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Credit and Investment in the Caribbean

By

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# CREDIT, INVESTMENT AND ECONOMIC CYCLES IN THE CARIBBEAN: SOME PRELIMINARY RESULTS

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Credit, Investment and Economic Cycles in the Caribbean: Some Preliminary Results[1]

Abstract

This study undertakes an empirical examination of the interplay between commercial bank lending, investment and economic cycles in a select group of Caribbean Countries. The analysis employs the concept of Granger Causality within the framework of a Vector Error Correction Model. The results suggest that in the long run, the relationship between credit and investment is demand following. The preliminary empirical results also suggest that bank credit impact upon economic growth only in the short-run.

## 1.0 Introduction

If countries are to benefit from increased savings, the quantum and quality of the allocation of domestic savings to the financing of investments must be given adequate attention. Similarly, the creation of investment opportunities for the channeling of domestic savings, is important for optimal usage of scarce financial resources. Indeed, whereas the mobilisation of financial resources increases the quantum of investable resources,, it is the transmission of savings to investment which impacts directly upon economic development. As such, the argument that an increase in the level of savings would bring about higher levels of economic growth is incomplete, unless due attention is paid to the allocation of domestic savings.

Undoubtedly, commercial banks have played a pivotal role in the savings and investment process of many small underdeveloped economies, such as those of the Caribbean region. These economies, lack suitable substitutes for bank credit, as the range of financial intermediaries are limited and capital markets are underdeveloped. Bank financing therefore emerges as the most important source of external finance for several firms and businesses in these countries.

An examination of the data in the CARICOM region, reveals that over the last

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ten to twenty years, the proportion of lending in bank asset portfolio has declined in the more developed countries (MDCs), (Figure 1).[2] In three of the countries, Guyana, Jamaica and Trinidad and Tobago, the decline was dramatic. The decline was gradual however, in the case of Barbados. This raises two important concerns. The first relates to why the growth of bank assets completely outstripped the growth of bank lending while the second relates to the implications of this trend for the real side of the economy. In addressing these questions, the nexus between bank lending and the real side of the economy needs to be considered.

Given the foregoing, the study seeks to explain the manner in which savings are converted to investment through the credit channel. Thus the immediate objective of the study is to analyse the causal and dynamic relationship between bank credit and investment in the Caribbean. For tractability, four Caribbean islands were selected, namely, Barbados, Guyana, Jamaica and Trinidad and Tobago. Commercial bank lending was chosen as the loci of analysis, since commercial banks are the main source of domestic credit in the Caribbean region.

The study is divided into four Sections. Section 2 reviews the stylised facts on the relationship between commercial bank lending and investment under different economic cycles. In Section 3, the theoretical and empirical relationships between credit and investment is discussed, while the actual methodology adopted in the study to analyse the relationships between the quantum and quality of bank lending with investment is outlined in Section 4. The Cointegration analysis is undertaken in Section 5. In particular, it is found that business lending and investment, as well as total lending and investment, are cointegrated. Following the cointegration analysis, VEC models are formulated in Section 6. A demand following relationship is found to exist between credit and investment. Section 7 examines the relationship between lending and efficiency through ordinary least squares estimation. Investment

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[2] MDCs as defined in the CARICOM treaty refer to Barbados, Guyana, Jamaica and Trinidad and Tobago

efficiency and bank credit are found to share a negative association. The direction of causality between the deepening of business lending and the quantum of investment is then examined in section 8. Bidirectional causality is generally found. Finally in Section 9, the discussion is summarised and some concluding comments are made.

## 2.1 Credit, Investment and Economic cycles: Previous Research

It seems to be well accepted that the quantum of commercial bank lending is related to economic cycles. The nexus between bank lending and economic cycles for example, was highlighted by Bourne (1985).

He compared bank operations in Jamaica during the period of economic depression and Trinidad and Tobago, where an economic boom took place almost simultaneously. In this study, Bourne (1985) found that during periods of economic decline, bank profitability fell, since banks were adversely affected by high loan delinquency. He noted as well that during periods of recession, private sector loans were substituted for lower yielding government loans. With respect to boom conditions, he observed that mortgages, real estate and the consumer sector increased in importance in the loan portfolio of commercial banks and argued that this may have taken place because lending opportunities to the productive sectors were limited, given the degree of economic concentration in lesser developed countries. Moreover, interest rate spreads in some sectors tended to be higher than spreads in the corporate sector, thus allowing the banks to increase their profitability by concentrating on these sectors. This results in the concentration of bank loan portfolio in favour of sectors in which demand and profits are sensitive to economic cycles. Bourne therefore concluded that banks reacted suboptimally to booms and depressions and suggested governments should curb their natural tendency to increase their borrowing in conditions of economic depression. During periods of economic boom, he suggested that monetary policy should be geared towards managing excess liquidity.

## 2.2 Credit, Investment and Economic cycles: Stylised Facts

In this subsection, an empirical comparison of the relationship between non-consumer loans, investment and economic cycles was undertaken, (Table 1). Before proceeding to the analysis, some definitional issues need to be clarified. In addition, a crude index of crowding out was formulated by calculating the quantum of lending to the government sector as a ratio of loans to the business sector. Economic cycles were identified in terms of movements in real GDP. A boom is defined as four consecutive years of growth in real GDP, while a depression refers to four consecutive years of decline in real GDP. Financial variables were then compared across economic cycles, for each territory, Table 1. The corresponding average growth in bank lending is also recorded.

Table 1.

| Country | Economic Conditions | Period | ReaL GDP growth | Growth in Loans | Non-consumer Loans/Total Loans | Growth in Investment |
|---|---|---|---|---|---|---|
| Barbados | Boom | 1970-1980 | 4.6 | 13.8 | 76.4 | 22.3 |
| | Depression | 1980-1983 | -0.5 | 13.5 | 78.7 | 9.2 |
| | | 1989-1992 | -2.5 | 4 | 77.1 | -7.2 |
| Guyana | Boom | 1965-1976 | 4.3 | 16.8 | 85 | 39.2 |
| | | 1991-1993 | 7.3 | 40.4 | 85.4 | 70.9 |
| | Depression | 1977-1990 | -3 | 25.1 | 86.2 | 37.4 |
| Jamaica | Boom | 1964-1973 | 5.71 | 21.27 | 90.2 | 18.5 |
| | | 1986-1994 | 3.23 | 30.69 | 94.9 | 39.3 |
| | Depression | 1974-1980 | -3.2 | 11.9 | 95.2 | 10.1 |
| Trinidad and Tobago | Boom | 1964-1973 | 4.8 | 21.9 | 75.5 | 10.3 |
| | | 1974-1982 | 5.9 | 26.3 | 56.8 | 28.4 |
| | | 1994-1997 | 3.5 | 6.1 | 58.7 | 26.5 |
| | Recession | 1983-1989 | -5.4 | 5.1 | 65.7 | -7.2 |

Source: Calculated from various Central Bank Publications

As expected, total loans outstanding grew at a lower rate during periods of economic decline. This result suggests that there was a decline in new loans during the recession period. The slow down in bank lending is consistent with the decline in investment observed during the recession period.

Total loans were also desegregated into consumer and non-consumer loans. During periods of economic decline, the proportion of non-consumer loans to total loans increased in all territories, (Table 1 and Figure 2). Put another way, the proportion of consumer loans declined during periods of recession. This observation, suggests that in boom times, banks tended to increase their lending to the consumer sector to realise higher returns. During periods of economic recession, banks ration credit as the problem of adverse selection under conditions of tight liquidity increases.[3]

There is another possible explanation, however, as to why bank credit to the business sector may have increased during periods of economic decline. Firms could have been more bank dependent during periods of recession compared to periods of economic growth. In boom periods, firms realise greater profitability and therefore utilise a greater proportion of retain earnings to finance their expenditures. Since demand for their product increase, profit margins widen, firms are in a better position to use internal funds to finance investment. In periods of recession, profit levels fall and in the absence of close substitutes to bank credit, the demand by firms for bank credit increases. Thus a heavier demand for loans by the business and government sector may take place during the recession.

## 3.0 Theoretical and Empirical Findings

In the theoretical realm, many expositions detailing the relationship between financial intermediation and economic development, have been developed. One such model, is that developed by Gertler and Rose (1991). They incorporated the problem of

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[3]      This argument is consistent with Bourne (1985)

information asymmetries within the wider ambit of the macro economy in a bid to illustrate how financial intermediaries transmit funds from savers to investors. An important feature of their model is that economic cycles do impact upon the level of lending. Lending, in turn, affects the level of investment and consequently economic growth. Thus for Gertler and Rose (1991), credit market activity is symbiotic with the real-side activity of the economy.

Gertler and Rose (1991) show that increases (decreases) in borrower net worth can result in lower (higher) risk premium at each level of investment and a higher (lower) equilibrium level of investment in the economy. Economic growth in their model results in higher (lower) positive net worth of firms, and as such, firms rely less (more) on self finance and more (less) external finance.

Some economists take the view that demand-following development of the financial sector is preceded by supply-leading development, at the early stages of economic development.[1] An interesting idea in this respect is that posited by St. Hill (1992). He contended that the relationship between economic growth and financial development switches from been supply leading to demand following, depending on the level of development of banking services in the economy.

At stage 1, the money supply is overshadowed by (M1) and bank loans are restricted to the volume of deposits. During this stage, the supply leading relationship dominates, as banks' supply of loanable funds depend principally on their success at mobilizing financial resources. At stage 2, the use of quasi money becomes more widespread as the means of payment. For St. Hill, the supply leading phenomenon occurs up to stage 2, after which, a demand following phenomenon occurs. Investment increases as banks are able to match credit demand by creating credit out of reserves instead of been constrained by actual deposits. The bank's ability to meet investment demand improves in the later stages, following the creation of an interbank market, a Central Bank, development of specialist human skills and the incorporation of technologies into the bank. Thus for St. Hill(1992), whether financial intermediation is supply leading or demand following, depends on the level of development of the

banking sector.

In the model by Bensivenga and Smith (1991), banks increase the funds available for the financing of investment, thereby improving the prospects of economic growth. The supply leading role of financial intermediation arise endogenously out of the ability of the ability of these financial intermediaries to trade uncertain liquidity requirements for illiquid assets. Thus, in their model, financial intermediaries reduce the need for self-financing by making a larger volume of funds available for investment. A remarkable feature of this model is that, without increasing the level of savings in the economy, financial intermediaries can augment the supply of loanable funds by their ability to convert liquid assets to illiquid assets and still meet the random liquidity needs of agents.

Another transmission mechanism discussed in the literature, has to do with the ability of financial intermediaries to analyse projects and grant loans to the most promising prospective entrepreneurs. Greenwood and Jovanic (1990) presented a formal model in which financial intermediaries receive information on projects, critically appraise them, and diversify risks across a large number of investors. In their model, the higher return investments induce economic growth, which in turn provides the impetus for an "extensive" structure for financial intermediation.

Four possible transmission mechanisms were considered in this section. Evidently, the matter of whether financial intermediation is supply leading or demand following is still not theoretically resolved. Different transmission mechanisms seem to lead to different conclusions on the subject. Indeed, the theoretical response to the question on whether financial intermediation is supply leading or demand following, is contingent upon the type of transmission mechanism assumed.

Empirical research on the relationship between credit and investment has not yielded conclusive nor uniform results either. Jung (1986), for example, conducted bivariate Granger causality tests on the relationship between financial variables and real economic growth in 56 countries. The results of his study indicated that financial development was supply leading in lesser developing Countries (LDCs), and demand

following in developed countries. Odedokun (1992) found, that the supply leading and demand following relationship occurred with the same frequency among the 35 LDCs to which he applied Granger Causality tests. Thornton (1994), on the other-hand, applied cointegration and Granger-causality tests to financial and real-side data of seven Asian countries. He found evidence of cointegration between financial and real-side variables and evidence of short-run causality was not shared by many of the countries in the sample.

The difference in findings are due in part, to problems associated with the:

(1)     statistical methodology  applied;

(2)     determination of the relevant indicators;

## 3.1  Problems with Statistical Methodologies

One such problem associated with the statistical methodology, is the appropriate choice of the lag-length.  Hsiao (1979) for example, showed that the results of Granger Causality tests were extremely sensitive to lag- length selection. Although several statistical criteria have been developed for the determination of the appropriate lag-length, these methods usually involve tradeoffs between estimators that are efficient, consistent and unbiased.

Another weakness of the statistical methodology applied, is that the results depend on the functional specification of the model.  Mispecification problems could arise due to non-parameter constancy, omitted relevant variables, omission of contemporaneous causality and inappropriate functional form.

## 3.2  Determination of the Relevant Indicators

The sensitivity of estimation results to variable selection, presents a further problem to the generalization of empirical studies.  Odeokun (1989) for example, used 11 different pair-wise combinations of real-side and financial variables and found that in

general, the inferences drawn as to whether financial development is supply-leading or demand-following varied according to the combinations of variables used.

## 4.0 Methodology: The Quantum of Commercial Bank Lending and Investment

The method adopted for the causality tests, utilizes the Granger-causal (1969) concept. This method assumes that the variables emanate from a stationary process.[4] Given that variable X and variable Y are cointegrated, the VEC model can be expressed as:

$$\Delta Y_t = \alpha_1 (Y_{t-1} - \beta X_{t-1}) + \sum \theta_1 \Delta Y_{t-i} + \sum \phi_1 \Delta X_{t-i} + \mu_{1t}, \qquad (1)$$

$$\Delta X_t = \alpha_2 (Y_{t-1} - \beta X_{t-1}) + \sum \theta_2 \Delta X_{t-i} + \sum \phi_2 \Delta Y_{t-i} + \mu_2 t \qquad (2)$$

where $\mu_{1t}$ and $\mu_{2t}$ are white noise, $\alpha_1 + \alpha_2 \neq 0$; Y denotes a real-side variable, while X denote a financial variable.

If for example the ECM is statistically significant in (1), then old shocks in $X_t$ can be taken to Granger cause changes in the current value of $Y_t$. The same applies to (2), where instead causality would run from $Y_t$ to $X_t$. If in (1) the ECM is not statistically significant, the notion that old shocks in $X_t$ cause current changes in $Y_t$ is rejected and instead the variable $X_t$ is considered to be weakly exogenous.

## 4.1 Empirical Examination of the Quality of Commercial Bank Lending

The efficiency of bank credit was analysed in terms of the quantum of funds it channeled to the non-consumer sector, during periods when output in relation to investment was highest. ICOR was used as an indicator of investment quality. ICOR

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[4] An important feature of the VEC in this respect, is that it incorporates level stochastic variables and still maintains stationarity in all its terms, (Engle and Granger 1991).

can be expressed as the ratio of GDP growth to the ratio of investment to GDP. That is,

$$(\Delta Y_t / Y_{t-1}) / (I_t / Y_{t-1}) \qquad\qquad (5)$$

where $Y_t$ denotes nominal GDP and $I_t$ denotes investment. This translates into a change in output associated with a given level of investment.

The ratio is a rather crude proxy for investment quality. According to Lynch (1995), this ratio contains several limitations, among which is that it attributes all of economic growth to capital efficiency, when in fact such growth may be attributable to the interplay of various factors of production. Moreover, capital is not homogeneous and as such, aggregation of capital may mask other important information. Indeed, ICOR can only be at best a crude proxy of investment efficiency.[2]

An OLS regression of the form

ICOR = f(BL,X) and

BL = f(ICOR,X),

was estimated.

One of the central difficulties in executing the econometric study, related to the limited number of observations. The relative shortness of these series, does set severe constraints on the study, since most of the estimators employed are based on asymptotic properties. The results must therefore be treated with care.

## 5.0 Unit Root Testing and Cointegration

All the variables utilised in the modeling exercise were tested for unit roots. For this purpose, the Augmented Dickey-Fuller tests (1979, 1981) were employed. Most of the variables turned out to be integrated of order one, I(1)s. Cointegration tests were conducted using the Johansen procedure, with respect to credit and investment.

There are two major difficulties associated with the Johansen test procedure. The first difficulty, relates to the determination of the appropriate lag length needed to purge the model of serial correlation. The second relates to the sensitivity of the

model when a constant or a trend is included in the cointegrating model. In this study, lag lengths of zero and one were adopted. An upper limit of one lag was used owing to the small sample size and the necessity of preserving degrees of freedom. If the test results changed radically between these two lags, then the results were deemed to be unreliable since they were lag sensitive. Also, it was assumed that no trend or constant are in the cointegrating equations.

## TABLE 2
### Cointegration Results
### Likelihood Ratio

| Country | Model and Variable Combination | 0 lag | | 1 lag | |
|---|---|---|---|---|---|
| | | r = 0 | r < 1 | r = 0 | r < 1 |
| *Barbados* | (1) L BLN-LI CV | 29.49 [1 -1.15]*** | 2.21 | 26.26 [1-1.15]*** | 1.63 |
| | (2) LLN-LI CV | 32.86 [1 -1.26]*** | 2.81 | 28.61 [1-1.26]*** | 2.44 |
| *Guyana* | (1) LBLN-LI CV | 30.20 [1-3.10]*** | 2.25 | 20.63 [1 -6.01]*** | 2.39 |
| | (2) LLN-LI CV | 35.78 [1 -7.67]*** | 3.39 | 26.91 [1 -36.41]*** | 3.21 |
| *Jamaica* | (1) LBLN-LI CV | 44.59 [1 -1.39]*** | 1.57 | 16.20 [1- 1.3]*** | 1.71 |
| | (2) LLN-LI CV | 52.78 [1- 1.26]*** | 1.46 | 17.3 [1- 1.24]*** | 1.87 |
| *T & T* | (1) LBLN-LI CV | 55.10 [1 -1.05]*** | 0.92 | 20.13 [1 -1.05]*** | 0.92 |
| | (2) LLN-LI CV | 36.07 [1 -1.20]*** | 19.05 | 19.05 [1 -1.18]*** | 0.82 |

Notes: The stars indicate the level of significance. *** indicate a 1% level of significance, ** indicate a 5% level of significance, and * indicate a 10% level of significance. For r = 0, the 1% and 5% significance level is 6.51 and 3.84 respectively. The normalized cointegrating vectors are reported in brackets. No trend or constant is included in the cointegrating regression.

The test results are displayed in, (Table 2). For all the models, the evidence rejects at the five percent level, the null hypothesis of no cointegrating vector in favour of the alternative of one cointegrating vector, when either no lags or one lag is employed. Thus the evidence shows that commercial bank lending and investment are cointegrated. The results indicate that lending and investment move together in time. By the Granger Representation theorem, a causal relationship exists. Bivariate models are therefore extended to the VEC framework.

## 6.0 Formation of VEC Models

VEC models were formulated for model(i) and (ii) for the case of zero and one lag respectively. No trend or constant term was included in the Vector Error Correction model (VEC). Results from the VEC are displayed in Tables 3(a) and 3(b). The lag length reported, was based on the lowest AIC. The lag length was varied between zero and one, to see whether there was stability in the significance of the ECM. In the case of Jamaica and Trinidad and Tobago, the coefficient of the ECM changed from significant to insignificant, when investment was used as the dependent variable, (Table 3b). As such, it is difficult to make pronouncements on the significance of commercial bank lending to investment in these territories. The coefficient of the ECM in both Barbados and Guyana was insignificant at the 5 percent, when investment was used as the dependent variable. It does not seem to be a clear case therefore that the current level of investment is affected by long term changes in bank lending.

## Table 3(a)
## Vector Error Correction Results

| Country | Model | $\alpha$ ECM | $\theta$ | $\phi$ |
|---|---|---|---|---|
| Barbados | (1) DLLN | -0.09 (-3.73)*** | -0.11 (-0.52) | 0.13 (2.11)*** |
| 0 lag | (2) DLI | 0.08 (0.87) | 1.41 (1.62) | -0.05 (-0.22) |
| 1 lag | (1) DLBLN | -0.17 (-4.79)*** | -0.23 (-1.38) | 0.13 (2.23)*** |
| | (2) DLI | 0.06 (0.39) | 0.71 (1.01) | (0.07) (0.28) |
| Guyana | (1) DLLN | -0.001 (-5.36)*** | -0.40 (-2.57)*** | 0.13 (1.53) |
| 0 lag | (2) DLI | -0.008 (-1.78) | 0.05 (0.16) | 0.14 (0.78) |
| 1 lag | (1) DLBLN | -0.008 (-4.44) | -0.38 (-2.14) | 0.09 (0.85) |
| | (2) DLI | -0.006 (-1.56) | 0.09 (0.24) | 0.11 (0.49) |
| Jamaica | (1) DLLN | -0.12 (-11.90)*** | AIC-lowest | |
| 0 lag | (2) DLI | -0.12 (-5.80)*** | | |
| 1 lag | (1) DLBLN | -0.12 (-4.26) | 0.04 (0.20) | 0.01 (0.12) |
| | (2) DLI | -0.10 (-1.68) | 0.17 (0.38) | 0.05 (0.19) |

## Table 3(a)
## Vector Error Correction Results

| Country | Model | α ECM | θ | φ |
|---|---|---|---|---|
| Jamaica<br><br>0 lag | (1) DLBLN<br><br>(2) DLI | -0.07<br>(-9.74)<br><br>-0.08<br>(-5.83) | | |
| 1 lag | (1) DLBLN<br><br>(2) DL | -0.09<br>(-4.13)<br><br>-0.07<br>(-1.68) | 0.03<br>(0.13)<br><br>0.32<br>(0.86) | 0.005<br>(0.04)<br><br>0.04<br>(0.16) |
| T & T<br><br>0 lag | (1) DLLN<br><br>(2) DLI | -0.09<br>(-6.92)<br><br>-0.06<br>(-3.17) | | |
| 1 lag | (1) DLLN<br><br>(2) DLI | -0.09<br>(-4.54)<br><br>-0.04<br>(-1.36) | 0.02<br>(0.12)<br><br>0.16<br>(0.75) | 0.02<br>(0.14)<br><br>0.11<br>(0.67) |
| 0 lag | (1) DLBLN<br><br>(2) DLI | -0.23<br>(-11.32)***<br><br>-0.16<br>(-2.77)*** | | |
| 1 lag | (1) DLBLN<br><br>(2) DLI | -0.25<br>(-4.76)<br><br>-0.11<br>(0.72) | -0.04<br>(0.23)<br><br>0.15<br>(0.34) | -0.05<br>(-0.48)<br><br>0.06<br>(0.19) |

Notes: The t statistic is reported in brackets. The stars indicate the level of significance. *** indicate a 1% level of significance, ** indicate a 5% level of significance, and * indicate a 10% level of significance. A lag length of 0 and 1 is employed for models (i) and (ii) respectively.

The Error Correction coefficient was significant when commercial bank lending was used as the dependent variable with respect to all four territories. This result suggests that in all territories, the current level of commercial bank lending adjust to the last period shock in investment ranging from 0.1 percent in the case of Guyana to

12 percent in the case of Jamaica. Short term non consumer lending on the other hand, exhibited a stronger relationship with long term investment ranging from 1 percent to over 20 percent with respect to Guyana and Trinidad and Tobago respectively. There therefore appears to be a long term relationship between lending and investment, with short term lending adjusting to long term investment. It made little difference to the result, whether total or non-consumer loans were used. The quantum of bank credit is therefore responsive to investment demand, and is therefore demand following.

It is interesting to note that none of the lagged variables in the total loans-investment result, turned out to be significant. This indicates that neither changes in total bank lending or investment in the current period values can be attributed to changes in the last period of both variables. The result however, does not rule out the possibility of instantaneous causality.

## 7.0 Efficiency of Commercial Bank Lending

Pair-wise contemporaneous combinations of (1) ICOR and the deepening of overall loans, and (2) ICOR and the deepening of business loans were analysed using ordinary least squares (OLS). What is of interest here is the sign, of the relationship obtained from the OLS regression. The results are displayed in Table 4.

Table 4
Least Squares

| Country | Dependent Variable | Constant | DBLNY | ICOR | $R^2$ | DW |
|---|---|---|---|---|---|---|
| Barbados | ICOR | 0.37 (3.58)*** | -6.86 (-4.02)*** | | 0.50 | 1.82 |
| | DBLNY | 0.02 (2.40)*** | | -0.06 (-4.10)*** | 0.42 | 1.87 |
| Guyana | ICOR | 0.52 (4.79)*** | -1.96 (-2.15)*** | | 0.18 | 2.01 |
| | DBLNY | 0.05 (2.97)*** | | -0.09 (-3.78)*** | 0.35 | 2.22 |
| Jamaica | ICOR | 0.76 (10.08)*** | -4.93 (-2.69) | | 0.27 | 2.00 |
| | DBLNY | 0.48 (2.81)*** | | -0.05 (-3.04)*** | 0.23 | 1.75 |
| T & T | ICOR | 0.48 (3.53)*** | -11.30 (-4.88) | | 0.57 | 2.20 |
| | DBLNY | 0.02 (2.97)*** | | -0.04 (-4.78)*** | 0.46 | 2.14 |

From the results, it can be gleaned that there is a negative contemporaneous linear relationship between efficiency and business loans. The same result was obtained, when total bank loans was substituted for business loans. These results suggest that in the region, at times when the return on investment increases (favourable selection), there is actually contemporaneous shallowing of commercial bank loans. Similarly, at times when return on investment is low, there is contemporaneous deepening of loans.

The negative contemporaneous relationship between the deepening of commercial bank lending and efficiency is consistent with what was observed when the raw data was examined. It suggests that at times when investment efficiency is high, bank lending tends to be low. This finding supports the hypothesis advanced earlier, that in periods where the return on investment is high, firms seem to substitute bank credit. The finding supports the argument advanced by Bourne 1985 that banks

tend to change portfolio in boom times and instead increase lending to the consumer sector as well as mortgage and real estate loans. To this end, an attempt was made to study the dynamic features of the relationship between the deepening of commercial bank lending and investment productivity, using an unrestricted VAR process (UVAR). The ICOR and the first difference of the ratio of business loans to GDP, were used as the endogenous variables, while the first difference of exports was added as an exogenous variable, so as to increase the explanatory power of the regression.

## 8.0    The Deepening of Business Lending and the Quantum of Investment

Granger Causality tests were applied to models involving pair-wise combinations between economic growth and the  following ratios: Business loans to GDP and Total Loans to GDP.  The Final Prediction Error is used as a statistical guide to lag-length selection.[5] The results of the FPE  are shown in Tables 5 and 6.

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[5]     Use of the FPE is especially suited to small samples and it has the advantage of minimising the forecast error of the variance Lutkepohl,(1991).  The FPE is given by $((T+L+1)/(T-L-1))(SSR/T)$ where T denote the number of observations, L the lag length and SSR the sum of the squared residuals.

Table 5
FPE of One-Dimensional Autoregressive Process

| Country | Order of Lag | DBLNY | DLLY | GLRY | |
|---|---|---|---|---|---|
| Barbados | | N = 21 | N = 27 | N = 27 | N = 22 |
| | 1 | 0.009379 | 0.008688 | $3.12 * 10^{-5}$ | $3.73*10^{-5}$ |
| | 2 | 0.002557 | 0.009798 | $3.53 * 10^{-5}$ | $4.30*10^{-5}$ |
| | 3 | 0.002909 | 0.011125 | $3.52 * 10^{-5}$ | $5.09*10^{-5}$ |
| Guyana | | N = 27 | N = 33 | N = 32 | N = 27 |
| | 1 | 0.094987 | 0.077628 | $6.09 * 10^{-5}$ | $3.61*10^{-5}$ |
| | 2 | 0.094309 | 0.076524 | $6.58 * 10^{-5}$ | $4.07*10^{-5}$ |
| | 3 | 0.105103 | 0.083692 | $5.55 * 10^{-5}$ | $4.61*10^{-5}$ |
| Jamaica | | N = 22 | N = 22 | N = 22 | |
| | 1 | 0.020034 | 0.019227 | $1.47 * 10^{-5}$ | |
| | 2 | 0.001149 | 0.021805 | $1.44 * 10^{-5}$ | |
| | 3 | 0.001138 | 0.023233 | $1.69 *10^{-5}$ | |
| T & T | | N = 30 | N = 44 | N = 44 | N = 30 |
| | 1 | 0.03521 | 0.028131 | $3.01 * 10^{-5}$ | $1.64*10^{-5}$ |
| | 2 | 0.032847 | 0.030181 | $2.79 * 10^{-5}$ | $1.79*10^{-5}$ |
| | 3 | 0.035886 | 0.031913 | $2.76 * 10^{-5}$ | $1.94*10^{-5}$ |

economic growth to business lending.    Final Prediction Error was lowest when past values of economic growth was added to the deepening of business lending by banks, and vise versa.  The results point to the presence of feedback.  A so,o;ar result holds when total loans is combined with economic growth.

## 9.0  Conclusion

The results of the study suggest that bank credit and investment are cointegrated. The VEC model revealed that the causal link from investment to credit is unidirectional. This suggest that business credit is "demand following."  The finding suggests that increasing the savings level may merely create excess liquidity, in the absence of a corresponding increased in credit demand. This may probably explain why bank lending may have declined in the asset portfolio of banks over the last decade or more. Indeed, the demand for business credit, may not have kept pace with the growth of bank assets.  As such, the evidence suggests that policies should be directed at creating investment opportunities, rather than merely increasing savings.

The fact that no causal link from bank lending to investment was established suggests that the decline in bank loans (domestic savings) did not have any significant effect on the level of investment in the economies.  This result is, however, not that surprising if one considers that the performance of these economies is to a large extent dependent on the performance of the external sector.  Indeed, several of the major investment projects undertaken in the domestic economy, are funded through foreign savings.

Another important finding emanating from the study, is that the proportion of non-consumer loans in the portfolio of banks, tends to increase in times of economic depression, and fall during periods of economic growth.  These results seem to suggest that during periods of boom, there tends to be an increase in consumerism, and as a consequence, bank lending tends to be directed at consumer demand.  Also, during the boom period, firms may be less dependent on bank financing, owing to the

increased levels of profit which stem from increased demand. In periods of economic downturn, firms may become dependent on bank financing and may be forced to "ration" loans to customers. Thus the challenge is to reduce consumerism in the boom period, while allowing investment in productive opportunities to lead the demand for bank credit.

With the exception of Jamaica, the Granger Causality tests indicated feedback between the short term deepening of bank lending and economic growth. The feedback effects suggest that bank credit is both "supply-leading" and "demand following" in the short run. The short term supply leading relationship is a bit surprising, if one considers that the long run relationship with investment is demand following. This result suggest that the impact of investments financed by bank credit in general, does not have a lasting impact on economic growth.

# BIBLIOGRAPHY

Bencivenga, Valarie, and Bruce Smith. "Financial Intermediation and
Endogenous Growth." Review of Economic Studies 58(2) (April 1991):195-209.

Bourne, Compton (a)."Banking in Boom and Bust Economies: Lessens
from Trinidad and Jamaica." Social and Economic Studies 34(4) (1985)

Dickey, David, A., and Wayne A. Fuller. "Distribution of the Estimators
for Autoregressive Time Series with a Unit Root." Journal of the American
Statistical Association 74(366) (June 1979):427-431.

_____. "Liklelihood Ratio Statistics for Autoregressive Time Series with
a Unit Root." Econometrica 49(4) (July 1981):1057-1072.

Gertler, Mark, and Andrew Rose. "Finance, Growth, and Public Policy."
World Bank Working Papers (WPS) 814 (December 1991).

Granger, Clive W.J. "Investigating Causal Relations by Econometric
Models and Cross Spectral Methods." Econometrica 37(3)(July 1969):424-438.

Greenwood, Jeremy, and Boyan Jovanic. "Financial Development
Growth, and the Distribution of Income." Journal of Political Economy Part 1
98(5) (October 1990):1076-1107.

Hsiao, Cheng. "Autoregressive Modeling of Canadian Money and Income
Data." Journal of the American Statistical Association 74(367)(September
1979):353-560.

Jung W.S. "Financial Development and Economic Growth:
International Evidence." Economic Development and Cultural Change 34(2)
(January 1986):333-346.

Lutkepohl, Helmut. Introduction to Multiple Time Series Analysis.
Springer-Verlag: Darmstadt,1991.

Odedokun M.O. "Causalities Between Financial Aggregates and
Economic Activities in Nigeria: The Results from Granger's Test." Savings and
Development 12(1) (1989):101-110.

_____. "Supply-Leading and Demand-Following Relationships
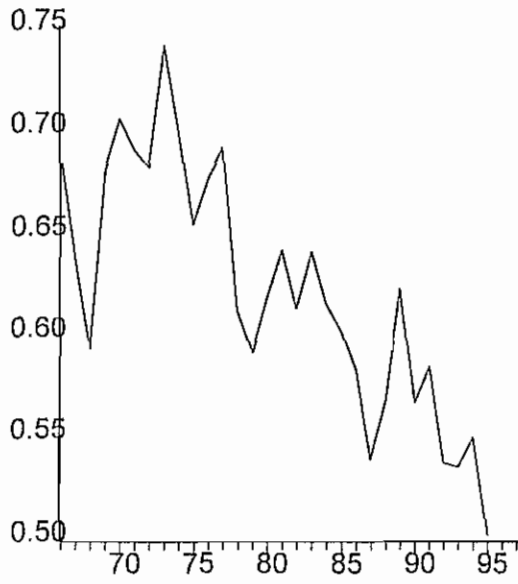between Economic Activities and Development Banking in Developing

Countries: An Empirical Analysis." <u>The Singapore Economic Review</u> (Formerly the Malayan Economic Review) 37(1) (April 1992):46-58.

St.Hill, Rodney L. "Stages of Banking and Economic Development." <u>Savings and Development</u> 16(1) (1992):5-21.
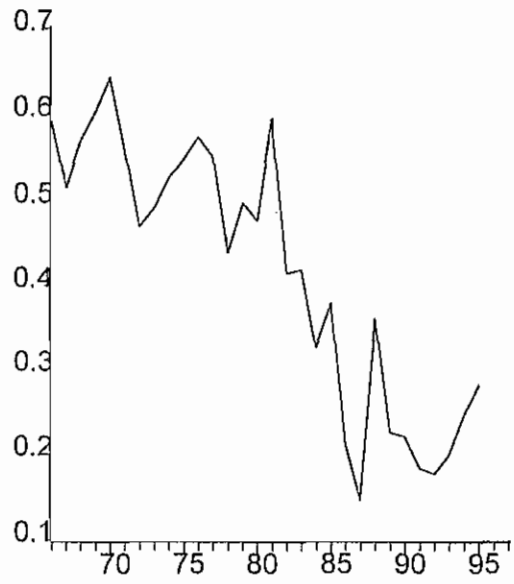
Thornton, John. "Financial Deepening and Economic Growth: Evidence from Asian Economies." Savings and Development 18(1994):41-51.
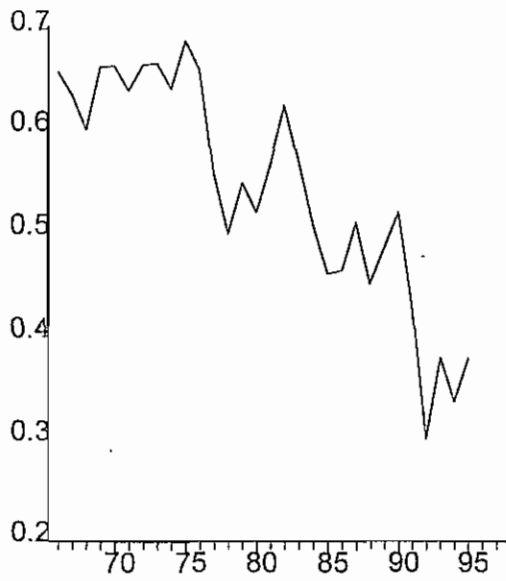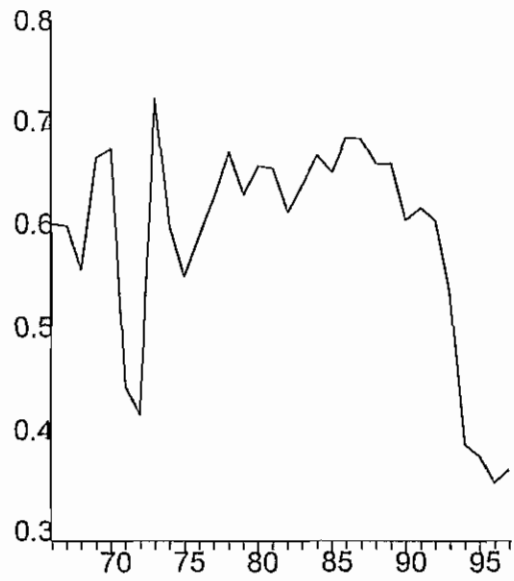
# APPENDIX

## Bank Loans to Bank Assets



Figure 1