

**CAPITAL MOBILITY: ESTIMATE & IMPLICATIONS
THE CASE OF BARBADOS**

by

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Contents

CONTENTS

ABSTRACT	56
INTRODUCTION	57
SECTION 1. Capital Mobility: Relevant Theoretical Aspects	58
1.1 International Capital Mobility Defined	58
1.2 Measures of International Capital Mobility	58
1.2.1 Savings - Investment Correlation	58
1.2.2 Interest Rate Determination - an Alternative	58
1.3 Capital Mobility in a Small Open Economy	59
1.3.1 Policy Advantages & Disadvantages	59
1.3.2 Other Considerations	60
1.4 Summary	60
SECTION 2. Capital Market Developments: Some Stylised Facts	60
2.1 The Capital Market of Barbados	61
2.2 Investment Conditions in the United States	63
2.3 Summary	63
SECTION 3. Empirical Analysis	63
3.1 Methodology and Data	64
3.1.1 Model Specification	64
3.1.2 Data Specification	65
3.1.3 The Hypotheses to be Tested	65
3.2 Empirical Results	66
SECTION 4. Implications & Economic Relevance	68
4.1 Monetary and Fiscal Policy	68
4.2 The Warning Signals of Financial Vulnerability	68
4.3 Functional Aspects of the Domestic Financial Market	68
CONCLUSION	69
APPENDICES	
1 The Securities Exchange of Barbados - SEB	70

2	Model Derivation	70
3	US and Barbados Interest Rates	71
4	Regression using the Composite Variable	72
BIBLIOGRAPHY		72

Abstract

This study adopts an interest rate determination model to capture the degree of capital mobility in Barbados. Focus is given to factors which may have conditioned this level of mobility, with special emphasis on the formation of the Stock Exchange of Barbados in 1987. Results show that in spite of the capital controls in this island economy, capital is relatively mobile - to indicate the sensitivity of the domestic system to external influences. As a result, the scope for monetary policy independence is limited.

Introduction

In recent years, analyses of international capital mobility have become rather prominent. Financial markets have expanded greatly and are now more integrated. Cross-border capital flows temper this integration by promoting the equalisation of interest rates across markets. The size and free movement of capital flows in the world economy have introduced (in some countries such as Mexico), a high level of sensitivity to foreign influences. In this paper, the degree of mobility for Barbados is established and conclusions made about the impact of external factors.

Obstfeld (1994) describes capital as being *globally mobile* when economic agents are uninhibited by governmental impediments, to negotiate and perform financial transactions in any part of the world with identical transaction costs. The most fundamental implication of perfect capital mobility relates to the law of one price, whereby the price of an asset must be the same wherever it is sold.

One avidly used measure of capital mobility relies on the cross-border flow of capital, generating (long-run) interest rate parity. This methodology is based on the hypothesis that if capital is freely mobile, arbitrage on the part of speculators in search of the highest returns, will result in the equalisation of interest rates in the respective countries. The current study adopts the interest-rate determination model of Edwards and Khan (1985) to examine the degree of capital mobility in Barbados and gauges the sensitivity of the local interest rate to domestic and foreign developments. It employs a partial adjustment process, to allow for the less than instantaneous adjustment of the domestic interest rate, to changes in its determinants.

The hypothesis tested focuses on whether capital controls in Barbados have resulted in a low degree of capital mobility. Or more specifically, have controls prevented the equalisation of cross-border interest rates, by limiting the free flow of capital and arbitrage operations? In this regard, one would expect capital mobility to be low under conditions of tight economic controls.

The second main issue addressed relates to factors that have conditioned the degree of mobility in Barbados. As earlier alluded to, the degree of mobility is grounded in the magnitude and freedom of capital inflows and outflows, in response to both domestic and foreign occurrences. Therefore, both external and domestic capital market developments that may have induced capital to flow in and out of Barbados are explored. As the theory of the model adopted suggests, capital outflows from Barbados may have been directed at attaining higher returns in the foreign capital market, which for the purpose of this study is

assumed to be the US market. This proposition is supported by interest rates in the US being higher than that in Barbados, for the majority of the period under analysis.

The next aspect to be considered is what developments may have induced capital to flow into Barbados. Domestically, particular attention is given to the establishment of the Stock Exchange of Barbados (SEB), in 1987. This is driven by the assumption that the SEB promoted improvements in the investment climate of Barbados, by enhancing information availability, investor confidence and offering tax concessions on investments transacted on the Exchange. This projection of positive developments in the capital market of Barbados inducing capital inflows is made more complete by the unfavourable investment climate in the US, for the same period. Under the assumption that some international investors were partial to investment conditions and prospectus in the island-economy, during this period (*ceteris paribus*), the degree of capital mobility is expected to have increased.

Another issue addressed relates to the implications and economic relevance of capital mobility. Under a high degree of mobility there can be little scope for monetary autonomy, with monetary aggregates being prescribed by external factors and surges in capital flows. Thus, the course of monetary policy may diverge from that desired, or seen as most beneficial to the economy, by policy-makers. This is of particular importance in a small open economy such as Barbados, where liquidity in the financial system and speculation against the fixed exchange rate parity are paramount and must be contained at moderate levels.

Other tests and studies of capital mobility {Bennett (1995)} have also been applied to Barbados and neighbouring Caribbean economies. The current work is distinctive in that it not only measures the degree of mobility in Barbados, but also attempts to isolate what may have conditioned it. Even though it is noteworthy that findings are subject to data availability, the analysis is expected to highlight some of the developmental and functional aspects of the capital market.

This study commences by addressing the relevant theoretical aspects of capital mobility and a detailed definition of it. In Section 2 a brief synopsis of the development of the capital market in Barbados is presented, with some stylised facts on the investment climate in the US. Subsequent to this, the model adopted is formulated and the basic hypotheses tested. The empirical results generated are reported in Section 3. Finally, Section 4 examines the implications of these findings and their economic relevance for the financial market of Barbados. Focus is given to policy implications and the functioning of the domestic system. This study is brought to an end with concluding remarks.

Section 1.

Capital Mobility: Relevant Theoretical Aspects

During the seventies and eighties, international financial markets grew almost explosively. This phenomenon motivated research on the impetus of capital flows and their economic implications.

There are various vehicles of international capital, namely; debt portfolio investment, equity investment and foreign direct investment. Razin et al. (1996), indicate that portfolio flows account for about a third of net resource flows to developing countries. It is however worthy to note that Schadler et al. (1993) comment that the form of inflows is not always important, since all inflows will eventually find their way into the financial system.

1.1 International Capital Mobility Defined

'Capital mobility' is commonly used to refer to the cross-border flow of capital. Obstfeld (1994) describes capital as being *globally mobile* when economic agents are uninhibited by governmental impediments, to negotiate and perform financial transactions in any part of the world with identical transaction costs. The ideal case of perfect international capital mobility - where capital moves freely with only marginal transaction costs - is of particular interest. The most fundamental implication of perfect capital mobility relates to the law of one price; whereby the price of an asset must be the same wherever it is sold.

Since governments do impose national taxes and controls on capital, as well as outright prohibitions, what is observed in practice varies from how capital mobility is defined. This casts doubt on whether capital movements should be described as imperfectly mobile across the world economy, or simply seen as a 'proxy' of free capital mobility.

By defining capital mobility, it should be clear that this is not identical to market integration, two concepts that have come to be used interchangeably. Goldstein et al. (1991) posit that;

- ♦ Market integration is conducive to capital mobility, or at least it leads to increasing potential capital flows.
- ♦ Macroeconomic capital mobility is not a necessary condition for market integration.
- ♦ The equalisation of real interest rates across countries is not a necessary condition for market integration but is nevertheless a strong indicator of such.
- ♦ Capital mobility is a sufficient condition for market integration, or at least that a high level of capital mobility, indicates a high level of market integration.

1.2 Measures of International Capital Mobility

Many measures have been formulated to capture the magnitude of capital flows across economies¹, an adequate summary of which is provided by Obstfeld (1994). Two of the most relevant of these are dealt with below. Both measures assume investors take advantage of opportunities to globally seek the highest return on investments, when capital is freely mobile. It is also commonly accepted, that investors residing in a given country will require the same after tax return on all assets, whether foreign or domestic {Bovenberg et al. (1989)}.

1.2.1 Savings-Investment Correlation

Early work in this field was provided by Feldstein and Horioka (1980). These writers depart from the premise that in an open economy domestic savings and investments do not necessarily balance. This is attributed to the possibility of non-zero net capital flows with the rest of the world, as capital is channelled to its most productive uses. Feldstein and Horioka proposed capital mobility to be characterised by the magnitude of correlation between an economy's savings rate and investment rate. If a large proportion of savings is retained for domestic investment - i.e. a high 'saving retention coefficient' exists - this is taken as an indication of low capital mobility across country borders.

Surprisingly, Feldstein and Horioka (1980) found that despite the existence of highly developed capital markets, signs of capital immobility existed in the nine industrialised countries examined. Many researchers have attempted to explain the 'savings-investment puzzle' of Feldstein and Horioka, by analysing the economic forces that underlie these main aggregates². It is interesting to note that Bennett (1995), using the methodology of Feldstein and Horioka, found capital mobility to be high for Barbados, Guyana, Jamaica and Trinidad and Tobago - Caribbean territories which do not have extremely well developed capital markets.

1.2.2 Interest Rate Determination - an Alternative

It is arguable that measures of capital mobility based on rates of return are more superior to saving-investment correlation. The former appears to be a much clearer and obvious measure of mobility and does not rely on strict assumptions, such as aggregate savings being exogenously specified, to gauge mobility. The use of rates of return assumes that if capital is fully mobile, there is a surety that interest earnings across country boundaries will eventually equalise, as arbitrage operations (in response to interest yields), erodes interest differentials. Eventually, arbitrage will become unprofitable, as cross-border interest rates

¹ See the pioneer work of Kouri and Porter (1974).

² See Baxter et al. (1993), Bayoumi (1990), Summers (1988) and Frankel (1986, 1993).

equalise. Frankel and Okongwu (1995) test and fail to reject the hypothesis that capital flows are strong enough to set the international differential in expected rates of return to zero. They conclude that in some developing countries, local interest rates have failed to converge to US rates due to exchange rate depreciation expectations.

A monumental piece of work provided by Edwards and Khan (1985), uses an interest-rate determination model to capture capital mobility (and the degree of openness of the capital account). The barometer of mobility is the co-movement of the domestic interest rate with the foreign interest rate. This measure was found to be very high for Singapore, while being low in Columbia. One assumption of the model is that information about investment opportunities is adequately communicated throughout the world and requires that assets located in different countries be perfect substitutes. More explicitly, the analysis mandates market efficiency and is theoretically reliant on movement towards the long-run interest rate parity proposition³, whereby;

"...given risk-neutral economic agents and the absence of capital controls, the return on similar⁴ domestic and foreign assets will not differ systematically across countries".

Burda and Wyplosz (1997).

Obstfeld (1994) suggests the superiority of utilising the relation between nominal interest rates on on-shore and offshore assets for the same currency, as an appropriate barometer for international capital mobility. This is in spite of the fact that offshore financial assets do not guarantee the same payment in all states of nature⁵. Nevertheless, off-shore measures of return are preferred to employing cross-country comparisons of nominal uncovered returns on similar assets (having different currencies), since foreign exchange risk premium and expectations errors can colour indications of capital mobility. In spite of these considerations, on-shore variables are used in the current study due to the absence of active offshore instruments for Barbados. Furthermore, the model to be formulated is based on uncovered interest rate parity and the assumption of the risk-neutrality of investors, thereby; neither of these factors need be considered.

The work of Edwards and Khan (1985) acted as a catalyst for research by many others; Hague and Montiel (1990) and Hataiseree and Phipps (1996). Adopting a similar methodology to that of Edwards and Khan (1985), the results of Hague et al. indicate relatively high capital mobility in 15 developing countries. They conclude that economic

³ Measures can be applied using covered, uncovered, or real interest rate parity.

⁴ In this instance 'similar' is defined by the risk category and the structure of the asset - mainly its maturity. See Burda and Wyplosz (1997).

⁵ Because offshore Euro markets are unregulated, it is felt that they are more prone to financial crises than on-shore markets, thus increasing the riskiness of returns on offshore assets. Studies using these offshore measures include Obstfeld (1986) and Frankel (1993), with the latter concluding that by 1988 there were few departures from free capital mobility.

agents in developing countries respond to differential rates of return and tend to circumvent restrictions on cross border capital movements. More controversially, the finding of Hataiseree et al. contradicts previous studies on Thailand, by proposing that only moderate signs of capital mobility exists in this territory, (use is made of cointegration techniques).

1.3 Capital Mobility in a Small Open Economy (SOE)

In this sub-section the significance of capital mobility to small open economies is explored. This analysis focuses mainly on policy aspects, with other considerations also being given attention. With regard to the former, it is assumed that the role of financial and monetary policy in developing countries is to promote economic growth and development. More precisely, these policies should maintain key macroeconomic variables (e.g. real interest rates, inflation rates and the exchange rate), in order to provide a price stable financial environment, where private decision makers can maximise their welfare.

1.3.1 Policy Advantages and Disadvantages

The 'impossible trilogy principle' states: full capital mobility, fixed exchange rates and monetary policy independence are pair-wise compatible, but are jointly incompatible {Burda and Wyplosz (1997)}. The scope for independent monetary policy depends on the degree of capital mobility in an economy⁶; especially where exchange rates are fixed and financial assets are perfect substitutes. The danger in any small economy is that under high capital mobility monetary aggregates can be easily manipulated and fluctuating levels of capital can thwart policy. As a result, the monetary authority may not be able to secure the monetary targets desired or determine its own monetary path, as it sees fit. Instead, monetary aggregates will tend towards that of the foreign monetary system {Burda and Wyplosz (1997)}. This study not only attempts to measure the degree of mobility in this island economy but to also draw conclusions about the scope of monetary independence.

Obstfeld (1994) proposes that the measure of capital mobility can be important in formulating not only monetary but fiscal policy in a SOE. If capital is highly mobile, there is less of an incentive for government to target the current account, with credit controls being less restrictive⁷. Furthermore, an increase in government's fiscal deficit may not necessitate the crowding out of domestic investment, when capital is mobile and foreign savings are accessible. With regard to financial policy, Feldstein and Horioka (1980) categorise the importance of capital mobility by assessing its role in the development of an

⁶ This can be directly tested by use of an 'offset coefficient' - to capture the negative effect of domestic credit expansion on the capital account. Frankel et al. (1995), found a substantial offset to monetary policy in Mexico.

⁷ In light of speculative pressures against a fixed exchange rate regime, government may nevertheless pursue this option.

optimal savings policy, to enhance domestic savings. If capital is perfectly mobile, increments to savings may not cause the desired effect of a comparable increase in domestic investment.

1.3.2 *Other Considerations*

By definition, an efficient financial system is one that transfers capital from surplus-savers to borrowers, to direct resources to the most productive and profitable outlets (Hossain and Chowdhury (1996)). In this respect, the theoretical (or rather potential) benefits of international capital mobility are apparent; individuals gain the opportunity to smooth consumption by borrowing and can diversify portfolios, with world savings being routed to the world's most productive investment opportunities. This can be of particular importance in a small open economy, where savings and capital resources in the domestic market are limited. Thereby, high capital mobility and the facilitation of financial transactions can be directly linked to economic growth enhancement.

Large capital outflows and inflows are implicit of a high degree of capital mobility. Schadler et al. (1993), associate capital inflows with a relaxation of liquidity constraints in the domestic money market and lower interest rates. Under a pure currency peg, the Hume's specie-flow mechanism implies that monetary aggregates cannot rise systematically in response to capital inflows, unless money demand rises. Schadler et al. (1993) posit that if the tightening of domestic credit stimulates inflows, money growth should only change marginally. However, when other causes are attributable, inflows represent an increase in the supply of money, unless the current account deficit also expands - to countervail initial inflows. Other derogative effects of inflow surges may include rising or sustained high inflation, the appreciation of the real exchange rate and as earlier alluded to, weaker monetary control. If the inflow is due to changes in real domestic economic policies - such as structural changes that improve potential productivity and promote greater macroeconomics stability - then the potential benefit of higher investment and output from capital inflows, are expected to be large.

1.4 Summary

To summarise the current literature on capital mobility; there is some ambiguity between applicable concepts and by extension the appropriate measure to be used. Implications are that even though financial markets show signs of integration, the world capital market is still far from the text book story of high capital mobility and heavy global portfolio diversification.

Section 2.

Capital Market Development: Some Stylised Facts

This section explores the general development of the capital market of Barbados and focuses on factors, which may have conditioned the degree of capital mobility in the island-economy. Given that mobility deals with bi-lateral flows in response to both domestic and foreign occurrences, comments extend beyond the domestic market. Namely, attention is given to the financial environment in the US. Firstly, because the Barbadian dollar has been pegged at a rate of BDS\$2.00 to US\$1.00, since 1975. Furthermore, the level of liquidity in the US capital market as well as the US being Barbados' main trading partner - makes this country the most relevant counterpart in the rest of the world, for measuring cross-border capital mobility.

It is accepted that avid investors are driven by profit gains, to seek the highest possible return for their investments. Therefore, it is anticipated that at times capital outflows from Barbados may have been motivated by higher interest rates in the US. With regard to capital inflows, market developments that may have induced inflows to Barbados, are explored. The analysis of capital flowing into and out of Barbados is driven by the assumption that capital controls are not severe enough to limit investment or arbitrage operations.

Investor confidence and financial stability are essential for a healthy investment climate. In this regard, the synopsis of the development of the capital market of Barbados is mainly focused on '*pull-factors*' which may have attracted capital to the island - such as the formation of the Stock Exchange of Barbados (SEB). Bovenberg, et al. (1989) state that a favourable tax regime on capital income can have powerful effects by acting as an incentive to investment balances. Thereby, it is expected that the tax incentives offered to trading on the Exchange and other implicit benefits would have increased investment and the amount of capital entering the Barbadian financial system, in the late 1980's and early 1990's.

This proposition of positive developments in the capital market of Barbados inducing capital inflows, is made more complete by the unfavourable investment climate in the US, for the coinciding period. Commentary is offered on external influences, which can be seen as *de facto* '*push-factors*'. The rationale for an examination of the influence of external financial factors is grounded in studies such as Calvo et al. (1993), who show that inflows into Latin America are negatively related to changes in US interest rates and output. As

well as Frankel et al. (1995)⁸, who cite a number of studies that confirm that external factors are a major cause of domestic capital balances. The possibility that some investors could have been partial towards investment conditions and prospects in Barbados during times of favourable market developments, implies (*ceteris paribus*) that the degree of capital mobility would have risen during the interim.

2.1 The Capital Market of Barbados

Williams (1996), characterises the capital market of Barbados by four developmental phases. These are supplemented with details relevant to the current study.

The Early Period Prior to 1972

This era was marked by Barbados being a member of the Eastern Caribbean Currency Agreement of 1965. Being also a member of the Sterling Area, currency restrictions were similar to those of the UK. Permission had to be granted for the opening of foreign currency accounts. Payments (proceeds) from invisibles originating within the Sterling Area were made (retained) freely, while flows from countries outside of this jurisdiction required the approval of the authorities. The fact that purchases of non-Sterling Area securities and real estate by residents was not permitted and that direct investment in Barbados by residents of countries outside the Sterling Area required exchange-control approval⁹, is representative of the bias that existed towards the Sterling Area.

During this period, trust companies were predominantly used for securities dealing, given the absence of formal market trading. Indications are that financial institutions held little equity, with most shares being in the possession of individuals and other companies. Government paper was only somewhat illiquid, with major subscribers being commercial banks, trust companies, insurance companies, the Government Savings Bank, statutory corporations and pension fund institutions.

The Epoch of the Monetary Authority 1972 - 1986

With the establishment of the Central Bank of Barbados in 1972, the Barbados dollar replaced the Eastern Caribbean dollar as the local currency unit. By 1974, exchange controls were extended to transactions with residents of all Sterling Area countries. For example, capital transfers required exchange control approval and securities payables were subject to deposit requirements. Non-residents could buy securities provided that it could be shown that adequate amounts of foreign currency were brought in for their purchase. Remittances were also allowed when proof of foreign source capital was made

available. With the formation of the Central Bank, opportunities for the development of the capital market became more feasible. However, the illiquidity of Government paper was only partly alleviated, (as this was not negotiable between the holder and a third party). Nevertheless, commercial banks took to trading treasury bills and debentures with the Central Bank, (in order to abate illiquidity woes). This phase was also marked by Government's commencement of tax reserve and tax refund certificates, which were not well favoured by investors. In 1987, savings bonds were introduced to the market, with interest earnings being tax free below a holding of \$500 per person. Treasury notes and long-term bonds were also made available, again with a tax-free threshold.

Corporate investors were permitted to claim a tax credit of 15% of gross dividend received, up to BDS\$1000. {Williams (1996)}. Williams (1996) also notes that in spite of per capita income in Barbados tripling during this period and financial savings being high, risk and venture capital requirements remained unsatisfied.

Preliminary endeavours at liberalising the financial system were also enacted during this phase. In 1980, authorised dealers were empowered to approve (without reference to the Central Bank), applications for foreign exchange up to specified limits. Subsequent to this (in 1983), fees levied on foreign exchange applications for current invisible transactions were revised to a flat rate of 1%.

The Dawn of the SEB 1987 - 1994

The Securities Exchange of Barbados (SEB)¹⁰ came into being on June 1st, 1987, with the proclamation of the Securities Exchange Act of 1982/44. As a self-regulating body, the SEB promoted the opportunity for improvement in the efficiency of the financial system via;

- (a) Greater information availability¹¹.
- (b) The elimination of some of the bureaucracy and costs to investing in Barbados. For example, tax concessions are offered to investors trading on the Exchange.
- (c) Investor confidence would have increased, since investors can be assured that any company listed on the exchange is legally registered, has had a positive earning profile over the preceding three years and has adequate working capital with competent management.
- (d) The timely disclosure of material changes affecting a public company.
- (e) By enhancing liquidity in the financial system and making securities more marketable.

Neither capital gains nor income on government securities are subject to income tax in the case of non-national or national holders, if these are traded on the Securities Exchange. Stamp duty and property transfer taxes on securities traded on the Exchange are also

⁸ Frankel et al. (1995), conclude that US interest rates are a major determinant of financial conditions and in particular, local interest rates in emerging-market countries.

⁹ See the IMF 23rd Annual Report on Exchange Arrangements and Exchange Restriction (1973).

¹⁰ See Appendix 1.

¹¹ According to Chapter 318A of the Securities Exchange Act: Information required for the records of the Exchange (such as the names and business addresses of the members with whom or through whom transactions are effected), may be published or made publicly available.

waived. However, there is a 15% withholding tax on dividends and interest paid to non-nationals. Non-nationals are advised to register inflows with the Foreign Exchange Department, Central Bank of Barbados in order to facilitate the easy repatriation of capital, with fees being attached to this approval. It is the discretion of the Central Bank to refuse large foreign purchases of shares in locally incorporated companies. In the case of nationals, the withholding tax rate is 12.5%. All tax concessions were enacted in an effort to alleviate excessive costs of share ownership transfer and to act as incentives to investors. Another tax concession also offered is that applicable to the purchase of new shares in public companies¹².

Strides towards a regional securities market were made in April 1991, with the stock exchanges of Barbados, Jamaica and Trinidad commencing the cross trading of listed securities. Other steps at developing the Exchange of Barbados have included the launching of an unlisted securities market in early 1992, to assist small companies which were highly geared (but did not qualify for full listing) and in need of capital. At the time it was hoped that this would have extended the scope of the Exchange and the range of capital available, however, corporate response was weak. Currently, not even corporate debt is available to the market.

Further undertakings at financial sector reform occurred in late 1988, *inter alia*; Central Bank approval on foreign exchange remittances for commissions and dividends of up to BDS\$500, was dispensed with.

More Recent Developments post 1994

With liberalisation on most world agendas, Barbados has preceded to gradually relax some of its controls on capital flows and interest rate movements. Hope of a more responsive, market-oriented system (to mobilise savings), has prompted the Central Bank to loosen its direct control on interest rates, reductions in reserve requirements and less stringent credit controls and exchange controls {Williams (1996)}.

Relinquishing controls increases the need for consistent monetary policy, since with capital being freer to roam, the financial system becomes more vulnerable. There are many implicit and explicit hindrances to free capital movement remaining. These include Central Bank approval being required by nationals borrowing large sums abroad or by non-nationals borrowing in Barbados. Furthermore, any borrowing by authorised dealers to finance their domestic operations requires the approval of the Central Bank.

¹² See Williams (1996).

With regard to investment, a 6% tax is levied on the portfolio investments of pension funds in foreign companies not registered with the Barbados Supervisor of Insurance.

As of the 31 December 1996, there were (20) companies listed on the SEB. Market capitalisation continues to fluctuate from year to year and recorded BDS \$1,540 million at the end of 1996. The number of shares bought and sold has increased annually by approximately 42.5% since 1989, with the exception of 1992 and 1995 (for which sharp declines are recorded). Currently trading remains thin, with only moderate yields on securities. According to Williams (1996), this may be partially due to the absence of active dealers to stimulate market activity¹³. Despite it being evident that the growth and development of the SEB is not complete, the Exchange has improved information available to the market on corporate activity. It is likely that this has led to a more reliable share valuation and potential investors can confidently formulate portfolios using SEB listings, while taking advantage of the tax concessions offered.

Government is said to have indirectly benefited from the lack of depth of the securities market in Barbados {Williams (1996)}. This is because commercial banks have had to rely on government paper to meet secondary reserve requirements. Likewise, insurance companies also tend to be significant holders of government paper for prudential reasons. In recent time, the dearth of alternative securities has resulted in excess liquidity being partly 'mopped up' by government paper.

Overall, the capital market of Barbados can be described as partly unsophisticated. The efficiency of this financial system is constrained by the persistence of various explicit (and implicit) barriers to the movement of capital. The lack of venture capital (especially in times of high liquidity), indicates some difficulty in the transfer of savings resources to profitable investment opportunities. It would appear that economic agents lack the relevant market information and general awareness about trading activity, to allow them to become avid investors. By extension, there also appears to be an intrinsic rigidity and conservatism in the investment practises of nationals. This has not only hampered financial innovation in the market but also potential market efficiency gains and as of to date, there has been no evidence of a forward market. However, whether these conditions are due to the temperament of investors or the small capital base of the market is not clear. What is evident is that many developmental strides must be enacted if the capital market of Barbados is to be considered amongst the nexus of emerging financial centres. However, Williams (1996) states;

¹³ Most members of the SEB are brokers who do not hold inventory of securities for their own account but mainly act in the market to satisfy orders.

"...plans for the development of the SEB in 1997 and beyond appear encouraging and the prospect of a wider regional market should give further impetus to the development of these markets".

2.2 Investment Conditions in the United States

Changing conditions in most of the major industrial countries during the late 1980s and early 1990s (characterised by falling interest rates and output), sent capital looking for more profitable investments (Schadler et al. (1993)). The lack of government controls on foreign exchange, with inward and outward direct portfolio investment being able to move freely in the USA - made conditions conducive to US capital seeking profitable external sources.

Bovenberg, et al. (1989) refer to decreased investment incentives in the US, during the late 1980s. They comment that, *"...the tax policy in the United States, was first liberalised between 1980 and 1984, but was later tightened around 1987...."*. Initially, the Economic Recovery Act of 1981 greatly liberalised depreciation schedules and provided for more generous investment credits. But only a year later the Tax Equity and Fiscal Responsibility Act of 1982 tightened some of these investment incentives.

The net subsidy granted on debt capital inflows rose during 1980-84, while in 1987 this subsidy dropped below its 1980 level (Bovenberg, et al. (1989)). The Tax Reform Act of 1986, reduced the marginal tax rate on corporate income but further tightened investment incentives by repealing investment credits and making the tax provision governing depreciation somewhat less generous. This Act also raised the tax rate on capital gains, which was originally reduced in the 1980's. During the interim under consideration, inflation rates were also low. For debt financing investments, this meant a lower deduction for nominal interest payments (Bovenberg, et al. (1989)).

In the final analysis, it is perhaps not surprising that the sharp decline in favourable investment taxes for the US in 1986, is associated with a major reduction in net private capital inflows in 1987.

One incentive for domestic US investors to invest abroad was section 901 and 902 of the US Internal Revenue Code - whereby, a foreign tax credit can be taken for direct taxes or indirect taxes paid to a foreign government. This was formulated to eliminate double taxation of foreign-source income. Between 1987 and 1988, the net purchase of Latin American and Caribbean stocks and bonds by the USA rose sharply by US\$558 million. This aggregate receded in 1989 and by 1990 a large net sale of financial assets

(US\$8,787) was recorded. The query arises as to how many of these securities were Barbadian financial assets? However, since no particular aggregate is tabulated specifically for Barbados, this can not be presently determined. In examining 'direct investment' in Barbados, this aggregate (which includes equity capital, reinvestment earnings and other capital associated with various international transactions), fluctuated on an annual basis, between 1987 and 1992.

One consideration to this analogy, is the '*international diversification puzzle*'; whereby indications of a '*home-bias*' in portfolios exists, that can not be directly attributed to investment costs, foreign exchange risk or official impediments to foreign investment¹⁴. Gehrig (1993) shows that a domestic bias arises quite naturally when investors are better informed about home assets. While Cole and Obstfeld (1991) argue that even a small transaction cost is enough to discourage an international investor. Differences in language and business practices are identified as easily causing the cost of an international financial deal, to be higher than that of a similar deal between residents of the same country. Tesar and Werner (1992) counter by proposing that the turnover rate for foreign equity investments is higher than that of domestic equity. Therefore, transaction costs can not be the motive behind this '*home-bias*'¹⁵.

2.3 Summary

The focus of this section is on improvements to the capital market of Barbados, some of which coincided with deteriorating investment conditions in the United States during the late 1980's. Implicitly, if capital flows between Barbados and the USA were greater in the late 1980's and thereafter, this should be reflected by a higher degree of capital mobility for the period. Of particular interest, is whether the establishment of the SEB in 1987, positively conditioned this measure of mobility? This may have occurred due to the SEB creating better investment conditions (such as increased information availability) and offering tax concessions to international investors trading on the Exchange.

Section 3.

Empirical Analysis

Based on the economic and market advantages of capital mobility, this measure is investigated for Barbados.

¹⁴ Golub (1991) who concludes that a '*home-bias*' exists amongst investors in industrial countries, confirmed this.
¹⁵ Stockman et al. (1989) and Obstfeld (1994) offer further explanations for this bias.

3.1 Methodology and Data

The econometric methodology used to make statistical inferences about capital mobility in Barbados follows that of Edwards and Khan (1985). This interest rate determination model is general in nature, in that it is applicable to an intermediate economy where capital movements are neither fully restricted nor unrestricted.

This model is formulated and data for Barbados and the US is used to test the existence of the stated hypotheses.

3.1.1 Model Specification

The model commences with a definition of the domestic interest rate. For the purpose of this paper this interest rate is taken as the interest rate on short-term government paper (i_t) and is hypothesised to be a weighted average of: (a) the uncovered interest parity rate, with (i_t^*) being the foreign (US) interest rate and (b) the domestic market-clearing interest rate (rr_t). This relation is specified as:

$$i_t = \phi \theta (i_t^* + e_t^*) + (1 - \phi)(rr_t + \pi_t^*) + \phi(1 - \theta)i_{t-1} \quad 0 < \phi < 1, 0 < \theta < 1 \quad (1)$$

where (θ) is the parameter of adjustment, (ϕ) the measure of the degree of openness of the financial sector and (π_t^*) the expected domestic inflation. The rate of return expected on any foreign assets purchased comprises of two parts¹⁶, the actual foreign interest rate and the expected exchange rate change, (e_t^*). This implies that for assets denominated in currencies that are expected to depreciate, interest rates must be higher to compensate investors for the expected currency loss. In the case of Barbados, the expected change in the local currency against the US dollar is zero, due to the fixed (and stable) parity.

Equation (1) assumes a partial adjustment framework for the domestic interest rate to reflect movement in its (domestic and foreign) determinants¹⁷. Thus, the domestic interest rate lagged one period is included. In a fully open economy with no restrictions on the movement of capital (ϕ) will equal one, as the domestic interest rate is expected to be identical to the foreign rate. Furthermore, as financial markets (and by extension interest rates) adjust rapidly to changes, the parameter (θ) will tend towards unity. Under these conditions, equation (1) simply reduces to the uncovered interest rate parity relation. In

the more general case of a semi-opened, semi-closed economy the parameters (θ) and (ϕ) will lie between zero and unity. In comparison, if an economy is fully closed, i.e. $\{\phi = 0\}$ and external factors do not influence the determination of the domestic interest rate, equation (1) will revert to the Fisher equation. To continue, (rr) is represented as:

$$rr_t = \rho - \lambda ESM_t + \omega_t \quad (2)$$

where (ρ) represents the long-run equilibrium real interest rate, (λ) is a parameter greater than zero, (ESM) the excess supply of real money balances and (ω) a random error term. According to equation (2) the real rate of interest will deviate from its long-run value (ρ), when monetary disequilibrium occurs and an excess supply (demand) of (for) real money balances yields a temporary lower (higher) real interest rate. The (ESM) is defined as the difference between the log of actual real money balances (m) and the log of desired real money balances (m^d), given by:

$$ESM_t = \log m_t - \log m_t^d \quad (3)$$

Equation (3) implies that substitution between both money and goods, as well as between money and financial assets is possible, with two opportunity-costs variables being employed; the above mentioned interest rate and the log of gross domestic product, $\log(y)$, which denotes real output¹⁸. The equilibrium demand for money can be expressed as:

$$\log m_t^d = \alpha_0 + \alpha_1 \log y_t - \alpha_2 (\rho + \pi_t^*) - \alpha_3 \pi_t^* \quad (4)$$

This demand for money takes the conventional form, with one exception. The expected rate of inflation plus the real interest rate are included instead of the current nominal interest rate. Reducing equations (1) through (4) generates equation (5), for the determination of the domestic nominal interest rate¹⁹:

¹⁶ In countries with adequately functional forward markets, this representation may be advanced to the covered interest parity relation. However, given the absence of such in Barbados, uncovered interest rate parity is applicable (Bennett (1995)).

¹⁷ This may be due to friction arising from transaction costs, or information lags.

¹⁸ See Edwards and Khan (1985).

¹⁹ See Appendix 2 for derivation and reduced-form parameters.

$$i_t = \gamma_0 + \gamma_1 i_t^* + \gamma_2 \log m_{t-1} + \gamma_3 \log y_t + \gamma_4 \pi_t^e + \gamma_5 i_{t-1} + z_t \quad (5)$$

where (i_t^*) represents ($i_t + e^*$) and (z_t) a random error term.

It is expected that ($\gamma_1 > 0$). Although there are legal restrictions in the financial system of Barbados, it is not expected that these are severe enough to retard the openness of the system (Bennett (1995)). Thereby, foreign influences are expected to have an impact on the economy. This parameter can also be taken as an indication of the level of market integration, between Barbados and the US.

On a theoretical note, the traditional IS-LM analysis, under a fixed exchange rate regime, determines that the domestic interest rate will move towards the foreign interest rate. If these rates diverge, capital will flow towards the higher of the two rates, as investors seek the best investment return. In the case of a rise in the foreign interest rate, this will cause the demand for foreign assets to rise, while the demand for domestic assets will decline. In an effort to maintain the fixed parity, the monetary authority would be induced to intervene in the capital market (altering money supply), in order to reduce pressure of an exchange rate change. Equilibrium is re-attained when the domestic interest rate realigns to the foreign rate. As a result, the domestic and foreign interest rate can only diverge in the short-run. Thereby, the coefficient of the latter variable is expected to be positive and significant.

Based on the IS-LM framework, ($\gamma_2 < 0$) is anticipated. This negative influence of money supply on interest rates occurs as higher liquidity places downward pressure on rates, in order to re-establish money market equilibrium. In the case of higher income levels, the greater transactions demand for money induces an increase in interest rates (Stevenson et al. (1988)). This is also applied in the Mundell-Flemming model of capital mobility under a fixed exchange rate regime, therefore, ($\gamma_3 > 0$) is expected. Inflation expectations are assumed to be adaptive and positively related to the domestic interest rate, to generate ($\gamma_4 > 0$). Finally, given that the domestic interest rate is assumed not to adjust instantaneously to changes, the value generated for (θ) is expected to be less than unity and positive, i.e. ($\gamma_5 > 0$).

The application of this model will allow inference to be made about the level of capital mobility in Barbados, based on the (γ_1) parameter. In equation (5), the magnitude of (γ_1) = $\theta\phi$ and (γ_5) = $\phi(1-\theta)$. It should be noted that the model is in semi-logs, to be more precise it is a lin-log model. As a result the coefficients of $\log(y)$ and $\log(m_{t-1})$ are semi-elasticities, revealing the percentage response in the domestic interest rate to an actual change in these determinants (Gujarati (1988)).

One limitation of the model presented is that it assumes a constant degree of openness of the financial sector through time (Edwards and Khan (1985)). But in practise, many developing countries are gradually undergoing liberalisation (especially with regard to the removal of capital restrictions). To the extent that these efforts result in a higher degree of openness and mobility, the assumption of a constant parameter is inappropriate. In this instance, the openness parameter that captures mobility can be modelled as a linear function of time. In the case of Barbados, since efforts at liberalisation have been gradual, this alteration to the model will not be pursued.

3.1.2 Data Specification

Ideally, market-determined interest rates represent the appropriate indicators of domestic financial conditions. However, the dependent variable in reduced equation (5), is the actual domestic market-clearing interest rate. This variable is used due to the absence of a curb market in Barbados, thereby it is assumed that the market-clearing rate is identical to any market-determined interest rate²⁰.

Use is made of annually specified data, spanning 1965-1995. Data is obtained from the IMF International Financial Statistics and the publications of the Central Bank of Barbados. Interest rates on short-term (three-month) government paper are used to measure rates of return for Barbados and the United States. In the case of Barbados, this series commences from 1967 only, when treasury bills first became available. (M1), the narrow definition of money (i.e. currency in circulation plus demand deposits), is the aggregate used for actual real money balances. Gross domestic product is used as the income variable. Following Hataiseree et al. (1996) and Bennett (1995), proxies are used in two instances: the actual ex-post exchange rate change replaces the expected change in currency value; secondly, the actual rate of inflation is used as a proxy for the unobservable variable (π^e).

3.1.3 The Hypotheses To Be Tested

A test for the degree of capital mobility in Barbados is performed, as well as for the impact of one major occurrence that may have conditioned this level of mobility, namely the formation of the Stock Exchange of Barbados.

²⁰ A curb market is an unofficial unregulated market, sometimes referred to as a black market. In some developing countries, where securities markets are lacking, financial repression may result in a curb market and divergence between the market-determined interest rate and the market-clearing rate.

Hypothesis I:

The null hypothesis I is that there is capital immobility in Barbados, as given by (ϕ) not being significantly different from zero.

For mobility to be high, the level of barriers to international capital mobility must be sufficiently low and the degree of substitutability between domestic and foreign assets sufficiently high, that arbitrage equates rates of return. Based on the current restrictions in the capital market of Barbados and the relative underdevelopment of this financial system, it is expected that not enough capital is attracted to equate cross-border interest rates through time.

Hypothesis II:

This hypothesis proposes that the existence of the SEB did not enhance the degree of capital mobility in the Barbadian economy. Thereby (γ_6), the coefficient of the dummy variable used to test this impact, will not be significantly different from zero.

Given that the Exchange improved the investment climate of Barbados and created incentives for portfolio investment, it is expected that the SEB had a positive influence on the degree of mobility. Tax concessions offered to trading on the Exchange, greater information availability on domestic companies and resultant increases to investors' confidence - are expected to have inducing capital inflows to the island. Beyond this, the SEB providing easier access to foreign securities, would have allowed capital to flow out of Barbados more readily, in response to cross-border interest rate differentials.

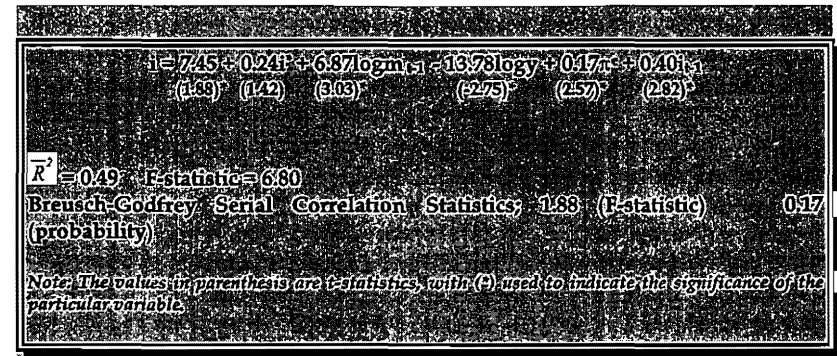
The cross listing of securities on the other regional Stock Exchanges is but one example of an avenue for the outward flow of capital. Based on these effects, it is expected that ($\gamma_6 > 0$).

3.2 Empirical Results

The parameters of equation (5) are estimated using Ordinary Least Squares estimation techniques. These regression results are reported in the boxes below. In this sub-section, attention is also given to domestic conditions that may explain these results.

Hypothesis I

Box 1. Regression Results; Hypothesis I



In assessing the structural coefficients (ϕ) and (θ), these were calculated as 0.64 and 0.38, respectively²¹. The moderate degree of openness (of 0.64) infers that in spite of capital controls, capital is still relatively mobile across the Barbadian economy and arbitrage operations operative. Therefore, the null hypothesis I of this variable not being significantly different from zero can not be accepted, to infer that the Barbadian financial system is sensitive to foreign influences. However, given the insignificance of the foreign interest rate this exposure to foreign influences can not be great or comparable to that under perfect capital mobility. A coefficient of adjustment of (0.38) reflects a relatively lengthy lag time for the nominal domestic interest rate to reflect changes in its determinants. This evidence of inefficiency in the financial system is possibly due to some form of information segmentation. Graphical evidence of this lag is reflected by an examination of the interest rate of Barbados and the US, as presented in Appendix 3. With the exception of 1985 and 1992 (when Barbados endured balance of payment crises), the interest rate of Barbados maps that of the US with a lag, as indicated by the adjustment parameter.

Most coefficients, except ($\log m_{t-1}$) and ($\log y_t$), were fitted with the expected signs. With regard to ($\log m_{t-1}$), it would appear that an expansion in money supply has a positive impact on the interest rate on government paper. It is probably that during periods when Government adopted inflationary financing measures (such as borrowing from the Central Bank) higher interest rates were also offered on government paper. Higher rates would have been offered to attract investors, to ensure that financing requirements were covered.

²¹ These were solved for using simple simultaneous equations.

The variable (*logmt-1*) also has the most significant influence on the determination of the domestic interest rate on treasury bills.

The negative relation between aggregate income and the said domestic interest rate is also of interest. This result may be linked to changes in government expenditure and by extension aggregate demand, being negatively correlated with the return on treasury bills. The reduced-form parameter for inflation indicates that the sign of this variable is indeterminate but results indicate that this coefficient is positive, in the case of Barbados. Inflation is not a very strong determinant of the interest rate on treasury bills; if the former rises by 10% the domestic interest rate will increase by almost 1.7%.

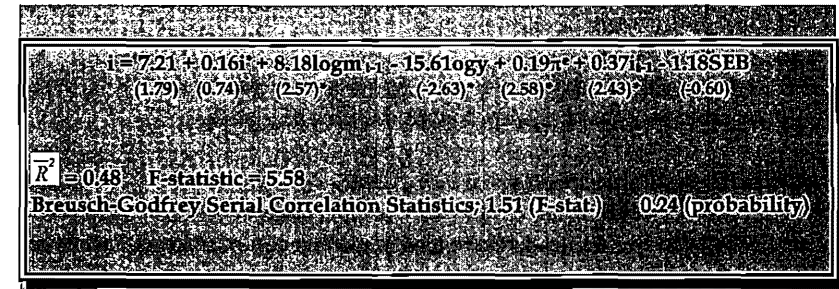
To investigate whether these results can be improved upon, effort is made to simplify the model. One option pursued by Edwards and Khan (1985) is to assume the income elasticity of the demand for money to be unity. This allows real income and lagged real money balances to be combined into one composite variable, (*logyt-logmt-1*). However, this did not improve the fit of the model, in the case of Barbados²².

These results are reliable based on the favourable diagnostic test results. The Breusch-Godfrey test is used to investigate the presence of serial correlation, instead of the Durbin-Watson statistic. This is because the latter is not applicable when a lagged dependent variable appears among the regressors, as is the case in the current model. Other tests performed include: the Chow and Recursive estimates tests for model and coefficient stability - to indicate the absence of any structural breaks in the estimation power of the model. The test for normality was based on the Jarque-Bera test; the Arch test and the White test for heteroskedasticity of the error terms were also performed; and a linearity test based on the regression of fitted residuals on actual residuals, to ensure that the regression relationship is linear.

Hypothesis II

A dummy variable is used to assess the impact of the SEB on the level of capital mobility. This takes the form of zero prior to the establishment of the Exchange and one thereafter. Gujarati (1988) identifies the dummy variable approach as having the particular advantage of indicating whether two regressions are different and pinpointing the source of the difference.

Box 2. Regression Results; Hypothesis II



As can be seen from Box 2, the insignificance of the event dummy variable establishes that the formation of the SEB did not significantly influence the domestic interest rate, as well as this relation being negatively signed. More importantly, the inclusion of the SEB variable has resulted in a decline in the degree of capital mobility from (0.64) to (0.53). As a result, it must be concluded that the null *hypothesis II* can not be rejected for Barbados.

It is possible that the result generated is skewed due to the low volume of trading on the Exchange and the short length of time that the SEB has been in existence. The performance of the SEB may have also been affected by what Bennett (1995) refers to as the structural weakness of regional capital markets. Whereby, the dominance of closely held family owned businesses limits the volume of tradable securities, which would be of interest to foreign investors.

Another aspect to be considered relates to the earlier mentioned 'home-bias' of international investors, since this could have dampened foreign portfolio investment in Barbados. Other issues to be addressed include the small capital base of the Barbadian financial system and associated liquidity risk. A small capital market can act as a deterrent to some investors (especially large or institutional ones), who perceive difficulty after entering a market and then being unable to easily exit, at a later date. When this occurs, it is mostly due to liquidity constraints and difficulty in off-loading financial assets, to result in assets being sold below their market value. Unsatisfactory disclosure rules for corporate information and the comparability and ease with which this information may be obtained, could also be related hindrances to trading on the SEB.

²² See Appendix 4.

Section 4.

Implications & Economic Relevance

A moderate degree of capital mobility has been reported in the case of Barbados. The next stage of this analysis explores the implications and economic relevance of this finding, with regard to the financial system and the economy as a whole.

4.1 Monetary and Fiscal policy

General policy inferences will focus on the two main macroeconomic instruments: fiscal policy and monetary policy. Based on the degree of mobility derived, external factors are expected to influence the domestic economy. Under this condition, fiscal policy will have a relatively strong effect on economic fundamentals, while monetary policy has the potential to influence capital flows and the balance of payments²³. However, the scope of monetary policy independence will be constrained by foreign conditions which will have impact on the domestic capital market and thwart the intentions (or targets) of policy-makers.

The degree of capital mobility derived for Barbados introduces the possibility of ineffective monetary policy, with policy instruments not attaining their monetary targets - which can be detrimental to any small open economy. Such an occurrence can result in price instability, the deterioration of investors' confidence, speculative pressure on the exchange rate and associated capital surges; to compromise economic activity. Bennett (1995) advances that the decisions of investors are not only influenced by access to the market but also the quality of government's economic policy. These results are similar to the findings of Cumby and Obstfeld (1988) and Takagi (1986), who perform similar tests and conclude that based on the levels of capital mobility in some developing countries, the scope for monetary autonomy is curtailed.

4.2 Warning Signals of Financial Vulnerability

It is generally accepted that a high degree of capital mobility is compatible with financial vulnerability. In this era of the global capital market, Calvo and Mendoza (1996) warn of a new kind of balance of payments crises (such as that of Mexico). Where countries with fixed exchange rates become vulnerable to the herd-behaviour of global investors.

Such occurrences may be signalled by the emergence of large imbalances between stocks of financial assets²⁴ and gross reserves, or between short-term public debt held by the private sector and gross reserves. In both instances, danger is derived from the possibility

of foreign reserves being drained. For Barbados in particular, the difference between (M2) and the foreign assets of the Central Bank of Barbados rose sharply in 1985 and 1986 but were not immediately followed by a crisis. However, a balance of payments crisis did later occur in 1989. More recently, this imbalance between the stated aggregates has continued to rise and peaked in 1995.

Synott (1996) suggests that the Mexican crises highlight the need for the continual surveillance of international capital flows and financial markets. Similarly Schadler et al. (1993) propose monitoring the following signals, to circumvent any economic overheating from heavy capital inflows:

- ◆ Widening current account deficits - due to the greater availability of foreign funds. This usually goes hand-in-hand with aggregate demand expansion, whether via consumption or more favourably, investment expansion.
- ◆ Large reversals of capital inflows - which may necessitate the tightening of financial policies and can be rather disruptive.
- ◆ The derailment of monetary targets (inflation, etc.) - caused by sharp expansions in monetary aggregates. This frequently affects prices of financial assets and real estate.

These writers continue by stating that the conventional wisdom about containing the unwanted effects of large capital inflows lies with reducing the fiscal deficit in order to restrain demand, inflationary pressures and the real appreciation of the exchange rate. However, in practice sterilisation²⁵ tends to be the first line of defence against surges in inflows due to the ease with which it can be implemented and the fact that it locks in a cushion of reserves against possible reversals (Schadler et al. (1993)). The counter effect of sterilisation is that it can sustain high domestic interest rates and defer any benefits to be gained from inflows, on investment and growth. Frankel and Okongwu (1995), comment that these higher interest rates make domestic assets more attractive to world investors - thus prolonging capital inflows.

4.3 Functional Aspects of the Domestic Financial Market

The degree of mobility derived implies that there is active investment in and out of the Barbadian financial system, with relatively functional arbitrage operations. This implies that in practice local investors take advantage of interest rate differentials, with interest rate in the US remaining higher than those in Barbados, for the majority of the period under analysis. Barbados' healthy investment climate and economic well being may have attracted inward capital flows. For the period under analysis, on average, real GDP growth remained buoyant, inflationary pressures were contained, capital controls were gradually

²³ See Mundell (1963).

²⁴ Preceding the crisis in Mexico, (M2) reached over US\$100 billion, due (amongst other things) to the elimination of

tight credit controls and reserve requirements, as well as large capital inflows.

²⁵ Sterilisation narrowly defined refers to neutralising reserve changes so as to leave the monetary base unaffected, while a broader definition encompasses leaving money supply unaffected.

being reduced and the island continued to be very politically stability. Emerging investment prospects, with noted expansions in the international business sector and offshore market would have also attracted capital inflows. It is noteworthy, that these movements would have been conducted without a highly developed stock exchange and in the absence of an active forward market to cover financial transactions, (which Edwards and Khan (1985) identify as a constraint to a high degree of capital mobility).

The degree of mobility calculated for Barbados can be accepted as evidence that existing capital controls may not be very effective in moderating the movement of capital. Hague et al. (1990) discover relatively high capital mobility in 15 developing countries and conclude; that in practise economic agents in developing countries tend to circumvent restrictions on cross border capital flows, in order to respond to differential rates of return and attain desired investment opportunities. Ideally, capital controls are expected to enable countries participating in fixed exchange rate regimes, to enact currency re-alignments and preserve some monetary autonomy, with the justification for controls being the establishment of a safe 'speed limit' for the scale of capital flows. As a result, effective controls have been defined with regard to the limitation placed on capital flows, so as to create a wedge between domestic interest rates and foreign interest rates, however, there is no clear indication as to how large a wedge {Mathieson et al. (1993)}. Furthermore, Wajid (1997) acknowledges that there is no general consensus in the literature as to whether controls re effective. In this regard, based on the interest rate wedge detected in Barbados and the moderate degree of capital mobility, it is indeterminate whether capital controls can be termed as effective.

Nadeem et al. (1990) report that in developing countries, when arbitrage operations are satisfactory (as is relatively true in Barbados), this undermines a key argument used to support policies of financial repression - such as maintaining low domestic interest rates to stimulate investment. Taking the reported level of mobility in Barbados as an indication of affluent arbitrage practises, this weakens the rational for the Central Bank of Barbados prescribing minimum interest rates on some financial assets.

The under-development of the SEB, coupled with the previously mentioned slow interest rate adjustment process in the Barbadian financial system, is a possible indication of some form of information asymmetry. Information asymmetries are said to arise in markets from financial services being mostly "experience" goods, where quality can only be determined after purchase or "credence" goods, where quality may never be determined {Hoschka (1993)}. According to Hoschka (1993), there are two main kinds of information asymmetry: where investors have incomplete information on assets and when financial products are too complex for agents to assess their quality.

Quality information can refer to the full extent of the riskiness of assets, such as whether a firm manages funds prudently, or even the effectiveness of management.

It is generally accepted that where information asymmetry exist, to protect the welfare of investors, government should intervene with the necessary regulation. In relation to international investment, Calvo et al. (1996) state that in a world where global investors are highly diversified investment to or away from a given country is highly sensitive to news and its availability, with some investors subscribing to herd-behaviour. This in itself can result in heavy capital surges, as investors' temperament and confidence level changes. Firms making full disclosure of all private and relevant information, to ensure that the market appropriately prices financial assets can dissolve information asymmetry. However, in actuality this is not always feasible for competitive reasons and the protection of insider information. In the case of Barbados, this situation can be approved by the formation of a private rating agency, to assess the prudence and risk of firms' asset management, to better disperse investment information.

Conclusion

Factors that may have conditioned capital mobility in Barbados, whether domestic or external, have been presented and an interest rate determination model is used to test for capital mobility. This model relies on a major proposition, namely the law of one price - to promote the equalisation of interest earnings across country borders - as arbitrage operations are enacted.

The moderate degree of mobility in Barbados, is synonymous with reduced monetary control. This sensitivity of the domestic financial system to foreign influences persists in spite of the existing capital and market controls - to indicate that investment and arbitrage operations are proceeding adequately. Further implications of these results are examined with regard to the functioning and efficiency of the domestic market. In this regard, the slow speed of adjustment of the domestic interest rate to changes, suggests some type of information segmentation in the market. It has also been shown, that possibly due to thin trading on the Securities Exchange of Barbados, the establishment of this institution did not have a significant impact on the degree of mobility, during the period under analysis.

APPENDIX 1.

The Securities Exchange of Barbados

Initially only ten companies were listed on the Securities Exchange. Companies eligible for listing are required to have a minimum of \$1 million in net assets. The Exchange trades; ordinary shares, preferred shares, Government debentures and Government guaranteed bonds. Only registered members of the Exchange may deal, trade or underwrite securities. The method of trading is by open outcry on the floor of the Exchange.

The regulation of the Exchange is at a developmental stage. Presently there is no Securities Exchange Commission, therefore the Board of the Securities Exchange has had to perform both regulatory and developmental functions, however, it is expected that this will change in the future. The potential exists for a market in corporate debentures, even though to date only one Barbadian Company has floated an issue. Similarly, a market in commercial paper may also be imminent, already being at an embryonic stage - with deposits being placed with commercial houses {Williams (1996)}.

APPENDIX 2.

Model Derivation

$$i_t = \phi\theta(i_{f,t} + e_t) + (1-\phi)(rr_t + \pi_t^e) + \phi(1-\theta)i_{t-1} \quad \dots\dots\dots(a)$$

$$rr_t = \rho - \lambda ESM + \omega_t \quad \dots\dots\dots(b)$$

$$m_t^d = \alpha_0 + \alpha_1 \log y_t - \alpha_2(\rho + \pi_t^e) + \alpha_3 \pi_t^e \quad \dots\dots\dots(c)$$

Substitute equation (b) into (a) generates:

$$i_t = \phi\theta(i_{f,t} + e_t) + (1-\phi)[\rho - \lambda(ESM) + \pi_t^e] + \phi(1-\theta)i_{t-1} \quad \dots\dots(d)$$

The definition $ESM_t = \log m_t - \log m_t^d$ can be rewritten as;

$ESM_t = (1-\beta)[\log m_{t-1} - \log m_t^d]$. This is substituted into equation (d) to generate:

$$i_t = \phi\theta(i_{f,t} + e_t) + (1-\phi)[\rho - \lambda\{(1-\beta)\log m_{t-1} - \log m_t^d\} + \pi_t^e] + \phi(1-\theta)i_{t-1} \quad \dots\dots\dots(e)$$

Substituting equation (c) into (e) generates;

$$i_t = \phi\theta(i_{f,t} + e_t) + (1-\phi)[\rho - \lambda\{(1-\beta)\log m_{t-1} - (\alpha_0 + \alpha_1 y_t - \alpha_2(\rho + \pi_t^e) + \alpha_3 \pi_t^e)\} + \pi_t^e] + \phi(1-\theta)i_{t-1} \quad \dots\dots\dots(f)$$

This can be reduced to;

$$\begin{aligned} i_t = & \phi\theta(i_{f,t} + e_t) + (1-\phi)\rho - (1-\phi)(1-\beta)\lambda \log m_{t-1} + (1-\phi)(1-\beta)\lambda \alpha_0 \\ & + (1-\phi)(1-\beta)\lambda \alpha_1 y_t - (1-\phi)(1-\beta)\lambda \alpha_2 \rho - (1-\phi)(1-\beta)\lambda \alpha_2 \pi_t^e \\ & + (1-\phi)(1-\beta)\lambda \alpha_3 \pi_t^e + (1-\phi)\pi_t^e + \phi(1-\theta)i_{t-1} + \omega_t \quad \dots\dots\dots(g) \end{aligned}$$

Following is the reduced form equation for the nominal interest rate;

where:

$$i_t = \gamma_0 + \gamma_1(i_{f,t} + e_t) + \gamma_2 \log m_{t-1} + \gamma_3 \log y_t + \gamma_4 \pi_t^e + \gamma_5 i_{t-1} + z_t, \dots (h)$$

$$\gamma_0 = (1-\phi)[\rho + \lambda(1-\beta)(\alpha_0 - \alpha_2 \rho)]$$

$$\gamma_1 = \theta \phi$$

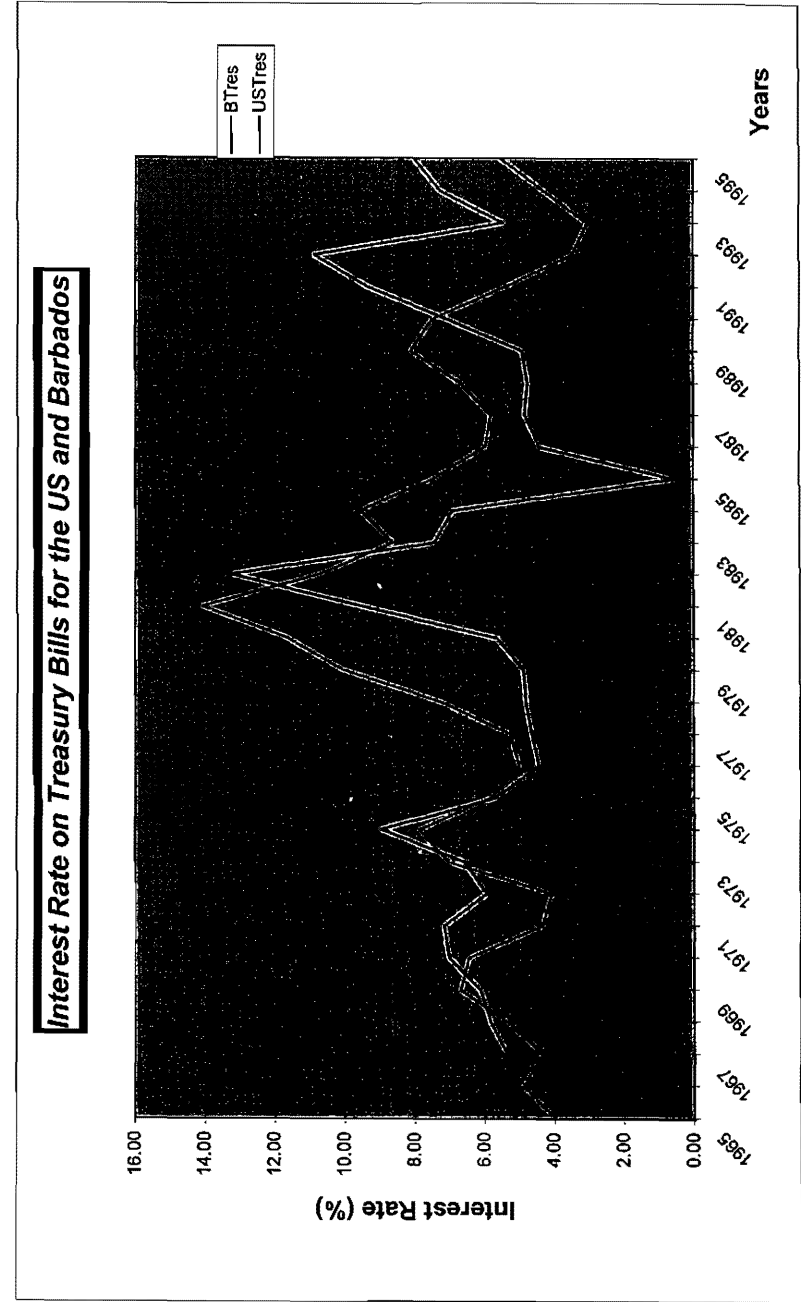
$$\gamma_2 = -(1-\phi)\lambda(1-\beta)$$

$$\gamma_3 = (1-\phi)\lambda(1-\beta)\alpha_1$$

$$\gamma_4 = (1-\phi)[1-\lambda(1-\beta)\alpha_2 + \alpha_3]$$

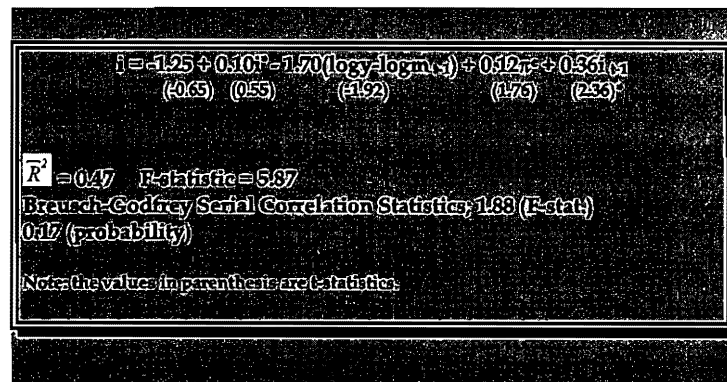
$$\gamma_5 = \phi(1-\theta)$$

Appendix 3. Chart 1



APPENDIX 4.

Box 4. Regression Using the Composite Variable



Bibliography

Abel.A and Mishkin.F "An Integrated view of Tests of Rationality, Market Efficiency and the Short-Run Neutrality of Monetary Policy" *Journal of Monetary Economics* II (1983), pp. 3-24.

Anthony.M "Measuring International Capital Mobility: Recent Evidence from Alternative Tests", XXVII Annual Conference of Monetary Studies, November 8th-11th, 1995.

Baxter.M and Crucini.M "Explaining Saving-Investment Correlations" *The American Economic Review* vol. 83 No. 3 June 1993 pp. 416-436.

Bayoumi.T "Saving-Investment Correlations: Immobile Capital, Government Policy, or Endogenous Behaviour?" *International Monetary Fund Staff Papers* vol. 37 No. 2 (June 1990) pp. 360-387.

Bennett.K "International Capital Mobility and the Caricom Economies", XXVII Annual Conference of Monetary Studies, November 8-11, 1995.

Bovenberg.A, Anderson.L, Aramaki.K and Chad.S "Tax Incentives and International Capital Flows: The case of United States and Japan" *International Monetary Fund Working Paper* January 17, 1989.

Burda.M and Wyplosz.C "Macroeconomics, A European Text" Second Edition, Oxford University Press 1997 pp. 276-277.

Calvo.G and Mendoza.E "Mexico's Balance-Of-Payments Crisis: A Chronicle of Death Foretold" *International Finance Discussion Papers* 545, March 1996.

Calvo.S and Reinhart.C "Capital Flows to Latin America: Is there Evidence of Contagion Effects." *Mimeo, World Bank, Washington D. C.*, 1995.

Codrington.H "An explanation of Short-Term Capital Movements in Barbados", *Social and Economic Studies*, Vol. 34, No. 4, December 1985.

Cole.H and Obstfeld.M "Commodity Trade and International Risk Sharing? How Much do Financial Markets Matter?" *Journal of Monetary Economics* 28 (August 1991), pp. 3-24.

Cumby.R and Obstfeld.M "Capital Mobility and the Scope for Sterilisation: Mexico in the 1970's" in *Financial Policies and the World Capital Markets: The Problem of Latin American Countries*, edited by Armella.P, Dornbusch.R and Obstfeld.M. The University of Chicago Press, 1988.

Cuthbertson.K, Hall.S and Taylor.M "Applied Econometric Techniques" The University of

Michigan Press (1992).

Dooley.M and Chinn.M "Financial Repression and Capital Mobility: Why Capital Flows and Covered Interest Rate Differentials Fail to Measure Capital Market Integration" National Bureau of Economic Research Working Paper 5347 (1995).

Edwards.S and Khan.M "Interest Rate Determination in Developing Countries: A Conceptual Framework" International Monetary Fund. Staff papers vol. 9 1985 pp. 377-403.

Feldstein.M and Horioka.C "Domestic Savings and International Capital Flows" The Economic Journal 90 (June 1980) pp. 314-329.

Frankel.J "International Capital Mobility and Crowding-Out in the US Economy : Imperfect Integration of Financial Markets or of Goods Market ?" in How Open is the US Economy? by Hafer.R Lexington, Mass., Heath 1986.

_____ "Quantifying International Capital Mobility in the 1980s" in On Exchange Rates, Cambridge, Mass., MIT Press, 1993.

_____ and Okongwu.C "Liberalised Portfolio Capital Inflows in Emerging Markets: Sterilisation, Expectations and the Incompleteness of Interest Rate Convergence" National Bureau of Economic Research Working Paper Series No. 5156, June 1995.

French.K and Porteba.J "Investor Diversification and international Equity Markets" American Economic Review 1991 vol. 81 pp. 222-226.

Gehrig.T "An Information Based Explanation of the Domestic Bias in International Equity Investment" Scandinavian Journal of Economics 26 (October 1993), pp. 97-109.

Glick.R and Hutchinson.L "Financial Liberalisation in the Pacific Basin: Implications for Real Interest Rate Linkages" Journal of the Japanese and International Economies 4 (1990) pp. 36-48.

Goldstein.M, Mathieson.D and Lane.T "Determinants and Systematic Consequences of International Capital Flows" International Monetary Fund Occasional Papers, No. 77 March 1991.

Golub.S "International Diversification of Social and Private Risk: The US and Japan" Mimeo, Swarthmore College, November 1991.

Gujarati.D "Basic Econometrics" Second Edition McGraw-Hill International Editions 1988, pp. 147-448.

Gupta.K and Lensink.R "Financial Liberalisation and Investment" Routledge Studies in

Development Economics 1996.

Hague.N and Montiel.P "Capital Mobility in Developing Countries__ Some Empirical Tests" International Monetary Fund, Working Papers December 1990.

Hataiseree.R and Phipps.A "The degree of Capital Mobility in Thailand: Some Estimates Using a Cointegration Approach" Applied Economics Letters, 1996, 3, pp. 9-13.

Heller.R "Money and the International Monetary System" Review : Federal Reserve Bank of St. Louis. Vol. 71 March April 1989 pp. 65-71.

Hoschka.T "Cross-Border Entry in European Retail Financial Services: Determinants, Regulation and the Impact on Competition" The MacMillan Press Ltd 1993, pp. 10-159.

Hossain.A and Chowdhury.A "Monetary and Financial Policies in Developing Countries: Growth and Stabilisation" Routledge Studies in Development Economics 1996.

Johnston.J "Econometric Methods" Third Edition McGraw-Hill International Series 1991, pp. 225.

Korajczyk.R "A Measure of Stock Market Integration for Developed and Emerging Markets" Policy Research Working Paper 1482, The World Bank, June 1995.

Kouri.D and Porter.M "International Capital Flows and Portfolio Equilibrium" Journal of Political Economy Vol. 82 (May/June 1974) pp. 443-467.

Krugman.P and Obstfeld.M "International Economics. Theory and Policy", Third Ed. Harper and Collins 1994.

Levine.R and Zervos.S "Capital Control Liberalisation and Stock Market Development", The World Bank Policy Research Working Paper 1622. July 1996.

_____ "Stock Market and Banks: Revving the Engines of Growth", The World Bank Policy Research Working Paper January 1995.

_____ "International Capital Flow Liberalisation and Stock Market Development: A Cross-Country Event Study", The World Bank Policy Research Working Paper December 1994.

Markowitz.H "Portfolio Selection: Efficient Diversification of Investments" New York: Wiley 1959.

Mathieson.D and Rojas-Suarez.L "Liberalisation of the Capital Account: Experiences and Issues" International Monetary Fund Occasional Paper 103 March 1993.

Mundell.R "*Capital Mobility and Stabilisation Policy Under Fixed and Flexible Exchange Rates*" *Canadian Journal of Economics and Political Science* Vol. 29 (November 1963) pp. 475-485.

Niehans.J "*International Monetary Economics*" Philip Allan 1984.

Obstfeld.M "*Capital Mobility in the World Economy: Theory and Measurement*" *Carnegie-Rochester Conference Series on Public Policy* 24 (Spring 1986), pp. 55-103.

_____ "*International Capital Mobility in the 1990's*" *Centre for Economic Policy Research. Discussion Paper Series No. 902* February 1994.

Razin.A, Sadka.E and Yuen.C "*Tax Principles and Capital Inflows: Is it efficient to tax non-resident income ?*" *National Bureau of Economic Research, Inc. Working Paper* 5513. March 1996.

Rivera-Batiz.F and Rivera-Batiz.L "*International Finance and Open Economy Macroeconomics*" *Second Ed. MacMillan* 1995.

Schadler.S, Carkovic.M, Bennett.A and Kahn.R "*Recent Experiences with Surges in Capital Inflows*" *International Monetary Fund Occasional Paper* 108, December 1993.

Sharpiro.A "*Multinational Financial Management*" *Prentice Hall International Editions, Fifth Edition* 1996, pp. 644-646.

Sinkey.J "*Commercial Bank Financial Management - In the Financial-Services Industry*", *Fourth Ed. MacMillan International* 1992.

Stevenson.A, Muscatelli.V and Gregory.M "*Macroeconomic Theory and Stabilisation Policy*" *Philip Allan, First Edition* 1988.

Stockman.A and Dellas.H "*International Portfolio Non-diversification and Exchange Rate Variability*" *Journal of International Economics* 26 (May 1989) pp. 271-289.

Summers.L "*Tax Policy and International Competitiveness*" in Jacob A. Frenkel, ed., *International Aspects of Fiscal Policies*, Chicago, University of Chicago Press, 1988, pp. 349-375.

Synott.T "*International Monetary Reform; A Modest Proposal*" *Business Economics* Vol. 31 Issue 3, July 1996, pp. 33-39.

Takagi.S "*Rediscount Policy and Official Capital Flows: A Study of Monetary Control in Central America in the 1950's*" *Canadian Journal of Economics and Political Science* vol. 29 (November 1986) pp. 475-485.

Tesar.L "*Savings, Investment and International Capital Flows*" *Journal of International Economics* 31 (1991) pp. 55-78.

Tesar.L and Werner.I "*Home Bias and the Globalisation of Securities Markets*" *National Bureau of Economic Research Working Paper* 4218, November 1992.

Wajid.S "*The Liberalisation of Capital Movements in Europe*" *Journal of Finance and Development* Vol. 34 Issue 1, March 97, pp. 52-53.

Wijnholds.J "*National & International Monetary Policy*" in *International Financial Policy* edited by Frankel.J & Goldstein.M. *International Monetary Fund* 1991 pp. 282-305.

Williams.M "*The Development of Capital Markets in Barbados 1972 - 1997*" *Annual Review Seminar of the Research Department, Central Bank of Barbados*. June 1996.

International Monetary Fund Annual Report on Exchange Arrangements and Exchange Restrictions 1971 - 1994.

Statistical Collections:

Central Bank of Barbados Economic Statistics; series 1975 - 1996.

Federal Reserve Bulletin, no. 77 and 75, July- December, 1989 - 1991.

International Financial Statistics, *International Monetary Fund* 1965 - 1995.

The World Tables, *The World Bank* 1996.