In the case of the MTMD, the F-statistic lies in the acceptable region indicating that there is not

enough evidence to reject the null hypothesis of equality of variance before and after liberalisation. As for the remaining stocks, the samples reveal lower variability after liberalisation and the F-statistic show that the null hypothesis of equality of variability cannot be rejected. Most of the above mentioned stocks are the cherished ones individually. Participants holding small portfolios minimize the beta variability of such portfolios by diversifying in larger portfolios of 100 to 500 stocks (Tol, 1981). That is not possible in the Mauritian context given the number of securities listed on the SEM. The tempting mechanistic strategy for participants would be to combine the above mentioned stocks with other stocks having low variability. Research, however shows that this produces portfolios that are more variable than those produced with random combination, (Kulman and Weintraub, 1994)

#### **7.2.6 Stock Market Liberalisation and Stock Market Development**

Changes in Market Size and Liquidity (Pre-liberalisation to Post-liberalisation) are examined to determine whether liberalisation has increased variability and growth of these indicators.

Difficulty of access to data prevents the carrying out of a cross-country analysis for the dynamics of changes in the Sub-Saharan region. This is because many countries have opened their stock market to foreign investors too recently while some others have not yet done so.

**Table 25.7**

**Variation in Market Capitalisation Ratio  
Before and After Liberalisation**

	Before	After
Count	50	50
Mean	16.279718	43.42386641
Standard Deviation	8.0774989	3.25772095
Minimum	8.2624371	37.57084489
Maximum	32.594159	53.59178477

The standard deviations indicate that the market size as measured by market capitalisation ratio fifty months before August 1994 and fifty months just after has become less volatile.

**Table 26.7**

**Test for equality of Variance**

F-Test Two-Sample for Variances		
	Before	After
Mean	16.280	43.424
Variance	65.246	10.613
Observations	50	50
df	49	49
F	6.1478895	
P(F<=f) one-tail	1.283E-09	
F Critical one-tail	1.6072903	

An F-test for equality of variance shows that the test statistic falls in the critical region and the null hypothesis is rejected. The alternative hypothesis that the standard deviation before is larger than after liberalisation is accepted.

The dynamics of short-term growth of market capitalization is examined below.

**Figure 13.7**

**Growth in Market Capitalisation Ratio - (Pre/Post Liberalisation)**

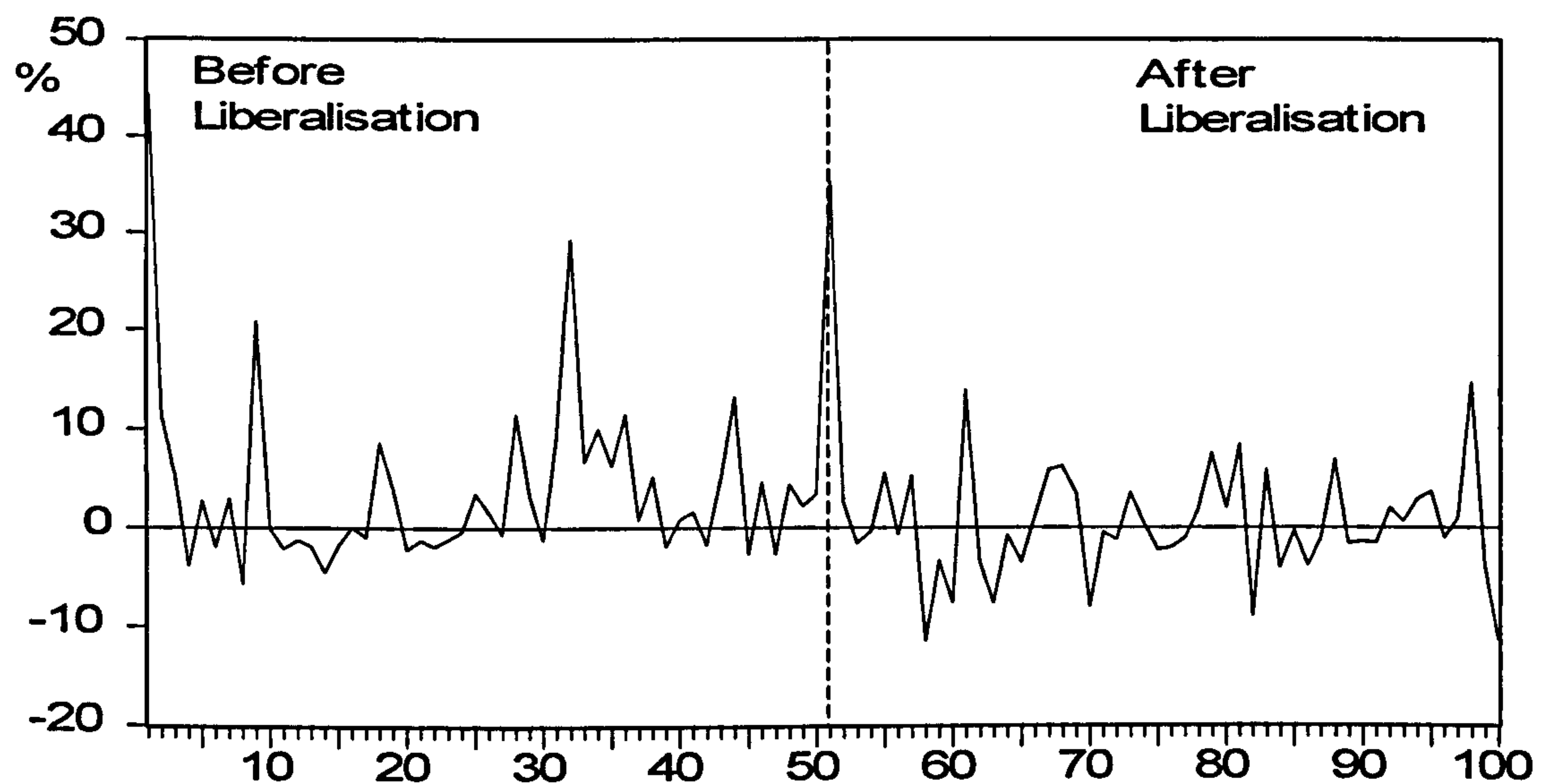


Figure 13.7 provides a first indication that growth in market capitalization has not improved with liberalisation of the stock exchange. Equality tests are run to determine whether the changes are statistically different.

NullHypothesis  $H_0: \mu_1 = \mu_2$

Alternative Hypothesis  $H_1: \mu_1 > \mu_2$



**Table 27.7**

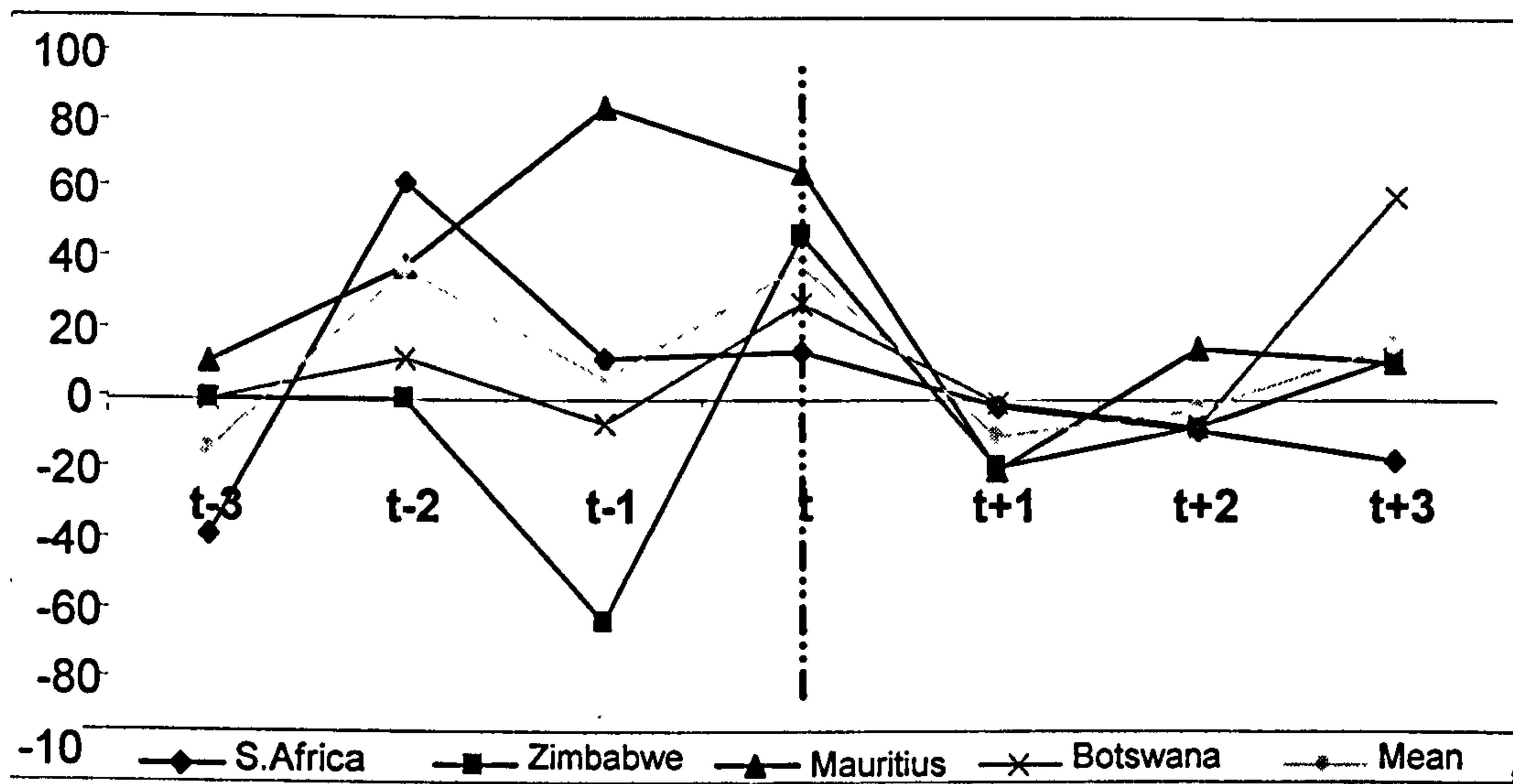
**Equality of Means**

t-Test: Two-Sample Assuming Unequal Variances		
	<b>Before</b>	<b>After</b>
Mean	3.859865321	0.919765763
Variance	76.4963783	54.136132
Observations	50	50
Hypothesized Mean Difference	0	
df	95	
t Stat	1.818952687	
P(T<=t) one-tail	0.036034538	
t Critical one-tail	1.661051101	
P(T<=t) two-tail	0.072069077	
t Critical two-tail	1.985249583	

The t-value for a one tailed test is higher than the critical value and so the difference between the means is not statistically different.

Figure14.7

Comparative Growth in Market Capitalisation Ratio –  
(Pre/Post Liberalisation)



Source: liquid Africa

Figure 14.7 shows growth in capitalization ratio for some selected countries in their respective liberalisation year t, three years before and three years after. The short-term dynamics reveals that Mauritius has comparatively performed better than the other countries both before and after their respective liberalisation dates.

**Table 28.7**

**Variation in Turnover Ratio  
Before and After Liberalisation**

	<i>Before</i>	<i>After</i>
No. of Observations	50	50
Minimum	0.052014541	0.210822
Maximum	0.919762731	2.95628
Range	0.86774819	2.745457
Mean	0.309430762	0.510373
Standard Deviation	0.202475471	0.403028

Unlike the capitalization ratio, the turnover ratio seems to be more volatile after liberalisation. The same series of tests is run with the market liquidity indicator.

$$\text{Null Hypothesis } H_0 : \sigma_1 = \sigma_2$$

Lower-tail test

$$\text{Alternative Hypothesis } H_1 : \sigma_1 < \sigma_2$$

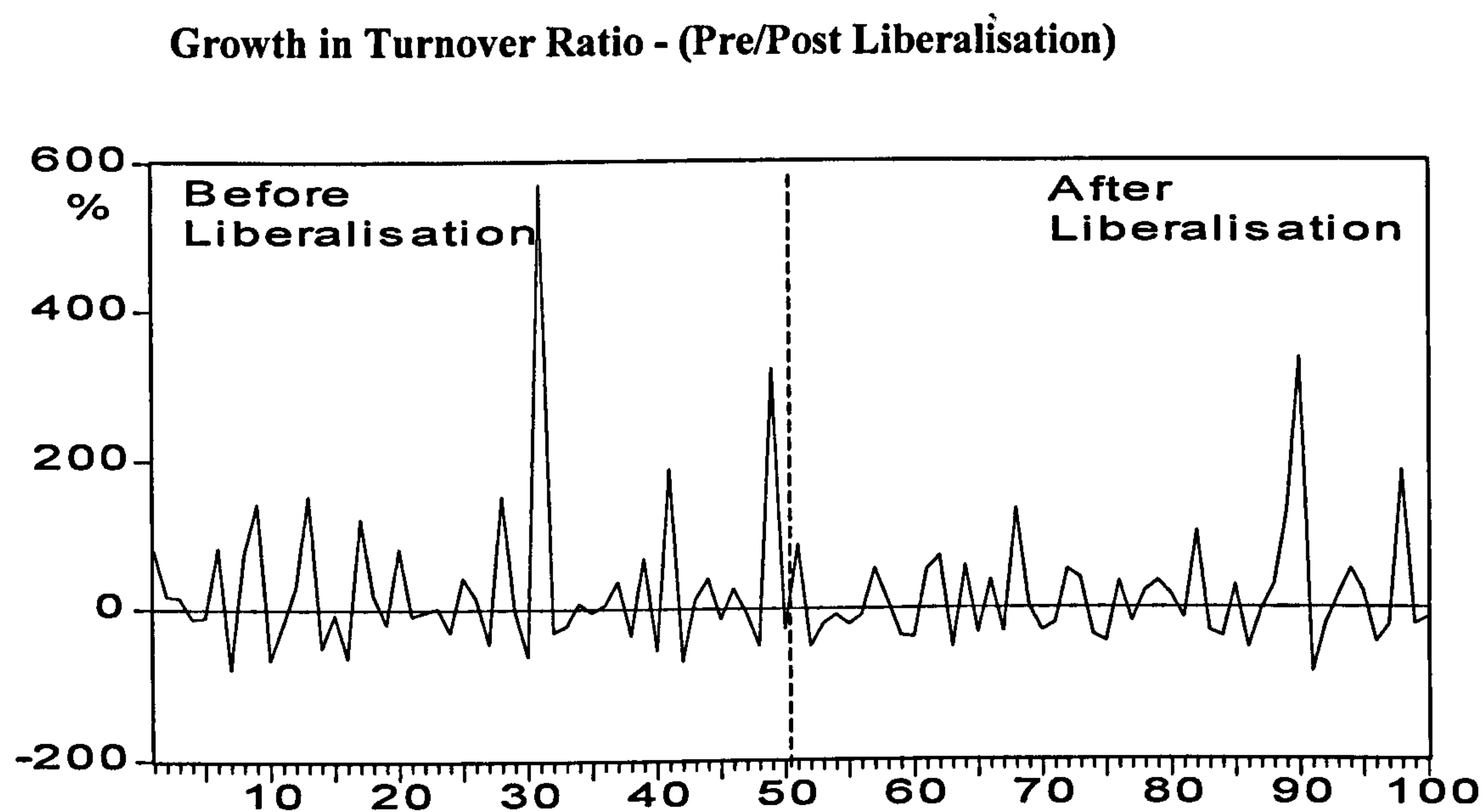
**Table 29.7**

**F-Test for equality of variability.**

	<b>Before</b>	<b>After</b>
Mean	0.309430762	0.510373
Variance	0.040996316	0.162432
Observations	50	50
df	49	49
F	0.252391202	
P(F<=f) one-tail	1.88554E-06	
F Critical one-tail	0.62216543	

The F statistic falls well within the critical region. The sample therefore provides strong evidence for the unequal population variances. Liquidity has therefore become more volatile after liberalisation. The contribution of foreign capital flows to this higher level of liquidity is an area for research in the future.

**Figure 15.7**



The result for a t-test for equality of means before and after liberalisation is shown below.



**Table 30.7**

**Equality of Means**

	Before	After
Mean	30.59757	16.03254
Variance	11807.73	5082.23
Observations	50	50
Hypothesized Mean Difference	0	
df	85	
t Stat	0.792468	
P(T<=t) one-tail	0.215147	
t Critical one-tail	1.662979	
P(T<=t) two-tail	0.430294	
t Critical two-tail	1.988269	

NullHypothesis $H_0:\mu_1=\mu_2$

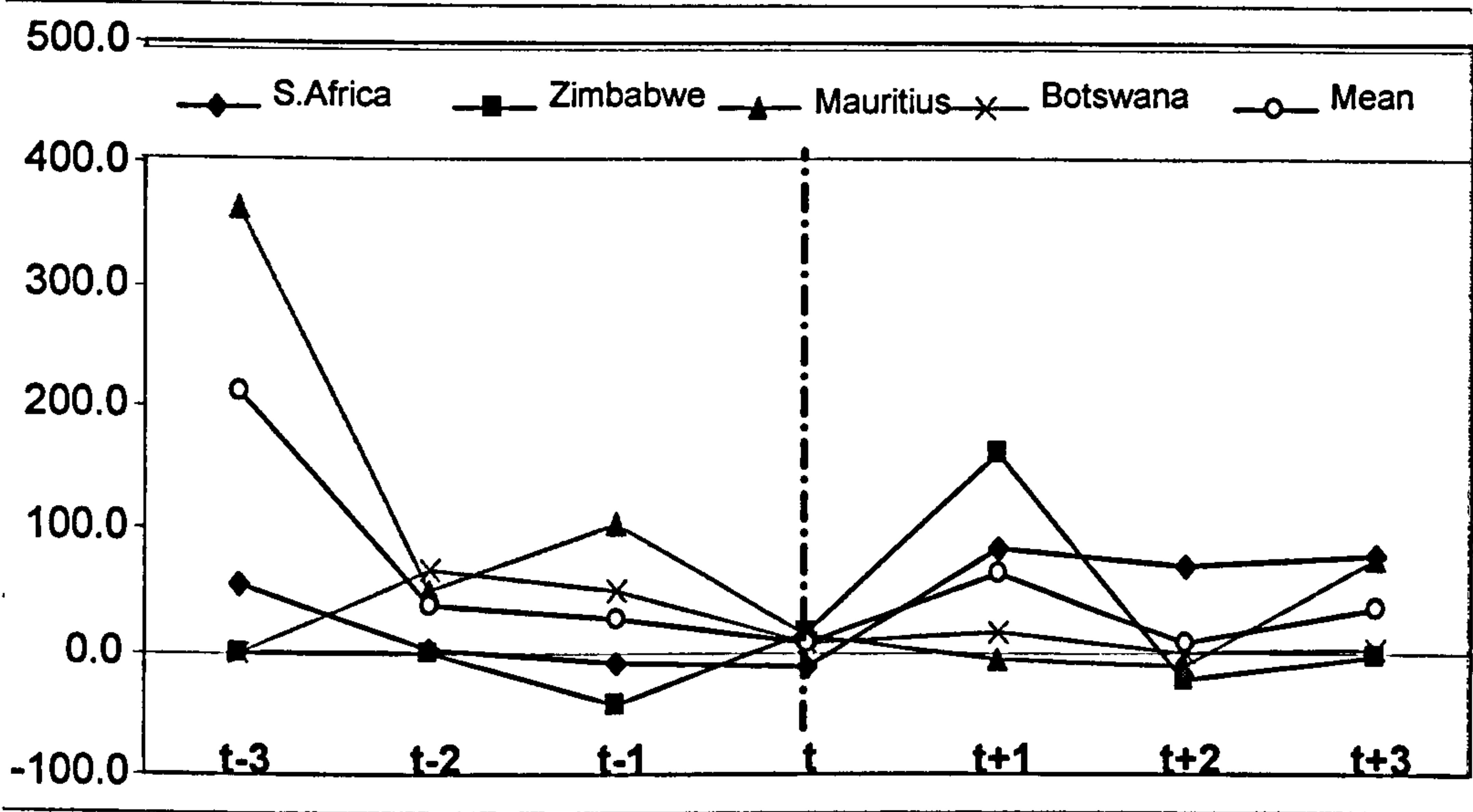
Alternative Hypothesis $H_1:\mu_1<\mu_2$

The t-value for a one tailed test is much smaller than the critical value and so the difference between the means is not statistically different.

Comparison of short-term dynamics is made with some southern sub-Saharan countries with respect to three years before and after the countries’s respective liberalisation dates at time t. Such comparison is limited to a yearly basis since monthly figures have not been accessible.

**Figure 16.7**

**Comparative Growth in Turnover Ratio - (Pre/Post Liberalisation)**



*Source: Liquid Africa*

Figure 16.7 depicts growth in turnover ratio for the same selected countries as for market capitalisation in their respective liberalisation year t, three years before and three years after. The short-term dynamics this time reveals that Mauritius has again comparatively performed better than the other countries before but not after their respective liberalisation dates. A likely reason for the post liberalisation situation is the bearish market conditions as depicted in figure 2.5.

### 7.3 Stock Market Crisis

Earlier in Chapter 7 reference was made to CMAX for identification of crises. Observations are made from end of month SEMDEX values for the period 1990-

2000. To make any sharp price decline more visible CMAX is worked out following Patel and Sarkar (1988),

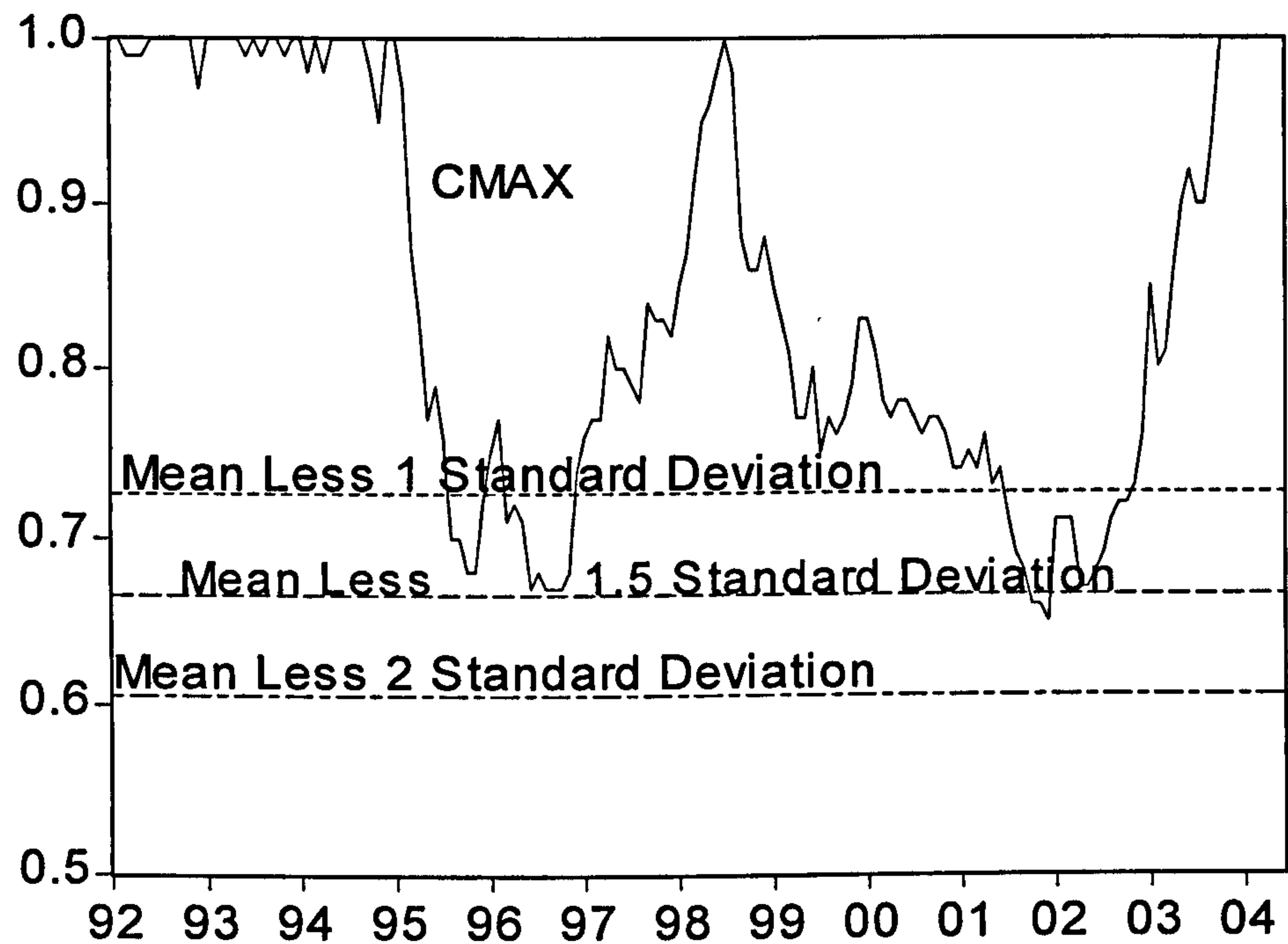
$$\text{CMAX Equity} = \frac{\text{SEMDEX at Time } t}{\text{Maximum SEMDEX for Period up to Time } t}$$

Three levels of crisis (mini-crisis, crisis and serious crisis) are identified using trigger levels of 1, 1.5 and 2.0 standard deviations respectively below the mean of the CMAX series. Using such criteria crises are identified below by taking into account the following points:

- Beginning of the crisis is the month in which the CMAX falls below one standard deviation below the mean of the CMAX series.
- Trough is the month during which CMAX reaches its minimum during the crisis.
- Recovery is the month in which the CMAX moves back above the first trigger level (standard deviation level 1).
- The decline is measured as the drop in SEMDEX from its pre-crisis level to its trough level.

**Figure 17.7**

**Stock Price Index Relative to Historical Maximum (Jan. 1992-Jun. 2004)**



**Table 31.7**

**Equity Crisis and Characteristics**

<b>Crisis No.</b>	<b>Trough Date</b>	<b>Duration</b>	<b>Type</b>	<b>% Drop in Stock Prices</b>
<b>1</b>	<b>Nov. 1995</b>	<b>5-6 months</b>	<b>Mini crisis</b>	<b>10.47</b>
<b>2</b>	<b>Nov. 1996</b>	<b>10-11 months</b>	<b>Mini Crisis</b>	<b>10.87</b>
<b>3</b>	<b>Dec. 2001</b>	<b>17-18 months</b>	<b>Crisis</b>	<b>11.88</b>



Figure 17.7 and table 31.7 show evidence of a less stable situation than in the banking sector with two successive long periods of decline. However the equity market has been facing fewer episodes of crises.

## **7.4 Summary**

Stock markets in sub-Saharan African countries are generally small in size compared to the banking sector except for South Africa and Zimbabwe. Stock market indicators are found to be more favorable in Mauritius than in Sub-Saharan countries other than the same two countries mentioned. The SEM has also performed better than the most important stock markets in Sub-Saharan Africa as regards to growth in market capitalization both before and after their respective liberalisation dates. In terms of growth in turnover ratio, Mauritius performed better than these countries before liberalisation but not after.

However, in spite of important initiatives taken to make the security market more transparent, more efficient, open to international capital and less exposed to financial crimes, there has been no significant change in market size, liquidity and activity after liberalisation. Growth rates in market capitalisation and liquidity were superior prior to liberalisation. Variability in market capitalization was higher before liberalisation while in the case of liquidity it was higher after liberalisation. Managed funds do not yet indicate signs of ability to considerably mobilize savings and hence to boost the security market. After 10 years of liberalisation the importance of foreign flows is still very weak reflecting a low level of integration of the domestic capital market in the global market. This could be a reason why stock prices have not

been more volatile after liberalisation. The annualized return was higher but more volatile before liberalisation. There is scope for further research to identify whether this is because the stocks were initially undervalued and or the stocks are now underperforming.

There is a first indication that physical investment in Mauritius is driven by borrowing in spite of its high cost compared to raising new capital. This will be further investigated in the next chapter.

In terms of non-diversifiable risks as measured by Beta, the individual stocks identified as having shown a greater variability after liberalisation are those of the MCB, MDIT and MCFT and the implications regarding diversification whenever such stocks are held in a portfolio have been discussed. There is also an indication that private companies have gone public for fiscal reasons and that their family-based tradition prevents them from diluting ownership beyond the minimum requirements as per the listing regulations.

In so far as stock prices are concerned, there is evidence that they have been following a random walk both before and after liberalisation but test on the weak form of efficient market hypothesis reveals a weaker position after liberalisation. Further, the stock market has been marked by three crises, the most important episode started in December 2001 and lasted eighteen months when price declined by nearly 12%. No crash as such has been identified

The research will now move its final stage with the studying of the financial deepening process in Mauritius and its impact on both growth of listed firms and economic growth.

## **Chapter 8**

### **MODELLING SOME IMPACT OF FINANCIAL**

### **LIBERALISATION IN MAURITIUS**

#### **8.1 Introduction**

During the last fifteen years governments in the Southern and Eastern African region have all adopted a policy of financial liberalisation with a view to achieve sustainable growth. In this chapter the empirical relevance of the theory of financial liberalisation is further being examined mainly for the Mauritian economy but some reference is also made to the region. In all these economies the formal financial sector is largely dominated by banks and this justifies the use of banking development variables as a measure of financial development. Three different aspects of the theory of financial liberalisation (Chapters 2 and 3) that will be examined are:

1. Financial Deepening and Interest Rate Liberalisation.
2. Financial Liberalisation and Economic Growth - (Mauritius only).
3. Liberalisation and Corporate Sector Financing Strategy - (Mauritius only).

#### **8.2 Financial Deepening - Mauritius and the Region**

This section of the thesis investigates empirically whether financial liberalisation has led to higher demand for bank assets as per the McKinnon and Shaw hypothesis. With higher deposit interest rate, the demand for real money balances is expected to increase via two channels, namely:



1. A shift towards a portfolio comprising less of real assets<sup>290</sup> and more of financial assets.

2. An increase in the holding of domestic financial assets relative to foreign assets held by nationals. The assumption is that before liberalisation there was an important amount of capital flight since residents preferred investing their wealth abroad while after the reforms the domestic environment has improved with financial assets enhanced both in terms of return and liquidity.

The monetization variable broad money to GDP  $\left(\frac{M2}{Y}\right)$  is used as a proxy for financial deepening in a money equation borrowed from the literature, (Agrawal, P. 2001).

$$\text{Financial Deepening} = f\left(\text{Real}^+ \text{GDP}, \text{Real}^+ \text{Interest Rate}, \text{Real}^+ \text{Exchange Rate}\right)$$

Adopting an open economy framework, the real exchange rate is included in the model with a view to capture any wealth effect of currency depreciation on the value of the foreign securities held by domestic residents as this could lead to a decrease in demand for money as per the currency substitution model, Arango and Nadiri (1981) and Girton and Roper (1981). These scholars argue that an expected rate of depreciation reduces the value of domestic assets held by foreigners and increases the value of foreign assets held by residents and may therefore give rise to a shift from domestic currency to foreign currencies, thereby reducing domestic

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<sup>290</sup> E.g commodities, gold and land.



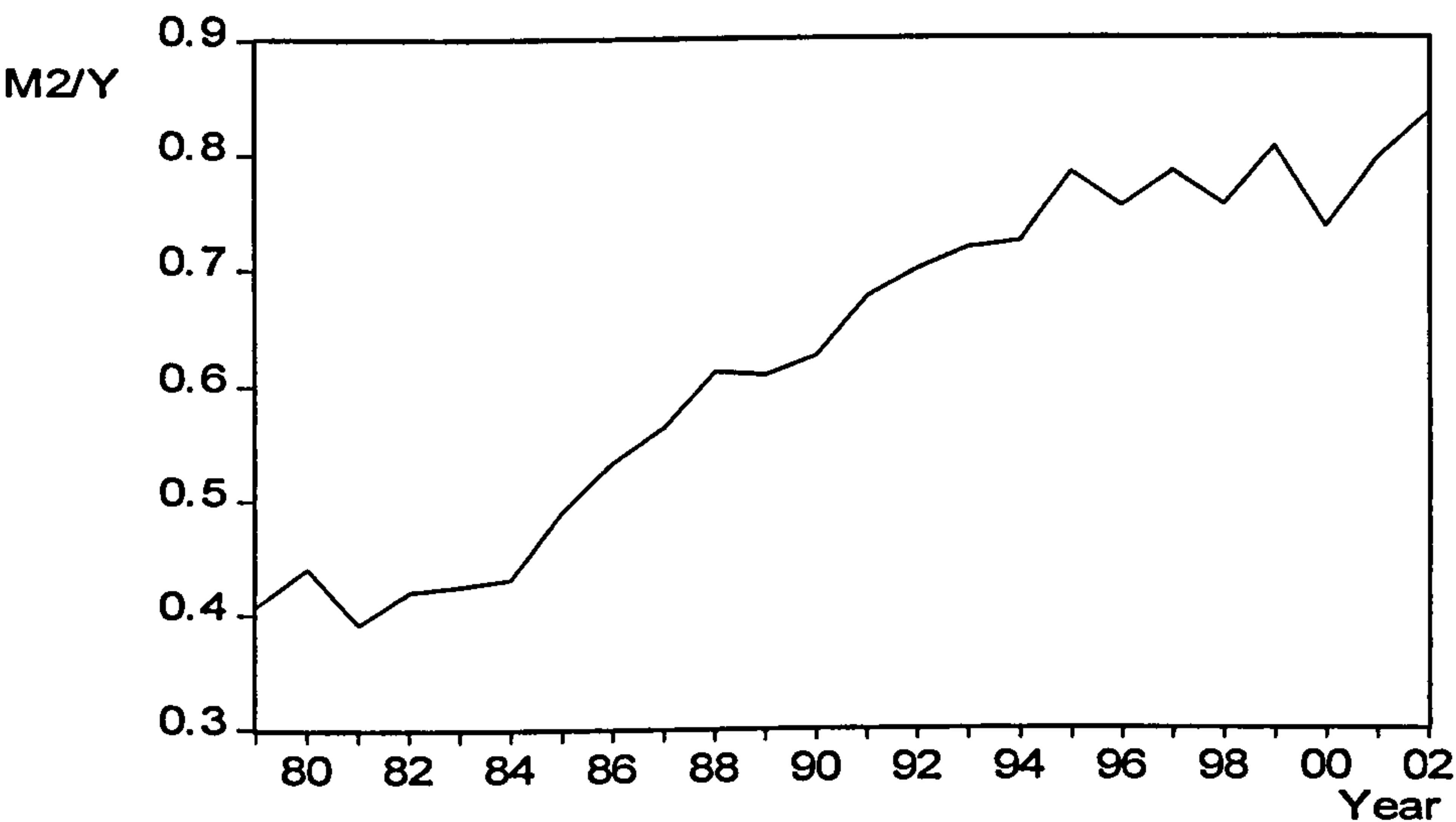
money demand. A positive relationship can therefore be expected between an appreciating exchange rate and financial deepening.

### 8.2.1 Financial Deepening in Mauritius

The financial deepening time series for Mauritius reveals that the monetization variable has consistently and considerably improved over the last two decades.

Figure 1.8

Financial Deepening in Mauritius



Source: IFS

The line graph indicates a continuous rise in financial deepening to a fairly high level. But it also indicates that there could be a structural break reflecting a weakening of the financial deepening process as from early 1990s. A Chow test of

stability is therefore run with 1991 as a break point and the results appearing in table 1.8 reject the null hypothesis of the same coefficient before and after liberalisation.

**Table 1.8**  
**Test for Structural Stability: Null Hypothesis of No Structural Change**

Chow Breakpoint Test: 1991			
F-statistic	8.257161	Probability	0.002430
Log likelihood ratio	14.44734	Probability	0.000729

Equality tests of variances and means before and after liberalisation are run to make inferences about the population before and after liberalisation.

- $H_0$  : Variance in both subgroups are equal
- $H_1$  : Variance in both subgroups are different

- $H_0$  : Mean in both subgroups are equal
- $H_1$  : Mean in both subgroups are different

**Table 2.8**

**Tests of Equality of variances before/after liberalisation (1979-90; 1991-2002)**

Test for Equality of Variances Between Series

Date: 05/17/04 Time: 09:36

Sample: 1 12

Included observations: 12

Method	df	Value	Probability
F-test	(11, 11)	3.492979	0.0490
Siegel-Tukey	(1, 22)	0.000000	1.0000
Bartlett	1	3.871816	0.0491
Levene	(1, 22)	9.685325	0.0051
Brown-Forsythe	(1, 22)	5.771005	0.0252

**Category Statistics**

Variable	Count	Std. Dev.	Mean Abs. Mean Diff.	Mean Abs. Median Diff.	Mean Tukey- Siegel Rank
BEFORELIB	12	0.088438	0.077507	0.076560	12.50000
AFTERLIB	12	0.047320	0.038130	0.038025	12.50000
All	24	0.149629	0.057818	0.057293	12.50000

Bartlett weighted standard deviation: 0.070924

The test rejects the null hypothesis  $H_0$  of equal variances at 5% significance but not at 1% level.

**Table 3.8****Tests of Equality of Means Before/After Liberalisation (1979-90; 1991-2002)**

Test for Equality of Means Between Series

Date: 05/17/04 Time: 09:37

Sample: 1 12

Included observations: 12

Method	df	Value	Probability
t-test	22	8.964839	0.0000
Anova F-statistic	(1, 22)	80.36834	0.0000

**Analysis of Variance**

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	1	0.404274	0.404274
Within	22	0.110666	0.005030
Total	23	0.514940	0.022389

**Category Statistics**

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
BEFORELIB	12	0.495983	0.088438	0.025530
AFTERLIB	12	0.755558	0.047320	0.013660
All	24	0.625771	0.149629	0.030543

Equality of means before and after liberalisation is rejected at both at 5% and 1% significance levels.

The various equality tests therefore confirm that, at population level, financial deepening is higher after liberalisation although the rate of increase in deepening seems to have weakened during the last decade. This is likely to be due to satiation resulting in declining “marginal deepening” as the monetization variable exceeds 65%. The variables of the money equation are plotted below for a first glance.



$$FINDEEP = f(\dot{REALGDP}, \dot{REALINT}, \dot{REER})$$

FINDEEP = Financial deepening ratio  $\left(\frac{M2}{Y}\right)$

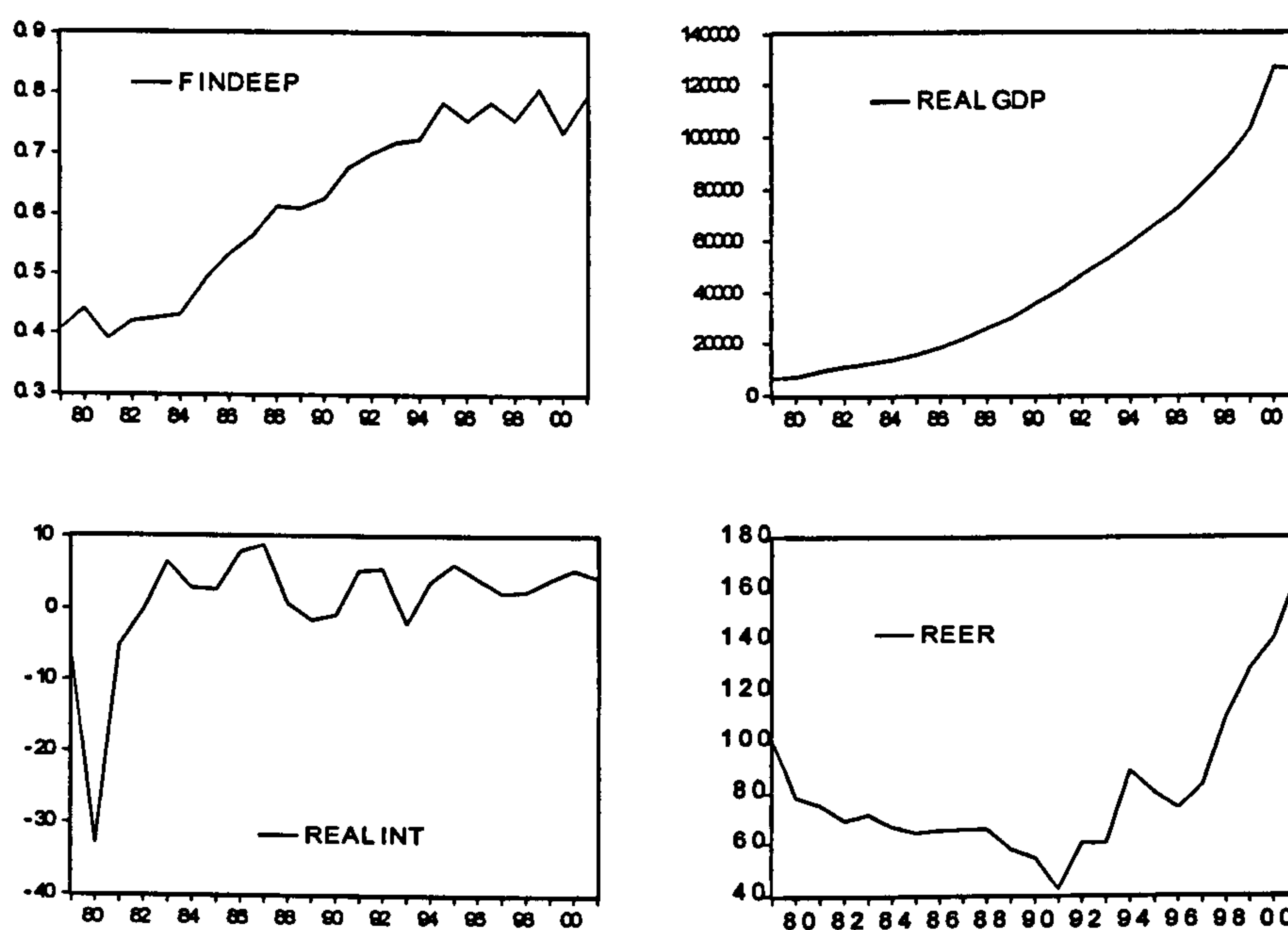
REALGDP = Real GDP

REALINT = Real Deposit Interest Rate

REER = Real Effective Exchange Rate Index

**Figure 2.8**

### Line Graph of Money Equation Variables



The real interest rate<sup>291</sup> was exceptionally low in 1980. That is due to high imported inflation caused by a sharp devaluation of the currency. The real GDP appears to be the variable that better explains the changes in financial deepening and

<sup>291</sup> Real interest rates used here vary slightly from the one used in chapter 6, table 5.6. Table 5.6 refers to financial year data while here we deal with calendar year and the main difference is due to different inflation rates.

this is confirmed by the regression results below where the equation is estimated using the Ordinary Least Squares estimator.

$$FINDEEP = \beta_0 + \beta_1 REALGDP + \beta_2 REALINT + \beta_3 REER )$$

**Table 4.8**

**Money Equation Output – Mauritius (LIN-LIN Model)**

Dependent Variable: FINDEEP  
 Method: Least Squares  
 Date: 05/11/04 Time: 14:06  
 Sample: 1979 2002  
 Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.620871	0.031746	19.55764	0.0000
REALGDP	5.02E-06	4.43E-07	11.34030	0.0000
REALINT	-0.000304	0.001348	-0.225665	0.8238
REER	-0.002941	0.000540	-5.448903	0.0000
R-squared	0.912780	Mean dependent var	0.625771	
Adjusted R-squared	0.899697	S.D. dependent var	0.149629	
S.E. of regression	0.047388	Akaike info criterion	-3.109873	
Sum squared resid	0.044913	Schwarz criterion	-2.913530	
Log likelihood	41.31847	F-statistic	69.76863	
Durbin-Watson stat	1.681791	Prob(F-statistic)	0.000000	

$$FINDEEP = 0.6208711447 + 5.018892698e-06*REALGDP - 0.0003041529841*REALINT - 0.002941268465*REER$$

The fit in the above regression is reasonably tight with an adjusted R-Square of 0.89.

The results show that REALGDP is the only factor having a positive link with financial deepening. This relationship is in line with what general economic theory would have predicted and the estimated coefficient from our sample suggests that for every Rs3bn increase in real GDP the financial deepening ratio increases by 0.015 (i.e 1.5%).

The coefficient of real interest looks very weak and is surprisingly negative. Further it is not statistically significant and a 100% increase in deposit rate seems to

predict a drop by 3.7% in financial deepening. Sample evidence here contradicts the theory of McKinnon & Shaw (1973). An absence of gain in financial deepening coming from interest policy is probably due to the fact that before interest rate liberalisation the economy was already highly monetized with a well-established banking system and a quasi-inexistent unofficial money market. The policy of interest liberalisation has therefore not been effective at increasing financial depth.

The Coefficient of REER is significant but is unexpectedly a negative value. Figure 2.8 reveals that the real effective exchange rate exhibits opposing trends, with a depreciating trend for the longer and earlier sub-period. Yet during the earlier period financial deepening was faster than in recent years. This suggests that economic agents might not have adjusted the share of domestic holding in the assets portfolio in response to exchange rate movements. The currency substitution channel did not work in Mauritius.

The results show that it is very unlikely that at population level there exists a positive relationship between real interest rate and financial deepening. The fact that  $\beta_2$  is not significant and is negative suggests that the empirical evidence in Mauritius for the period 1979 to 2002 shows that the policy of interest rate liberalisation has not accelerated the financial deepening process and it has therefore not been consistent with the prediction of McKinnon and Shaw (1973).

A specification error test (Ramsey Reset Test) is run using an augmented regression by adding  $\hat{FINDEEP}^2, \hat{FINDEEP}^3$  as proxies for any possible omitted variable.



**Table 5.8**

**Specification Test**

Ramsey RESET Test:

F-statistic	7.692115	Probability	0.003851
Log likelihood ratio	14.82508	Probability	0.000604

Test Equation:

Dependent Variable: FINDEEP

Method: Least Squares

Date: 05/17/04 Time: 12:24

Sample: 1979 2002

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.457385	1.308538	-1.877962	0.0767
REALGDP	-2.85E-05	1.56E-05	-1.826895	0.0843
REALINT	0.001429	0.001600	0.893135	0.3836
REER	0.017388	0.009105	1.909778	0.0722
FITTED^2	12.67012	5.043973	2.511932	0.0218
FITTED^3	-7.653262	2.683527	-2.851941	0.0106
R-squared	0.952973	Mean dependent var	0.625771	
Adjusted R-squared	0.939910	S.D. dependent var	0.149629	
S.E. of regression	0.036679	Akaike info criterion	-3.560918	
Sum squared resid	0.024216	Schwarz criterion	-3.266404	
Log likelihood	48.73101	F-statistic	72.95200	
Durbin-Watson stat	1.321602	Prob(F-statistic)	0.000000	

The overall fit of this augmented equation is not significantly different from the previous one, indicating that the initial equation was not misspecified.

As far as detecting multicollinearity is concerned the Pearson correlation matrix shown below reveals that the only correlation coefficient to exceed 0.8 is between REER and REAL GDP.



**Table 6.8**

**Person Correlation Matrix**

	FINDEEP	C	REALGDP	REALINT	REER
FINDEEP	1		0.6875761642	0.1312291602	0.6334600088
			54	83	19
C					
REALGDP	0.6875761642		1	0.2062536755	0.9510189725
	54			38	58
REALINT	0.1312291602		0.2062536755	1	0.2594849988
	83		38		
REER	0.6334600088		0.9510189725	0.2594849988	1
	19		58		

Although it appears that multicollinearity is present between REALGDP & REER, the square of this simple correlation coefficient ( $0.951^2 = 0.904$ ), does not exceed the unadjusted  $R^2$  (0.912), suggesting that there is actually no severe multicollinearity. Running the regression without REER actually deteriorates the fit and the Durbin Watson statistic as shown below.

**Table 7.8**

**Redundant Variable Test**

Redundant Variables: REER

F-statistic	29.69054	Probability	0.000025
Log likelihood ratio	21.84198	Probability	0.000003

Test Equation:

Dependent Variable: FINDEEP

Method: Least Squares

Date: 09/15/04 Time: 10:38

Sample: 1979 2002

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.470511	0.024143	19.48884	0.0000
REALGDP	3.04E-06	3.90E-07	7.798807	0.0000
REALINT	0.002131	0.001956	1.089254	0.2884
R-squared	0.783300	Mean dependent var		0.625771
Adjusted R-squared	0.762662	S.D. dependent var		0.149629
S.E. of regression	0.072895	Akaike info criterion		-2.283123
Sum squared resid	0.111587	Schwarz criterion		-2.135867
Log likelihood	30.39748	F-statistic		37.95412
Durbin-Watson stat	0.562967	Prob(F-statistic)		0.000000

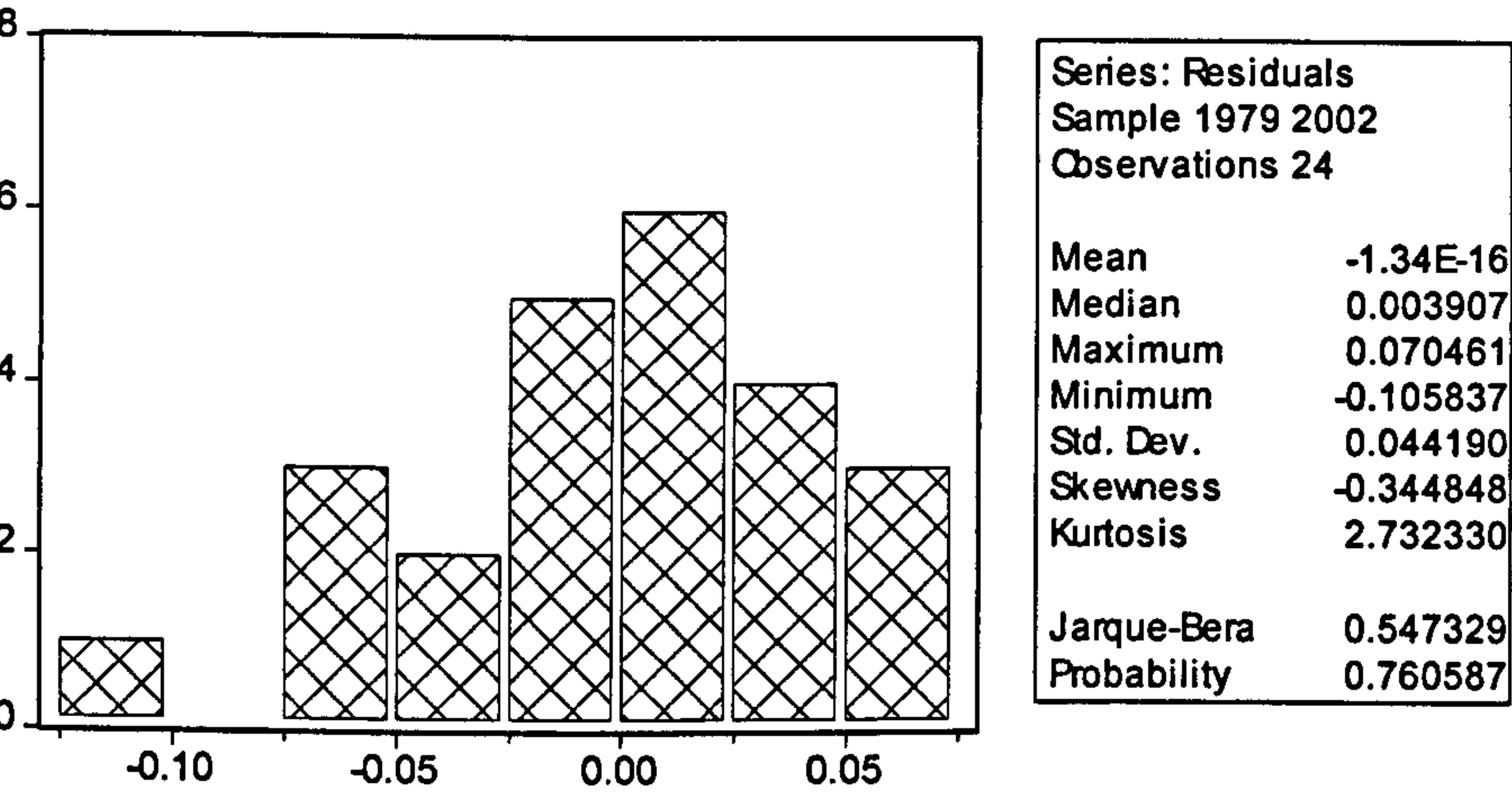
The other classical assumptions are now examined through the residual tests.

- **Normality test**

The Jarque-Bera (JB) statistic measures the difference of skewness and kurtosis of the series from the normal distribution and is distributed as chi-squared with 2 d.f.

**Figure 3.8**

**The Jarque-Bera test of normality for residuals**

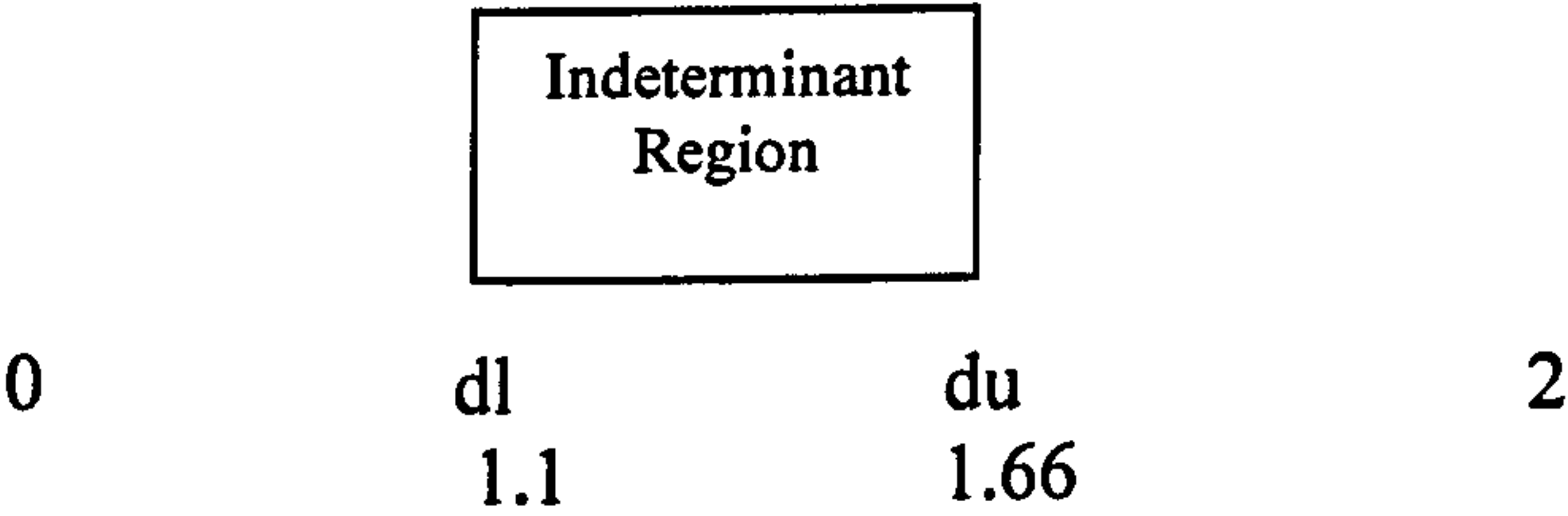


$H_0: JB = 0$

The high probability (0.76) that a JB statistic exceeds (in absolute value) the observed value under the  $H_0$  of a normal distribution suggests that the normality test is passed.

- Serial Correlation Tests

The regression output indicates a Durbin Watson statistic of 1.68. From a D-W statistic table [No of observations =24; No of explanatory variables = 3]  $d_l = 1.1$  &  $d_u = 1.66$



There is a first indication of no serial correlation of order 1. The Breusch-Godfrey Tests (order 1 and 2) are run below in order to get a better judgement about serial correlation.

**Table 8.8**

**Testing serial correlation of order 1.**

**Breusch-Godfrey Serial Correlation LM Test:**

F-statistic	0.436422	Probability	0.516785
Obs*R-squared	0.538891	Probability	0.462893

**Test Equation:**

Dependent Variable: RESID

Method: Least Squares

Date: 05/17/04 Time: 11:56

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.007888	0.034345	-0.229680	0.8208
REALGDP	-1.65E-07	5.14E-07	-0.320888	0.7518
REALINT	0.000435	0.001517	0.286479	0.7776
REER	0.000184	0.000615	0.299926	0.7675
RESID(-1)	0.178357	0.269984	0.660622	0.5168
R-squared	0.022454	Mean dependent var	-1.34E-16	
Adjusted R-squared	-0.183345	S.D. dependent var	0.044190	
S.E. of regression	0.048070	Akaike info criterion	-3.049249	
Sum squared resid	0.043904	Schwarz criterion	-2.803821	
Log likelihood	41.59099	F-statistic	0.109105	
Durbin-Watson stat	1.976107	Prob(F-statistic)	0.977859	

H0: No serial Correlation. The p-value of the Breush-Godfrey LM statistic suggests a non-rejection and this implies that we cannot conclude that there is pure serial correlation of order 1.



**Table 9.8**

**Testing serial correlation of order 2**

**Breusch-Godfrey Serial Correlation LM Test:**

F-statistic	0.473827	Probability	0.630164
Obs*R-squared	1.200344	Probability	0.548717

**Test Equation:**

Dependent Variable: RESID

Method: Least Squares

Date: 05/17/04 Time: 11:59

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.012859	0.035459	-0.362655	0.7211
REALGDP	-2.65E-07	5.38E-07	-0.491543	0.6290
REALINT	0.000702	0.001581	0.443977	0.6624
REER	0.000300	0.000643	0.467024	0.6461
RESID(-1)	0.181825	0.273486	0.664842	0.5146
RESID(-2)	0.179323	0.248150	0.722639	0.4792
R-squared	0.050014	Mean dependent var	-1.34E-16	
Adjusted R-squared	-0.213871	S.D. dependent var	0.044190	
S.E. of regression	0.048686	Akaike info criterion	-2.994514	
Sum squared resid	0.042667	Schwarz criterion	-2.700001	
Log likelihood	41.93417	F-statistic	0.189531	
Durbin-Watson stat	1.911357	Prob(F-statistic)	0.962737	

H0: No serial Correlation. A non rejection of the null hypothesis again prevents the conclusion that there is pure serial correlation of order 2. The two tests allow us to consider that there is very little serial correlation.

**Table 10.8**

**The White Test of Heteroskedasticity**

White Heteroskedasticity Test:				
F-statistic	0.891545	Probability	0.522667	
Obs*R-squared	5.744369	Probability	0.452427	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 05/17/04 Time: 12:01				
Sample: 1979 2002				
Included observations: 24				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.004936	0.005425	-0.909949	0.3756
REALGDP	-6.22E-08	6.77E-08	-0.917426	0.3718
REALGDP^2	5.75E-13	6.89E-13	0.833589	0.4161
REALINT	8.42E-05	0.000134	0.627667	0.5386
REALINT^2	1.23E-07	4.80E-06	0.025706	0.9798
REER	0.000165	0.000115	1.436338	0.1691
REER^2	-7.97E-07	6.30E-07	-1.264178	0.2232
R-squared	0.239349	Mean dependent var	0.001871	
Adjusted R-squared	-0.029116	S.D. dependent var	0.002516	
S.E. of regression	0.002552	Akaike info criterion	-8.865069	
Sum squared resid	0.000111	Schwarz criterion	-8.521470	
Log likelihood	113.3808	F-statistic	0.891545	
Durbin-Watson stat	1.774634	Prob(F-statistic)	0.522667	

The null hypothesis of no heteroskedasticity is not rejected. The equation has now passed a series of traditional tests and looks acceptable. The results do not validate the theory regarding financial deepening. Both the interest channel and the currency substitution channel did not work. The important variable to relate to financial deepening has been real income. This has policy implications as considered in chapter 9.

The adoption of a direct monetary policy framework in Mauritius has made the financial system more complex. Once the monetary authority sends the desired signal through the Lombard refinancing rate the forces of competition between the banks will determine the interest rate on deposit at the level of each bank without

being constrained by a ceiling. The figures reveal that financial deepening has in no way been boosted by removal of the interest ceiling and so it can be argued that the previous financial repression framework did not act as a constraint to financial deepening in Mauritius. This observation raises concerns about whether the gains from a policy of interest liberalisation in Mauritius are not actually below the expectations.

It appears the point made by Lucas (1988) about the fact that economists badly over-stress the role of the financial system could be relevant to the Mauritian context. However, the question will be further discussed in section 9.3 by taking into account its relation to economic growth. The analysis concerning financial deepening is now repeated but at regional level.

### 8.2.2 Cross-Country Analysis

$$\text{FINDEEP?} = f(\text{REALGDP?}, \text{REALINT?}, \text{REER?}, \text{FINDEEP?}(-1)),$$

where (?) indicates all the countries in the panel data namely, Botswana, Kenya, Lesotho, Madagascar, Malawi, Mauritius, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.



**Table 11.8****Money Equation: Pooled Series – Common Intercept and Common Coefficients**

Dependent Variable: FINDEEP?  
Method: Seemingly Unrelated Regression  
Date: 08/26/04 Time: 20:01  
Sample: 1986 2000  
Included observations: 15  
Number of cross-sections used: 11  
Total panel (balanced) observations: 165

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.023682	0.006305	3.755895	0.0002
REALGDP?	7.86E-10	1.38E-09	0.568091	0.5708
REALINT?	0.000540	5.17E-05	10.43687	0.0000
REER?	1.32E-05	2.55E-06	5.156138	0.0000
FINDEEP?(-1)	0.936769	0.017374	53.91651	0.0000
Weighted Statistics				
Log likelihood	361.3273			
Unweighted Statistics				
R-squared	0.911406	Mean dependent var	0.391079	
Adjusted R-squared	0.909191	S.D. dependent var	0.237699	
S.E. of regression	0.071630	Sum squared resid	0.820926	
Durbin-Watson stat	1.920411			

The regression output shows that overall in the region the real GDP does not seem to be a significant variable while both real interest rate and real exchange rate look significant. The overall regional picture looks different from that of the Mauritian case taken separately where real GDP was found to be the most significant variable.

The regional regression is now run with a specific intercept and a specific slope coefficient for each country and each explanatory variable and using an autoregressive process of order 1 to try to identify any pattern or any exceptional case.



Table 12.8

Money Equation Pooled Series -Specific Intercepts, Specific Coefficients

Dependent Variable: FINDEEP?  
Method: Seemingly Unrelated Regression  
Date: 06/24/04 Time: 15:57  
Sample: 1986 2000  
Included observations: 15  
Number of cross-sections used: 11  
Total panel (balanced) observations: 165

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_BOT-- REALGDP_BOT	-3.46E-06	1.95E-06	-1.776967	0.0783
_KEN-- REALGDP_KEN	3.57E-08	7.12E-08	0.501960	0.6167
_LES-- REALGDP_LES	-1.27E-05	7.81E-06	-1.629309	0.1061
_MAD-- REALGDP_MAD	-9.07E-06	5.09E-06	-1.782929	0.0774
_MAL-- REALGDP_MAL	-1.42E-06	4.14E-07	-3.430297	0.0008
_MAU-- REALGDP_MAU	2.86E-06	7.06E-07	4.052504	0.0001
_SAF-- REALGDP_SAF	-4.01E-08	1.71E-08	-2.351669	0.0205
_SWA-- REALGDP_SWA	-1.82E-05	4.03E-06	-4.514040	0.0000
_TAN-- REALGDP_TAN	1.64E-06	4.00E-06	0.411145	0.6818
_ZAM-- REALGDP_ZAM	3.75E-09	2.87E-09	1.309632	0.1930
_ZIM--REALGDP_ZIM	-0.000703	8.01E-05	-8.777746	0.0000
_BOT--REALINT_BOT	-0.000323	0.003513	-0.092045	0.9268
_KEN--REALINT_KEN	0.000654	0.000635	1.031011	0.3048
_LES--REALINT_LES	0.000666	0.001738	0.383313	0.7022
_MAD-- REALINT_MAD	0.001460	0.001070	1.364297	0.1753
_MAL--REALINT_MAL	0.000408	0.000274	1.485073	0.1404
_MAU-- REALINT_MAU	-0.002611	0.001721	-1.517387	0.1320
_SAF--REALINT_SAF	0.003066	0.000541	5.663606	0.0000
_SWA-- REALINT_SWA	0.000167	0.000117	1.431409	0.1551
_TAN--REALINT_TAN	-0.001227	0.001148	-1.068200	0.2878
_ZAM--REALINT_ZAM	0.000301	9.91E-05	3.034555	0.0030
_ZIM--REALINT_ZIM	0.008937	0.001062	8.415728	0.0000
_BOT--REER_BOT	0.099453	0.027795	3.578103	0.0005
_KEN--REER_KEN	-0.001296	0.000998	-1.298331	0.1969
_LES--REER_LES	0.019137	0.015355	1.246280	0.2153
_MAD--REER_MAD	7.06E-05	4.27E-05	1.651856	0.1014
_MAL--REER_MAL	0.005830	0.001588	3.670212	0.0004
_MAU--REER_MAU	-0.027094	0.006063	-4.468512	0.0000
_SAF--REER_SAF	0.027548	0.005371	5.129187	0.0000

_SWA--REER_SWA	0.019271	0.012526	1.538474	0.1268
_TAN--REER_TAN	6.90E-05	6.25E-05	1.104125	0.2719
_ZAM--REER_ZAM	2.76E-05	1.76E-05	1.564352	0.1206
_ZIM--REER_ZIM	-0.035151	0.004689	-7.496430	0.0000
_BOT--	0.064468	0.134217	0.480325	0.6319
FINDEEP_BOT(-1)				
_KEN--	0.848080	0.173104	4.899258	0.0000
FINDEEP_KEN(-1)				
_LES--	0.602321	0.118882	5.066552	0.0000
FINDEEP_LES(-1)				
_MAD--	0.253557	0.110686	2.290783	0.0239
FINDEEP_MAD(-1)				
_MAL--	0.151063	0.210232	0.718554	0.4739
FINDEEP_MAL(-1)				
_MAU--	0.055896	0.178078	0.313888	0.7542
FINDEEP_MAU(-1)				
_SAF--	0.532240	0.084068	6.331046	0.0000
FINDEEP_SAF(-1)				
_SWA--	-0.318179	0.200285	-1.588634	0.1150
FINDEEP_SWA(-1)				
_TAN--	0.541711	0.117950	4.592721	0.0000
FINDEEP_TAN(-1)				
_ZAM--	0.992299	0.086479	11.47447	0.0000
FINDEEP_ZAM(-1)				
_ZIM--FINDEEP_ZIM(-1)	-1.524167	0.266062	5.728620	0.0000
Fixed Effects				
_BOT--C	-0.021206			
_KEN--C	0.127167			
_LES--C	0.086594			
_MAD--C	0.523235			
_MAL--C	0.125445			
_MAU--C	1.016880			
_SAF--C	0.127942			
_SWA--C	0.383918			
_TAN--C	0.044674			
_ZAM--C	-0.022434			
_ZIM--C	1.366172			
Weighted Statistics				
Log likelihood	457.7602			
Unweighted Statistics				
R-squared	0.947600	Mean dependent var	0.391079	
Adjusted R-squared	0.921876	S.D. dependent var	0.237699	
S.E. of regression	0.066438	Sum squared resid	0.485547	
Durbin-Watson stat	1.839719			

The estimated equations for each country are represented below as a summary.

$$\text{FINDEEP\_BOT} = -0.02120607539 - 3.464287887\text{e-}06*\text{REALGDP\_BOT} - 0.0003233435756*\text{REALINT\_BOT} + 0.09945345781*\text{REER\_BOT} + 0.06446789533*\text{FINDEEP\_BOT}(-1)$$

$$\text{FINDEEP\_KEN} = 0.1271666332 + 3.574295814\text{e-}08*\text{REALGDP\_KEN} + 0.0006544992983*\text{REALINT\_KEN} - 0.001295719546*\text{REER\_KEN} + 0.848079535*\text{FINDEEP\_KEN}(-1)$$

$$\text{FINDEEP\_LES} = 0.08659439036 - 1.272575703\text{e-}05*\text{REALGDP\_LES} + 0.0006661207249*\text{REALINT\_LES} + 0.01913653468*\text{REER\_LES} + 0.6023214434*\text{FINDEEP\_LES}(-1)$$

$$\text{FINDEEP\_MAD} = 0.5232347699 - 9.071030604\text{e-}06*\text{REALGDP\_MAD} + 0.001460271219*\text{REALINT\_MAD} + 7.061488397\text{e-}05*\text{REER\_MAD} + 0.2535570324*\text{FINDEEP\_MAD}(-1)$$

$$\text{FINDEEP\_MAL} = 0.1254448796 - 1.420520003\text{e-}06*\text{REALGDP\_MAL} + 0.0004075792537*\text{REALINT\_MAL} + 0.005830066763*\text{REER\_MAL} + 0.151062816*\text{FINDEEP\_MAL}(-1)$$

$$\text{FINDEEP\_MAU} = 1.016880235 + 2.860133464\text{e-}06*\text{REALGDP\_MAU} - 0.002610882938*\text{REALINT\_MAU} - 0.02709354514*\text{REER\_MAU} + 0.05589633072*\text{FINDEEP\_MAU}(-1)$$

$$\text{FINDEEP\_SAF} = 0.1279417818 - 4.011959706\text{e-}08*\text{REALGDP\_SAF} + 0.003066153199*\text{REALINT\_SAF} + 0.02754837058*\text{REER\_SAF} + 0.532240472*\text{FINDEEP\_SAF}(-1)$$

$$\text{FINDEEP\_SWA} = 0.3839184165 - 1.818225418\text{e-}05*\text{REALGDP\_SWA} + 0.0001672118375*\text{REALINT\_SWA} + 0.01927052889*\text{REER\_SWA} - 0.3181791195*\text{FINDEEP\_SWA}(-1)$$

$$\text{FINDEEP\_TAN} = 0.04467432734 + 1.644896185\text{e-}06*\text{REALGDP\_TAN} - 0.001226811501*\text{REALINT\_TAN} + 6.902479504\text{e-}05*\text{REER\_TAN} + 0.5417110949*\text{FINDEEP\_TAN}(-1)$$

$$\text{FINDEEP\_ZAM} = -0.02243374116 + 3.753230981\text{e-}09*\text{REALGDP\_ZAM} + 0.000300668187*\text{REALINT\_ZAM} + 2.756734347\text{e-}05*\text{REER\_ZAM} + 0.9922985753*\text{FINDEEP\_ZAM}(-1)$$

$$\text{FINDEEP\_ZIM} = 1.36617183 - 0.0007030595901*\text{REALGDP\_ZIM} + 0.008936874365*\text{REALINT\_ZIM} - 0.03515133188*\text{REER\_ZIM} + 1.524167421*\text{FINDEEP\_ZIM}(-1)$$

From the pooled regression it appears that the significance of the coefficients can be summarised in the table below.



**Table 13.8**

**Significant Coefficients by Country**

Significant Coefficients	Countries
Real GDP	Madagascar, Mauritius, South Africa, Swaziland, Zimbabwe
Real Interest Rate	South Africa, Zambia
Real Exchange Rate	Botswana, Madagascar, Malawi, Mauritius, South Africa, Zambia

The pooled series analysis shows that there is generally little empirical evidence in the region in favour of the MacKinnon & Shaw hypothesis except for South Africa and Zambia. The value of the coefficients and their statistical significance in the pooled regression suggest that in the southern and eastern African region, the interest channel has worked only in S.Africa and Zambia while the currency substitution channel has worked only in Botswana and South Africa. There is then no common pattern for the region and this suggests that the policy of regional integration might well be retarded because of lack of convergence in the transmission of liberalization policies.

**8.3 Financial Deepening and Growth**

In Chapters 2 and 3 the finance growth connection was discussed. Any causality between these two economic variables has important policy implication for long-term growth and therefore an empirical analysis is undertaken at the level of Mauritius over a two-decade period. Two different approaches are adopted for this study. One takes a banking intermediation index as the explanatory variable and uses



the GMM estimator while the other one compares the effects of both macroeconomic real and financial variables using a vector autoregressive (VAR) model.

The first analytical framework is based on the growth finance equation from Levine, Loayza and Beck (2000).

$$Growth_i = \alpha + \beta Finance_i + \gamma [Conditioning Set]_i + \varepsilon_i$$

where,

- (a) Growth is change in real per capita GDP.
- (b) Finance is an index of four indicators of the banking intermediary sector development.
- (c) The conditioning set is a vector of conditioning information that controls for other factors associated with growth.

The chosen predetermined variables that are likely to be correlated with growth are annual population growth, secondary education enrolment as a measure of human capital, government size, investment ratio, openness of the economy and initial real per capita GDP.

In the growth equation the finance variable is determined by constructing an index of financial development based on Gurley and Shaw (1955) who measure financial development according to an intermediation approach but more precisely based on King and Levine (1993) who take four indicators of financial development namely: DEPTH, BANK, PRIVATE and PRIVY.

- (1) DEPTH: DEPTH is a good indicator of the size of the financial sector. Depth measures liquid liabilities as a share of the GDP

$$DEPTH = \frac{\text{Currency} + \text{Demand and interest bearing liabilities}}{GDP} = \frac{M2}{GDP}$$

(2) Although the size of the financial sector is positively related to the provision of financial services, DEPTH does accurately reflect provision of such services that are provided by commercial banks rather than by central banks. A better indicator of increased financial services is BANK.

$$BANK = \frac{\text{Commercial Bank Assets}}{\text{Commercial Bank Assets} + \text{Central Bank Domestic Assets}}$$

A higher BANK corresponds to increased provision of financial services by commercial banks.

(3) With price and allocation of credit being market determined, it is expected that the flow of credit to the private sector will increase. PRIVATE measures where there is a greater redistribution of credit towards private firms.

$$PRIVATE = \frac{\text{Credit to Private Non – Financial Institutions}}{\text{Credit to Public Sector} + \text{Credit to Private \& Public Enterprise}}$$

A higher PRIVATE means a greater distribution of credit from public to private firms.

(4) The fourth indicator of financial development measures whether more credit is being channeled to the private sector as a share of the GDP; i.e a measure of financial activity in the banking sector.

$$PRIVY = \frac{\textit{Credit Issued to Private Enterprises}}{GDP}$$

Although other scholars, namely Rajan and Zingales (1998) and Levine, Loayza and Beck (2000) have been including the legal framework<sup>292</sup> and accounting standards in the measure of financial development in cross country analysis, these variables have not been retained for the present analysis because this is not a cross-country one where differences in such variables could influence financial intermediation and ultimately growth differently. Further, the changes have taken place only in recent years and the amendments of the Companies' Act in relation to bankruptcy procedures are currently under study. A revision is likely to impact on creditor rights. The introduction of a dummy variable to account for changes in these parameters is not possible as the post –reform series would be too short for a regression exercise.

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<sup>292</sup> E.g creditor rights and enforcement quality



**Table 14.8**

**Growth Regression Results (1)**

Dependent Variable: D(LOG(RGDP))  
Method: Generalized Method of Moments  
Date: 09/15/04 Time: 01:10  
Sample(adjusted): 1980 2002  
Included observations: 23 after adjusting endpoints  
Prewhitening  
Bandwidth: Fixed (2)  
Kernel: Bartlett  
Convergence achieved after: 19 weight matrices, 20 total coef iterations  
Instrument list: C D(LOG(ANPOPGRO)) D(LOG(SECENRO))  
D(LOG(GOVSIZE)) D(LOG(INVRAT)) D(LOG(OPEN))  
D(LOG(INITIALRGDP))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.129749	0.004447	29.17639	0.0000
D(LOG(FINANCE))	0.400423	0.052360	7.647425	0.0000
R-squared	-0.025754	Mean dependent var		0.130514
Adjusted R-squared	-0.074600	S.D. dependent var		0.055081
S.E. of regression	0.057099	Sum squared resid		0.068466
Durbin-Watson stat	2.097526	J-statistic		0.266712

The r-square value does not have any interpretation here since OLS is not being used. In this equation six instruments were used to estimate one parameter and so the number of overidentifying restrictions is  $6-1=5$ .

The Hansen's J-statistics is obtained by multiplying the Eviews software J –statistic by the number of observations in the sample.

$$J = 0.266712 \times (24) = 6.134376$$

If the equation is properly specified with the overidentifying restrictions as valid, the J-statistic has a chi-square distribution with five<sup>293</sup> degrees of freedom. Here the J-statistic is less than 11.07, the critical value for a Chi-square distribution with five

<sup>293</sup> Equal to the number of restrictions



degrees of freedom. We can not therefore reject the null hypothesis of correct specification.

The estimated equation is:

$$D(\text{LOG}(\text{RGDP})) = 0.1297485079 + 0.4004229263 \cdot D(\text{LOG}(\text{FINANCE}))$$

The results then show a positive relationship between the finance index and growth.

Changing the explanatory variable from an overall financial index to a financial deepening ratio gives a similar result as shown below.

**Table 15.8**

**Growth Regression Results (2)**

Dependent Variable: D(LOG(RGDP))				
Method: Generalized Method of Moments				
Date: 09/15/04 Time: 01:19				
Sample(adjusted): 1980 2002				
Included observations: 23 after adjusting endpoints				
Prewhitening				
Bandwidth: Fixed (2)				
Kernel: Bartlett				
Convergence achieved after: 36 weight matrices, 37 total coef iterations				
Instrument list: C D(LOG(ANPOPGRO)) D(LOG(SECENRO))				
D(LOG(GOVSIZE)) D(LOG(INVRAT)) D(LOG(OPEN))				
D(LOG(INITIALRGDP))				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.113154	0.003824	29.58955	0.0000
D(LOG(FINDEEP))	0.317720	0.079757	3.983588	0.0007
R-squared	-0.073915	Mean dependent var		0.130514
Adjusted R-squared	-0.125054	S.D. dependent var		0.055081
S.E. of regression	0.058424	Sum squared resid		0.071681
Durbin-Watson stat	2.303865	J-statistic		0.317287

$$D(\text{LOG}(\text{RGDP})) = 0.113153826 + 0.3177199365 \cdot D(\text{LOG}(\text{FINDEEP}))$$

A different approach is now adopted with a view to compare the causal effect of some macroeconomic real variables and some banking development variables on economic growth. In the literature various studies (Levine and Zervos (1998), Rajan and Zingales (1998), Levine, Loayza and Beck (2000) to name a few) show evidence of finance leading growth. These studies, however, have certain inferential weaknesses:

1. They are cross-sectional in nature. Arestis and Demetriades (1997) suggest that cross-sectional analysis implicitly assumes that the countries concerned have similar economic structure, population and technology. Further, it must be remembered that causality patterns may vary across countries.

2. They tested causality from finance to economic growth but did not examine the possible feedback effects between the two variables. Gujarati (1995) highlights that whenever bidirectional causality exists, ignoring it could introduce simultaneous-equation bias and render models statistically inconsistent. In such cases vector autoregression (VAR) models can be more reliable than single equation models. Sims (1980) developed the VAR time series model as an alternative to structural systems of simultaneous equations models. The VAR model makes use of the interaction among the different variables and models economic relations without unnecessary assumptions. This makes a VAR model acceptable to people from different schools of thought who usually have different sets of assumptions.

A VAR model is therefore used to test the hypotheses pertaining to causality running in both directions between financial development and economic growth. Given that financial development is not the only likely variable to have an impact on economic

growth, some controlling variables are included in the model. The use of a multivariate model rather than a bivariate one minimizes the risk of misleading causality inferences from bias resulting from omitted variables (Lutkepohl, 1982).

The three macroeconomic endogenous variables chosen are real GDP, openness ratio, investment ratio while the selected banking sector variable is private sector credit ratio to GDP as in the previous GMM equation.

Exports and investments are the traditional macroeconomic injections while private sector credit as a proxy to finance is introduced to find out about the supply leading hypothesis discussed in chapter 2.

Every endogenous variable listed above is modeled in a system as a function of the lagged values of itself and of every other endogenous variable. On the basis of the Akaike Information Criteria a lag structure of 1 through 3 was initially chosen as the optimal one. However, with three lags the Eviews software identified insufficient number of observations to run the Johansen test<sup>294</sup> probably due to depletion of degrees of freedom. This constraint imposed a final selection of two lags. The four-variable VAR model is a system of equations as shown below with a constant as the only exogenous variable:

$$\begin{aligned} \text{Log(RGDP)}_t = & C_1 + \alpha_{1,1}\text{Log(RGDP)}_{t-1} + \alpha_{1,2}\text{Log(EXPO)}_{t-1} + \alpha_{1,3}\text{Log(INV)}_{t-1} + \\ & \alpha_{1,4}\text{Log(PRIVY)}_{t-1} + \beta_{1,1}\text{Log(RGDP)}_{t-2} + \beta_{1,2}\text{Log(EXPO)}_{t-2} + \beta_{1,3}\text{Log(INV)}_{t-2} \\ & + \beta_{1,4}\text{Log(PRIVY)}_{t-2} \end{aligned}$$

$$\begin{aligned} \text{Log(EXPO)}_t = & C_2 + \alpha_{2,1}\text{Log(RGDP)}_{t-1} + \alpha_{2,2}\text{Log(EXPO)}_{t-1} + \alpha_{2,3}\text{Log(INV)}_{t-1} + \\ & \alpha_{2,4}\text{Log(PRIVY)}_{t-1} + \beta_{2,1}\text{Log(RGDP)}_{t-2} + \beta_{2,2}\text{Log(EXPO)}_{t-2} + \beta_{2,3}\text{Log(INV)}_{t-2} \\ & + \beta_{2,4}\text{Log(PRIVY)}_{t-2} \end{aligned}$$

---

<sup>294</sup> The Eviews software implements the VAR-based cointegration test using Johansen's methodology.



$$\text{Log(INV)}_t = C_3 + \alpha_{3,1}\text{Log(RGDP)}_{t-1} + \alpha_{3,2}\text{Log(EXPO)}_{t-1} + \alpha_{3,3}\text{Log(INV)}_{t-1} + \alpha_{3,4}\text{Log(PRIVY)}_{t-1} + \beta_{3,1}\text{Log(RGDP)}_{t-2} + \beta_{3,2}\text{Log(EXPO)}_{t-2} + \beta_{3,3}\text{Log(INV)}_{t-2} + \beta_{3,4}\text{Log(PRIVY)}_{t-2}$$

$$\text{Log(PRIVY)}_t = C_4 + \alpha_{4,1}\text{Log(RGDP)}_{t-1} + \alpha_{4,2}\text{Log(EXPO)}_{t-1} + \alpha_{4,3}\text{Log(INV)}_{t-1} + \alpha_{4,4}\text{Log(PRIVY)}_{t-1} + \beta_{4,1}\text{Log(RGDP)}_{t-2} + \beta_{4,2}\text{Log(EXPO)}_{t-2} + \beta_{4,3}\text{Log(INV)}_{t-2} + \beta_{4,4}\text{Log(PRIVY)}_{t-2}$$

The VAR is estimated and the results are displayed below.

**Table 16.8**

**Vector Autoregression Estimates**

Date: 09/21/04 Time: 13:51  
Sample(adjusted): 1981 2002  
Included observations: 22 after adjusting endpoints  
Standard errors & t-statistics in parentheses

	LOG(RGDP)	LOG(EXPO)	LOG(INV)	LOG(PRIVY)
LOG(RGDP(-1))	0.393961 (0.14589) (2.70034)	0.984829 (0.56777) (1.73456)	-0.013490 (0.71992) (-0.01874)	-0.224918 (0.35519) (-0.63324)
LOG(RGDP(-2))	0.154064 (0.10782) (1.42886)	-0.710420 (0.41962) (-1.69303)	-0.381629 (0.53206) (-0.71726)	0.583259 (0.26250) (2.22192)
LOG(EXPO(-1))	0.184445 (0.06523) (2.82739)	1.027014 (0.25387) (4.04537)	1.452461 (0.32191) (4.51205)	-0.062625 (0.15882) (-0.39432)
LOG(EXPO(-2))	0.055096 (0.11096) (0.49656)	-0.115435 (0.43181) (-0.26733)	-0.455214 (0.54752) (-0.83140)	-0.095117 (0.27013) (-0.35212)
LOG(INV(-1))	0.048152 (0.04900) (0.98271)	-0.147874 (0.19069) (-0.77547)	0.215696 (0.24179) (0.89207)	0.177637 (0.11929) (1.48909)
LOG(INV(-2))	0.000597 (0.03814) (0.01565)	-0.050474 (0.14845) (-0.34002)	0.382368 (0.18823) (2.03142)	-0.139346 (0.09286) (-1.50053)
LOG(PRIVY(-1))	0.211043 (0.08924)	0.575555 (0.34728)	0.240501 (0.44035)	0.577363 (0.21725)



	(2.36498)	(1.65732)	(0.54616)	(2.65758)
LOG(PRIVY(-2))	0.052626 (0.07876) (0.66815)	-0.524116 (0.30652) (-1.70988)	-0.925954 (0.38866) (-2.38240)	-0.193504 (0.19175) (-1.00913)
C	2.326891 (0.41673) (5.58365)	-0.132422 (1.62180) (-0.08165)	-2.879974 (2.05641) (-1.40049)	-3.072854 (1.01456) (-3.02875)
R-squared	0.999724	0.996500	0.994496	0.990136
Adj. R-squared	0.999554	0.994346	0.991109	0.984066
Sum sq. resids	0.004344	0.065791	0.105777	0.025747
S.E. equation	0.018280	0.071139	0.090203	0.044503
F-statistic	5889.228	462.6140	293.6076	163.1179
Log likelihood	62.61343	32.71888	27.49550	43.03859
Akaike AIC	-4.873949	-2.156262	-1.681409	-3.094418
Schwarz SC	-4.427613	-1.709926	-1.235074	-2.648082
Mean dependent	10.58205	10.12409	9.217410	-0.994284
S.D. dependent	0.865957	0.946055	0.956623	0.352558
Determinant	Residual 2.28E-12			
Covariance				
Log Likelihood	169.9994			
Akaike Information Criteria	-12.18176			
Schwarz Criteria	-10.39642			

The VAR model with the substituted coefficients is

$$\begin{aligned} \text{LOG(RGDP)} = & 0.3939606823 \cdot \text{LOG(RGDP(-1))} + 0.1540642285 \cdot \text{LOG(RGDP(-2))} + \\ & 0.1844445217 \cdot \text{LOG(EXPO(-1))} + 0.05509643035 \cdot \text{LOG(EXPO(-2))} + \\ & 0.04815236577 \cdot \text{LOG(INV(-1))} + 0.0005968712716 \cdot \text{LOG(INV(-2))} + \\ & 0.2110425956 \cdot \text{LOG(PRIVY(-1))} + 0.05262574558 \cdot \text{LOG(PRIVY(-2))} + 2.326891377 \end{aligned}$$

$$\begin{aligned} \text{LOG(EXPO)} = & 0.9848290735 \cdot \text{LOG(RGDP(-1))} - 0.710419761 \cdot \text{LOG(RGDP(-2))} + \\ & 1.027013814 \cdot \text{LOG(EXPO(-1))} - 0.1154353343 \cdot \text{LOG(EXPO(-2))} - 0.14787401 \cdot \text{LOG(INV(-1))} - \\ & 0.05047399622 \cdot \text{LOG(INV(-2))} + 0.5755549526 \cdot \text{LOG(PRIVY(-1))} - \\ & 0.5241159276 \cdot \text{LOG(PRIVY(-2))} - 0.1324216565 \end{aligned}$$

$$\begin{aligned} \text{LOG(INV)} = & -0.01348993941 \cdot \text{LOG(RGDP(-1))} - 0.3816292027 \cdot \text{LOG(RGDP(-2))} + \\ & 1.45246105 \cdot \text{LOG(EXPO(-1))} - 0.4552135735 \cdot \text{LOG(EXPO(-2))} + 0.2156961882 \cdot \text{LOG(INV(-1))} + \\ & 0.3823681424 \cdot \text{LOG(INV(-2))} + 0.240501242 \cdot \text{LOG(PRIVY(-1))} - \\ & 0.9259539566 \cdot \text{LOG(PRIVY(-2))} - 2.879974305 \end{aligned}$$

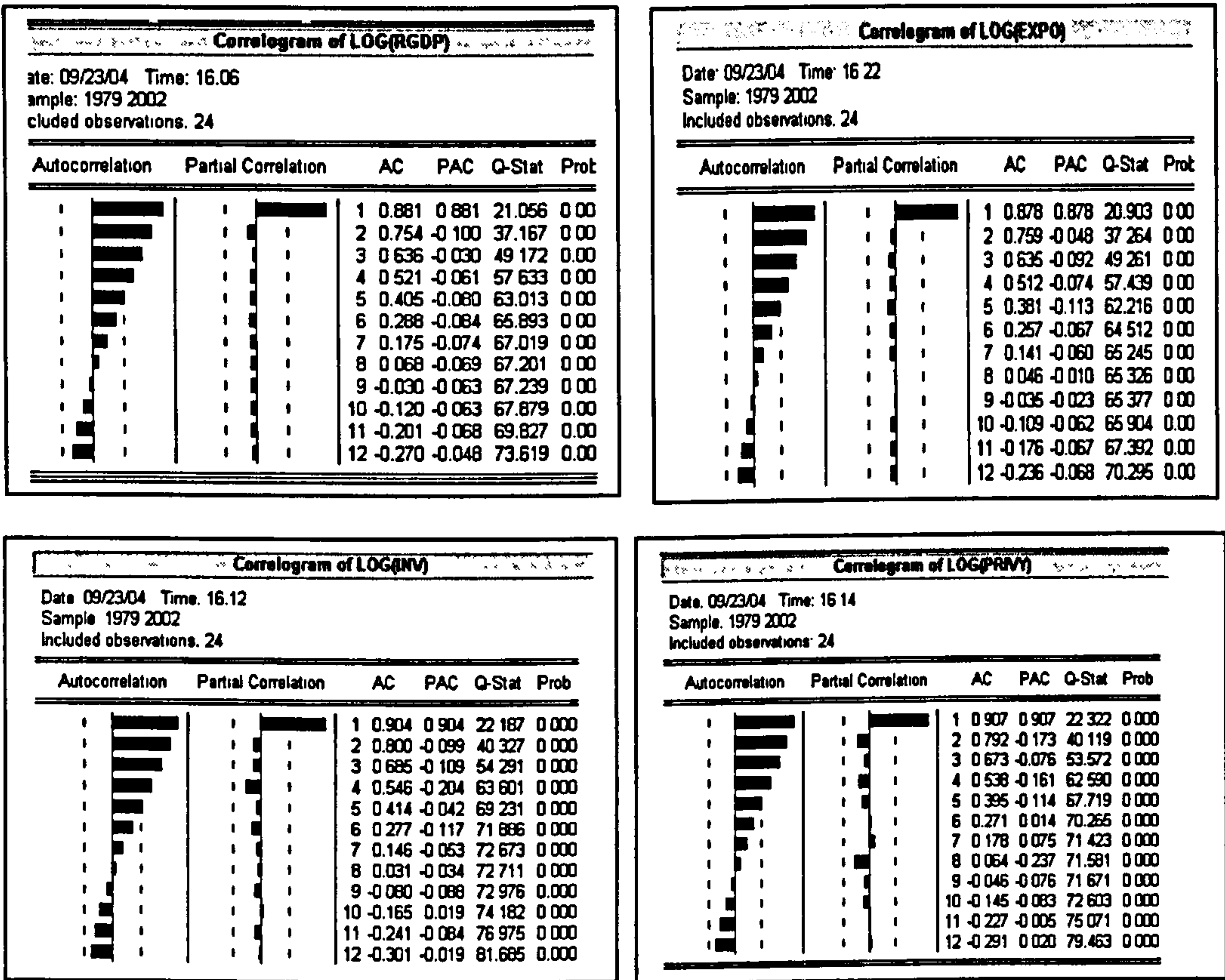
$$\begin{aligned} \text{LOG(PRIVY)} = & -0.2249178232 \cdot \text{LOG(RGDP(-1))} + 0.5832590757 \cdot \text{LOG(RGDP(-2))} - \\ & 0.06262508648 \cdot \text{LOG(EXPO(-1))} - 0.09511709511 \cdot \text{LOG(EXPO(-2))} + \\ & 0.1776371394 \cdot \text{LOG(INV(-1))} - 0.1393461258 \cdot \text{LOG(INV(-2))} + 0.5773627048 \cdot \text{LOG(PRIVY(-1))} - \\ & 0.193504003 \cdot \text{LOG(PRIVY(-2))} - 3.072853981 \end{aligned}$$

From the above it appears that both lag(1) and lag(2) values of PRIVY are positively related to RGDP.

Before running the test of no-causality there is a need to ensure that the series are stationary. If not, spurious results are obtained (Granger and Newbold, 1974)<sup>295</sup>. A regression between two I(1) variables is possible only if they both share the same source of ‘I (1)ness’ and they move together in the long-run<sup>296</sup>. A visual examination of the correlograms gives a first indication that all the series are non-stationary.

Figure 4.8

Correlograms of growth variables



<sup>295</sup> Granger and Newbold show that when estimating equations with non-stationary variables we often find good fit and statistically significant relationships between variables when none actually exists.

<sup>296</sup> i.e they are cointegrated variables.



Formal unit root tests are now run to seek confirmation as to whether the series behave as non-stationary random walks. Only the upper sections of the regression results are reproduced hereunder.

**Table 17.8**

**Unit Root Tests**

**Phillips-Perron Test: Log(RGDP)\_level**

PP Test Statistic	0.103113	1%	Critical Value*	-4.4167
		5%	Critical Value	-3.6219
		10%	Critical Value	-3.2474

\*MacKinnon critical values for rejection of hypothesis of a unit root.

**Phillips-Perron Test: log (RGDP)\_1<sup>st</sup> difference**

PP Test Statistic	-6.583497	1%	Critical Value*	-4.4415
		5%	Critical Value	-3.6330
		10%	Critical Value	-3.2535

\*MacKinnon critical values for rejection of hypothesis of a unit root.

**Phillips-Perron Test: log(EXPO)\_level**

PP Test Statistic	-0.961379	1%	Critical Value*	-4.4167
		5%	Critical Value	-3.6219
		10%	Critical Value	-3.2474

\*MacKinnon critical values for rejection of hypothesis of a unit root.

**Phillips-Perron Test: log(EXPO)\_1<sup>st</sup> difference**

PP Test Statistic	-4.975889	1%	Critical Value*	-4.4415
		5%	Critical Value	-3.6330
		10%	Critical Value	-3.2535

\*MacKinnon critical values for rejection of hypothesis of a unit root.

**Phillips-Perron Test: log(INV)\_Level**

PP Test Statistic	-1.199070	1% Critical Value*	-4.4167
		5% Critical Value	-3.6219
		10% Critical Value	-3.2474

\*Mackinnon critical values for rejection of hypothesis of a unit root.

#### Phillips-Perron Test: log(INV)\_1<sup>st</sup> Difference

PP Test Statistic	-4.681287	1% Critical Value*	-4.4415
		5% Critical Value	-3.6330
		10% Critical Value	-3.2535

\*Mackinnon critical values for rejection of hypothesis of a unit root.

#### Phillips-Perron Test: log(PRIVY)\_Level

PP Test Statistic	-3.296480	1% Critical Value*	-4.4167
		5% Critical Value	-3.6219
		10% Critical Value	-3.2474

\*Mackinnon critical values for rejection of hypothesis of a unit root.

#### Phillips-Perron Test: log(PRIVY)\_1<sup>st</sup> Difference

PP Test Statistic	-4.057032	1% Critical Value*	-4.4415
		5% Critical Value	-3.6330
		10% Critical Value	-3.2535

\*Mackinnon critical values for rejection of hypothesis of a unit root.

These tests reveal that that the series contain a unit root and are integrated of order one [ $\sim I(1)$ ].

The two options that are now available to avoid spurious regression from the non-stationarity nature of the variables are:

1. Run the Granger causality test on the first difference of the variables to make them stationary.



2. Find out whether a linear combination of any two variables is integrated of order zero<sup>297</sup>. The variables are then cointegrated. There is a long run relationship between them with residuals fluctuating around zero. OLS is super-consistent since the estimates approach their true parameters at a faster rate than in the case of stationary variables (Engle and Granger, 1987).

Both options are presented below:

Option One: Granger causality test on the first difference. The disadvantage of adopting this option is that when  $[~I(1)]$  forms of the variables are constructed this can filter out information about long-run behaviour of the variables and implicitly only the short-run is being analysed. Inferences are then biased. Further economic relations link levels of variable rather than differences. So while it deals with the statistical problem, the economic interpretation remains problematical.

Table 18.8

Granger Causality test\_1st set

Pairwise Granger Causality Tests			
Date: 09/23/04 Time: 12.23			
Sample: 1979 2002			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
D(LOG(EXPO)) does not Granger Cause D(LOG(RGDP))	21	8.16603	0.00360
D(LOG(RGDP)) does not Granger Cause D(LOG(EXPO))	21	1.08735	0.36076
D(LOG(INV)) does not Granger Cause D(LOG(RGDP))	21	2.74706	0.09428
D(LOG(RGDP)) does not Granger Cause D(LOG(INV))	21	0.57874	0.57192

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$y_t = \alpha + \beta x_t + \varepsilon_t$   
 If  $x_t \sim I(1)$  and  $y_t \sim I(1)$ , then generally,  $y_t - \beta x_t \sim I(1)$ . However, if  $\varepsilon_t \sim I(0)$  then  $y_t - \beta x_t \sim I(0)$

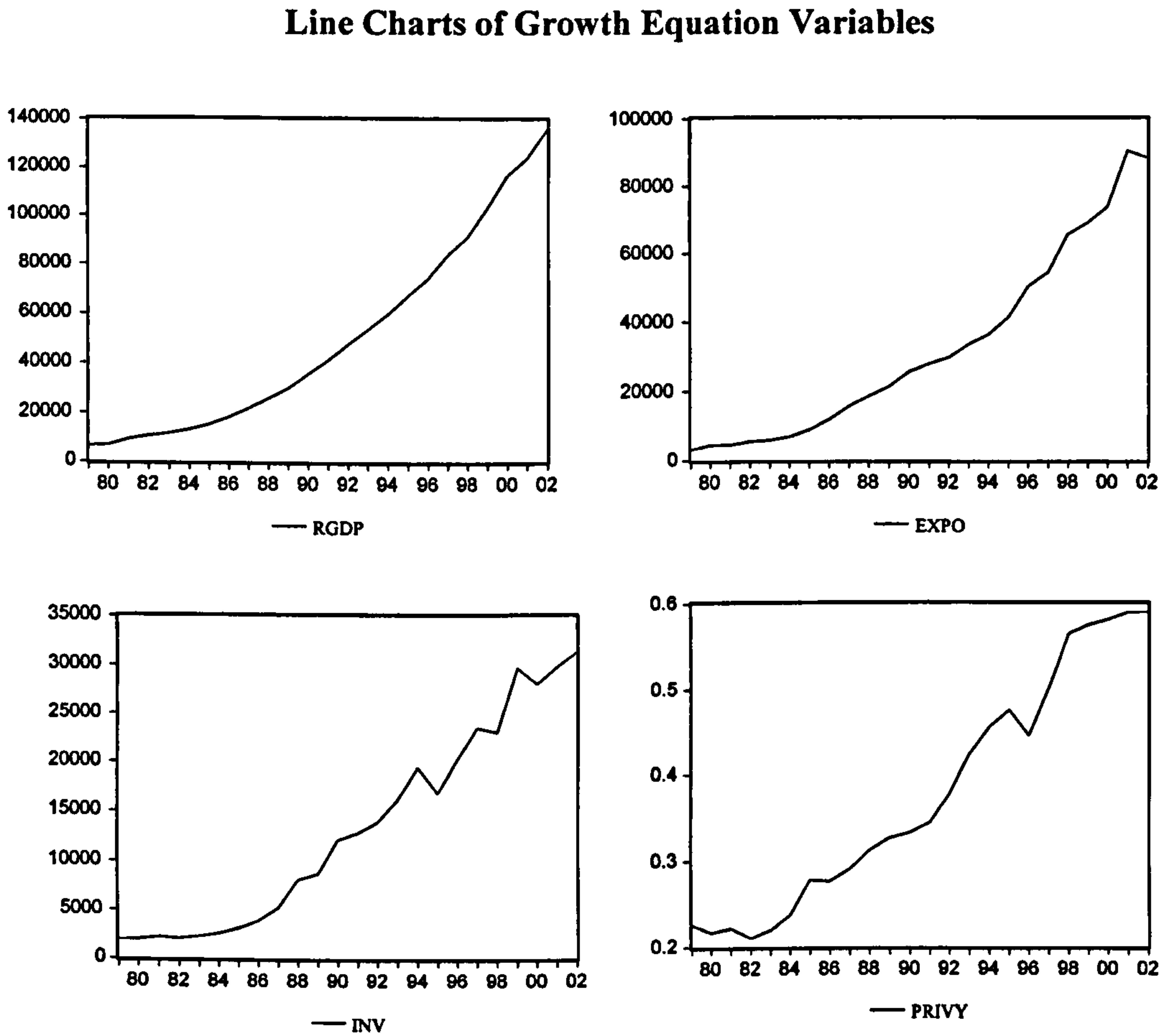
D(LOG(PRIVY)) does not Granger Cause 21	2.14695	0.14929
D(LOG(RGDP))		
D(LOG(RGDP)) does not Granger Cause 21	0.91783	0.41942
D(LOG(PRIVY))		
D(LOG(INV)) does not Granger Cause 21	1.08178	0.36254
D(LOG(EXPO))		
D(LOG(EXPO)) does not Granger Cause 21	9.50452	0.00190
D(LOG(INV))		
D(LOG(PRIVY)) does not Granger Cause 21	0.79902	0.46692
D(LOG(EXPO))		
D(LOG(EXPO)) does not Granger Cause 21	0.32532	0.72697
D(LOG(PRIVY))		
D(LOG(PRIVY)) does not Granger Cause 21	0.20438	0.81725
D(LOG(INV))		
D(LOG(INV)) does not Granger Cause 21	0.77651	0.47659
D(LOG(PRIVY))		

The results show unidirectional causality from exports to real GDP but that credit to private sector does not Granger-cause real GDP. Option one contrasts with the results obtained for finance using the GMM estimator.

Option two is a preferred one because as per Granger's representation theorem, (Engle and Granger, 1987), the unrestricted VAR is appropriate only when there are no cointegrating relations. Whenever variables are cointegrated (they are non-stationary but share a common stochastic drift) there is the possibility of constructing a dynamic vector error correction (VEC) model to test for significance of long-run information in a model that is otherwise short-run. In such cases the VEC model improves the standard Granger-causality tests by adding a regressor as an error correction term in each equation in the system. This regressor is a lagged error from a regression of the I (0) variables. This prevents errors in the long run relationships to be larger. A first glance at the graphical display of the four variables suggests that

they share some common stochastic trend and they could move together over the long run<sup>298</sup> (i.e there could be some cointegration relationship among them).

**Figure 5.8**



A formal test of cointegration is run below using the Johansen technique, Johansen (1991, 1995) to determine whether the non-stationary series are cointegrated and if so to identify the cointegrating (long-run equilibrium) relationships.

<sup>298</sup> There is a sort of equilibrium relationship between the variables.



Table 19.8

Johansen Cointegration Test

Date: 09/22/04 Time: 10:02  
Sample: 1979 2002  
Included observations: 21  
Test  
assumption:  
Linear  
deterministic  
trend in the  
data  
Series: LOG(RGDP) LOG(EXPO) LOG(INV) LOG(PRIVY)  
Exogenous series: C  
Warning: Critical values were derived assuming no exogenous series  
Lags interval: 1 to 2

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.901430	137.0790	62.99	70.05	None **
0.854849	88.42229	42.44	48.45	At most 1 **
0.824987	47.89265	25.32	30.45	At most 2 **
0.415914	11.29186	12.25	16.26	At most 3

(\*\*) denotes rejection of the hypothesis at 5%(1%) significance level  
L.R. test indicates 3 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

LOG(RGDP)	LOG(EXPO)	LOG(INV)	LOG(PRIVY)	@TREND(80)
-9.074141	1.517298	2.918715	1.383830	0.504123
-5.066716	-7.001902	6.099015	-10.87690	1.425029
2.509400	-6.315740	1.900771	-2.406543	0.512409
3.887737	-2.222757	0.295503	-10.16099	0.377670

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

LOG(RGDP)	LOG(EXPO)	LOG(INV)	LOG(PRIVY)	@TREND(80)	C
1.000000	-0.167211	-0.321652	-0.152503	-0.055556	-5.325653
	(0.07931)	(0.04582)	(0.12927)	(0.01212)	

Log likelihood 173.3440

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

LOG(RGDP)	LOG(EXPO)	LOG(INV)	LOG(PRIVY)	@TREND(80)	C
1.000000	0.000000	-0.416862	0.095671	-0.079917	-5.567041
		(0.01245)	(0.08853)	(0.00540)	
0.000000	1.000000	-0.569401	1.484192	-0.145691	-1.443615
		(0.02128)	(0.15125)	(0.00922)	

Log likelihood 193.6088

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)



LOG(RGDP)	LOG(EXPO)	LOG(INV)	LOG(PRIVY)	@TREND(80)	C
1.000000	0.000000	0.000000	-4.222972 (1.86668)	0.053094 (0.09215)	-15.50594
0.000000	1.000000	0.000000	-4.414739 (2.32900)	0.035992 (0.11497)	-15.01938
0.000000	0.000000	1.000000	-10.35988 (4.37262)	0.319076 (0.21585)	-23.84218
Log likelihood 211.9092					

The upper section of the table shows the test for the number of cointegrating relations. In the first row, the null hypothesis is that there is no cointegration. The second row is testing at most one cointegration relation, the third row tests for at most two cointegrating relations while the last row tests the null hypothesis of at most three cointegrating relations. In all four cases the alternative hypothesis is that all the series in the VAR are stationary. The test shows three cointegrating relations and from the lower section of the table the three cointegrating relations are:

1.  $\text{Log(RGDP)} - 4.22\text{log(PRIVY)} - 15.5$
2.  $\text{Log(EXPO)} - 4.41\text{Log(PRIVY)} - 15.0$
3.  $\text{Log(INV)} - 4.37 - \text{Log(PRIVY)} - 23.8$

It is not appropriate here to run the standard Granger causality test. The original unrestricted VAR did not assume the presence of cointegration. Cointegration restrictions are now imposed among the variables in the VAR and a VEC Model is obtained as below.

Table 20.8

Vector Error Correction Estimates

Date: 09/22/04 Time: 10:48  
Sample(adjusted): 1982 2002  
Included observations: 21 after adjusting endpoints  
Standard errors & t-statistics in parentheses

Cointegrating Eq: CointEq1				
LOG(RGDP(-1))	1.000000			
LOG(EXPO(-1))	-0.167211 (0.07931) (-2.10839)			
LOG(INV(-1))	-0.321652 (0.04582) (-7.02046)			
LOG(PRIVY(-1))	-0.152503 (0.12927) (-1.17968)			
@TREND(79)	-0.055556 (0.01212) (-4.58251)			
C	-5.325653			
Error Correction:	D(LOG(RGD P))	D(LOG(EXP O))	D(LOG(INV))	D(LOG(PRIV Y))
CointEq1	-0.005704 (0.20376) (-0.02799)	2.129047 (0.38996) (5.45971)	0.832254 (1.01305) (0.82153)	1.103188 (0.44707) (2.46760)
D(LOG(RGDP(- 1)))	0.171958 (0.14600) (1.17782)	0.548682 (0.27941) (1.96372)	-0.264032 (0.72586) (-0.36375)	-0.340391 (0.32033) (-1.06262)
D(LOG(RGDP(- 2)))	0.067054 (0.14922) (0.44936)	-0.921751 (0.28557) (-3.22770)	0.155474 (0.74188) (0.20957)	-0.082749 (0.32740) (-0.25274)
D(LOG(EXPO(- 1)))	0.141808 (0.08355) (1.69723)	0.187430 (0.15990) (1.17215)	1.272664 (0.41540) (3.06368)	-0.121473 (0.18332) (-0.66262)
D(LOG(EXPO(- 2)))	0.244001 (0.11332) (2.15314)	0.132121 (0.21688) (0.60920)	0.536761 (0.56342) (0.95269)	-0.254073 (0.24864) (-1.02184)

D(LOG(INV(-1)))	-0.020126 (0.06843) (-0.29411)	0.295754 (0.13096) (2.25827)	-0.232969 (0.34023) (-0.68475)	0.486008 (0.15015) (3.23690)
D(LOG(INV(-2)))	-0.014589 (0.05323) (-0.27409)	0.375457 (0.10187) (3.68582)	0.224177 (0.26463) (0.84713)	0.151346 (0.11678) (1.29594)
D(LOG(PRIVY(-1)))	0.135356 (0.11015) (1.22879)	0.163823 (0.21081) (0.77710)	0.449239 (0.54766) (0.82029)	-0.085952 (0.24169) (-0.35563)
D(LOG(PRIVY(-2)))	0.171591 (0.10919) (1.57149)	0.092454 (0.20897) (0.44243)	0.091234 (0.54287) (0.16806)	-0.287555 (0.23957) (-1.20028)
C	0.028973 (0.02904) (0.99783)	0.048450 (0.05557) (0.87189)	-0.145769 (0.14436) (-1.00977)	0.095869 (0.06371) (1.50483)
R-squared	0.734309	0.841568	0.648759	0.578639
Adj. R-squared	0.516926	0.711942	0.361380	0.233890
Sum sq. resids	0.005547	0.020315	0.137101	0.026701
S.E. equation	0.022455	0.042974	0.111641	0.049269
F-statistic	3.377944	6.492280	2.257502	1.678435
Log likelihood	56.71288	43.08204	23.03363	40.21175
Akaike AIC	-4.448846	-3.150670	-1.241298	-2.877310
Schwarz SC	-3.951454	-2.653278	-0.743907	-2.379918
Mean dependent	0.128264	0.141053	0.125683	0.046699
S.D. dependent	0.032308	0.080070	0.139702	0.056289
Determinant	Residual 7.95E-13			
Covariance				
Log Likelihood	173.3440			
Akaike Information Criteria	-12.22324			
Schwarz Criteria	-9.984977			

The model with its substituted coefficient is:

$$D(\text{LOG}(\text{RGDP})) = -0.0057040815 * (\text{LOG}(\text{RGDP}(-1)) - 0.167211207 * \text{LOG}(\text{EXPO}(-1)) - 0.3216519065 * \text{LOG}(\text{INV}(-1)) - 0.1525025279 * \text{LOG}(\text{PRIVY}(-1)) - 0.05555599808 * (@\text{TREND}(79)) - 5.325652748) + 0.1719580789 * D(\text{LOG}(\text{RGDP}(-1))) + 0.06705350665 * D(\text{LOG}(\text{RGDP}(-2))) + 0.1418077125 * D(\text{LOG}(\text{EXPO}(-1))) + 0.2440008044 * D(\text{LOG}(\text{EXPO}(-2))) - 0.02012637232 * D(\text{LOG}(\text{INV}(-1))) - 0.01458918694 * D(\text{LOG}(\text{INV}(-2))) + 0.1353560618 * D(\text{LOG}(\text{PRIVY}(-1))) + 0.1715908651 * D(\text{LOG}(\text{PRIVY}(-2))) + 0.02897268687$$

$$D(\text{LOG}(\text{EXPO})) = 2.12904732 * (\text{LOG}(\text{RGDP}(-1)) - 0.167211207 * \text{LOG}(\text{EXPO}(-1)) - 0.3216519065 * \text{LOG}(\text{INV}(-1)) - 0.1525025279 * \text{LOG}(\text{PRIVY}(-1)) - 0.05555599808 * (@\text{TREND}(79)) - 5.325652748) + 0.5486816129 * D(\text{LOG}(\text{RGDP}(-1))) - 0.9217510186 * D(\text{LOG}(\text{RGDP}(-2))) + 0.1874304283 * D(\text{LOG}(\text{EXPO}(-1))) +$$



$$0.1321213189 \cdot D(\text{LOG}(\text{EXPO}(-2))) + 0.2957541118 \cdot D(\text{LOG}(\text{INV}(-1))) + \\ 0.3754565895 \cdot D(\text{LOG}(\text{INV}(-2))) + 0.1638226958 \cdot D(\text{LOG}(\text{PRIVY}(-1))) + \\ 0.09245402612 \cdot D(\text{LOG}(\text{PRIVY}(-2))) + 0.04844989989$$

$$D(\text{LOG}(\text{INV})) = 0.8322540331 \cdot ( \text{LOG}(\text{RGDP}(-1)) - 0.167211207 \cdot \text{LOG}(\text{EXPO}(-1)) - \\ 0.3216519065 \cdot \text{LOG}(\text{INV}(-1)) - 0.1525025279 \cdot \text{LOG}(\text{PRIVY}(-1)) - \\ 0.05555599808 \cdot (@\text{TREND}(79)) - 5.325652748 ) - 0.2640318318 \cdot D(\text{LOG}(\text{RGDP}(-1))) + \\ 0.1554736096 \cdot D(\text{LOG}(\text{RGDP}(-2))) + 1.272664416 \cdot D(\text{LOG}(\text{EXPO}(-1))) + \\ 0.5367614408 \cdot D(\text{LOG}(\text{EXPO}(-2))) - 0.2329690258 \cdot D(\text{LOG}(\text{INV}(-1))) + \\ 0.2241772313 \cdot D(\text{LOG}(\text{INV}(-2))) + 0.4492387265 \cdot D(\text{LOG}(\text{PRIVY}(-1))) + \\ 0.09123398691 \cdot D(\text{LOG}(\text{PRIVY}(-2))) - 0.1457686084$$

$$D(\text{LOG}(\text{PRIVY})) = 1.103188336 \cdot ( \text{LOG}(\text{RGDP}(-1)) - 0.167211207 \cdot \text{LOG}(\text{EXPO}(-1)) - \\ 0.3216519065 \cdot \text{LOG}(\text{INV}(-1)) - 0.1525025279 \cdot \text{LOG}(\text{PRIVY}(-1)) - \\ 0.05555599808 \cdot (@\text{TREND}(79)) - 5.325652748 ) - 0.3403911722 \cdot D(\text{LOG}(\text{RGDP}(-1))) - \\ 0.08274882831 \cdot D(\text{LOG}(\text{RGDP}(-2))) - 0.1214726179 \cdot D(\text{LOG}(\text{EXPO}(-1))) - \\ 0.2540729771 \cdot D(\text{LOG}(\text{EXPO}(-2))) + 0.486007618 \cdot D(\text{LOG}(\text{INV}(-1))) + \\ 0.1513458015 \cdot D(\text{LOG}(\text{INV}(-2))) - 0.08595231499 \cdot D(\text{LOG}(\text{PRIVY}(-1))) - \\ 0.2875551141 \cdot D(\text{LOG}(\text{PRIVY}(-2))) + 0.09586873433$$

Using the VEC model to measure precedence the Granger test is run on the following:

$$d(\text{Log}(\text{RGDP})) \text{Log}(\text{RGDP}(-1)) \text{Log}(\text{EXPO}(-1)) \text{log}(\text{INV}(-1)) \text{log}(\text{PRIVY}(-1)) \\ d(\text{log}(\text{RGDP}(-1))) d(\text{log}(\text{RGDP}(-2))) d(\text{log}(\text{EXPO}(-1))) d(\text{log}(\text{EXPO}(-2))) \\ d(\text{log}(\text{INV}(-1))) d(\text{log}(\text{INV}(-2))) d(\text{Log}(\text{PRIVY}(-1))) d(\text{log}(\text{PRIVY}(-2))) \\ d(\text{log}(\text{Expo})) d(\text{log}(\text{INV})) d(\text{log}(\text{PRIVY}))$$

Table 21.8

Pairwise Granger Causality Tests

Pairwise Granger Causality Tests			
Date: 09/22/04 Time: 11:14			
Sample: 1979 2002			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
LOG(RGDP(-1)) does not Granger Cause 21		NA	NA
D(LOG(RGDP))			
D(LOG(RGDP)) does not Granger Cause 21		NA	NA
LOG(RGDP(-1))			
LOG(EXPO(-1)) does not Granger Cause 21		5.49390	0.01526
D(LOG(RGDP))			
D(LOG(RGDP)) does not Granger Cause 21		1.48127	0.25691
LOG(EXPO(-1))			
LOG(INV(-1)) does not Granger Cause 21		3.87271	0.04249
D(LOG(RGDP))			



D(LOG(RGDP)) does not Granger Cause LOG(INV(-1))	0.46807	0.63452
LOG(PRIVY(-1)) does not Granger Cause D(LOG(RGDP))	21	6.12976
D(LOG(RGDP)) does not Granger Cause LOG(PRIVY(-1))	1.94522	0.17531
D(LOG(RGDP(-1))) does not Granger Cause D(LOG(RGDP))	20	NA
D(LOG(RGDP)) does not Granger Cause D(LOG(RGDP(-1)))	NA	NA
D(LOG(RGDP(-2))) does not Granger Cause D(LOG(RGDP))	19	0.20674
D(LOG(RGDP)) does not Granger Cause D(LOG(RGDP(-2)))	1.7E+30	0.00000
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(RGDP))	20	2.53155
D(LOG(RGDP)) does not Granger Cause D(LOG(EXPO(-1)))	0.09977	0.90564
D(LOG(EXPO(-2))) does not Granger Cause D(LOG(RGDP))	19	0.56873
D(LOG(RGDP)) does not Granger Cause D(LOG(EXPO(-2)))	3.53632	0.05713
D(LOG(INV(-1))) does not Granger Cause D(LOG(RGDP))	20	1.14334
D(LOG(RGDP)) does not Granger Cause D(LOG(INV(-1)))	5.91107	0.01279
D(LOG(INV(-2))) does not Granger Cause D(LOG(RGDP))	19	1.56460
D(LOG(RGDP)) does not Granger Cause D(LOG(INV(-2)))	4.67492	0.02786
D(LOG(PRIVY(-1))) does not Granger Cause D(LOG(RGDP))	20	0.72515
D(LOG(RGDP)) does not Granger Cause D(LOG(PRIVY(-1)))	2.20902	0.14426
D(LOG(PRIVY(-2))) does not Granger Cause D(LOG(RGDP))	19	3.97962
D(LOG(RGDP)) does not Granger Cause D(LOG(PRIVY(-2)))	0.88275	0.43545
D(LOG(EXPO)) does not Granger Cause D(LOG(RGDP))	21	8.16603
D(LOG(RGDP)) does not Granger Cause D(LOG(EXPO))	1.08735	0.36076
D(LOG(INV)) does not Granger Cause D(LOG(RGDP))	21	2.74706
D(LOG(RGDP)) does not Granger Cause D(LOG(INV))	0.57874	0.57192
D(LOG(PRIVY)) does not Granger Cause D(LOG(RGDP))	21	2.14695
D(LOG(RGDP)) does not Granger Cause D(LOG(PRIVY))	0.91783	0.41942
LOG(EXPO(-1)) does not Granger Cause	21	12.2406

LOG(RGDP(-1))						
LOG(RGDP(-1))	does	not	Granger	Cause	2.44755	0.11820
LOG(EXPO(-1))						
LOG(INV(-1))	does	not	Granger	Cause	21	5.02961
LOG(RGDP(-1))						0.02020
LOG(RGDP(-1))	does	not	Granger	Cause	0.90208	0.42539
LOG(INV(-1))						
LOG(PRIVY(-1))	does	not	Granger	Cause	21	2.31708
LOG(RGDP(-1))						0.13070
LOG(RGDP(-1))	does	not	Granger	Cause	9.20832	0.00218
LOG(PRIVY(-1))						
D(LOG(RGDP(-1)))	does	not	Granger	Cause	20	NA
LOG(RGDP(-1))						NA
LOG(RGDP(-1))	does	not	Granger	Cause	NA	NA
D(LOG(RGDP(-1)))						
D(LOG(RGDP(-2)))	does	not	Granger	Cause	19	2.25513
LOG(RGDP(-1))						0.14158
LOG(RGDP(-1))	does	not	Granger	Cause	2.5E+22	0.00000
D(LOG(RGDP(-2)))						
D(LOG(EXPO(-1)))	does	not	Granger	Cause	20	7.34591
LOG(RGDP(-1))						0.00597
LOG(RGDP(-1))	does	not	Granger	Cause	0.74313	0.49234
D(LOG(EXPO(-1)))						
D(LOG(EXPO(-2)))	does	not	Granger	Cause	19	3.37264
LOG(RGDP(-1))						0.06375
LOG(RGDP(-1))	does	not	Granger	Cause	1.52240	0.25220
D(LOG(EXPO(-2)))						
D(LOG(INV(-1)))	does	not	Granger	Cause	20	3.94232
LOG(RGDP(-1))						0.04208
LOG(RGDP(-1))	does	not	Granger	Cause	1.56092	0.24220
D(LOG(INV(-1)))						
D(LOG(INV(-2)))	does	not	Granger	Cause	19	2.66411
LOG(RGDP(-1))						0.10460
LOG(RGDP(-1))	does	not	Granger	Cause	2.85439	0.09126
D(LOG(INV(-2)))						
D(LOG(PRIVY(-1)))	does	not	Granger	Cause	20	3.26253
LOG(RGDP(-1))						0.06662
LOG(RGDP(-1))	does	not	Granger	Cause	2.01763	0.16749
D(LOG(PRIVY(-1)))						
D(LOG(PRIVY(-2)))	does	not	Granger	Cause	19	2.27800
LOG(RGDP(-1))						0.13916
LOG(RGDP(-1))	does	not	Granger	Cause	0.25543	0.77811
D(LOG(PRIVY(-2)))						
D(LOG(EXPO))	does	not	Granger	Cause	21	3.13863
LOG(RGDP(-1))						0.07081
LOG(RGDP(-1))	does	not	Granger	Cause	3.75182	0.04612
D(LOG(EXPO))						
D(LOG(INV))	does	not	Granger	Cause	21	1.50426
LOG(RGDP(-1))						0.25198
LOG(RGDP(-1))	does	not	Granger	Cause	0.66836	0.52629
D(LOG(INV))						



D(LOG(PRIVY)) does not Granger Cause 21	0.54023	0.59287
LOG(RGDP(-1))		
LOG(RGDP(-1)) does not Granger Cause	0.24500	0.78558
D(LOG(PRIVY))		
LOG(INV(-1)) does not Granger Cause 21	4.10402	0.03642
LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	10.8058	0.00107
LOG(INV(-1))		
LOG(PRIVY(-1)) does not Granger Cause 21	1.55838	0.24079
LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	3.00028	0.07825
LOG(PRIVY(-1))		
D(LOG(RGDP(-1))) does not Granger 20	3.01850	0.07912
Cause LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	5.54559	0.01574
D(LOG(RGDP(-1)))		
D(LOG(RGDP(-2))) does not Granger 19	4.62662	0.02868
Cause LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	1.41966	0.27455
D(LOG(RGDP(-2)))		
D(LOG(EXPO(-1))) does not Granger 20	NA	NA
Cause LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	NA	NA
D(LOG(EXPO(-1)))		
D(LOG(EXPO(-2))) does not Granger 19	0.39539	0.68071
Cause LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	4.5E+22	0.00000
D(LOG(EXPO(-2)))		
D(LOG(INV(-1))) does not Granger Cause 20	0.64756	0.53735
LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	9.98171	0.00175
D(LOG(INV(-1)))		
D(LOG(INV(-2))) does not Granger Cause 19	1.85645	0.19269
LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	0.45707	0.64226
D(LOG(INV(-2)))		
D(LOG(PRIVY(-1))) does not Granger 20	0.89587	0.42901
Cause LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	0.46845	0.63483
D(LOG(PRIVY(-1)))		
D(LOG(PRIVY(-2))) does not Granger 19	0.98776	0.39693
Cause LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	0.22441	0.80181
D(LOG(PRIVY(-2)))		
D(LOG(EXPO)) does not Granger Cause 21	NA	NA
LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	NA	NA
D(LOG(EXPO))		
D(LOG(INV)) does not Granger Cause 21	1.14631	0.34257
LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	0.54065	0.59264

D(LOG(INV))		
D(LOG(PRIVY)) does not Granger Cause 21	1.66254	0.22080
LOG(EXPO(-1))		
LOG(EXPO(-1)) does not Granger Cause	0.18152	0.83569
D(LOG(PRIVY))		
LOG(PRIVY(-1)) does not Granger Cause 21	0.26692	0.76908
LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	1.71052	0.21222
LOG(PRIVY(-1))		
D(LOG(RGDP(-1))) does not Granger 20	0.87815	0.43586
Cause LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	4.36020	0.03216
D(LOG(RGDP(-1)))		
D(LOG(RGDP(-2))) does not Granger 19	0.04345	0.95761
Cause LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	5.98935	0.01320
D(LOG(RGDP(-2)))		
D(LOG(EXPO(-1))) does not Granger 20	10.2555	0.00156
Cause LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	1.59411	0.23564
D(LOG(EXPO(-1)))		
D(LOG(EXPO(-2))) does not Granger 19	1.67759	0.22228
Cause LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	1.94228	0.18011
D(LOG(EXPO(-2)))		
D(LOG(INV(-1))) does not Granger Cause 20	NA	NA
LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	NA	NA
D(LOG(INV(-1)))		
D(LOG(INV(-2))) does not Granger Cause 19	1.72464	0.21402
LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	1.1E+24	0.00000
D(LOG(INV(-2)))		
D(LOG(PRIVY(-1))) does not Granger 20	0.70732	0.50869
Cause LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	0.68300	0.52014
D(LOG(PRIVY(-1)))		
D(LOG(PRIVY(-2))) does not Granger 19	0.48353	0.62653
Cause LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	0.37018	0.69717
D(LOG(PRIVY(-2)))		
D(LOG(EXPO)) does not Granger Cause 21	6.50705	0.00855
LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	3.28001	0.06401
D(LOG(EXPO))		
D(LOG(INV)) does not Granger Cause 21	NA	NA
LOG(INV(-1))		
LOG(INV(-1)) does not Granger Cause	NA	NA
D(LOG(INV))		
D(LOG(PRIVY)) does not Granger Cause 21	0.37176	0.69532
LOG(INV(-1))		



LOG(INV(-1)) does not Granger Cause D(LOG(PRIVY))	0.11312	0.89375
D(LOG(RGDP(-1))) does not Granger Cause LOG(PRIVY(-1))	20 2.06755	0.16105
LOG(PRIVY(-1)) does not Granger Cause D(LOG(RGDP(-1)))	2.16482	0.14928
D(LOG(RGDP(-2))) does not Granger Cause LOG(PRIVY(-1))	19 0.66932	0.52770
LOG(PRIVY(-1)) does not Granger Cause D(LOG(RGDP(-2)))	0.80391	0.46720
D(LOG(EXPO(-1))) does not Granger Cause LOG(PRIVY(-1))	20 0.25892	0.77527
LOG(PRIVY(-1)) does not Granger Cause D(LOG(EXPO(-1)))	1.34921	0.28918
D(LOG(EXPO(-2))) does not Granger Cause LOG(PRIVY(-1))	19 0.08026	0.92329
LOG(PRIVY(-1)) does not Granger Cause D(LOG(EXPO(-2)))	1.01022	0.38920
D(LOG(INV(-1))) does not Granger Cause LOG(PRIVY(-1))	20 0.66029	0.53109
LOG(PRIVY(-1)) does not Granger Cause D(LOG(INV(-1)))	0.53037	0.59902
D(LOG(INV(-2))) does not Granger Cause LOG(PRIVY(-1))	19 1.39273	0.28078
LOG(PRIVY(-1)) does not Granger Cause D(LOG(INV(-2)))	0.45381	0.64422
D(LOG(PRIVY(-1))) does not Granger Cause LOG(PRIVY(-1))	20 NA	NA
LOG(PRIVY(-1)) does not Granger Cause D(LOG(PRIVY(-1)))	NA	NA
D(LOG(PRIVY(-2))) does not Granger Cause LOG(PRIVY(-1))	19 2.28125	0.13882
LOG(PRIVY(-1)) does not Granger Cause D(LOG(PRIVY(-2)))	1.6E+26	0.00000
D(LOG(EXPO)) does not Granger Cause LOG(PRIVY(-1))	21 0.20867	0.81383
LOG(PRIVY(-1)) does not Granger Cause D(LOG(EXPO))	1.75684	0.20429
D(LOG(INV)) does not Granger Cause LOG(PRIVY(-1))	21 0.60389	0.55868
LOG(PRIVY(-1)) does not Granger Cause D(LOG(INV))	1.07601	0.36439
D(LOG(PRIVY)) does not Granger Cause LOG(PRIVY(-1))	21 NA	NA
LOG(PRIVY(-1)) does not Granger Cause D(LOG(PRIVY))	NA	NA
D(LOG(RGDP(-2))) does not Granger Cause D(LOG(RGDP(-1)))	19 NA	NA
D(LOG(RGDP(-1))) does not Granger Cause D(LOG(RGDP(-2)))	NA	NA
D(LOG(EXPO(-1))) does not Granger Cause	20 8.62315	0.00321

Cause D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	1.38959	0.27948	
D(LOG(EXPO(-1)))					
D(LOG(EXPO(-2)))	does not	Granger 19	2.32530	0.13429	
Cause D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	0.37228	0.69578	
D(LOG(EXPO(-2)))					
D(LOG(INV(-1)))	does not	Granger Cause 20	2.51424	0.11437	
D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	0.58412	0.56979	
D(LOG(INV(-1)))					
D(LOG(INV(-2)))	does not	Granger Cause 19	1.05517	0.37425	
D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	5.49538	0.01732	
D(LOG(INV(-2)))					
D(LOG(PRIVY(-1)))	does not	Granger 20	2.00769	0.16881	
Cause D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	1.76001	0.20577	
D(LOG(PRIVY(-1)))					
D(LOG(PRIVY(-2)))	does not	Granger 19	0.71772	0.50497	
Cause D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	2.13432	0.15522	
D(LOG(PRIVY(-2)))					
D(LOG(EXPO))	does not	Granger Cause 20	4.39920	0.03137	
D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	0.35038	0.71004	
D(LOG(EXPO))					
D(LOG(INV))	does not	Granger Cause 20	10.8658	0.00121	
D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	0.18945	0.82936	
D(LOG(INV))					
D(LOG(PRIVY))	does not	Granger Cause 20	0.56410	0.58048	
D(LOG(RGDP(-1)))					
D(LOG(RGDP(-1)))	does not	Granger Cause	0.39874	0.67807	
D(LOG(PRIVY))					
D(LOG(EXPO(-1)))	does not	Granger 19	4.16485	0.03808	
Cause D(LOG(RGDP(-2)))					
D(LOG(RGDP(-2)))	does not	Granger Cause	0.93685	0.41510	
D(LOG(EXPO(-1)))					
D(LOG(EXPO(-2)))	does not	Granger 19	6.49358	0.01011	
Cause D(LOG(RGDP(-2)))					
D(LOG(RGDP(-2)))	does not	Granger Cause	1.26622	0.31228	
D(LOG(EXPO(-2)))					
D(LOG(INV(-1)))	does not	Granger Cause 19	10.0715	0.00195	
D(LOG(RGDP(-2)))					
D(LOG(RGDP(-2)))	does not	Granger Cause	0.16862	0.84652	
D(LOG(INV(-1)))					
D(LOG(INV(-2)))	does not	Granger Cause 19	2.57537	0.11158	
D(LOG(RGDP(-2)))					
D(LOG(RGDP(-2)))	does not	Granger Cause	0.49072	0.62233	
D(LOG(INV(-2)))					



D(LOG(PRIVY(-1))) does not Granger Cause D(LOG(RGDP(-2)))	19	0.21838	0.80651
D(LOG(RGDP(-2))) does not Granger Cause D(LOG(PRIVY(-1)))		0.45085	0.64602
D(LOG(PRIVY(-2))) does not Granger Cause D(LOG(RGDP(-2)))	19	1.30461	0.30231
D(LOG(RGDP(-2))) does not Granger Cause D(LOG(PRIVY(-2)))		2.02677	0.16864
D(LOG(EXPO)) does not Granger Cause D(LOG(RGDP(-2)))	19	1.81482	0.19916
D(LOG(RGDP(-2))) does not Granger Cause D(LOG(EXPO))		0.86594	0.44201
D(LOG(INV)) does not Granger Cause D(LOG(RGDP(-2)))	19	6.69145	0.00913
D(LOG(RGDP(-2))) does not Granger Cause D(LOG(INV))		0.02567	0.97470
D(LOG(PRIVY)) does not Granger Cause D(LOG(RGDP(-2)))	19	0.01240	0.98769
D(LOG(RGDP(-2))) does not Granger Cause D(LOG(PRIVY))		1.94844	0.17925
D(LOG(EXPO(-2))) does not Granger Cause D(LOG(EXPO(-1)))	19	NA	NA
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(EXPO(-2)))		NA	NA
D(LOG(INV(-1))) does not Granger Cause D(LOG(EXPO(-1)))	20	0.85673	0.44431
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(INV(-1)))		10.6575	0.00132
D(LOG(INV(-2))) does not Granger Cause D(LOG(EXPO(-1)))	19	1.98824	0.17377
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(INV(-2)))		8.85434	0.00327
D(LOG(PRIVY(-1))) does not Granger Cause D(LOG(EXPO(-1)))	20	0.78622	0.47346
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(PRIVY(-1)))		0.77250	0.47938
D(LOG(PRIVY(-2))) does not Granger Cause D(LOG(EXPO(-1)))	19	0.25344	0.77961
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(PRIVY(-2)))		0.57405	0.57595
D(LOG(EXPO)) does not Granger Cause D(LOG(EXPO(-1)))	20	NA	NA
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(EXPO))		NA	NA
D(LOG(INV)) does not Granger Cause D(LOG(EXPO(-1)))	20	0.74719	0.49053
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(INV))		2.09422	0.15772
D(LOG(PRIVY)) does not Granger Cause D(LOG(EXPO(-1)))	20	0.85161	0.44636
D(LOG(EXPO(-1))) does not Granger Cause D(LOG(EXPO(-1)))		0.07984	0.92366

D(LOG(PRIVY))			
<hr/>			
D(LOG(INV(-1)))	does not Granger Cause 19	0.58246	0.57150
D(LOG(EXPO(-2)))			
D(LOG(EXPO(-2)))	does not Granger Cause	1.91216	0.18442
D(LOG(INV(-1)))			
<hr/>			
D(LOG(INV(-2)))	does not Granger Cause 19	0.59214	0.56642
D(LOG(EXPO(-2)))			
D(LOG(EXPO(-2)))	does not Granger Cause	9.30643	0.00269
D(LOG(INV(-2)))			
<hr/>			
D(LOG(PRIVY(-1)))	does not Granger 19	1.22526	0.32333
Cause D(LOG(EXPO(-2)))			
D(LOG(EXPO(-2)))	does not Granger Cause	0.02981	0.97069
D(LOG(PRIVY(-1)))			
<hr/>			
D(LOG(PRIVY(-2)))	does not Granger 19	1.21294	0.32673
Cause D(LOG(EXPO(-2)))			
D(LOG(EXPO(-2)))	does not Granger Cause	0.91038	0.42492
D(LOG(PRIVY(-2)))			
<hr/>			
D(LOG(EXPO))	does not Granger Cause 19	3.2E+31	0.00000
D(LOG(EXPO(-2)))			
D(LOG(EXPO(-2)))	does not Granger Cause	1.49233	0.25852
D(LOG(EXPO))			
<hr/>			
D(LOG(INV))	does not Granger Cause 19	6.64135	0.00937
D(LOG(EXPO(-2)))			
D(LOG(EXPO(-2)))	does not Granger Cause	1.78916	0.20326
D(LOG(INV))			
<hr/>			
D(LOG(PRIVY))	does not Granger Cause 19	0.14466	0.86659
D(LOG(EXPO(-2)))			
D(LOG(EXPO(-2)))	does not Granger Cause	0.67896	0.52308
D(LOG(PRIVY))			
<hr/>			
D(LOG(INV(-2)))	does not Granger Cause 19	NA	NA
D(LOG(INV(-1)))			
D(LOG(INV(-1)))	does not Granger Cause	NA	NA
D(LOG(INV(-2)))			
<hr/>			
D(LOG(PRIVY(-1)))	does not Granger 20	0.18538	0.83266
Cause D(LOG(INV(-1)))			
D(LOG(INV(-1)))	does not Granger Cause	0.79395	0.47016
D(LOG(PRIVY(-1)))			
<hr/>			
D(LOG(PRIVY(-2)))	does not Granger 19	0.02642	0.97397
Cause D(LOG(INV(-1)))			
D(LOG(INV(-1)))	does not Granger Cause	0.60706	0.55868
D(LOG(PRIVY(-2)))			
<hr/>			
D(LOG(EXPO))	does not Granger Cause 20	10.0055	0.00173
D(LOG(INV(-1)))			
D(LOG(INV(-1)))	does not Granger Cause	2.93415	0.08405
D(LOG(EXPO))			
<hr/>			
D(LOG(INV))	does not Granger Cause 20	NA	NA
D(LOG(INV(-1)))			
D(LOG(INV(-1)))	does not Granger Cause	NA	NA
D(LOG(INV))			
<hr/>			
D(LOG(PRIVY))	does not Granger Cause 20	0.22916	0.79793
D(LOG(INV(-1)))			



D(LOG(INV(-1))) does not Granger Cause D(LOG(PRIVY))	0.74028	0.49362
D(LOG(PRIVY(-1))) does not Granger Cause D(LOG(INV(-2)))	19 0.19324	0.82644
D(LOG(INV(-2))) does not Granger Cause D(LOG(PRIVY(-1)))	0.92634	0.41897
D(LOG(PRIVY(-2))) does not Granger Cause D(LOG(INV(-2)))	19 0.12062	0.88728
D(LOG(INV(-2))) does not Granger Cause D(LOG(PRIVY(-2)))	0.55228	0.58768
D(LOG(EXPO)) does not Granger Cause D(LOG(INV(-2)))	19 0.47530	0.63137
D(LOG(INV(-2))) does not Granger Cause D(LOG(EXPO))	2.60923	0.10886
D(LOG(INV)) does not Granger Cause D(LOG(INV(-2)))	19 9.9E+31	0.00000
D(LOG(INV(-2))) does not Granger Cause D(LOG(INV))	0.88331	0.43524
D(LOG(PRIVY)) does not Granger Cause D(LOG(INV(-2)))	19 1.23197	0.32148
D(LOG(INV(-2))) does not Granger Cause D(LOG(PRIVY))	0.94581	0.41183
D(LOG(PRIVY(-2))) does not Granger Cause D(LOG(PRIVY(-1)))	19 NA	NA
D(LOG(PRIVY(-1))) does not Granger Cause D(LOG(PRIVY(-2)))	NA	NA
D(LOG(EXPO)) does not Granger Cause D(LOG(PRIVY(-1)))	20 0.82416	0.45752
D(LOG(PRIVY(-1))) does not Granger Cause D(LOG(EXPO))	0.14253	0.86832
D(LOG(INV)) does not Granger Cause D(LOG(PRIVY(-1)))	20 0.83528	0.45296
D(LOG(PRIVY(-1))) does not Granger Cause D(LOG(INV))	0.03578	0.96493
D(LOG(PRIVY)) does not Granger Cause D(LOG(PRIVY(-1)))	20 NA	NA
D(LOG(PRIVY(-1))) does not Granger Cause D(LOG(PRIVY))	NA	NA
D(LOG(EXPO)) does not Granger Cause D(LOG(PRIVY(-2)))	19 1.55507	0.24554
D(LOG(PRIVY(-2))) does not Granger Cause D(LOG(EXPO))	0.65912	0.53264
D(LOG(INV)) does not Granger Cause D(LOG(PRIVY(-2)))	19 0.16166	0.85229
D(LOG(PRIVY(-2))) does not Granger Cause D(LOG(INV))	0.07338	0.92961
D(LOG(PRIVY)) does not Granger Cause D(LOG(PRIVY(-2)))	19 1.1E+32	0.00000
D(LOG(PRIVY(-2))) does not Granger Cause D(LOG(PRIVY))	1.32698	0.29667
D(LOG(INV)) does not Granger Cause	21 1.08178	0.36254

D(LOG(EXPO))						
D(LOG(EXPO))	does	not	Granger	Cause	9.50452	0.00190
D(LOG(INV))						
D(LOG(PRIVY))	does	not	Granger	Cause	21	0.79902
D(LOG(EXPO))						
D(LOG(EXPO))	does	not	Granger	Cause	0.32532	0.72697
D(LOG(PRIVY))						
D(LOG(PRIVY))	does	not	Granger	Cause	21	0.20438
D(LOG(INV))						
D(LOG(INV))	does	not	Granger	Cause	0.77651	0.47659
D(LOG(PRIVY))						

A summary showing the variables that granger causes realGDP or its differences is displayed below:

- LOG(EXPO(-1)) Granger Causes D(LOG(RGDP))
- LOG(INV(-1)) Granger Causes D(LOG(RGDP))
- LOG(PRIVY(-1)) Granger Causes D(LOG(RGDP))
- D(LOG(RGDP)) Granger Causes D(LOG(EXPO(-2)))
- D(LOG(RGDP)) Granger Causes D(LOG(INV(-1)))
- D(LOG(RGDP)) Granger Causes D(LOG(INV(-2)))
- D(LOG(PRIVY(-2))) Granger Causes D(LOG(RGDP))
- D(LOG(EXPO)) Granger Causes D(LOG(RGDP))
- D(LOG(INV)) Granger Causes D(LOG(RGDP))
- LOG(EXPO(-1)) Granger Causes LOG(RGDP(-1))
- LOG(INV(-1)) Granger Causes LOG(RGDP(-1))
- LOG(RGDP(-1)) Granger Causes LOG(PRIVY(-1))
- D(LOG(EXPO(-1))) Granger Causes LOG(RGDP(-1))
- D(LOG(EXPO(-2))) Granger Causes LOG(RGDP(-1))
- D(LOG(INV(-1))) Granger Causes LOG(RGDP(-1))
- D(LOG(EXPO)) Granger Causes LOG(RGDP(-1))
- LOG(RGDP(-1)) Granger Causes D(LOG(EXPO))
- LOG(INV(-1)) Granger Causes LOG(EXPO(-1))

LOG(EXPO(-1)) Granger Causes LOG(INV(-1))  
 LOG(EXPO(-1)) Granger Causes LOG(PRIVY(-1))  
 D(LOG(RGDP(-1))) Granger Causes LOG(EXPO(-1))  
 LOG(EXPO(-1)) Granger Causes D(LOG(RGDP(-1)))  
 D(LOG(RGDP(-2))) Granger Causes LOG(EXPO(-1))  
 LOG(EXPO(-1)) Granger Causes D(LOG(INV(-1)))  
 LOG(INV(-1)) Granger Causes D(LOG(RGDP(-1)))  
 LOG(INV(-1)) Granger Causes D(LOG(RGDP(-2)))  
 D(LOG(EXPO)) Granger Causes LOG(INV(-1))  
 D(LOG(EXPO(-1))) Granger Causes D(LOG(RGDP(-1)))  
 D(LOG(RGDP(-1))) Granger Causes D(LOG(INV(-2)))  
 D(LOG(EXPO)) Granger Causes D(LOG(RGDP(-1)))  
 D(LOG(INV)) Granger Causes D(LOG(RGDP(-1)))  
 D(LOG(EXPO(-1))) Granger Causes D(LOG(RGDP(-2)))  
 D(LOG(EXPO(-2))) Granger Causes D(LOG(RGDP(-2)))  
 D(LOG(INV(-1))) Granger Causes D(LOG(RGDP(-2)))  
 D(LOG(INV)) Granger Causes D(LOG(RGDP(-2)))  
 D(LOG(EXPO(-1))) Granger Causes D(LOG(INV(-1)))  
 D(LOG(EXPO(-1))) Granger Causes D(LOG(INV(-2)))  
 D(LOG(EXPO(-2))) Granger Causes D(LOG(INV(-2)))  
 D(LOG(INV)) Granger Causes D(LOG(EXPO(-2)))  
 D(LOG(EXPO)) Granger Causes D(LOG(INV(-1)))  
 D(LOG(EXPO)) Granger Causes D(LOG(INV))

These results are not much different from the first Granger causality tests run on the difference of the variables as per the first option discussed earlier.

The GMM Model presented earlier revealed a positive relationship between financial deepening ratio or more broadly between a finance index and growth. The VAR



model shows a positive relationship between finance (proxied by private sector credit) and growth:

[ (1) LOG(PRIVY(-1)) Granger causes D(LOG(RGDP)); (2) D(LOG(PRIVY(-2))) Granger causes D(LOG(RGDP)); (3) LOG(RGDP(-1)) Granger causes LOG(PRIVY(-1)) ]

The results therefore give confidence in the models and the data and additionally the VAR model highlights bi-directional causality between the two variables.

#### **8.4 Liberalisation and Corporate Sector Financing Strategy**

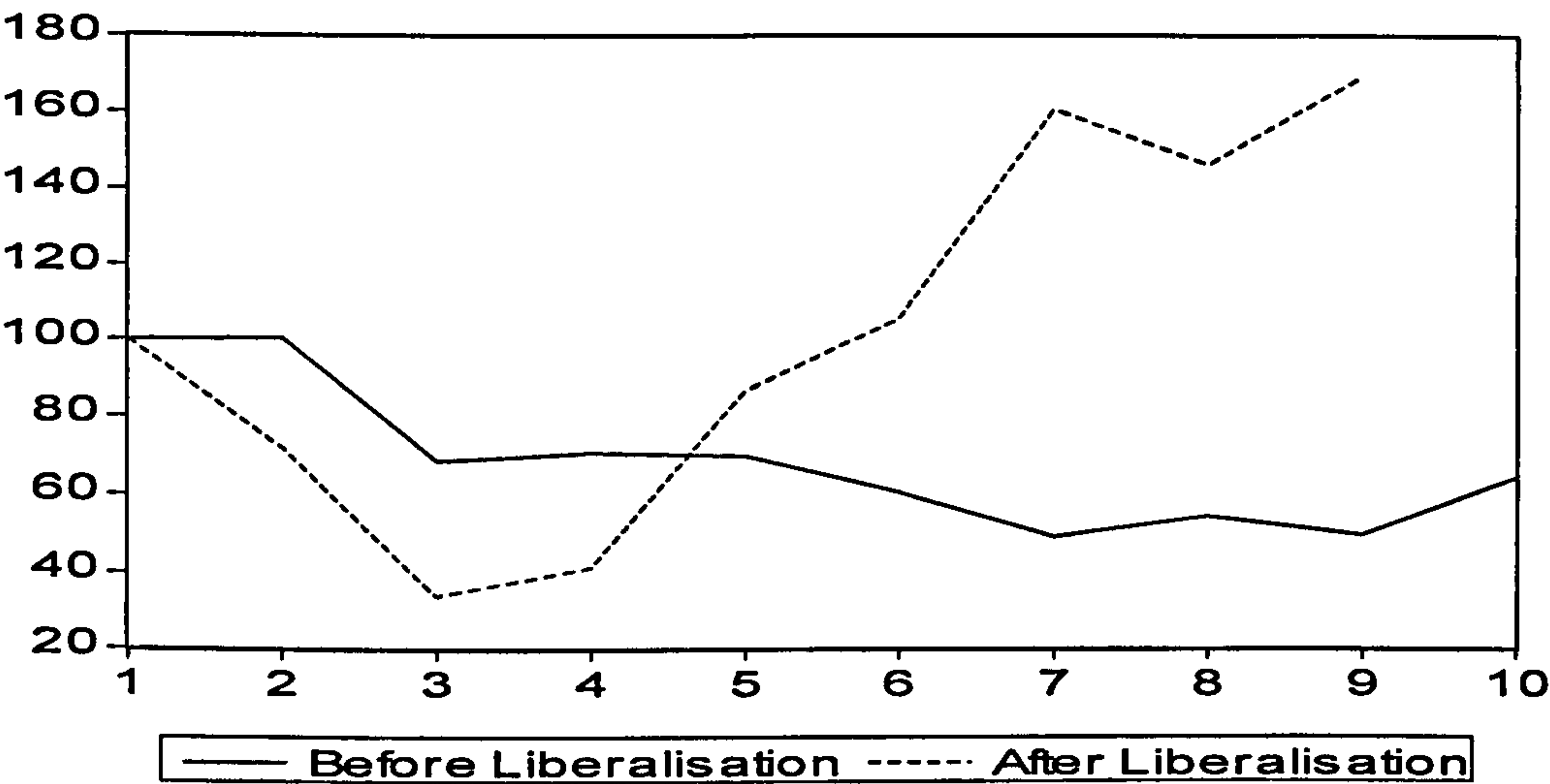
Financial liberalisation is expected to allow a greater flow of debt finance to the corporate sector. The financial structure and financing options of eleven selected listed companies have been examined below in order to study the impact of deregulation of interest rates on corporate financing strategy and to test the prediction of “pecking order” theory of financial gearing according to which firms prefer internal to external finance and whenever the latter is taken the preference goes for debt while equity finance remains a last resort (Myers, 1984). The theory suggests that this is so because market imperfections make external financing more costly. Further the market for equity is more subject to adverse selection than the debt market.

The interest rate liberalisation process started in 1991 and was completed in 1995. A debt equity index is constructed for comparison between the pre-liberalisation period (1984-1993) and post-liberalisation period (1993- 2003).



**Figure 6.8**

**Debt-Equity Index of Selected Firms Before and After Interest Rate Liberalisation**



The index shows very clearly that while during the period before liberalisation the companies in the sample were relying more heavily on internal financing, after liberalisation financial leverage has been consistently higher.

A test of equality between the two series is run below for inferences about differences in the population means of the debt equity profile before and after liberalisation and the results are shown below.

**Table 22.8**

Equality Tests			
Test for Equality of Means Between Series			
Date: 09/08/04 Time: 12:12			
Sample: 1 10			
Included observations: 10			
Method	df	Value	Probability
t-test	17	1.975472	0.0647
Anova F-statistic	(1, 17)	3.902488	0.0647

This two-sided test with a p-value below 0.05 does not allow the rejection of the null hypothesis of equality of the means at 5% significance level but we remain confident that at 10% significance that the population means are not equal before and after liberalisation.

Higher long-term debt is not necessarily connected with internal growth of firms through the acquisition of fixed physical assets. Companies sometimes acquire long-term financing for financial investment or for external growth purposes. To obtain a deeper insight about whether companies have preferred debt financing to equity financing for the purpose of acquisition of physical investment, the section below presents an econometric analysis of corporate financing and tries to establish whether there is a link between interest rate liberalisation and the financial strategy of firms in relation to internal growth.

Firms commit funds to long-term assets whenever there exists opportunities of earning higher profits. An investment equation is considered below on a similar basis to the one used by Omole and Falokun (1999) for Nigeria.

Assumption:

Investment can be financed in one or more of the following ways:

1. Retained Profit (Internal Financing - Cash Flow)
2. Equity Finance
3. Debt Finance

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha_0 + \alpha_1 \left( \frac{I_{i,t-1}}{K_{i,t-2}} \right) + \alpha_2 \left( \frac{\Delta Y_i}{K_{i,t-1}} \right) + \alpha_3 \left( \frac{P_i}{K_{i,t-1}} \right) + \alpha_4 \left( \frac{D_{i,t-1}}{K_{i,t-1}} \right) + \alpha_5 \left( \frac{D_{i,t-1}}{E_{i,t-1}} \right) + V_{i,t}$$

Where,

$I_{i,t}$  = firm gross physical investment at time  $t$

$K_{i,t}$  = firms pecific fixed capital at time  $t$

$\Delta Y_{i,t} = (Y_{i,t} - Y_{i,t-1})$  firm specific increase in turnover at time  $t$

$P_{i,t}$  = firm specific gross profit at time  $t$

$D_{i,t}$  = firm specific stock of debt at time  $t$

$E_{i,t}$  = firm specific equity at time  $t$

To capture the effects of liberalisation, the coefficient of internal finance and those of the two leverage ratios are made to reflect the situation before and after liberalisation by introducing three additional dummy variables:

$$+ \alpha_6 \left( \frac{\text{Dum}P_i}{K_{i,t-1}} \right) + \alpha_7 \left( \frac{\text{Dum}D_{i,t-1}}{K_{i,t-1}} \right) + \alpha_8 \left( \frac{\text{Dum}D_{i,t-1}}{E_{i,t-1}} \right)$$

These dummy variables are assumed to be zero pre-liberalisation and equal to the original value post liberalisation. The dummy variables are introduced in a multiplicative way hence influencing the partial slopes.

The revised equation is:

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha_0 + \alpha_1 \left( \frac{I_{i,t-1}}{K_{i,t-2}} \right) + \alpha_2 \left( \frac{\Delta Y_i}{K_{i,t-1}} \right) + \alpha_3 \left( \frac{P_i}{K_{i,t-1}} \right) + \alpha_4 \left( \frac{D_{i,t-1}}{K_{i,t-1}} \right) + \alpha_5 \left( \frac{D_{i,t-1}}{E_{i,t-1}} \right) + \alpha_6 \left( \frac{DumP_i}{K_{i,t-1}} \right) + \alpha_7 \left( \frac{DumD_{i,t-1}}{K_{i,t-1}} \right) + \alpha_8 \left( \frac{DumD_{i,t-1}}{E_{i,t-1}} \right) + V_{i,t}$$

Liberalisation of interest rates was gradual over the period 1991-1995 and 1993 is taken as a reasonable break date for the end of the pre-liberalisation period.

Table 23.8

Investment Regression Output

Dependent Variable: I?/K?(-1)				
Method: Seemingly Unrelated Regression				
Date: 09/08/04 Time: 13:37				
Sample: 1986 2003				
Included observations: 18				
Number of cross-sections used: 11				
Total panel (unbalanced) observations: 194				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002867	0.002819	1.017263	0.3104
I?(-1)/K?(-2)	0.367439	0.049822	7.374985	0.0000
D(Y?)/K?(-2)	0.018558	0.006894	2.691798	0.0078
P?/K?(-1)	0.237380	0.034800	6.821342	0.0000
DE?(-1)/K?(-1)	0.403157	0.665714	0.605601	0.5455
DE?(-1)/EQ?(-1)	0.158923	0.530876	0.299359	0.7650
DUM?*P?/K?(-1)	-0.029428	0.043793	-0.671989	0.5024
DUM?*DE?(-1)/K?(-1)	-0.292441	0.673904	-0.433950	0.6648
DUM?*DE?(-1)/EQ?(-1)	-0.201565	0.535662	-0.376291	0.7071
1)				
Weighted Statistics				
Unweighted Statistics				
R-squared	0.392422	Mean dependent var	0.098389	
Adjusted R-squared	0.366148	S.D. dependent var	0.150237	
S.E. of regression	0.119611	Sum squared resid	2.646755	
Durbin-Watson stat	2.384498			

I/K(-1) = f( I(-1)/K(-2), D(Y)/K(-2), P/K(-1), DE(-1)/K(-1), DE(-1)/EQ(-1), DUM\*P/K(-1) DUM\*DE(-1)/K(-1), DUM\*DE(-1)/EQ(-1))



This is a regression result for the pre and post liberalisation periods combined. It appears that only lagged investment ratio  $I(-1)/K(-2)$ , turnover ratio  $D(Y)/K(-2)$  and cash flow ratio  $P/K(-1)$  seem significant. Unfortunately, the series is not long enough to allow the software to split it in the two defined periods 1984 to 1993 and 1994 and 2003 respectively for comparison. It has therefore been necessary to consider two slightly overlapping periods (1986<sup>299</sup> to 1995 and 1993 to 2003) to get sufficient number of observations for both periods. This *a priori* poses some problems of accuracy of the comparative analysis but the degree of distortion due to that adjustment should not be a major one since interest rate liberalisation started in 1991 and was completed by 1995. The years 1993 to 1995 actually fall in the transition period and are not years that can be classified categorically as pre or post-liberalisation ones.

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<sup>299</sup> Refer to the related comments in the chapter on methodology.

Table 24 .8

Regression Results before Liberalisation

Dependent Variable:  $I^*/K^*(-1)$   
Method: Seemingly Unrelated Regression  
Date: 09/08/04 Time: 14:13  
Sample: 1986 1995  
Included observations: 10  
Number of cross-sections used: 11  
Total panel (unbalanced) observations: 109

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003351	0.002073	1.616833	0.1091
I?(-1)/K?(-2)	0.450564	0.043836	10.27850	0.0000
D(Y?)/K?(-2)	0.024160	0.005020	4.812696	0.0000
P?/K?(-1)	0.188920	0.019144	9.868529	0.0000
DE?(-1)/K?(-1)	0.507565	0.293641	1.728523	0.0870
DE?(-1)/EQ?(-1)	-0.019615	0.229584	-0.085437	0.9321
DUM?*P?/K?(-1)	-0.053725	0.046328	-1.159683	0.2489
DUM?*DE?(-1)/K?(-1)	1.810301	0.873419	2.072660	0.0408
DUM?*DE?(-1)/EQ?(-1)	-1.721466	0.654428	-2.630489	0.0099
Weighted Statistics				
Unweighted Statistics				
R-squared	0.577935	Mean dependent var	0.122971	
Adjusted R-squared	0.544170	S.D. dependent var	0.154409	
S.E. of regression	0.104250	Sum squared resid	1.086799	
Durbin-Watson stat	2.205684			

**Table 25 .8**

**Regression Results after liberalisation**

Dependent Variable:  $I?/K?(-1)$   
Method: Seemingly Unrelated Regression  
Date: 09/08/04 Time: 14:14  
Sample: 1993 2003  
Included observations: 11  
Number of cross-sections used: 11  
Total panel (unbalanced) observations: 118

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004565	0.002301	1.983957	0.0498
$I?(-1)/K?(-2)$	0.114688	0.033359	3.438012	0.0008
$D(Y?)/K?(-2)$	0.024413	0.007183	3.398765	0.0009
$P?/K?(-1)$	1.400723	0.145728	9.611893	0.0000
$DE?(-1)/K?(-1)$	-11.14410	1.111128	-10.02954	0.0000
$DE?(-1)/EQ?(-1)$	8.769636	1.000674	8.763726	0.0000
$DUM?*P?/K?(-1)$	-1.085361	0.146047	-7.431584	0.0000
$DUM?*DE?(-1)/K?(-1)$	11.25950	1.113206	10.11448	0.0000
$DUM?*DE?(-1)/EQ?(-1)$	-8.707398	1.001690	-8.692703	0.0000
1)				
Weighted Statistics				
Unweighted Statistics				
R-squared	0.285611	Mean dependent var	0.073058	
Adjusted R-squared	0.233179	S.D. dependent var	0.135852	
S.E. of regression	0.118963	Sum squared resid	1.542593	
Durbin-Watson stat	2.184673			

The results suggest that before liberalisation firms relied more heavily on their internal financing position for their strategy regarding the acquisition of land and plant and machinery while external finance has become a more significant variable after liberalisation. The empirical evidence is consistent with the prediction of the “pecking order “ theory of financial gearing However, there is a need to carry out further research in this area in order to determine whether small and medium enterprise in Mauritius adopt the same behaviour and also to investigate inter-firm and inter-industry differences. A clarification of these issues will allow the adoption of a more effective strategy on the supply side of the financial market.



## 8.5 Liberalisation and Banking Spread

In Chapter 6 the spread was calculated as the weighted average of lending rate less that of deposit rate for the overall banking sector. It was found that after liberalisation spread initially widened before starting to narrow in the recent years. The thesis now attempts to consider the determinants of spread and the causality issue. Due to unavailability of data regarding some suggested determinants for the overall sector, it is proposed that the two biggest banks, MCB and SBM, be jointly considered as a proxy for the banking sector. This is a reasonable assumption given that these two banks jointly hold around 70% of the banking deposit.

Given that the raw figures available for the calculation of spread for these individual banks are not the same as those made available by the BOM for the calculation of spread for the whole sector, a different methodology is employed. Spread is defined as:

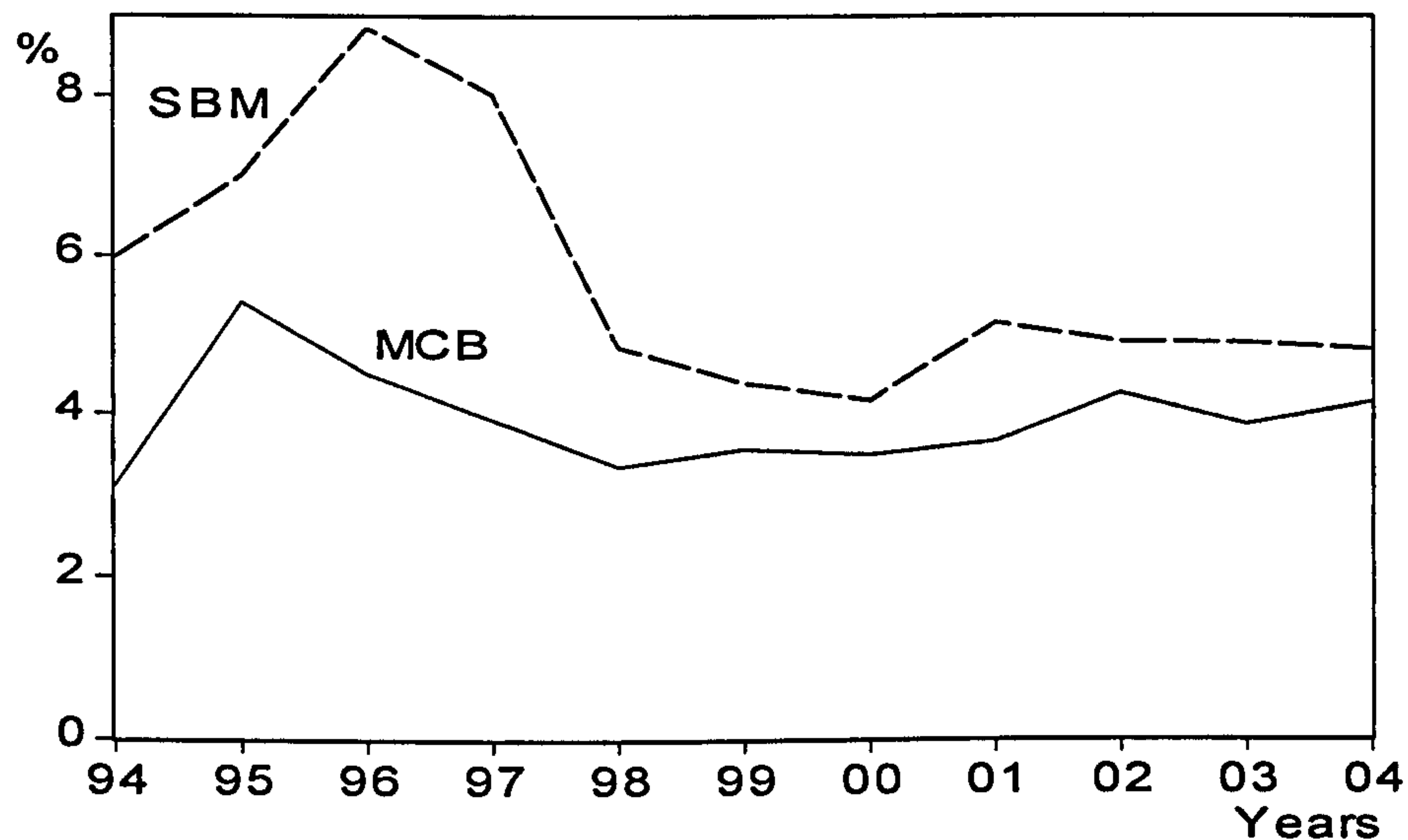
$$\text{Spread} = \frac{\text{Interest on Loans and Advances}}{\text{Loans and Advances}} \text{ less } \frac{\text{Interest on Deposits}}{\text{Deposits}}$$

The results exhibited in figure 7.8 shows that the date for the start of the decline is between 1995 and 1996, that is a few year after liberalisation of interest date. This date does not coincide with the date identified in Chapter 6 because of different methodology employed, but the pattern is the same. It also shows that spread is consistently lower at the level of MCB, the biggest bank.



**Figure 7.8**

**Interest Spread at the Two Biggest Banks (1994-2004)**



A three variable VAR model with two lags is used to test causality between spread, market share and the cost of acquiring fund. Market share is measured by share of deposit. Considering demand deposit as funds acquired at the lowest cost, the cost of acquiring fund is measured by the ratio  $\frac{\text{Demand Deposits}}{\text{Loan}}$ .

Since the larger the amount of deposit, the smaller is the cost of acquiring funds for loans, the inverse of the ratio is used instead, namely  $\frac{\text{Loan}}{\text{Demand Deposits}}$ .

$$\begin{aligned} \text{Log}(\text{SPREAD})_t = & C_1 + \alpha_{1,1}\text{Log}(\text{SPREAD})_{t-1} + \alpha_{1,2}\text{Log}(\text{MKTSHARE})_{t-1} + \alpha_{1,3}\text{Log}(\text{FUNDCOST})_{t-1} \\ & + \beta_{1,1}\text{Log}(\text{SPREAD})_{t-2} + \beta_{1,2}\text{Log}(\text{MKTSHARE})_{t-2} + \beta_{1,3}\text{Log}(\text{FUNDCOST})_{t-2} \end{aligned}$$

$$\begin{aligned} \text{Log}(\text{MKTSHARE})_t = & C_2 + \alpha_{2,1}\text{Log}(\text{SPREAD})_{t-1} + \alpha_{2,2}\text{Log}(\text{MKTSHARE})_{t-1} + \alpha_{2,3}\text{Log}(\text{FUNDCOST})_{t-1} \\ & + \beta_{2,1}\text{Log}(\text{SPREAD})_{t-2} + \beta_{2,2}\text{Log}(\text{MKTSHARE})_{t-2} + \beta_{2,3}\text{Log}(\text{FUNDCOST})_{t-2} \end{aligned}$$

$$\begin{aligned} \text{Log}(\text{FUNDCOST})_t = & C_3 + \alpha_{3,1}\text{Log}(\text{SPREAD})_{t-1} + \alpha_{3,2}\text{Log}(\text{MKTSHARE})_{t-1} + \alpha_{3,3}\text{Log}(\text{FUNDCOST})_{t-1} \\ & + \beta_{3,1}\text{Log}(\text{SPREAD})_{t-2} + \beta_{3,2}\text{Log}(\text{MKTSHARE})_{t-2} + \beta_{3,3}\text{Log}(\text{FUNDCOST})_{t-2} \end{aligned}$$

Where,

SPREAD = Banking Spread

MKTSHARE = Market Share of deposits

FUNDCOST = Cost of acquiring fund

Table 26.8

VAR Estimates (Interest Spread, MCB & SMB)

Date: 05/09/05 Time: 18:04			
Sample(adjusted): 4 22			
Included observations: 19 after adjusting endpoints			
Standard errors & t-statistics in parentheses			
	SPREAD	MKTSHARE	FUNDCOST
SPREAD(-1)	0.720184 (0.19602) (3.67406)	0.013905 (0.01149) (1.21002)	-0.008919 (0.03144) (-0.28366)
SPREAD(-2)	-0.355767 (0.22646) (-1.57096)	0.000447 (0.01328) (0.03370)	-0.065997 (0.03633) (-1.81674)

SPREAD(-3)	-0.027234 (0.18473) (-0.14742)	0.010056 (0.01083) (0.92852)	0.001911 (0.02963) (0.06449)
MKTSHARE(-1)	-5.438967 (6.24205) (-0.87134)	1.083472 (0.36593) (2.96090)	0.915240 (1.00129) (0.91406)
MKTSHARE(-2)	-21.97128 (7.72219) (-2.84521)	0.015576 (0.45270) (0.03441)	-0.756286 (1.23872) (-0.61054)
MKTSHARE(-3)	21.90276 (6.83603) (3.20402)	0.555686 (0.40075) (1.38663)	-2.677673 (1.09657) (-2.44186)
FUNDCOST(-1)	-1.341306 (1.90518) (-0.70403)	0.232199 (0.11169) (2.07902)	0.245321 (0.30561) (0.80272)
FUNDCOST(-2)	-3.446699 (1.72340) (-1.99995)	0.108540 (0.10103) (1.07433)	0.022357 (0.27645) (0.08087)
FUNDCOST(-3)	1.713296 (2.01806) (0.84898)	0.033406 (0.11830) (0.28237)	-0.911523 (0.32372) (-2.81580)
C	7.119348 (4.44780) (1.60065)	-0.626595 (0.26074) (-2.40312)	2.411180 (0.71347) (3.37950)
R-squared	0.926534	0.927911	0.826342
Adj. R-squared	0.853068	0.855822	0.652683
Sum sq. resids	3.147603	0.010817	0.080992
S.E. equation	0.591383	0.034668	0.094864
F-statistic	12.61175	12.87173	4.758434
Log likelihood	-9.880751	44.01527	24.88964
Akaike AIC	2.092711	-3.580554	-1.567331
Schwarz SC	2.589784	-3.083481	-1.070258
Mean dependent	4.906138	0.342808	0.697546
S.D. dependent	1.542804	0.091303	0.160967
Determinant	Residual	1.16E-07	
Covariance			
Log Likelihood		70.83981	
Akaike Information Criteria		-4.298927	
Schwarz Criteria		-2.807708	

SPREAD = 0.720184388\*SPREAD(-1) - 0.3557667119\*SPREAD(-2) -  
0.02723428471\*SPREAD(-3) - 5.438967073\*MKTSHARE(-1) - 21.97128445\*MKTSHARE(-  
2) + 21.9027581\*MKTSHARE(-3) - 1.341306342\*FUNDCOST(-1) -  
3.446699125\*FUNDCOST(-2) + 1.71329608\*FUNDCOST(-3) + 7.119348332

MKTSHARE = 0.01390454035\*SPREAD(-1) + 0.000447367589\*SPREAD(-2) +  
0.01005559512\*SPREAD(-3) + 1.083471888\*MKTSHARE(-1) +



$$0.01557554697 \cdot \text{MKTSHARE}(-2) + 0.5556855138 \cdot \text{MKTSHARE}(-3) + 0.2321993338 \cdot \text{FUND COST}(-1) + 0.1085400311 \cdot \text{FUND COST}(-2) + 0.03340580231 \cdot \text{FUND COST}(-3) - 0.6265946774$$

$$\text{FUND COST} = -0.008919221055 \cdot \text{SPREAD}(-1) - 0.06599705096 \cdot \text{SPREAD}(-2) + 0.001910964564 \cdot \text{SPREAD}(-3) + 0.9152395914 \cdot \text{MKTSHARE}(-1) - 0.7562863585 \cdot \text{MKTSHARE}(-2) - 2.677672796 \cdot \text{MKTSHARE}(-3) + 0.2453206844 \cdot \text{FUND COST}(-1) + 0.02235726965 \cdot \text{FUND COST}(-2) - 0.9115232967 \cdot \text{FUND COST}(-3) + 2.411180277$$

Before proceeding with the Granger test of no-causality, the four series are verified for stationarity using the Phillips-Perron Test.

**Table 27.8**  
**Unit Root Tests on SPREAD, MKTSHARE, and FUND COST**

**Phillips-Perron test on SPREAD**

PP Test Statistic	-2.272022	1%	Critical Value*	-3.7856
		5%	Critical Value	-3.0114
		10%	Critical Value	-2.6457

\*Mackinnon critical values for rejection of hypothesis of a unit root.

**Phillips-Perron test on D(SPREAD)**

PP Test Statistic	-3.960483	1%	Critical Value*	-3.8067
		5%	Critical Value	-3.0199
		10%	Critical Value	-2.6502

\*Mackinnon critical values for rejection of hypothesis of a unit root.

**Phillips-Perron test on MKTSHARE**

PP Test Statistic	-0.459132	1%	Critical Value*	-3.7856
		5%	Critical Value	-3.0114
		10%	Critical Value	-2.6457

\*Mackinnon critical values for rejection of hypothesis of a unit root.



Phillips-Perron test on D(MKTSHARE)

PP Test Statistic	-4.239096	1%	Critical Value*	-3.8067
		5%	Critical Value	-3.0199
		10%	Critical Value	-2.6502

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Phillips-Perron test on FUNDCOST

PP Test Statistic	-2.130803	1%	Critical Value*	-3.7856
		5%	Critical Value	-3.0114
		10%	Critical Value	-2.6457

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Phillips-Perron test on D(FUNDCOST)

PP Test Statistic	-6.694501	1%	Critical Value*	-3.8067
		5%	Critical Value	-3.0199
		10%	Critical Value	-2.6502

\*MacKinnon critical values for rejection of hypothesis of a unit root.

The series are integrated of order one.

The Johansen test of cointegration is now run to detect whether some of the original series are cointegrated.

Table 28.8

Johansen Test (Spread)

Date: 05/09/05 Time: 18:23  
Sample: 1 22  
Included observations: 20  
Test assumption: Linear deterministic trend in the data  
Series: SPREAD MKTSHARE FUNDCOST  
Lags interval: 1 to 1

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.581834	23.51417	29.68	35.65	None

0.208648	6.076617	15.41	20.04	At most 1
0.067436	1.396358	3.76	6.65	At most 2

(\*\*) denotes rejection of the hypothesis at 5%(1%) significance level  
 L.R. rejects any cointegration at 5% significance level

Unnormalized Cointegrating Coefficients:

SPREAD	MKTSHARE	FUNDCOST
0.228311	5.102417	2.639552
0.099490	-0.992240	-1.456295
0.012691	2.655079	-0.168385

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

SPREAD	MKTSHARE	FUNDCOST	C
1.000000	22.34857	11.56123	-20.80149
	(3.31751)	(2.17995)	

Log likelihood 41.29225

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

SPREAD	MKTSHARE	FUNDCOST	C
1.000000	0.000000	-6.553648	-0.435356
		(6.79538)	
0.000000	1.000000	0.810561	-0.911295
		(0.30838)	

Log likelihood 43.63238

There is no cointegration between the variables. The Granger no causality test is therefore run on the first difference of the series

Table 29.8

Granger No Causality Test (Spread)

Pairwise Granger Causality Tests  
 Date: 05/09/05 Time: 17:58  
 Sample: 1 22  
 Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
D(MKTSHARE) does not Granger Cause D(SPREAD)	19	3.96832	0.04312
D(SPREAD) does not Granger Cause D(MKTSHARE)		0.18579	0.83247
D(FUNDCOST) does not Granger Cause D(SPREAD)	19	0.05915	0.94280
D(SPREAD) does not Granger Cause D(FUNDCOST)		0.83897	0.45276

D(FUNDCOST)			
D(FUNDCOST)	does not Granger Cause	19	1.28515 0.30732
D(MKTSHARE)			
D(MKTSHARE)	does not Granger Cause	0.11926	0.88847
D(FUNDCOST)			

From the above table it can be seen that there is unidirectional granger causality from market share of deposits to banking spread.

### 8.6 Summary of Findings

Financial deepening has improved fast in Mauritius in early 1980s. However, there has been a structural break over the last decade with a slow down as the monetization variable  $\frac{M2}{Y}$  exceeded 65%. There is also reduced variability in the deepening process in the recent years. In Chapter 6 (Table 6.7) it was noted that real interest rate has not been higher after liberalisation. This chapter has shown that financial depth is not positively related with real interest rate in Mauritius. Countries in the region taken separately do not equally show a positive relationship between interest rate and financial deepening except in the case of South Africa and Zambia. There are probably specific conditions in these two countries that made the hypothesis valid. Identification of these specific conditions could constitute new areas for research in future. As for interest spread, it is definitely narrowing down and this is influenced by the Treasury Bill rate.

Although the evidence does not support the McKinnon and Shaw predictions concerning interest rate and mobilization of savings, yet there has been freer access

to credit after liberalisation and the study has shown that private sector credit as a share of GDP is positively related to economic growth and there is bidirectional causality between them.

In so far as corporate financing is concerned with liberalisation firms now get easier access to credit and the study shows that the behaviour of listed firms is consistent with the pecking order theory of finance and that the level of financial leverage is higher as the listed companies have now become more sensitive to external financing for the acquisition of physical investment, in relation to their internal growth strategy.

Banking spread which has started to narrow after initially widening and is explained by market share though surprisingly a negative relationship is observed between the two variables.



## **Chapter 9**

### **CONCLUSIONS, RECOMMENDATIONS AND**

### **DIRECTIONS FOR FUTURE RESEARCH**

This thesis has examined the theoretical backing to the growth promoting financial liberalisation process. The cost of the policy of financial liberalisation in terms of financial instability and its subsequent adverse impact on economic activity has also been discussed.

In the case of Mauritius it has been observed that the shift from a financial repression model to a financially liberalized one has been relatively smooth. The reform from direct to market-oriented monetary policy has been conducted successfully as a series of gradual steps. Although the most recent prescription in the literature is about a sequenced internal and external liberalisation, these two dimensions have been undertaken almost concurrently in Mauritius. It did not lead to a destabilization of the currency rate, of the domestic banking sector and of the stock market albeit some minor crises, not important enough to cause an economic downturn, were detected. This is an indication that there is no such thing as a correct sequencing for financial liberalization. What probably matters more is the gradual but consistent approach to allow the economy time to adapt and respond to the changes. This suggests that any shift to a more market oriented approach should be a managed one.

The findings concerning banking crises are limited in so far as we do not know whether the banking sector as a whole was facing a crisis or whether during the crises some specific banks were unaffected. However, the identification and

measurement of the mini banking crises opens new avenues of research for identifying whether these were due to bad banking or caused by unfavourable macroeconomic conditions. Taking into account that the phased liberalisation of interest rate ended in 1995 and that the phasing out of high reserve requirement was fully achieved in 1998 it can be concluded that the situation in the banking sector has been more calm after liberalization than it was before and during the transition period. Future research is now needed to find out about the connections with other asset markets and identify which assets people consider as good substitutes to bank deposits and to securities in periods of crises and to study the transmission of these crises to the real economy.

At the level of the stock market the trading process has improved but there is evidence of a weak form of market efficiency with a weaker position after liberalisation. Information cost has been improved in recent years with enhanced disclosure requirements but transaction costs remain an area where it is recommended that Government intervenes in favour of a lowering of such costs to help correcting misalignment of asset prices and hence sending more accurate signals for a more efficient investment.

External liberalisation did not have a negative feedback effect on internal liberalisation because the freeing of the capital account of the balance of payments has not yet given rise to a massive flow of “hot-money” via either the stock market channel or the bank channel. Although foreign loans and advances constitute now a regular activity, these are still at a very low level as compared to the massive build up of such flows in South East Asia before the crisis. Here again, the results point

towards gradualism as a recommended approach in so far as the opening of the economy to short-term capital is concerned. Vulnerability due to exposure to such volatile flows will inevitably increase in future. This is because the Treasury Bill has now been listed on the SEM and becomes available to foreign buyers and the transmission mechanism of the monetary policy through the external channel transmission is likely to improve over time as the domestic financial instruments become more attractive and the domestic financial institutions become more visible in the international financial markets. Adoption of a liberalisation policy and maintenance of some government interference in the financial sector are not mutually exclusive. So far government has a declared policy of limiting its role to that of introducing prudential regulations and setting up a system of supervision. In line with the framework discussed in sections 4.4.1 and 4.4.2 of the thesis it is considered that government should go beyond this. As a vigilant approach to minimize the impact of a potential “Minskian” crisis in an open economic context it is proposed that an observation crisis post be set up for the close monitoring of credit boom, short-term capital inflows and outflows, especially the short-term bank-to-bank foreign lending/borrowing and equally any worsening of current account deficit as a proportion of GDP. The monitoring of the short-term loans is really crucial since the Basel Capital weights (see Chapter 3) favour short-term lending over medium/long-terms lending for riskiness reasons but without making the important distinction between domestic and international short-term lending. Ex-ante detection of financial fragility would allow the appropriate authorities to take timely political decisions regarding the opportunity of temporary control



aiming at dampening any band-wagon behaviour. A decision to slow down the short-term flows while maintaining the freedom of long-term flows can limit the magnitude of an economic downturn and should not be neglected just because of ideological reasons. This can be done fairly rapidly as the legislation regarding exchange control has not been repealed but simply suspended.

In so far as the McKinnon and Shaw hypothesis is concerned the evidence in Mauritius points towards mixed results. The economy was already highly monetized before the start of financial liberalisation. Financial deepening has kept on increasing but since the beginning of the 1990s this has consistently been at a slower pace. The evidence indicates that in an island economy which is relatively open and not fragmented by the coexistence of a traditional indigenous economy and a modern sector prior to liberalisation it is wrong to blame financial repression for insufficient financial deepening and low saving rate. The fact that many African countries still have a low monetization ratio after many years of financial liberalisation reinforces the proposition made above. This sets out new directions for future research to test the proposition in similar island economies like Seychelles with a view to consider some possible generalisations.

Neither the liberalisation of the interest rate (through the domestic channel as well as through the currency substitution channel) nor the liberalisation of the capital account has led to an improvement of savings in Mauritius. While in LDCs savings have been interest inelastic, in Mauritius it has been found that savings was sensitive to real interest rates but the McKinnon hypothesis has been proved wrong. This is so either because of interest rigidity on deposits (which could be linked with



a credit rationing equilibrium) following liberalisation or perhaps more fundamentally the question that crops up is whether the interest ceiling on deposits prior to liberalization was far from the competitive equilibrium level. It also raises a fundamental question namely why should it be assumed that in a policy of access to cheap money governments in developing countries have been fixing the ceiling on deposits at a big differential from the competitive equilibrium? It could well be that the deviation from equilibrium comes mostly from the lending rate side. That could explain why spread widened just after liberalization but has subsequently narrowed because of increased competition due to the entry of new banks in the industry.

The spread has been found to be explained by market share of deposit of the two big banks. The negative coefficient in the VAR suggests that the larger is the share the smaller is the spread. The finding is supported by the observation made in figure 7.8 which shows that the MCB which is the top bank in terms of deposits has a lower spread than SBM, the number two bank. This is an unconventional result from the policy of liberalisation. However, until now the two big banks have hardly been challenged by competitors and it is somewhat early to make a comprehensive judgment regarding the final outcome of the liberalisation policy on spread. The fact that new important potential competitors have appeared on the scene only recently must not be neglected. The effect of the recent appearance of the Mauritius Post and Co-operative bank as well as foreign players like Caisse D'Epargne and the State bank of India in the country as mentioned in Chapter 5 will only be felt in the next five years to come when these banks and possibly other new entrants gather momentum and acquire their stable share of the market. There is a possibility that

with such changes banks behaviour change over time. Therefore a more comprehensive analysis of banking spread in Mauritius would be possible in around five years from now. Finally, the fact that the spread is still higher than its pre-liberalisation level does not necessarily imply that the policy of liberalisation has failed. It has to be taken into account that the spread before liberalisation was only artificially low and that what matters more is that it is now following a downward trend. It is also recommended that while structural deregulation is both facilitating the entry of new banks and exercising a threat to entry on incumbent banks, there is a need for the authorities to refrain from allowing a proliferation of banks in Mauritius so as to ensure that the banking sector does not lose economies of scale and does not engage in ruinous competition. That is a precondition to be fulfilled if Mauritius wants to become a regional leader as set out in the wider strategy of regional economic cooperation through SADC and COMESA. In the same logic, the market discipline of banks needs some consolidation. This can be achieved by adopting the New Zealand path through requesting banks to regularly publish statements in a format readable by the general public and that allows industry comparison as well as comparison over time. That implies the eventual development of a banking index which would serve as a benchmark.

It appears that we are expecting too much from a liberalization of the interest rate and that so far this channel has not transmitted a positive impact on savings. It could perhaps be more important to accelerate the listing of government securities on the stock market and to ensure that small savers are not penalized by being excluded by some minimum size of transactions. This will stimulate the



debentures market on the SEM. There is also scope for research to be conducted to assess the difficulties met by the collective saving schemes in the mobilization of savings, to identify the causes of low share ownership as well as the impediments to further deepening in the insurance sector and to recommend policy measures towards a change.

Although financial liberalization has not met the expectations concerning mobilization of savings through the interest rate channel still it has brought about some financial development in terms of a greater supply of credit and liquidity in the economy from the banking system following elimination of high reserves requirement and from access to foreign savings following external liberalisation. The result of this is that although the behaviour of firms is still consistent with the pecking order theory of financial leverage it has now been established that the listed firms have now become more sensitive to external financing for the acquisition of physical investment in relation to their internal growth strategy. This can only have a positive effect on capital formation and ultimately on growth. However, it would be good in future to deepen the research to find out whether the same pattern can be established at the level of small and medium enterprises that are gaining importance in the economy on account of their higher capacity to create jobs at the moment. Given that the regression results also show a bi-directional link existing between finance and real GDP, and that export Granger causes investment and real GDP, there is a need to ensure a sustainable economic growth by increasing efforts in the direction of trade policies. This will create a self-reinforcing dynamic on growth through the finance connection. Therefore, the efforts made by the authorities to

promote the development of banks and non-bank financial intermediaries with a view to sustain economic growth were fully warranted although the *prima facie* empirical evidence and the models reject the McKinnon and Shaw hypothesis.

In so far as financial deepening is concerned in the region, the results have shown a lack of convergence in the transmission of the liberalisation policies and this can only retard any higher level of regional integration in future.



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# APPENDICES



## **Appendix 1**

### **List of Companies**

1. Harel Frères Limited
2. Mon Désert Alma Ltd
3. Mauritius Oil Refineries Ltd
4. The Mount Sugar Estates Co Ltd
5. Maurutius Stationary Manufacturers Ltd
6. Mon Trésor Mon Désert Ltd
7. Rogers and Co Ltd
8. The Savannah S.E Co Ltd
9. Swan Insurance Co Ltd
10. The United Basalt Product Ltd

## Appendix 2

Table 1.2

### *Summary of Macprudential Indicators*

<b>Aggregated Microprudential Indicators</b>	<b>Macroeconomic indicators</b>
<b>Capital adequacy</b>	<b>Economic growth</b>
Aggregate capital ratios	Aggregate growth rates
Frequency distribution of capital ratios	Sectoral slumps
<b>Asset quality</b>	<b>Balance of payments</b>
<i>Lending institution</i>	Current account deficit
Sectoral credit concentration	Foreign exchange reserve adequacy
Foreign currency denominated lending	External debt (including maturity structure)
Nonperforming loans and provisions	Terms of trade
Loans to loss-making public sector entities	Composition and maturity of flows
Risk profiles of assets	<b>Inflation</b>
Connected lending	Volatility of inflation
<b>Leverage ratios</b>	<b>Interest and exchange rates</b>
<i>Borrowing entities</i>	Volatility in interest and exchange rates
Debt-equity ratios	level of domestic real interest rates
Corporate profitability	Exchange rate sustainability
Other indicators of corporate conditions	Exchange rate guarantees
Household indebtedness	<b>Lending and asset price booms</b>
<b>Management soundness</b>	lending booms
Expense ratios	Asset price booms
Earnings per employees	<b>Contagion effects</b>
Growth in number of financial transactions	Trade spillovers
<b>Earnings and profitability</b>	Financial market correlation
Return on assets	<b>Other factors</b>
Return on equity	Directed lending and investment
Income and expense ratios	Government recourse to the banking system
Structural profitability indicators	Arrears in the economy
<b>Liquidity</b>	
Central bank credit to financial institution	
Segmentation of interbank rates	
Deposits in relation to monetary aggregates	
Loans-to-deposit ratios	
Maturity structure of assets and liabilities (liquid asset ratios)	
Measures of secondary market liquidity	
<b>Sensitivity to market risk</b>	
Foreign exchange risk	
Interest rate risk	
Equity price risk	
Commodity price risk	
<b>Market-based indicators</b>	
Market prices of financial instruments, including equity	
Indicators of excess yields	
Credit ratings	
Sovereign yield spreads	

*Source: IMF Occasional Paper No 192, April 2000*

## Appendix 3

### Summary of Empirical Literature

	Theme	Observation /Findings	Author
1	Savings and Interest rate	LDCs response to higher interest rate policy is either insignificant or too small for policy relevance	Giovannnni (1985)
2	Savings and Interest rate	Changes in interest rate can either increase or decrease the current consumption and hence saving depends on the balance between the income and substitution effect.	Deaton (1989)
3	Savings and Interest rate	In LDCs where households must first achieve subsistence consumption (and savings), intertemporal elasticity of substitution and interest ate sensitivity of saving is for some time almost zero.	Ogagri, Ostry and Reinhart (1995)
4	Savings and Interest rate	High interest rate policy can result in lower aggregate savings when the effect of income distribution, tax treatment of interest payment and corporate financial distress are taken into account	Akyuz and Kotte (1991)

5	Interest rate movement in Africa	Real deposit rate did not change significantly in several African countries after liberalisation	Turtleboom (1981)
6	Interest and Savings	High interest rate policy can result in lower aggregate savings when the effect of income distribution, tax treatment of interest payment and corporate financial distress are taken into account	Akyuz and Kotte (1991)
7	Capital Market Liquidity and Savings	The desire for liquidity works against the propensity to save	Jappellini and Pagano (1984)
8	Stock Market and Capital Formation	Greater stock market liquidity is associated with faster rate of capital accumulation	Levine (1996, 2001)
9	Stock Market and Capital Formation	Stock Market liquidity is a robust predictor of real per capita GDP growth	Levine and Zervos (1998)
10	Stockmarket Development and Banking System	Bank-based financial systems such as Germany, Japan and to some extent France are more capable of promoting long-term growth than in the market-based Anglo-Saxon system.	Arestis, Demetriades and Luintel (1999)



11	Financial Systems and Innovation	Better financial systems improve the profitability of successful innovation and thus accelerate growth.	King and Levine (1993)
12	Liberalisation and Institutional Dimensions	Growth tends to be higher if reforms pertaining to property rights and contract enforceability precede stock market liberalisation	Fuch-Schünde and Funke (2001)
13	Technology and Finance	Technology enhances intermediation and financial deepening	Rousseau (1998)  King and Levine (1998)
14	Causality Issue	The development of financial intermediaries exert a large causal impact on economic growth.	Levine, Loayza, and Beck (2000)
15	Causality Issue	There is no evidence of one way causality from financial development to economic growth in China, Australia, Canada, Denmark, France, Italy, Japan, New Zealand, UK and USA	Shan, Morris and Sun (2001)
16	Law and Financial	Countries that efficiently impose compliance with laws tend to have better	Levine, Loayza, and Beck (2000)

	Development	<p>developed financial intermediaries.</p> <p>Countries where corporations publish relatively comprehensive and accurate financial statements have better developed financial intermediaries</p>	
17	Regulations	<p>Regulation does not work satisfactorily in many developing countries because of high level of corruption and poor institutional quality.</p>	<p>Demirgüç-Kunt and Detragiache (2002)</p>

## **Appendix 4**

### **The South East Asian Crisis**

In S.E Asian countries, overvalued pegged exchange rates deteriorated the terms of trade. Current account deficit were being financed by massive inflows of short-term foreign capital in a context of capital account liberalisation and the BOP did not appear to be in difficulty. The ratio short-term debt<sup>1</sup> to international reserves in East Asia and Pacific increased from 124% in 1990 to 214% in 1997 - (World Bank, Global Development Finance 2000). Rodrik and Velasco (1999) show evidence of high levels of short-term debt systematically increasing the risks of a financial crisis. Short-term bank-to-bank lending<sup>2</sup> was the main contributor to the rapid flow of “hot-money” in S.E Asia. Short-term interest dropped in OECD countries in the 1990s and global liquidity increased. Interest differential in favour of East Asian economies throughout 1990-1996 provided arbitrage opportunities to finance current account deficits and acted as a push factor encouraging international financial intermediation. Low interest in Japan due to the weakness of the economy encouraged Japanese banks to lend to the S.E. Asian Tigers at higher rates. Domestic banks found it profitable to borrow short-term foreign exchange in the US and Japan for long-term lending in the domestic market at higher rate after currency conversion and also to buy government debt at higher rates. The ex-ante foreign exchange risks<sup>3</sup> looked non-existent because of pegged exchange rates. Such behaviour related to the

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<sup>1</sup> Maturity less than 1 year.

<sup>2</sup> It must be observed that short-term loans are less risky. The Basel Capital weights favour short-term lending over medium/long-terms lending and makes no distinction between domestic and international short-term lending.

<sup>3</sup> Ex post risks were associated with exposure to currency devaluation, mismatch in maturity of assets and liability, deterioration of firm performance with the deterioration of the economy.



peg was also present in the Latin American and the Turkish crisis. However, pegged rates do become misaligned and if maintained unchanged for too long can, in a world of capital mobility, lead to currency crisis. International capital inflows intermediated in the banking sector can be expected to stabilise as the increase the supply of credit drives interest rate down at parity to foreign interest rate<sup>4</sup>. However, capital inflows perpetuated in S.E Asia because of increased demand for investment and bank credit arising out of the private sector's belief that with economic liberalisation the economy would grow still faster, (Bird and Rajan, 1999). This coupled with an uncompetitive banking market structure prevented convergence with international interest rate as per parity theory. Adverse selection occurred since firms of good repute could borrow abroad directly and so banking intermediation was for the relatively less efficient firms. When foreign loans got in the real estate sector<sup>5</sup> it did not generate foreign earnings for loan repayment as the productive sector would from Debt servicing not offset by higher export earnings exacerbated the current account deficit. Additionally, asset prices boomed and when they subsequently collapsed borrowers could not repay the domestic banks whose balance sheets were weakened with high proportions of non-performing loans. Asymmetry of information prevented foreign investors from identifying the degradation of banks assets and the inflows continued financing the current account deficit. Current account deficit in Thailand rose from 5.7% to 8.4% GDP in 1995. In Korea the change was from 1.5% in 1994 to 4.6% in 1996. In Malaysia current account deficit reached 8.8% GDP in 1995. When much later current account deficits were perceived as unsustainable with

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<sup>4</sup> After allowing for expected currency weakening and risk premia.

<sup>5</sup> Especially in Malaysia.



relatively low foreign reserves to defend the exchange rate this triggered a speculative currency attack. Some reversal of private capital flows of around 109 billion US\$ has been observed in S.E.Asia between 1996 and 1997, (Institute for International Finance, 1998).With massive outflows the peg collapsed and banks faced increased foreign currency debt creating a twin crisis, banking-cum-currency, a phenomenon that has been found to be very common in financially liberalised emerging economies, (Glick and Hutchinson 1999). The South East Asian crisis can actually be considered "Minskian" (see Chapter 4) in nature.

## **Appendix 5**

### **Short History of Banking Development before Liberalisation**

Soon after the British had captured the island from the French in 1810, Governor Robert Farquhar gave support to the creation of the first bank in Mauritius. The “Colonial Bank of Mauritius, Bourbon and Dependencies” was created by the people of French origin but it was forced to close down in September 1813 because of the absence of prior authorisation from the Secretary of State (Patureau, 1988). Within a couple of months some of its shareholders followed all required procedures and set up “La Banque de l’île Maurice”<sup>6</sup> in December of the same year. However, a major fire ravaged the island in 1816 and led to liquidity problems in spite of financial assistance from the colonial government. Liquidation processes started in 1819 and ended in 1826. Meanwhile the Eastern Commission of Enquiry<sup>7</sup> (1826-28) recommended, interalia, the creation of a Bank.

Subsequently in 1831 the “Banque de Maurice” was founded by a group of Franco-Mauritians with the financial support of people in London. The Mauritius Commercial Bank (MCB<sup>8</sup>) was founded by British businessmen jointly with another group of French settlers to foster some competition. The 1847 financial crisis in London led to the stoppage of operations of the “Banque de Maurice” in 1848, leaving the MCB as a monopoly banking institution. From 1852 to the end of the

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<sup>6</sup> A commercial bank. It was also known as la banque Gaillardon. Gaillardon being one of the shareholders.

<sup>7</sup> A Royal Commission appointed in 1822 to look into economic and administrative problems in Mauritius and other British colonies in the region.

<sup>8</sup> MCB is still in operation.

19th century the MCB faced very little and sporadic competition from several banks joining the industry but subsequently leaving.

- Oriental Bank Corporation, 1852-85
- Nouvelle Banque Orientale, 1886-92
- Chartered Mercantile Bank of India, 1859-65
- Banque Franco-Egyptienne, 1881-89

With the quasi-monopoly power of the MCB over almost half a century, the Franco-Mauritian sugar producers holding economic power gradually constituted its captive market. It is only towards the end of the 1800s and early 1900s that the MCB faced stable, though relatively weak, competition. Competition for market share came from both foreign banks having local branches as well as locally incorporated banks. The presence of the few foreign banks<sup>9</sup> in the economy even before financial liberalisation has contributed to establishing a minimum standard of good banking practices in Mauritius but the highly dominant position of the MCB persisted until entry of the State Bank of Mauritius (SBM) in the industry in 1973. That constituted a major event both in terms redistribution of market power in the industry and in terms of financial deepening. Through innovation SBM set forth to become a real challenger to MCB and in the process it significantly improved the intermediation process over the island. Unlike the other banks, which had their main activities at their head quarters in Port Louis, supported by three or four branches in the main towns, SBM set out to attract depositors in all regions by innovation through the introduction of branches in remote areas. It also used TV advertising<sup>10</sup>

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<sup>9</sup> E.g Barclays Bank, HSBC

<sup>10</sup> Never in the past had banks advertised on radio/T.V



as a marketing instrument in the process. Small savers from low-income groups and people from remote areas had hitherto been ignored to a certain extent and they found in SBM a more attractive proposition. Apart from bringing new depositors into the banking sector, SBM also captured part of the market from other existing institutions. Many small savers who were customers at the Post Office Saving Bank switched over to SBM which provided them with extra services<sup>11</sup> such as a variety of deposit instruments and giro transfer for salary being paid direct to their accounts as well as loan facilities. The SBM also proved to be very flexible regarding personal loans as compared to other banks. In that respect it has also contributed to weaken the thin unofficial money market. The bank has also been an important public sector partner facilitating debt management of public finance via acquisition of Treasury bills.

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<sup>11</sup> Deposits are accepted at all branches of the POSB, while withdrawal is limited to MUR 2000 at branches. Customers can apply for larger sums at branches by giving notice of withdrawal 3 days in advance. Any amount can be withdrawn on demand only at the Central Office in Port Louis.



## Appendix 6

### Methodology Employed for Calculation of Total Return Index

#### Step 1: XD Adjustment

Daily announced dividend is transposed into index points on the ex-dividend date.

$$\text{XD Adjustment} = \left( \frac{\sum_{i=1}^n g_i w_i}{d} \right) \times 100$$

Where,

$g_i$  = Announced dividend per share of the  $i$ th company

$w_i$  = Number of ordinary shares issued by the  $i$ th company

$d$  = Divisor (base market capitalization) of the underlying capital index, SEMDEX

#### Step 2: Total Return Index (SEMTRI) Calculation

Assumption: Reinvestment of Dividends

$$\text{SEMTRI}_t = \text{SEMTRI}_{t-1} \left( \frac{\text{SEMDEX}_t + \text{XD}_t}{\text{SEMDEX}_{t-1}} \right)$$

Where,

$\text{SEMTRI}_t$  = Total Return Index Value Today

$\text{SEMTRI}_{t-1}$  = Total Return Index Value Yesterday

$\text{SEMDEX}_t$  = Underlying Capital Index Today

$\text{SEMDEX}_{t-1}$  = Underlying Capital Index Yesterday

$\text{XD}_t$  = XD adjustment to underlying Capital Index Today

## Appendix 7

### Chronology of Liberalisation in the Mauritian Monetary Sector

	<b>Event</b>	<b>Date</b>
1	Gradual elimination of directed credit programme	1991
2	1 <sup>st</sup> phase of open market operations  (Treasury Bills in the Primary Market)	1991
3	Interest rate liberalisation	1991-1995
4	Accommodation policy reviewed so that banks having liquidity deficit seek reserves from the interbank market before seeking refinancing from the central bank.	1992
5	Phasing out of high reserve requirement	1996-1998
6	Creation of secondary market in treasury bills through OTC sales of Treasury Bills (TBs) to non-bank institutions and to individuals	1998
7	2 <sup>nd</sup> phase of open market operations with the introduction of repo transactions to allow the central bank influence the liquidity of the banking sector	1999
8	Final stage of development of secondary market in TBs via the trading of TBs on the Stock exchange of Mauritius	2003
9	Removal of exchange control on current account	1987-1992
10	Liberalisation of capital account	1991-1994

## **Appendix 8**

### **List of Guidelines Issued by the BOM (Undated)**

1. **Guideline on Public Disclosure of Information**
2. **Guideline on Related Party Transactions**
3. **Guideline on Liquidity**
4. **Guideline on Credit Concentration Limits**
5. **Guideline on Corporate Governance**
6. **Guidance Note on General Principles for Maintenance of Accounting and Other Records and Internal Control Systems**
7. **Guidelines for Calculation and Reporting of Foreign Exchange Exposures of Banks**
8. **Guideline on Internet Banking**
9. **Guidance Notes on Risk Weighted Capital Adequacy Ratio**
10. **Guideline on Transactions or Conditions respecting Well-being of a Financial Institution Reportable by the External Auditor To the Bank of Mauritius**
11. **Guideline on Credit Impairment Measurement and Income Recognition**
12. **Guidance Notes on Credit Risk Management**
13. **Guidance Notes on Fit and Proper Person Criteria**  
**Appendix to Fit and Proper Person Questionnaire**
14. **Guidance Notes on Anti-Money Laundering and Combating the Financing of Terrorism for Banks and Cash Dealers**

## **Appendix 9**

### **Basel Provision Regarding Capital Base**

In line with the Basel provision the minimum capital base is in different components: -

(i) At least 50% of the capital base should compose a core element (tier 1) representing equity capital<sup>12</sup> and retained earnings.

(ii) Supplementary capital (tier 2) representing revaluation reserves, general provisions/general loan loss reserves, hybrid<sup>13</sup> capital instruments and subordinated term debts<sup>14</sup>.

Tier 3 capital comprising subordinated debt of at least two years' maturity as amended in 1996 by the Basel capital accord of 1988 is not yet considered in Mauritius because banks are not heavily involved in securities trading which involve market risks.

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<sup>12</sup> Paid ordinary shares and non-cumulative preference shares

<sup>13</sup> debt/equity – cumulative preference shares.

<sup>14</sup> Created against the possibility of future losses and are not intended to deal with specific assets. However where provisions have been created against identified losses/deterioration of value of any asset or group of assets they do not represent the characteristic of capital and are not included in capital base. This represents an amendment made in 1996 to the 1988 Basel capital accord.



## **Appendix 10**

### **Loan Classification & Provisions in Mauritius**

1. **Standard Credit:** This refers to performing credit with adequate sources of repayments and collateral.
  2. **Substandard Credit:** This refers to current performing credit but where there exists doubts about the borrower's ability to comply with the terms and conditions of the credit. Further, whenever a non-performing loan<sup>15</sup> is past due between 90 and 180 days, it is automatically classified as substandard.
  3. **Doubtful credit includes:**
    - (a) Loans where the collection of debt has become highly improbable
    - (b) Non-performing loans that are past due for a period exceeding 180 days but less than one year.
  4. **Irrecoverable loan (Loss)** refers to credit considered as uncollectable. This category also comprises non-performing loans that are past due for a period longer than one year. Banks are requested to write-off irrecoverable loans even if there might be some recovery in the long-term. This prevents any attempts at rolling over loans. The aim is to reduce the ratio below 4 percent by carrying out revival plans of large debtors in the second fiscal half.
- The amount of non-performing loans is now compiled by each bank and the figures reported to the central bank<sup>16</sup>. Banks are expected to set a general provision of a minimum 1% of their standard advances as a cushion for credit loss. They also need

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<sup>15</sup> In case the principal or interest on past due accounts are due and unpaid for 90 days or more a loan is defined as non-performing.

<sup>16</sup> No record is available about non-performing loans for years preceeding 1996.

to ensure that 20% of their substandard credit, 50% of doubtful credit and 100% of irrecoverable credit are treated as provision for bad debt to avoid overstating existing loans and swelling profits and making excessive dividend payments<sup>17</sup>.

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<sup>17</sup> Banks are not allowed to declare any dividend or issue bonus shares out of profit until the adequate provision has been made to the satisfaction of the BOM in respect of bad or doubtful debts.