

Can Bank Credit Explain the Economic Miracle of Mauritius? Policy Lessons for the Central Bank

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Abstract

This paper starts with an estimation of the effects of bank credit on economic growth in Mauritius. Existing empirical studies in Mauritius have used fixed coefficient models (see Jankee, 2006; Seetanah, 2008; Nowbutsing et al., 2010) to estimate the effects of bank credit on economic growth. However, the relationship between bank credit and economic growth may have changed over time because of different financial policies adopted in the country since independence in 1968. In that respect, because the effect of policies on the relationship between finance and growth may not be constant, we use the Time-Varying Coefficient model of Swamy and von zur Muehlen (2020) to estimate the time-varying total effects of bank credit on economic growth from 1970 to 2019. The Time-Varying Coefficient model of Swamy and von zur Muehlen (2020) is superior to extant models using fixed and variable coefficients because it estimates total effects and does not ignore the correlation between the error term and the explanatory variables, and hence also considers the indirect effects of the explanatory variables on the dependent variable. The results show a non-linear relationship between bank credit and economic growth with a non-monotonic decline of the total effects of the former on the latter from 1986 onwards. In the second part of the paper, to gain further insights into the reasons behind that non-monotonic decline, we introduce a novel theory in Africa known as the quantity theory of disaggregated credit and use its methodology to disaggregate total bank credit into two types namely, bank credit for GDP transactions and bank credit for non-GDP transactions before estimating the total effects of the former on economic growth. The best model of the total effects of bank credit for GDP transactions on economic growth shows that bank credit for GDP transactions, in particular to investment in machines (IM), or more broadly to manufacturing, spearheaded high growth rates during the country's miracle years

in the 1980s. In fact, during the period 1973-1993, the Bank of Mauritius had a system of credit guidance in place, which also coincided with the strong effects of bank credit for GDP transactions on economic growth during those years. The removal of this policy instrument from the monetary policy toolkit of the Bank of Mauritius as from 1993 coincided, too, with a decrease in average real economic growth. A corollary to the results is that policies that guide bank lending towards productive investment can be very effective in stimulating economic growth, more so than conventional interest rate policies, to which credit guidance can act as a complement and not necessarily as a substitute.

Keywords

Bank Credit, Monetary Policy, Economic Miracle, Economic Growth, RGDP, Finance, Financial Development, TVC Model, Total Effects, QTC, QTDC

1. Introduction

After the Global Financial Crisis (GFC) of 2007-2008, there has been a renewed interest in the role of banks, and on their money creating capacity and its implications on economic activity. The new debate has included leading central banks (see ECB, 2011: p. 68; ECB, 2012: p. 112; McLeay et al., 2014: p. 4 (from the Bank of England); Bundesbank, 2017: p. 13; Norges Bank, 2018: p. 35; Reserve Bank of New Zealand, 2019: p. 1) and has put back into focus the actual details of the banking system. Undergraduate macroeconomics textbooks widely describe banks as financial intermediaries that take savings deposits from households and lend money to businesses allocating capital between alternative capital investment possibilities. However, this limited description of what modern banks do is detached from reality. In a modern banking economy, commercial banks also create money (i.e., deposits) when they lend; they create money, credit, and purchasing power out of nothing by the act of lending to non-banks (See Werner, 2014).

Dominant neo-classical economics has paid little attention to this fact, in particular to the phenomenon that by lending newly created money to businesses to fund capital investment projects, banks can increase the rate of investment and economic growth. Early 20th century economists like Schumpeter (1912) and Keynes (1930) identified this fact as central to economic development but their ideas fell out of mainstream macroeconomics as from the 1960s. Bank lending in advanced and in an increasing number of emerging economies do not fund capital investment but instead funnel a large share of bank credit to consumption expenditures and, more significantly, to real estate (See Jordà et al., 2016).

Turner (2014) explains that the dominance of real estate reflects the increasing importance of land and housing as secured collateral for banks and its importance as an asset class for borrowers. The awareness of rising real estate pric-

es gives momentum to the price effect, as real estate becomes an asset class in which people invest not only to enjoy housing services but also to gain from capital appreciation. In his best-selling book “Capital in the 21st century”, [Piketty \(2013\)](#) shows that in many countries, the surge in the wealth-to-income ratio over the past 40 years has been driven mainly by the value of land and housing. Therefore, banks and borrowers engage in a self-reinforcing cycle of credit supply, credit demand and asset prices which often end with a financial crisis like the GFC in 2007-2008.

In Mauritius, the early 1990s was landmark in terms of economic reforms and a shift to a freer market-based system accelerated after the advent of the Washington consensus in 1989. In 1993, the relaxation of all credit guidelines led to a major shift in the composition of bank credit, including a significant surge in the amount of lending to real estate and construction. Similarly, there has been a dramatic increase in bank credit to offshore companies, which are less GDP intensive in nature as most firms in this sector mostly spend their money abroad. Bank credit to the construction and financial sector alone today accounts for about 60% of total commercial bank credit ([Bank of Mauritius Annual Report, 2019](#)). Arguably, the creation of too much of the wrong sort of debt in Mauritius could explain in part why the financing of productive investment has been inadequate and economic growth has remained relatively subdued during the most recent decades.

The allocation of excessive credit to speculative activities has been accompanied by a substantial decrease in bank credit to primary and manufacturing industries, which today represents a mere 9% of total bank credit ([Bank of Mauritius Annual Report, 2019](#)). Other categories of bank credit, for instance, bank credit to information and communication technology has remained vastly underfinanced, standing at less than 1% of total commercial bank credit in 2019 ([Bank of Mauritius Annual Report, 2019](#)). It is important to mention that prior to 1993, the allocation of bank credit was categorized into priority and non-priority sectors, mainly to encourage productive credit and economic growth in the country.

In 1986, the manufacturing sector alone (including companies in Export Processing Zone (EPZ) and other industries and manufacturers) absorbed 65% of the overall increase in total bank credit ([Bank of Mauritius Annual Report, 1986: p. 24](#)). This credit system continued in the late 1980s and, incidentally, the period from 1983 to 1988 was marked by unprecedented high rates of economic growth and is known as the “miracle or golden years” in the history of the country. However, from 1990 onwards, the country has witnessed falling rates of economic growth, and Mauritius has been compared with Bangladesh as a country also trapped in the league of middle-income economies (see [Ramanayake & Lee, 2014](#)).

[Werner \(2005\)](#) argues that in the non-fiction world of disequilibrium economics, actual growth often falls short of potential growth, which means that we

need a more realistic modeling of the reasons why this happens. He argues that a bank-credit driven model supplies a more realistic answer to the slow growth we observe in many countries around the world. If banks create new purchasing power and lend it for buying and selling of assets, i.e. financial transactions, then the amount of national output will stay unchanged since the new funds do not lead to the production of new goods and services. However, if banks lend their additional purchasing power to real sector transactions, it increases the production of new goods and services which stimulate national output. The proxy “bank credit to the real sector,” also known as Bank credit for GDP transactions (BCGDP), was developed by [Werner \(1992\)](#) in his Quantity Theory of Disaggregated Credit (QTDC). The theory posits that increases in BCGDP lead to increases in nominal GDP. However, one of the most pragmatic implications of QTDC is that when actual output falls short of potential output, an increase in BCGDP or in productive credit will have significant positive effects on real GDP.

In this paper, we first investigate the total effects (direct effects + indirect effects) of commercial bank credit per capita (CBC) on real GDP per capita (RGDP) in Mauritius for the period 1970 to 2019, using the time-varying coefficient (TVC) estimation technique of [Swamy and von zur Muehlen \(2020\)](#). In the second part of the paper, guided by the theoretical framework of QTDC, we remove forms of “unproductive bank credit” from total bank credit to get a proxy of BCGDP and then proceed to measure its total effects on RGDP. We use three disaggregated forms of investment to measure the indirect effects of the former on the latter, namely using residential and commercial real estate investment (RCREI), investment in machines (IM), and investment in infrastructure (II). The rest of the paper is organized as follows: Section 2 provides the evolution of financial policies in Mauritius with a particular focus on the credit system in place before 1993. Sections 3 and 4 provide the empirical framework and results respectively on measuring the total effects of CBC on RGDP. Section 5 presents the pocketbook version of QTDC. Section 6 estimates the best measures of BCGDP. Section 7 provides the empirical results and discussions of the total effects of BCGDP on RGDP. Finally, section 8 concludes with the study’s major findings and makes policy recommendations to the Bank of Mauritius.

2. The Evolution of Financial Policies in Mauritius

In 1968 when Mauritius became independent, sugar exports represented 95% of the country’s exports revenue. At that time, the country was confronted with different challenges, notably the phasing out of the Commonwealth Sugar Agreement, the devaluation of the pound sterling, decreasing sugar prices and very serious problems of unemployment. The governor of the Bank of Mauritius (BOM) at the time, Aunauth Beejadhur, noted that, Mauritius could not look with confidence to increasing sugar exports under the existing arrangements as a primary means of expanding incomes and employment. Viewed against this

long-term perspective, the need to diversify the economy had assumed a sense of urgency (Bank of Mauritius Annual Report, 1970: p. 11). In response, Prime Minister Sir Seewoosagur Ramgoolam (SSR) and his colleagues felt compelled to show economic pragmatism to address the difficult situation at the time¹.

In November 1970, the government embarked on laying the foundation of an industrial economy with the creation of the Export Processing Zone (EPZ). The objective of the EPZ was to encourage the establishment of “export” enterprises in Mauritius (Bank of Mauritius Annual Report, 1974: p. 15). Interestingly, the pragmatism of the government was complemented by an equally strong pragmatism of the Bank of Mauritius who introduced new legislation which emphasized the importance of the financial system to promote the allocation of bank credit to support the development objectives of the real economy. At the time, the Bank deemed the sophistication necessary because, as it states “the Development Plan gathers momentum, the financial system, in particular the banking system, will be called upon to play an increasingly important role in the mobilization of domestic resources for development. It is against this broader perspective of the increasing sophistication of the banking system that the new legislation should be viewed in Mauritius.” (Bank of Mauritius Annual Report, 1971: p. 20).

A comparison of the credit levels as at end of June for 1970, 1971 and 1972 confirmed the emergence of the industrial sector as an important claimant of credit (Bank of Mauritius Annual Report, 1972: p. 19). The analysis of the trends in bank credit by the Bank of Mauritius in 1972 however showed that a significant rise in credit to the private sector had taken place in the trade sector. In that respect, a key measure of the Bank of Mauritius stipulated that commercial banks should ensure that the volume of credit to the trade sector will not rise by more than 10 per cent during the latter half of 1973 (Bank of Mauritius Annual Report, 1973: p. 23).

Concurrently with the measure of the Bank of Mauritius to cap the expansion of trade credit, the government provided a series of incentives to promote the production of new goods in the country. For instance, export enterprises enjoyed infrastructural facilities and were totally exempted from payment of import duty on capital goods and raw materials and enjoyed a tax holiday for a period of 10 to 20 years. These industries include the electronic industry, toy manufacture, a diamond cutting and polishing plant and some garment producing units (Bank of Mauritius Annual Report, 1974: p. 15). Thus, with a combination of the right kinds of credit policies by the monetary authority coupled with the right kind of economic incentives by the state, national income expanded by 30% in 1973 (Bank of Mauritius Annual Report, 1974: p. 6).

¹In January 1969, SSR met the President of France, Charles De Gaulle, in his attempt to secure a new market for sugar with the European Economic Community (EEC). In May 1969, the Minister of Finance, Sir Veerasamy Ringadoo, approached the World Bank for technical assistance. Dr. Nijhawan assumed duty as Director of the Economic Planning Unit and six months later after i.e. in May 1971, a four-year development plan was published and subsequently adopted as the charter for the economic and social development of the country.

The unprecedented increase in world sugar prices which occurred in the latter half of 1974 led to an escalation of liquidity in the economy contributing to inflationary pressures (Bank of Mauritius Annual Report, 1975: p. 8). One of the measures to mop up the high level of liquidity in the economy during 1974-1975 was the floatation of an unprecedentedly high level of Government Stocks, valued at Rs 310 million (Bank of Mauritius Annual Report, 1975: p. 17). During the mid-1970s, the price of sugar on the world market started its descent and falling export revenues coupled with higher wages and import demand increased the balance of payments deficit. Against the backdrop of falling foreign exchange reserves and the increasing pressure of import demand, the policy of restrained credit expansion continued and bank credit in 1977 to sectors other than exempted categories was allowed to expand by an average of 15 per cent over the level permitted in 1976 and credit to traders was limited in 1977 to the average level extended to that sector in 1976 (Bank of Mauritius Annual Report, 1977: p. 8).

The high levels of public expenditure to finance the growth in wages and salaries led to rising imports and inflationary pressures. Despite the increasingly tight monetary policy that the BOM was pursuing and the Government's control on imports of goods, the economic situation in Mauritius led to an economic crisis in 1979 and required the intervention of the IMF. The economic scene during the year ended June, 1980, was marked by the devaluation of the rupee by 22.9 per cent in October, 1979, and the adoption of an economic and financial programme supported by a stand-by arrangement with the International Monetary Fund for balance of payments assistance amounting to SDR 73 million over a period of about two years (Bank of Mauritius Annual Report, 1980: p. 7). The main objective of this economic programme was to correct the disequilibrium in the balance of payments in the medium term through a change in relative prices and the application of demand management policies to curtail the growth in aggregate expenditures (Bank of Mauritius Annual Report, 1980: p. 7).

The adverse weather conditions which prevailed in early 1980 resulted in a drastic fall in sugar production which, in turn, led to a heavy shortfall in sugar exports in 1980-1981. A fall in the rupee price of sugar exports which was due to the weakening of the pound sterling and the other European Currencies also contributed towards reducing the export proceeds of sugar. Besides, the value of total imports in both rupee and foreign currency terms continued to go up in 1980-1981 although in terms of volume a contraction of imports was observed. These developments culminated in an overall balance of payments deficit of Rs. 953 million for 1980-1981. Thus, a realignment of the external value of the rupee became inevitable and the exchange rate of the rupee was readjusted downwards in September, 1981, by 16.7 percent (Bank of Mauritius Annual Report, 1982: p. 7).

As part of the structural adjustment program led by the IMF under the stand-by agreement, money supply was controlled through the control of credit from

1979 to 1986 (Fry & Roi, 1995: p. 2). However, the credit policies put in place by the BOM allowed credit to flow to priority sectors and supported the industrial expansion of the economy in the mid-1980s. For instance, credit to priority sectors, which included sugar and other agricultural interests, exports sectors, industries, and manufacturers, absorbed more than 50% of the increase in total credit to the private sector in 1984 (Bank of Mauritius Annual Report, 1984: p. 21). Around the peak of the economic miracle years in 1986-1987, about 92 percent of bank credit was extended to the “productive sectors” of the economy, and the manufacturing sector alone accounted for nearly 50 percent of the overall increase in private sector credit (Bank of Mauritius Annual Report, 1987: p. 21). However, credit allocation alone was necessary but not sufficient for sustained economic growth.

The high rates of growth have been a combination of factors which include a well-managed Export Processing Zone, conducting diplomacy regarding trade preferences, avoiding currency overvaluation, and facilitating business, Svirydenka and Petri (2014: p. 82). The period from 1983 to 1988 marked unprecedented rates of economic growth, leading to full employment in 1989. The performance of the Mauritian economy in 1989 reflected a watershed in its process of development as the period of exceptionally high rates of economic growth, engineered by the rapid expansion of the manufacturing sector: the EPZ, itself based on the absorption of unemployed labor, came to an end (Bank of Mauritius Annual Report, 1990: p. 6).

During the early 1990s, many proponents of financial liberalization in Mauritius, such as Fry and Roi (1995), argued that low interest rates failed to mobilize savings which were needed to spur the economic growth of developing countries. The shift to a more market-based system became pressing and the years 1991-1992 were a landmark in terms of the introduction of new financial and monetary policy reforms in Mauritius. The monetary policy reforms initiated in the 1990s marked a major departure from the system of direct monetary control to an indirect method of monetary control, mainly through open market operations which replaced domestic credit as the main policy instrument (Fry & Roi, 1995: p. 7).

Fry and Roi (1995) explained that the first sign to the market transition came in November 1991 with the introduction of Treasury Bills auctions. The second step was the abolition of credit ceilings for priority and non-priority sectors in 1992 and 1993 respectively. In 1994, a secondary market cell was set up at the BOM, and open market operations (OMO) targeted the bank rate which was then linked to the average T-Bill rate. Thus, OMO replaced domestic credit as the most active policy instrument. However, as in many emerging market countries, Mauritius' secondary government bond market was relatively illiquid and underdeveloped. Therefore, the BOM could not easily target short-term interest rates directly through open market operations. In the wake of the Asian crisis of 1998, a thin bond market was a weak channel to influence the bank rate and it took the Central Bank various interventions in the market to signal its monetary policy stance.

During that time, the focus of the BOM also shifted from credit controls to inflation targeting. To reduce variability in the inflation rate, as from 1996 the central bank began announcing an aggregate inflation target. Stone (2003) coined the phrase “inflation targeting lite” for countries such as Mauritius that float their exchange rate and announce an inflation target but are not able to maintain the inflation target as the foremost policy objective. This is true for an open economy such as Mauritius as monetary policy also controls exchange rate fluctuations for the external balance of the country.

After the East Asian crisis in 1999, the Bank of Mauritius introduced the Lombard Rate (interest rate which commercial banks paid for using the Lombard Facility) as the key interest rate for monetary policy. In December 2006, the Repo Rate replaced the Lombard Rate as the policy rate to signal changes in monetary policy and achieve specific inflation targets. In response to changing economic circumstances of subdued inflation and slow growth due to the GFC, the BOM cut the Repo rate from 2008 onwards to stimulate private investment and economic growth which however remained anemic till today.

Table 1 summarizes a selection of key changes in bank credit and bank credit policies from 1973 to 1993. It can also be seen from **Table 1** that the BOM has on numerous occasions encouraged the promotion of credit to priority areas, for instance at the beginning of the economic miracle years in 1984 and at its peak in 1989. These credit policies coupled with other sound macroeconomic policies such as the promotion of the EPZ and business facilitation led to a positive feedback effect between credit, investment, and growth.

As shown in **Table 1**, the monitoring of the quantity and quality of bank credit

Table 1. A selection of key changes in bank credit and bank credit policies.

| | |
|------|--|
| 1973 | Introduction of a credit ceiling of 10% on the expansion of credit to the trade sector (categorized as a non-priority sector) |
| 1976 | Continued restraint on the expansion of credit due to inflationary pressures |
| 1979 | Removal of overall credit ceiling but credit ceiling to traders maintained |
| 1984 | Credit to the priority sectors (sugar and other agricultural interests, export sectors, industries and manufacturers) absorbed more than 50% of the increase in total credit to the private sector |
| 1986 | Liberalization of exchange rate controls on current and capital account transactions |
| 1987 | Credit to the private sector grew by 18.9% and credit policies made less restrictive to support the current industrial expansion in a non-inflationary environment |
| 1989 | Credit to the priority sectors accounted for 64.9% of the overall increase in credit to the private sector |
| 1992 | Abolition of credit ceilings to priority sectors |
| 1993 | Abolition of credit to non-priority sectors |

by the BOM took the back seat from 1992 onwards. After the abolition of credit ceilings in 1993, the next three decades witnessed a major shift in the composition of bank credit to construction, financial and tertiary sectors (consists mainly of hotel activities, acquisition, and construction). These changes are shown in **Figure 1**.

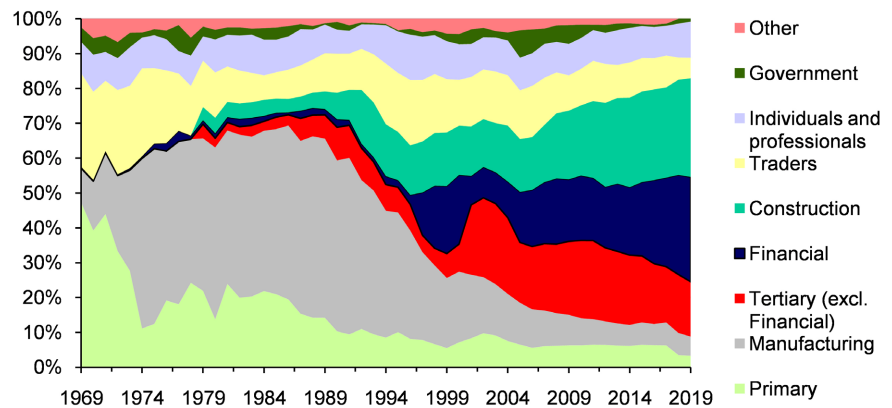


Figure 1. Sectoral composition of credit from 1969 to 2019. Source: Author's own compilation using data from various issues of Bank of Mauritius annual reports.

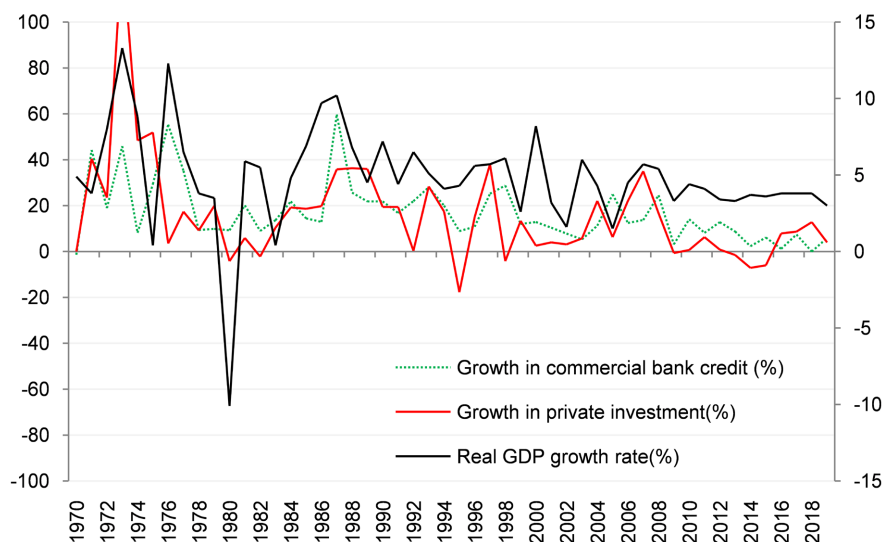


Figure 2. Growth in private investment to GDP (left-axis) and Growth in real GDP, Growth in commercial bank credit to GDP (right-axis) from 1970 to 2019. Source: Author's compilation using data from Bank of Mauritius and Statistics Mauritius.

A closer look at the data on the sector-wise distribution of bank credit to the construction sector reveals that from Rs 1 billion in 1990, this figure stood at Rs 108 billion in 2019 (*Bank of Mauritius Annual Report, 2019*). Real estate projects in Mauritius have gained impetus with the introduction of the Integrated Resort Scheme (IRS) and Real Estate Scheme (RES) which encourage foreigners to acquire property around the island.

There has also been a surge in the amount of bank credit allocated to financial

companies. The data shows that bank credit to the financial sector stood at Rs 323 million in 1993 but this figure surged to more than Rs 110 billion in 2019 (Bank of Mauritius Annual Report, 2019: p. 84). It is important to note that bank credit to offshore companies does not have a large impact on GDP as these companies carry out most of their business activities outside the country. Importantly, bank credit to offshore companies consists of most of the bank credit to the financial sector, standing at around 60% of total bank credit to the financial sector (Bank of Mauritius Annual Report, 2019: p. 84). Therefore, like bank credit to the construction sector, it remains dubious if the soaring level of bank credit to the financial sector has had significant and sustained effects on GDP.

Figure 2 shows the behavior of the growth in commercial bank credit, private investment and economic growth. It shows that from the mid to late 1990s, there has been a declining trend in the growth in bank credit, investment, and economic growth in the country.

3. Empirical Studies and Framework

Existing empirical studies in Mauritius have used fixed coefficient frameworks (see Jouan, 2005; Jankee, 2006; Seetannah, 2008; Nowbutsing et al., 2010) to estimate the effects of different measures of finance on economic growth. **Table 2** provides a summary of the empirical studies of the effects of those measures of finance on growth in Mauritius. **Table 2** shows that private sector credit, M2 and bank deposits have been used as the main measures of finance and their effects on economic growth in the short and long run seem to be positive. In this paper, we use commercial bank credit as our main measure of finance. Like Werner (2005) we believe that banks are special, and, unlike other financial institutions, when banks create credit, they create new purchasing power that did not exist before with meaningful implications on the evolution of the structure of the economy over time.

In Mauritius, the relationship between bank credit and economic growth may have changed over time because of different financial policies adopted in the country since independence in 1968. Therefore, a fixed coefficient model will not be able to measure the precise functional form of the relationship between CBC and RGDP from 1970 to 2019. In this paper, we use time-varying coefficients (TVC) to estimate a better approximation of the true functional form of the relationship between CBC and RGDP or alternatively between bank credit and economic growth in Mauritius for the past 50 years.

In contrast to existing fixed and other variable coefficient models, which ignore the correlation of the regressor with the error term² and hence the indirect effects of the regressor on the dependent variable, the TVC model of Swamy and von zur Muehlen (2020) measures the *total effects*³ of CBC on RGDP from 1970

²The correlation of the regressor with the error term gives rise to indirect effects which is also known as “omitted variable biases”.

³The estimate of the total effects of a regressor on a dependent variable estimate the direct effects but also the indirect effects of a regressor on a dependent variable.

Table 2. Empirical studies of financial development and economic growth in Mauritius.

| Study | Sample | Estimation Methods | Main Measures | Main Findings |
|--------------------------|----------------------|------------------------|--|---|
| Jouan (2005) | Mauritius, 1979-2002 | ECM/Granger causality | Private sector credit to GDP | PSC significantly and positively related to economic growth and bi-directional causality between finance and growth |
| Jankee (2006) | Mauritius, 1970-2000 | ECM/Granger causality | Bank deposits to GDP, Private sector credit to GDP | Positive bi-directional causality between banking sector development and economic growth |
| Seetannah (2008) | Mauritius, 1952-2004 | ARDL/ECM | Private sector credit to GDP and M2/GDP | Positive and significant short-run and long-run effects of finance on growth |
| Nowbutsing et al. (2010) | Mauritius, 1970-2009 | VECM/Granger causality | M2/GDP, Private sector credit to GDP | Positive long-run causal effects of M2/GDP and Private sector credit to GDP on economic growth |

to 2019. The TVC estimation technique presented below addresses many limitations of conventional econometric techniques such as simultaneity issues (See Swamy et al., 2022).

Several attempts have been made in the empirical literature to estimate the time-varying and/or non-linear relationship between finance and growth using a polynomial in the form of a square of private sector credit, or threshold regressions, or state space models. For instance, Arcand et al. (2012) and Cecchetti and Kharroubi (2012) captured the dynamic relationship between credit to the private sector and RGDP by imposing a curvature onto the estimated relationship between the two variables. Both authors added a polynomial term for credit to the private sector in their regression, arguing that the relationship is quadratic and that many econometric models are misspecified because they generally assume a linear relationship which fails to capture any vanishing effects. Arcand et al. (2012) suggested that there is a threshold (80% to 100%) above which finance starts to have negative effects on output growth. However, they did not estimate the total effects of credit to the private sector on RGDP, assuming instead that the square of the regressor included in their regression was the only regressor

omitted from it. They found that the bias due to omitting this regressor was negative and increased in absolute value over time, as credit to the private sector increased. Arcand et al.'s (2012) reasoning was based on the linear relationship $y_t = x_t\alpha + u_t$ where x_t represents financial depth, y_t represents economic growth, and the least squares estimate of α is biased because of the omitted regressor, x_t^2 . However, u_t is made up of all relevant omitted regressors and is correlated with x_t , a situation that fixed coefficient models ignore.

Other ostensibly variable coefficient models, such as the threshold regression models of Huang and Lin (2009) and Law and Singh (2014) or the state space model of Awe et al. (2015) used for Nigeria, also ignore the correlation of the error term with the included regressors, which highlights the fact that both fixed and variable coefficient models are plagued with the same econometric problems. Table 3 shows a compilation of the main features of these time varying and non-linear studies of finance on growth.

We claim and will demonstrate that the TVC estimation technique of Swamy and von zur Muehlen (2020) used in this paper is superior to all existing models because it does not ignore the correlation between the error term and the explanatory variables. In general, the empirical literature on finance and growth suffers from a deeply ingrained assumption in econometrics, exemplified by Greene's (2012: p. 12), assertion that the error term of a regression is made up of the net effect of omitted variables and is uncorrelated with the included regressors. On the contrary, Pratt and Schlaifer (1984: pp. 9-12) have shown that the error term of each equation is typically made up of omitted relevant regressors that cannot be proved to be uncorrelated with the included variables and that any correlations between the included regressors and each omitted relevant regressor lead to indirect effects when the error term is made up of omitted relevant regressors.

We now present the TVC model based on the work of Swamy and von zur Muehlen (2020) and Swamy et al. (2022). A time-varying coefficient model relating the total effects of CBC on RGDP is specified as follows:

$$RGDP_t = \alpha_{0t} + \alpha_{1t}CBC_t + \sum_{\ell=1}^{L_t} \omega_{\ell t} w_{\ell t} \quad (1)$$

where $w_{1t}, \dots, w_{L_t t}$ are all the omitted but relevant regressors in the relationship between y_t and x_{1t} in which we are interested. To indicate the time-variability of the coefficients in (1), we have assigned to them a time subscript. We address the simultaneity problem in (1) alluded to before by positing that $w_{1t}, \dots, w_{L_t t}$ obeys the following stochastic law:

$$w_{\ell t} = \lambda_{0\ell t} + \lambda_{1\ell t}CBC_t, \quad \ell = 1, \dots, L_t \quad (2)$$

where all the variables in Equation (2) including $\lambda_{0\ell t}$ and $\lambda_{1\ell t}$ are treated as random variables. Accordingly, following Swamy et al. (2022), we shall refer to Equation (2) as a "stochastic equation".

Table 3. Time-varying and non-linear studies of the effects of financial development on economic growth.

| Study | Sample | Estimation Methods | Main Measures of FD | Main Findings |
|--------------------------------|---|---|--|---|
| Huang and Lin (2009) | 71 developed and developing countries, 1960-1995 | Instrumental variable threshold regression. Initial income per capita is used as the threshold variable. Legal origins are used as instrumental variables. | Liquid liabilities to GDP and Private sector credit to GDP | There are positive non-linear effects of finance on growth and the positive effects are larger for low-income countries than for high-income countries. Given that law enforcement is correlated with legal origins and is more heterogenous among low-income countries, the stronger positive effects of finance on growth for low-income countries may be driven by the differential effects of law enforcement. |
| Cecchetti and Kharroubi (2012) | 50 developed and emerging economies, 1980-2009 | Cross-section and Panel regression analysis using five-year averages. The square of the FD measure is used to estimate the parabolic relationship between finance and growth. | Private sector credit to GDP | There is a non-linear relationship between finance and growth. The peak of the parabola suggests that for private credit extended by banks the turning point is close to 90% of GDP. After this point, private sector credit reduces economic growth. Therefore, the results show that financial sector growth eventually becomes a drag on productivity growth and economic performance. |
| Arcand et al. (2012) | 100 developed and developing countries, 1960-2010 | Cross-section and Panel regressions. The square of private sector credit is used to test the “too much finance” hypothesis. | Private sector credit to GDP | There is non-linear relationship between finance and growth. When private sector credit to GDP reaches 100%, it starts to have negative effects on growth. The results are consistent with the “vanishing effects” of financial development on economic growth. The “vanishing effects” are not driven by output volatility, banking crises, low institutional quality, or by differences in bank regulation and supervision. |
| Law and Singh (2014) | 87 developed and developing countries, 1980-2010 | Dynamic panel threshold technique with regime switching. The level of FD is the threshold variable that is used to split the sample into regimes. | Liquid liabilities to GDP and Private sector credit to GDP | When FD is below the threshold finance level it has positive effects on growth. However, after the threshold level, higher FD will lead to negative effects on growth. The finding indicates that the private sector credit threshold level is close to 88% of GDP. The authors argue that there is an “optimal” level of financial development and that the efficient allocation of credit for productive purposes is important in ensuring the effectiveness of finance for growth. |
| Awe et al. (2015) | Nigeria, 1960-2009 | State space model with time-varying parameters to analyze the economic relationship between key economic indicators such as money supply and GDP. | Annual money supply | The economic indicator that best predicts GDP along with money supply is capital expenditure for the period 1960 to 2009. In comparison the lending rate, exchange rate, T-bill rate and external debt level performed relatively poorly in predicting GDP. The findings show that policy makers in Nigeria should embrace policies that will encourage private sector investment in sectors such as agriculture and manufacturing. |

Source: Author’s own compilation.

Inserting the right-hand side of Equation (2) for w_{it} in Equation (1), gives Equation (3):

$$\begin{aligned} RGDP_t &= \alpha_{0t} + \sum_{\ell=1}^{L_t} \omega_{\ell t} \lambda_{0\ell t} + \left(\alpha_{1t} + \sum_{\ell=1}^{L_t} \omega_{\ell t} \lambda_{1\ell t} \right) CBC_t \\ &= \gamma_{0t} + \gamma_{1t} CBC_t \end{aligned} \quad (3)$$

where the intercept is $\gamma_{0t} = \alpha_{0t} + \sum_{\ell=1}^{L_t} \omega_{\ell t} \lambda_{0\ell t}$ and the total effects of CBC_t on $RGDP_t$ is $\gamma_{1t} = \alpha_{1t} + \sum_{\ell=1}^{L_t} \omega_{\ell t} \lambda_{1\ell t}$.

α_{0t} is the possibly time-varying intercept of Equation (1), the $\omega_{\ell t}$ are the coefficients of omitted regressors included in Equation (1), $\lambda_{0\ell t}$ is the *remainder* of each omitted regressor w_{it} obtained after the effect $\lambda_{1\ell t}$ of CBC_t on w_{it} has been subtracted out.

α_{1t} is the potentially time-varying direct effect of CBC_t on $RGDP_t$ as indicated in Equation (1), $\sum_{\ell=1}^{L_t} \omega_{\ell t} \lambda_{1\ell t}$ is the indirect effect of CBC_t on $RGDP_t$ due to the fact that CBC_t affects each omitted regressor w_{it} which in turn affects $RGDP_t$.

The total effect of CBC_t on $RGDP_t$ is γ_{1t} and is the sum of direct and indirect effects. As is evident from Equations (1) and (2) both direct and indirect effects depend on omitted regressors, but the total effects do not depend on omitted regressors. Notably, because of this specification of Equations (1) and (2), the estimates in Equation (3) will yield the total effects of CBC_t on $RGDP_t$.

The remaining issue is that the coefficients and the regressor in Equation (3) are still correlated, as they move together over time. Following the approach of [Swamy and von zur Muehlen \(2020\)](#), to satisfy the required conditional independence assumption, we propose linking the coefficients in question with certain variables, to be determined by search, that we shall refer to as “coefficient drivers”, and we posit the following two equations:

$$\gamma_{0t} = \pi_{00} + z_{it} \pi_{0i} + u_{0t} \quad (4)$$

$$\gamma_{1t} = \pi_{10} + z_{jt} \pi_{1j} + u_{1t} \quad (5)$$

where z_{it} and z_{jt} are the coefficient drivers. We need to find z_{it} and z_{jt} , so that γ_{0t} and γ_{1t} are conditionally independent of CBC_t , given z_{it} and z_{jt} . In addition to (3), (4) and (5), [Swamy and von zur Muehlen \(2020\)](#) assume that:

$$u_t = (u_{0t}, u_{1t})' = \varphi u_{t-1} + a_t \quad (6)$$

where φ is diagonal with ϕ_{00} and ϕ_{11} as its diagonal elements, $E(a_t) = 0$,

$$\text{and } E(a_t, a_s') = \begin{cases} \sigma_a^2 \Delta_a & \text{if } t = s \\ 0 & \text{if } t \neq s \end{cases}.$$

In the following section, we estimate the total effects of CBC on RGDP using private investment (PI), gross fixed capital formation (GFCF), and private consumption (PC) as our main coefficient drivers for z_{jt} as these variables are theoretically the indirect channels through which CBC can affect RGDP. Our focus

will be on Equation (5), with the intent to accept the model having the most significant t -ratios for π_{10} and π_{1j} . In addition, we will use a forecasting criterion to validate those models having the lowest Theil's U statistic, implying that the forecasts are closer to the actuals than away from them.

In Swamy et al. (2022), the authors use exclusively the U statistic to select the best model that estimates the total effects of bank credit on economic growth. In this paper, since our interest also lies in the separate direct and indirect effects of the total effects of bank credit on economic growth, in addition to the U statistic, we use the t -ratios to ensure the significance of π_{10} and π_{1j} . Swamy and von zur Muehlen (2020: p: 5) explain how π_{10} and π_{1j} absorb at least part of the direct and indirect effects respectively of a regressor on a dependent variable. In addition to the significance of t -ratios, using forecasting to validate our models adds another layer of robustness to our econometric analysis.

The empirical estimation in this paper uses the Stochastic Coefficient Estimation Program (SCEP) and data for Mauritius which covers the period from 1970 to 2019. Data on bank credit has been gathered from various issues of the Bank of Mauritius annual reports. Data on population to calculate per capita for CBC and RGDP has been obtained from the United Nations World population prospects database. Data on Commodities and Exports Price Index (CEXPI) has been obtained from the International Financial Statistics of the IMF. Data on Real Effective Exchange Rate (REEXR) has been gathered from the European think tank, the Bruegel Institute. Data on Private Consumption (PC), Gross Fixed Capital Formation (GFCF), Private Investment (PI), imports and exports (to calculate Openness of Mauritius Trade (OMT), nominal GDP (to calculate OMT) and real GDP have been obtained from Statistics Mauritius⁴.

4. Empirical Results

Case II in Table 4 shows the best results in terms of the significance of both coefficients of γ_{it} in Equation (5). It also has the lowest U statistic. The results for Case II show that when the pair of coefficient drivers (OMT, PI) is used, the direct effect (π_{10}) of credit on growth is positive but the indirect effect (π_{1j}) of credit on growth via investment is negative and significant. Figure 3 shows the time path of the total effects of CBC on RGDP for Case II is positive from around the early 1970s to about the mid-1980s, although there some sporadic downturns during this period, especially in the late 1970s when the country faced a severe external crisis. The peak of the total effects of credit on growth, when the pair of coefficient drivers (OMT, PI) is used, occur around 1979, which marked the beginning of the structural adjustment period, and around 1986, a period considered the economic miracle years. The y -axis in Figure 3 plots γ_{it} which estimates the total effects of CBC on RGDP of the country. However, from 1987, the total effects of credit on growth in the

⁴All data can be made available upon request to the author.

country declined steadily. The negative indirect effects of PI suggest that credit has negatively influenced growth through investment and provide a partial explanation of the declining effects of bank credit on economic growth from 1987 to 2019.

Table 4. Total effects of CBC on RGDP.

| Models | Unrestricted case ($\varphi \neq 0$) or restricted case ($\varphi = 0$) | Coefficient Driver of Equation (4) | Coefficient Estimates of γ_{0t} in Equations (3) and (4) | | Coefficient Driver of Equation (5) | Coefficient Estimates of γ_{1t} in Equations (3) and (5) | | Theil Forecasting Values | Conclusion |
|--------|---|------------------------------------|---|----------------------------------|------------------------------------|---|-------------------------------------|--------------------------|---------------|
| | | | Z_{it} | π_{00} | | π_{0i} | Z_{jt} | | |
| I | $\varphi = 0$ | CEXPI | 159842.90 (10.95) ^a | -512.65 (-4.317) ^a | PI | 1.985 (16.36) ^a | -0.000018 (-7.119) ^a | 12.27 | REJECT |
| II | $\varphi \neq 0$ | OMT | 55627.70 (3.307) ^a | 244.12 (1.660) ^c | PI | 2.479 (2.247) ^b | -0.000013 (-2.266) ^b | 0.65 | ACCEPT |
| III | $\varphi = 0$ | OMT | 9320.21 (1.196) | 473.03 (6.265) ^a | PI | 9.492 (8.089) ^a | -0.00016 (-5.081) ^a | 8.91 | REJECT |
| IV | $\varphi = 0$ | REEXR | 128708.07 (4.656) ^a | -595.29 (-2.566) ^a | PI | 11.212 (7.792) ^a | -0.0002 (-4.936) ^a | 10.96 | REJECT |
| V | $\varphi = 0$ | CEXPI | 33091.90 (4.417) ^a | 161.69 (3.314) ^a | GFCF | 13.047 (9.169) ^a | -0.00018 (-6.007) ^a | 11.96 | REJECT |
| VI | $\varphi = 0$ | OMT | 9689.82 (1.261) | 468.19 (6.285) ^a | GFCF | 9.806 (8.277) ^a | -0.00013 (-5.291) ^a | 8.71 | REJECT |
| VII | $\varphi = 0$ | REEXR | 127989.55 (4.695) ^a | -590.57 (-2.581) ^a | GFCF | 11.577 (7.973) ^a | -0.00016 (-5.137) ^a | 10.7 | REJECT |
| VIII | $\varphi \neq 0$ | CEXPI | 109318.23 (12.84) ^a | -244.65 (-4.048) ^a | PC | 3.384 (3.534) ^a | -0.0000052 (-2.430) ^b | 5.91 | REJECT |
| IX | $\varphi = 0$ | CEXPI | 35287.53 (4.379) ^a | 151.79 (2.885) ^a | PC | 11.413 (8.122) ^a | -0.00004 (-4.919) ^a | 18.91 | REJECT |
| X | $\varphi \neq 0$ | OMT | 76300.71 (4.867) ^a | 30.931 (0.223) | PC | 3.551 (4.208) ^a | -0.0000054 (-2.530) ^a | 6.84 | REJECT |
| XI | $\varphi \neq 0$ | OMT | 8383.01 (1.015) | 486.80 (6.168) ^a | PC | 8.581 (7.466) ^a | -0.000029 (-4.387) ^a | 13.72 | REJECT |
| XII | $\varphi = 0$ | REEXR | 130223.24 (4.507) ^a | -604.15 (-2.491) ^b | PC | 10.165 (7.213) ^a | -0.000036 (-4.287) ^a | 16.89 | REJECT |

Note: The 1%, 5% and 10% significance levels are denoted by a, b and c respectively.

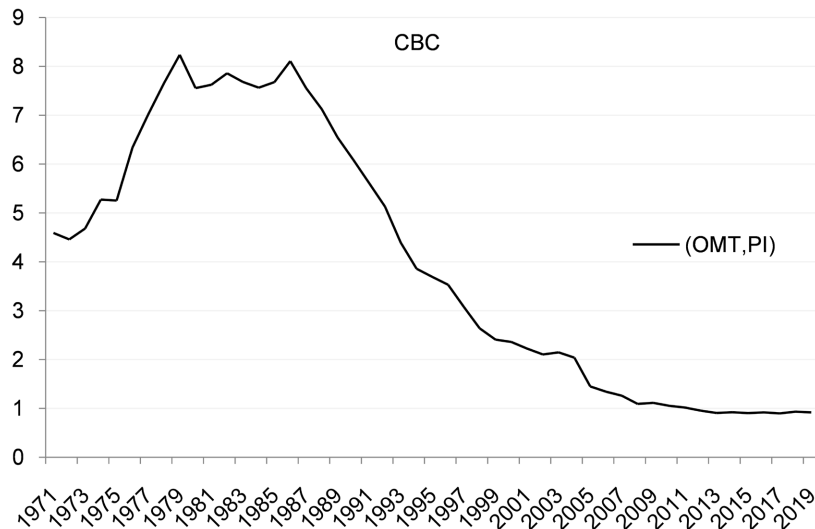


Figure 3. Time path of the total effects of CBC on RGDP from 1970-2019. Source: Based on estimation by author.

5. Pocket Book Version of QTDC

In the previous section, we used total commercial bank credit as an aggregate measure before testing its effects on economic growth. However, it is important to mention that not all types of bank credit affect economic growth. For instance, bank credit issued for financial transactions like the buying and selling of assets have zero effects on GDP. In this section, we introduce a relatively novel theory in this part of the world known as the Quantity theory of disaggregated credit (QTDC) which presents a methodology to disaggregate total bank credit into two types, namely bank credit to real sector transactions and bank credit to financial transactions and the effects of the former can then be tested on GDP.

The QTDC was originally formulated in a set of papers in the 1990s in the context of the Japanese economy and was later applied to other countries namely the Czech Republic, the UK, Spain and Germany. In its briefest formulation, using the traditional equation of exchange as its foundation, (See Werner, 1992), the theory postulates the existence of a causal, robust, stable, autonomous relationship or mechanism, relating two pairs of variables. The first pair consists of nominal GDP ($nGDP$) and another variable that we refer to as “bank credit for GDP transactions”, (C_R^b). The second pair consists of “asset prices” (AP) (real estate or land prices), and “bank credit for *non*-GDP transactions” (C_F^b). The theory also asserts unidirectional causality going from C_R^b to $nGDP$ or $P_R Y$, and from C_F^b to AP or $P_F A$ and posits the former variables to be the “actual cause” of the latter. We can express these two relations algebraically as follows:

$$C_F^b V_R = P_R Q_R = P_R Y \tag{7}$$

with $V_R = \frac{P_R Y}{C_R^b}$ constant

And:

$$C_F^b V_F = P_F Q_F = P_F A \quad (8)$$

with $A = \text{quantity of assets}$

$$V_F = \frac{P_F Q_F}{C_F^b} \text{ constant}$$

where:

C_R^b = bank credit for GDP transactions

$P_R Y$ = nominal GDP

C_F^b = bank credit for non-GDP transactions

$P_F A$ = nominal asset prices

Equation (7) shows that bank credit for GDP transactions impacts nominal GDP, whereas Equation (8) shows that bank credit for non-GDP transactions determines asset prices, only. Equation (7) shows that there is a direct correspondence between bank credit for GDP transactions and nominal GDP. The QTDC rests on a critically important premise about modern banking: banks create money (i.e., deposits) when they lend, they create money, credit, and purchasing power out of nothing by the act of lending (See [ECB, 2012](#); [Werner, 2014](#); [McLeay, Radia, & Thomas, 2014](#); [Bundesbank, 2017](#); [Norges Bank, 2018](#); [Reserve Bank of New Zealand, 2019](#)). [Werner \(2014\)](#) shows that banks do not intermediate funds from savers to borrowers, they create money, credit, and purchasing power ex nihilo by the act of lending to non-banks⁵.

The effects of the new purchasing power created by banks on the overall level of economic activity were explored by [Werner \(2012\)](#), who argued that in order for GDP to expand, more money is needed to settle those transactions. [Werner \(2012\)](#) provided the technical reasoning: “nominal GDP growth this year means that more transactions (that are part of GDP) have taken place this year than last year... we know that this is only possible if more money has also exchanged hands to pay for these transactions...the next question therefore is: how can the amount of money used for transactions increase in our modern financial system?” It follows that for GDP to expand, bank lending has to expand. This implies that when banks create money, credit, and new purchasing power, they contribute not only sectorally to GDP but, more importantly, to the expansion of GDP. In contrast, the lending of financial intermediaries such as insurance companies and mutual funds contributes towards GDP at a rate which can only increase if their sectoral contribution to GDP increases.

The implications of QTDC are innovative and highly relevant for a banking economy that attempts to increase its growth rate. If banks create deposits and hence additional purchasing power, the newly created money can be used to skew demand towards variables with the greatest potential to drive growth. Much of the traditional growth literature has focused on potential output. But actual output is very often below potential output. [Werner \(2005\)](#) argues that a

⁵Can banks individually create money out of nothing?—The theories and the empirical evidence, [Werner \(2014\)](#).

bank-credit driven model supplies a more realistic answer to the slow growth we observe in many countries around the world. In this paper, we consider bank credit for the financing of productive investment as a key feature of a modern banking economy that attempts to drive *RGDP*. QTDC introduces bank credit for GDP transactions as a financing concept whose importance for the real economy can be easily demonstrated. In principle, if actual output is below potential output, then there is no reason for increases in bank credit for GDP transactions C_R^b to produce inflation, i.e., $\Delta P_R = 0$. In this case, our disequilibrium model reads as follows:

If $Y^* > Y$ and $C_R^b > 0$.

Then with $\Delta P_R = 0$ we replace in (7) we have:

$$\Delta C_R^b = \Delta Y \quad (9)$$

This means that when not all resources are fully mobilized or when there are productivity gains, one *Rs* in credit creation used for GDP transactions may result in one *Rs* in new real output and income without inflation. The increase in nominal GDP (PY) will be entirely due to rises in real GDP (Y). This case of underutilization of factor inputs conveniently describes Mauritius situation during much of the period from 1970 to 2019. Therefore, it is plausible, that an increase in bank credit could be the force that would expand output by allowing firms to mobilize factors of production that the borrowing firm would otherwise not have been able to mobilize.

In this paper, we consider the impact bank credit for GDP transactions on the financing of three forms of investment and hence on *RGDP*. In his book, a new paradigm on macroeconomics, [Werner \(2005: p. 214\)](#) hints about the need for further research to disaggregate nominal investment into different types of investment to identify the different productivity levels of investment projects. With that in mind, we follow the approach of [Turner \(2014\)](#) to disaggregate GFCF into three types namely, residential and commercial real estate investment ($RCREI_t$), investment in machines (IM_t) and investment in infrastructure (II_t).

Figure 4 presents the evolution of the three disaggregated measures of investment of GFCF from 1970 to 2019. It shows that there has been a significant increase in residential and commercial real estate investment in Mauritius and that the trend in this type of investment gained momentum after the financial liberalization in 1990s. In contrast, the trend in IM, which consists largely of investment in manufacturing industries, suffered a dramatic fall in recent years from its highest level in the early 1970s and mid-1980s, which marked the peak of the “economic miracle years”. The trend clearly shows that investment in machines has fallen consistently since the early 1990s and today forms only a minor share of total GFCF in the country. **Figure 4** also shows that total infrastructure investment has remained quasi-stable in the country over the past fifty years.

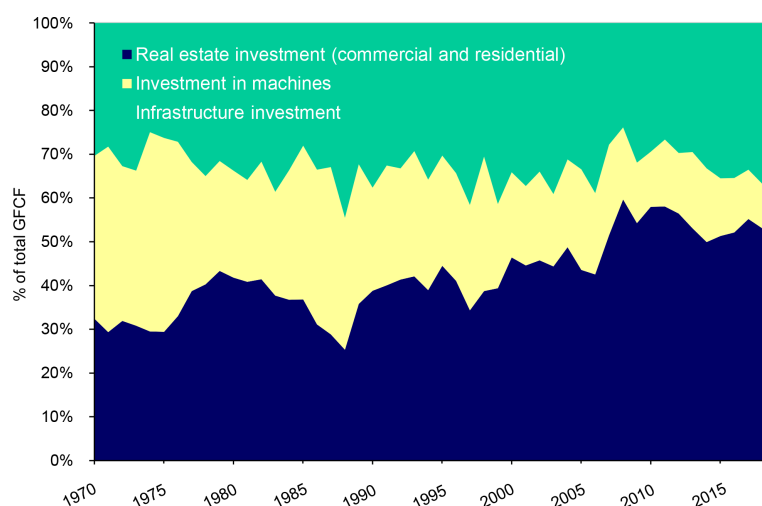


Figure 4. GFCF and its disaggregation into three types of investment from 1970-2019. Source: Authors' own compilation of data from Statistics Mauritius.

6. Measuring Bank Credit for GDP Transactions in Mauritius

It is important to recall that the equation of exchange and quantity theory of money assume a constant velocity of money. As [Werner \(2005\)](#) explained, the velocity of money (V_r) shows the strength of the link between money and the real economy. If there is a strong link between the two, it means that “money” is being used for real sector transactions ([Achameesing, 2020](#)). This implies that the velocity of money should be stable. However, a dilemma observed in many countries around the world is the fall in the velocity of money ([Achameesing, 2020](#)). See [Figure 5](#) below for Mauritius.

The QTDC shows that the velocity decline is due to the neglect of non-GDP transactions (financial transactions). Put simply, the velocity of money expresses the relationship between the numerator, GDP, and the denominator, money. If the latter rises faster than the former, there will be a velocity decline ([Achameesing, 2020](#)). Therefore, if money created for financial transactions is excluded from the denominator, the QTDC predicts that the velocity of money should become stable ([Werner, 2005: p. 202](#)). The stable velocity prediction is a cornerstone of the QTDC and helps to categorize bank credit for GDP or non-GDP transactions.

[Table 5](#) shows that the measure of bank credit for GDP transactions i.e. proxy 10 has the most stable velocity over time (lowest average standard deviation) which implies that a very large amount of bank credit in this proxy has been used for real sector transactions. As the empirical literature on QTDC also shows (See [Werner, 1997](#); [Werner, 2005](#); [Bezemer & Werner, 2009](#); [Voutsinas & Werner, 2011](#)), the financial and construction sectors are the “usual suspects” when it comes to the issue of bank credit for non-GDP transactions. Indeed, [Table 5](#) also shows that proxy 2 and 3 have the most unstable velocity over time, which confirms that a very large amount of bank credit in the construction and financial sectors has been used for financial or non-GDP transactions.

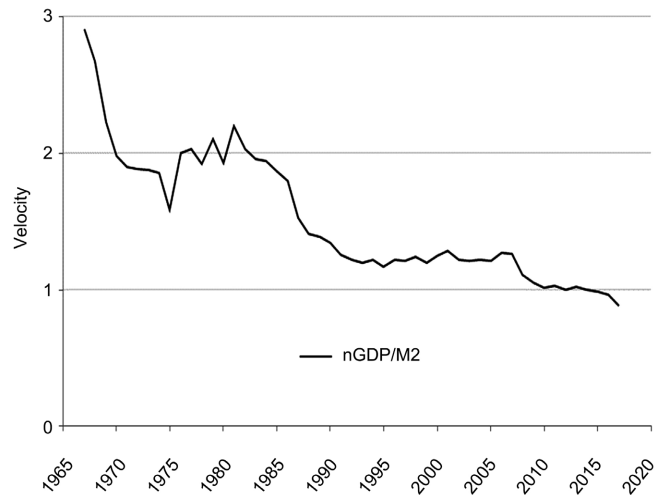


Figure 5. Velocity of broad money (GDP/M2) in Mauritius from 1970-2019. Source: Author's own compilation using data from Bank of Mauritius.

Table 5. Standard deviation of each proxy of bank credit for GDP transactions.

| Proxy | Included sectors (bank credit allocation) | Average Standard deviation |
|-------|--|-------------------------------|
| 1 | Total bank credit | 1.44 |
| 2 | To financial sector | 334.97 |
| 3 | To financial and construction | 338.40 |
| 4 | To financial, construction, tertiary and traders | 9.40 |
| 5 | To financial, construction, tertiary and traders and individuals and professionals | 6.16 |
| 6 | To financial, construction, tertiary and traders and individuals, professionals and government | 5.50 |
| 7 | To primary, manufacturing and tertiary | 1.66 |
| 8 | To primary, manufacturing and tertiary and trading | 1.23 |
| 9 | To primary, manufacturing and tertiary and trading and individuals and professionals | 1.18 |
| 10 | To primary, manufacturing and tertiary and trading and individuals and professionals and government | 1.15 |

In a nutshell, the process of finding the best proxy of bank credit for GDP transactions intuitively tries to find which sectors have used bank credit the most for GDP transactions. This implies that the best proxy excludes the largest amount of bank credit for non-GDP transactions (or financial transactions) and can then, appropriately so, be used to estimate the effects of bank credit for GDP transactions or productive credit on RGDP. In the next section, we provide a TVC estimation of the total effects of BCGDP i.e. proxy 10 on RGDP in Mauritius from 1970 to 2019.

7. Empirical Results

As in the previous empirical section, we use the same empirical framework for estimation and selection criteria to accept the best model. Having removed forms of “unproductive credit” from CBC to arrive at BCGDP i.e. proxy 10, in this section, we estimate the total effects of proxy 10 on RGDP. We use real and commercial real estate investment (RCREI), investment in machines (IM), and investment in infrastructure (II) as our main coefficient drivers for z_{jt} whose coefficients will estimate the indirect effects of BCGDP on RGDP. Therefore, we disaggregate GFCF into RCREI, IM, and II to identify the indirect channels through which BCGDP has the strongest and weakest impact on RGDP.

Table 6 shows that Case V gives the best results in terms of the significance of both coefficients of γ_{1t} in Equation (5). The y-axis in **Figure 6** plots γ_{1t}

Table 6. Total effects of BCGDP on RGDP.

| Models | Unrestricted case ($\varphi \neq 0$) or restricted case ($\varphi = 0$) | Coefficient Driver of Equation (4) Z_{it} | Coefficient Estimates of γ_{0t} in Equations (3) and (4) | | Coefficient Driver of Equation (5) Z_{jt} | Coefficient Estimates of γ_{1t} in Equations (3) and (5) | | Theil Forecasting Values U Statistic | Conclusion Accept/Reject |
|--------|---|--|---|----------------------------------|--|---|-----------------------------------|---|-----------------------------|
| | | | π_{00} | π_{0i} | | π_{10} | π_{1j} | | |
| II | $\varphi = 0$ | CEXPI | 33584.40 (4.540) ^a | 157.36 (3.267) ^a | II | 14.24 (9.580) ^a | -0.00054 (-5.803) ^a | 0.67 | REJECT |
| III | $\varphi = 0$ | OMT | 10646.68 (1.383) | 457.72 (6.128) ^a | II | 10.78 (8.625) ^a | -0.00038 (-4.975) ^a | 0.53 | REJECT |
| IV | $\varphi = 0$ | REEXR | 124224.59 (4.635) ^a | -560.23 (-2.491) ^b | II | 12.679 (8.362) ^a | -0.00047 (-4.941) ^a | 0.69 | REJECT |
| V | $\varphi \neq 0$ | CEXPI | 99318.03 (12.24) ^a | -183.48 (-3.266) ^a | IM | 3.73 (6.916) ^a | -0.00011 (-2.063) ^b | 0.33 | ACCEPT |
| VI | $\varphi = 0$ | CEXPI | 132794.50 (13.11) ^a | -390.82 (-4.948) ^a | IM | 3.569 (13.59) ^a | -0.00015 (-6.231) ^a | 2.38 | REJECT |
| VII | $\varphi \neq 0$ | OMT | 70503.24 (5.594) ^a | 58.56 (0.520) | IM | 4.476 (6.905) ^a | -0.00013 (-2.120) ^b | 0.39 | REJECT |
| VIII | $\varphi = 0$ | OMT | 10195.42 (0.6130) | 641.03 (4.493) ^a | IM | 3.894 (15.30) ^a | -0.00017 (-6.956) ^a | 1.77 | REJECT |
| IX | $\varphi = 0$ | REEXR | 174796.17 (5.634) ^a | -773.52 (-2.921) ^a | IM | 3.901 (14.14) ^a | -0.00017 (-6.707) ^a | 2.18 | REJECT |
| X | $\varphi = 0$ | CEXPI | 34662.15 (4.512) ^a | 152.99 (3.054) ^a | RCREI | 13.18 (9.078) ^a | -0.0003 (-5.244) ^a | 7.15 | REJECT |
| XI | $\varphi = 0$ | OMT | 9875.12 (1.247) | 468.13 (6.010) ^a | RCREI | 9.99 (8.293) ^a | -0.00021 (-4.537) ^a | 5.17 | REJECT |
| XII | $\varphi = 0$ | REEXR | 125398.15 (4.539) ^a | -566.97 (-2.446) ^b | RCREI | 11.75 (8.010) ^a | -0.00026 (-4.499) ^a | 6.41 | REJECT |

Note: The 1%, 5% and 10% significance levels are denoted by a, b and c respectively.

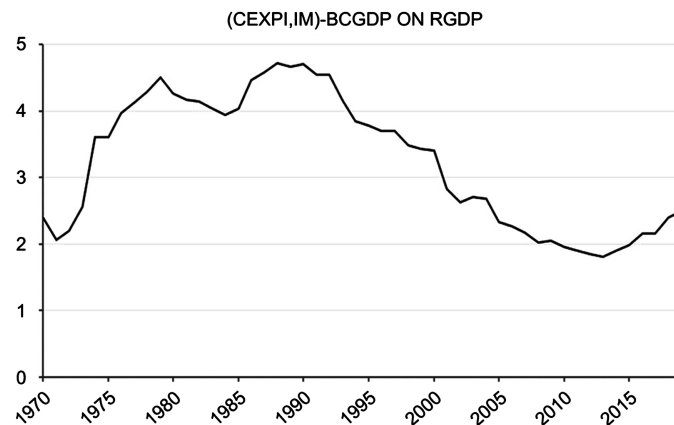


Figure 6. Total effects of BCGDP on RGDP from 1970-2019. Source: Author's own compilation.

which estimates the total effects of BCGDP on RGDP. **Figure 6** zooms out the total effects of BCGDP on RGDP, estimated by Case V, and shows strong total effects of bank credit for GDP transactions on economic growth until about 1992, before the effects of bank credit on economic growth start a non-monotonic decline from 1993 to about 2014. However, from 2014 onwards, there is a notable increase in the total effects of BCGDP on RGDP. We believe that a major event contributes to an explanation of the reversal in the total effects of BCGDP on RGDP beginning in 2014: the 2nd April 2015 collapse of the Bramer Banking Corporation, a major commercial bank subsequently taken over by a newly formed state-owned bank, the MauBank, which itself came from the defunct Mauritius Post Co-operative Bank. The newly established MauBank started its activities on 4th January 2016 with its core activity being to provide significant financial support to SMEs that could have increased the total effects of BCGDP on RGDP ([Government of Mauritius, 2016](#)). The assets of MauBank increased from Rs 10 billion in 2015-2016 to reach more than Rs 15 billion in 2018-2019, which represents an increase of more than 50% within four years. We believe that these developments have led to a significant boost in bank credit for GDP transactions through SME loans and hence provide an explanation of the acceleration in the positive effects of BCGDP on RGDP from 2015-2016 onwards⁶.

The total effects of BCGDP on RGDP, estimated by the pair of coefficient drivers (CEXPI, IM), provide striking evidence of the effects of credit policies by the BOM on the strength of the link between bank credit for GDP transitions

⁶It is important to mention that recent research from [Clavero \(2017\)](#) highlights that apart from bank credit which [Werner \(1992\)](#) assumes is the only counterpart of M in the traditional equation of exchange, there can also be other counterparts of money in the balance sheet of the banking system which includes net external assets such as exports. This implies that during boom years, the effects of C_R on GDP would likely be the strongest as compared to normal or bust years. As an example, during the economic boom of the 1980s in Mauritius, more bank credit for the manufacturing of goods for exports, led to a feedback loop through an increase in net external assets, which when paid from abroad increased bank deposits which were further used to produce more goods. Therefore, the dynamics at work in Mauritius from 1984 to 1990 were very different from the one we observed from 2015 to 2019.

and RGDP. **Figure 6** shows that the total effects of BCGDP on RGDP grow substantially in the early 1970s and mid-1980s and start to fall as from 1992. With striking coincidence, the period 1973-1992 was one of a system of credit controls whose overriding objective at the time was to ensure that the expansion of bank credit was directed towards productive sectors of the economy. The following is a little history.

The introduction of credit controls, which mainly took the form of ceilings imposed by the BOM on the credit banks were allowed to extend to specific sectors of the Mauritian economy, took place in June 1973 as a response to what was perceived as an excessive demand for unproductive credit. The measure took the form of a cap on the growth rate of bank lending to the trade sector, which the BOM mandated was to rise by less than 10 percent per year during the latter half of 1973 (*Bank of Mauritius Annual Report, 1973: p. 23*). In July 1974, an exemption was introduced for those industries operating in the Export Processing Zone (EPZ) and to those holding a Development Certificate, to which the ceilings stopped to apply (*Bank of Mauritius Annual Report, 1974: p. 29*). Concomitantly, the industrial sector continued its growth in 1976, and the credit requirements of export industries, both long-term and working capital, were met on a priority basis with export finance provided at a concessional rate (*Bank of Mauritius Annual Report, 1976: p. 11*). In June 1976, bank credit to industries and manufacturers accounted for more than 45% of total private sector credit (*Bank of Mauritius Annual Report, 1976: p. 24*).

The fall in sugar prices from the mid-1970s, rising imports, and continuing pressures of foreign exchange reserves called for an intensification of the existing measures in the formulation of monetary policy for 1979. From May that year, importers of lower priority items were not allowed access to credit from the domestic banking system or from abroad (*Bank of Mauritius Annual Report, 1979: p. 7*). In the late 1970s, the country faced a severe balance of payments crisis, and subsequently, the time path of BCGDP on RGDP declined from 1979 to 1983. During that time, under the stand-by agreement, an overall credit ceiling continued to be established in consultation with the IMF (*Fry & Roi, 1995: p. 2*).

The trend in the allocation of credit to the productive sectors of the economy strengthened again from 1984, marking the beginning of the “economic miracle” years of the country. The priority sectors of the economy absorbed over 50 percent of the increase during the year 1983-1984 (*Bank of Mauritius Annual Report, 1984: p. 21*). The manufacturing sector alone absorbed 65 percent of the overall increase in private sector credit (*Bank of Mauritius Annual Report, 1986: p. 23*). In 1986-1987, about 92 percent of bank credit was extended to the “productive sectors” of the economy, and the manufacturing sector alone accounted for nearly 50 percent of the overall increase in private sector credit (*Bank of Mauritius Annual Report, 1987: p. 21*).

Fluctuations of the time-series within the 1973-1993 periods are consistent with the data on how bank credit was allocated. It is striking how that story is

told in a different way but quite eloquently in **Figure 6**. The entire period of credit controls on unproductive credit, which lasted 20-odd years, from June 1973 until 1992-1993, coincides with a sharp rise in the total effects of BCGDP on RGDP in 1973-1974 and a steady decline of the total effects of BCGDP after 1992-1993, a striking coincidence that is not accidental and, following the previous argument, is to be expected.

In July 1992 and 1993, all forms of credit ceilings on the expansion of credit were removed. Afterwards, bank credit to financial and construction activities surged. In July 1993, the sub-ceiling on credit to the non-priority sectors of the economy was abolished, and one year later, credit to non-priority sectors of the economy soared by 55.3 percent and accounted for 71.1 percent of the total increase in private sector credit (*Bank of Mauritius Annual Report, 1994: p. 27*). This trend in bank credit continued during much of the 1990s, while credit to the construction and financial sectors accelerated (see **Figure 1**).

To recap: The statistical results, synthesized in **Figure 6**, are consistent with the historical record, the rises and falls in the total effects coinciding very well with the introduction and abolition of credit ceilings to unproductive sectors, respectively. The findings are also consistent with our understanding of the different sectors of the economy and of how much they contribute to GDP and non-GDP transactions.

The evolution of the time path of the total effects of BCGDP on RGDP with IM as the main coefficient driver that measures the indirect effects of bank credit on economic growth validates the importance of bank credit for productive investment. These findings concur with the views of eminent economists such as *Schumpeter (1954)*, who stated that bank lending may lead to the creation of “real capital” that would not have otherwise existed: Banks do not, of course, “create” legal-tender money and still less do they “create” machines. They do, however, something that is perhaps easier to see in the case of the issue of banknotes, which, in its economic effects, comes close to creating legal-tender money and which may lead to the creation of “real capital” that could not have been created without this practice (*Schumpeter, 1954: p. 1114*).

We believe that, in addition to bank credit, several other factors have also played a role in explaining the high growth rates of Mauritius, especially in the 1980s. *Romer (1993)* argued that ideas, rather than capital, labour, or other factors of production, were the key ingredient for growth. In the case of Mauritius, he suggested that importing ideas from abroad through inward FDI was mainly due to Chinese businessmen bringing textile manufacturing ideas and kick-starting the country’s industrialization (*Svirydzenka & Petri, 2014: p. 4*). Indeed, the time path of the total effects of BCGDP on RGDP surged to its peak in 1988, which marked the climax of the golden years of the country. It should be noted that the clothing and textile industry was the major sector experiencing the transformation, with employment growing from 20,000 in 1983 to over 80,000 in 1988 (*Nath & Madhoo, 2003: p. 24*).

In their paper, [Subramanian and Roy \(2001\)](#) attempted to delve deeper into the question of explaining the Mauritian miracle by referring to the ideas of [Meade \(1961\)](#), [Romer \(1993\)](#), [Sachs and Warner \(1995, 1997\)](#) and [Rodrik \(1999\)](#). Referring to Meade who wrote in 1961: “It is going to be a great achievement if the country can find productive employment for its population without a serious reduction in the existing standard of living. The outlook for peaceful development is weak.” [Subramanian and Roy \(2001, p. 5\)](#) argued that history proved Nobel Prize winner James Meade famously wrong, as the level of economic growth soared in Mauritius from the 1970s.

[Subramanian and Roy \(2001\)](#) argued that [Romer \(1993\)](#), [Sachs and Warner \(1995, 1997\)](#) and [Rodrik \(1999\)](#) did not provide convincing explanations of the Mauritian growth experience in the mid-1970s and 1980s. In their empirical study, [Subramanian and Roy \(2001\)](#) found that the economic miracle could be attributed partly to strong domestic institutions in place in the country and that this has not been given due attention by economists in explaining the high growth experience of Mauritius.

These authors argue, however, that their econometric results suggest that even after accounting for the role of institutions, there is a sizable unexplained component to Mauritian growth ([Subramanian & Roy, 2001: p. 37](#)). In response to this apparent puzzle, our research points to a new factor or variable to be taken into consideration, one that has not been given the attention it deserves and of which authors seem barely aware, namely, credit guidance schemes. We show that setting up of the credit controls system by the BOM in the form of a credit ceiling on the expansion of credit to non-priority sectors in 1973 and the unrestrained expansion of credit to priority sectors from 1973 to 1993 has been a key element in driving higher growth rates of the country in the 1970s and indeed during its miracle years in the 1980s.

8. Conclusion

This study, for which the experience described for Mauritius in the preceding section may be described as a laboratory, has brought to light a major finding. The measured total effects of BCGDP on RGDP explain very well the high economic growth rates of Mauritius in the 1970s and during its economic miracle years until all credit controls were removed in 1993. The indirect effects of BCGDP on RGDP, measured by investment in machines (IM) also show a powerful channel through which BCGDP stimulates growth of the real economy. By contrast, the indirect effects of BCGDP on RGDP, measured by residential and commercial real estate investment (RCREI), which includes large amounts of financial transactions, show the weakest forecasting channel through which BCGDP predicts economic growth.

The inclusion of financial transactions as part of bank credit to construction is a fact implicitly recognized by the BOM, which defines the construction sector as the construction of buildings etc. but also encompasses the real estate sector,

which includes the acquisition and disposal of real estate properties, property rentals and other real estate services (Bank of Mauritius Annual Report, 2017: p. 47). The financing of construction also includes the transaction of a major non-GDP component in the form of existing land whose value has been rising sharply across Mauritius as from the 2000s (see Brooks et al., 2017: p. 8). This surge in the price of land implies that a larger amount of bank credit to the construction sector is in effect financing the acquisition of more expensive land, which weakens the positive effects of bank credit on GDP over time.

In light of our findings, the economic performance of Mauritius during the 1970s and more so in the 1980s lead us to propose the reintroduction of a credit scheme to drive productive investment. The productive credit scheme should again become a powerful tool available to the central bank to ignite the sluggish economic growth observed in the country during the recent decades. However, the details of that credit policy require important considerations. On the one hand, it is important to highlight that one of the key challenges in attempting to increase bank credit to emerging sectors is the fact that bank lending to finance non-real estate business investment requires complex assessment of discounted cash flows, and if the project fails, the assets financed often have little resale value (Turner, 2016: p. 71). On the other hand, real estate value usually has value for many competing users.

Indeed, the presence of asymmetric information in bank lending to finance non-real estate business investment implies that taking security against real estate mitigates the adverse selection and moral hazard problems associated with non-real estate lending. One policy to circumvent the asymmetric information problem is to issue government guarantees to banks for bank loans to firms and industrial sectors that are often credit-constrained. Werner (2005) argued that in many countries, government guarantees to encourage loans to small manufacturing firms are a clear example, as these firms tend to be severely credit-rationed even in the best of times. As Werner (2005) explains “due to the positive feedback loop between credit, economic activity and hence the state of borrowers’ balance sheets, suitably executed policies of issuing government guarantees on bank loans are likely never to incur substantial liabilities: as the government guarantees loans to small firms, for instance, for productive investors, each loan carries a certain default risk... but as consequently total lending increases, and hence economic activity expands, borrowers’ balance sheets improve, hence reducing their risk of default” (Werner, 2005: p. 302).

In the Bank of Mauritius’s current interest-rate and inflation-targeting regime, using interest rates to control inflation or stimulate the economy are limited objectives for a modern banking economy because balance sheets of commercial banks are of great importance for the evolution of the structure of the economy. The Bank of Mauritius Act (2004) enshrines in law that, in addition to the primary objective of price stability, the central bank should also promote an orderly and balanced economic development. However, this second goal notwithstanding, the Bank of Mauritius appears not to have given due attention to the signif-

icant shifts in the composition of commercial bank credit towards non-GDP transactions from early 1990s onwards with documented deleterious effects on real GDP, as this paper has demonstrated.

The empirical findings lead us to propose a monetary policy that favors GDP related sectors like business investment in emerging sectors over non-GDP intensive sectors like construction and offshore finance. We emphasize that this type of monetary policy should not tell banks which businesses to lend to but rather to constrain their lending quantitatively at the sectoral level, only. We are aware that this may be criticized as dangerously interventionist as it impedes the free allocation of bank credit by market forces. However, given the bias of banks of creating too much of the wrong sort of debt, and the reality of credit rationing in markets with imperfect information (Stiglitz & Weiss, 1981), direct intervention in the credit market is indeed warranted. Therefore, the monetary authority should take the rudimentary step of implementing a well-designed credit scheme which shall stimulate bank credit for productive investment and accelerate the catch-up growth rate of the country in the 21st century.

The early success of economic policies in Mauritius has also been made possible by pragmatic leaders, political stability, the presence of strong domestic institutions, and importantly, an industrial policy that focused on the promotion of higher quality FDI and the production and exports of higher value-added goods. Therefore, without these set of basic virtues, it would be likely that the introduction of a productive system of credit allocation would remain muted.

If these virtues are in place, a pragmatic monetary policy which includes a bank credit guidance scheme should spearhead the process of creative destruction in Mauritius, about which Schumpeter wrote so eloquently: “the organizational development from the craft shop to such concerns as U.S. Steel illustrate the same process of industrial mutation, if I may use that biological term, that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one... this process of creative destruction is the essential fact about capitalism” (Schumpeter, 1942: p. 8). If policymakers in Mauritius are pragmatic and ingenious, they should be able to create an industrial policy that will channel more bank credit in high-learning industries like precision agriculture, high-tech manufacturing, information and communication technology, fin-tech, renewable technology, and the ocean economy, amongst others.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- Achameesing, A. (2020). *Amplifying the Power of Helicopter Money by the Original Mechanics of Quantitative Easing*. <https://www.lexpress.mu/node/375748>
- Arcand, J. L., Berkes, E., & Panizza, U. (2012). *Too Much Finance?* IMF Working Paper No. 12/161. International Monetary Fund. <https://doi.org/10.5089/9781475504668.001>
- Awe, O., Crandell, I., Adepoju, A., & Leman, S. (2015). Time Varying Parameter State Space Model for Analyzing Money Supply-Economic Growth Nexus. *Journal of Statistical and Econometric Methods*, 4, 73-95.
- Bank of Mauritius Act (2004). *The Bank of Mauritius Act 2004*. <https://www.bom.mu/about-bank/legislations/bank-mauritius-act-2004>
- Bank of Mauritius Annual Report* (1970). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1970.pdf
- Bank of Mauritius Annual Report* (1971). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1971.pdf
- Bank of Mauritius Annual Report* (1972). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1972.pdf
- Bank of Mauritius Annual Report* (1973). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1973.pdf
- Bank of Mauritius Annual Report* (1974). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1974.pdf
- Bank of Mauritius Annual Report* (1975). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1975.pdf
- Bank of Mauritius Annual Report* (1976). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1976.pdf
- Bank of Mauritius Annual Report* (1977). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1977.pdf
- Bank of Mauritius Annual Report* (1979). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1979.pdf
- Bank of Mauritius Annual Report* (1980). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1980.pdf
- Bank of Mauritius Annual Report* (1982). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1982.pdf
- Bank of Mauritius Annual Report* (1984). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1984.pdf
- Bank of Mauritius Annual Report* (1986). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1986.pdf
- Bank of Mauritius Annual Report* (1987). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1987.pdf
- Bank of Mauritius Annual Report* (1990). Report Issued by the Bank of Mauritius. <https://www.bom.mu/publications-statistics/publications/annual-report/annual-report-year-ended-30-june-1990>
- Bank of Mauritius Annual Report* (1994). Report Issued by the Bank of Mauritius. https://www.bom.mu/sites/default/files/annual_report_1994.pdf
- Bank of Mauritius Annual Report* (2017). Report Issued by the Bank of Mauritius. <https://www.bom.mu/publications-statistics/publications/annual-report/annual-report>

[-year-ended-30-june-2017](#)

- Bank of Mauritius Annual Report* (2019). Report Issued by the Bank of Mauritius.
<https://www.bom.mu/publications-statistics/publications/annual-report/annual-report-year-ended-30-june-2019>
- Bezemer, D. J., & Werner, R. A. (2009). *Disaggregated Credit Flows and Growth in Central Europe*. MPRA Paper No. 17456. Munich Personal RePEc Archive.
<http://mpra.ub.uni-muenchen.de/17456/>
- Brooks, C., Lamport, M., Padachi, K., Sannasee, V., Seetah, K., & Seetanaah, B. (2017). The Impact of Foreign Real Estate Investment on Land Prices: Evidence from Mauritius. *Review of Development Economics*, 21, 131-146. <https://doi.org/10.1111/rode.12316>
- Bundesbank (2017). *The Role of Banks, Non-Banks and the Central Bank in the Money Creation Process*. Monthly Report (April). Deutsche Bundesbank.
- Cecchetti, S., & Kharroubi, E. (2012). *Reassessing the Impact of Finance on Growth*. BIS Working Paper No. 381. Bank for International Settlements.
- Clavero, B. (2017). *A Contribution to the Quantity Theory of Disaggregated Credit*. MPRA Paper No. 76657.
- ECB (2011). *Monthly Bulletin, October*. European Central Bank.
- ECB (2012). *Monthly Bulletin, May*. European Central Bank.
- Fry, M., & Roi, R. (1995). Monetary Policy-Making in Mauritius. *Bank of Mauritius Quarterly Review*, 12, 11-16.
- Government of Mauritius (2016). *MauBank to Spearhead the SME Sector*.
<http://www.govmu.org/English/News/Pages/MauBank-to-Spearhead-the-SME-sector-.aspx>
- Greene, W. H. (2012). *Econometric Analysis* (7th ed.). Prentice Hall.
- Huang, H. C., & Lin, S. C. (2009). Non-Linear Finance and Growth Nexus: A Threshold with Instrumental Variable Approach. *Economics of Transition*, 17, 439-466.
<https://doi.org/10.1111/j.1468-0351.2009.00360.x>
- Jankee, K. (2006). Banking Controls, Financial Deepening and Economic Growth in Mauritius. *African Review of Money Finance and Banking*, 2006, 75-96.
- Jordà, Ò., Schularick, M., & Taylor, A. M. (2016). The Great Mortgaging: Housing Finance, Crises and Business Cycles. *Economic Policy*, 31, 107-152.
<https://doi.org/10.1093/epolic/eiv017>
- Jouan, K. (2005). *Financial Liberalization in Mauritius: The Finance-Growth Nexus*. Ph.D. Thesis, Napier University.
- Keynes, J. M. (1930). *A Treatise on Money: The Pure Theory of Money*. Macmillan.
- Law, S. H., & Singh, N. (2014). Does too Much Finance Harm Economic Growth? *Journal of Banking and Finance*, 41, 36-44. <https://doi.org/10.1016/j.jbankfin.2013.12.020>
- McLeay, M., Radia, A., & Thomas, R. (2014). *Money Creation in the Modern Economy*. Bank of England Quarterly Bulletin 2014 Q1. Bank of England.
- Meade, E. J. (1961). *The Economic and Social Structure of Mauritius: Report to the Governor of Mauritius*. Methuen.
- Nath, S., & Madhoo, N. Y. (2003). *Explaining African Economic Growth Performance: The Case of Mauritius*. African Economic Research Consortium.
- Norges Bank (2018). *Central Bank Digital Currencies*. Norges Bank Papers, No. 1. Norges Bank.
- Nowbutsing, B. M., Ramsahok, S., & Ramsahok, K. (2010). A Multivariate Analysis of

- Financial Development and Growth in Mauritius: New Evidence. *Global Journal of Human Social Science*, 10, 2-13.
- Piketty, T. (2013). *Capital in the 21st Century*. Harvard University Press.
- Pratt, J. W., & Schlaifer, R. (1984). On the Nature and Discovery of Structure. *Journal of American Statistical Association*, 79, 9-21.
<https://doi.org/10.1080/01621459.1984.10477054>
- Ramanayake, S. S., & Lee, K. (2014). Growth Miracle and Slowdown in Mauritius Compared with Bangladesh: An Example of the Adding up Problem among Developing Countries. *Millennial Asia*, 5, 197-217. <https://doi.org/10.1177/0976399614541213>
- Reserve Bank of New Zealand (2019). *Letter from Angus Barclay, External Communications Adviser, in Response to a Request to the Reserve Bank. Under the Provisions of Section 12 of the Official Information Act (the OIA), Asking a Series of 14 Questions*. Reserve Bank of New Zealand.
- Rodrik, D. (1999). *The New Global Economy and Developing Countries: Making Openness Work*. Overseas Development Council. <https://doi.org/10.56021/9781565170278>
- Romer, P. M. (1993). Two Strategies for Economic Development: Using Ideas and Producing Ideas. *The World Bank Economic Review*, 6, 63-91.
https://doi.org/10.1093/wber/6.suppl_1.63
- Sachs, J. D., & Warner, A. (1995). Economic Reform and the Process of Global Integration. *Brookings Papers on Economic Activity*, 1995, 1-118.
<https://doi.org/10.2307/2534573>
- Sachs, J. D., & Warner, A. (1997). Sources of Slow Growth in African Economies. *Journal of African Economies*, 6, 335-376. <https://doi.org/10.1093/oxfordjournals.jae.a020932>
- Schumpeter, J. (1912). *Theorie der wirtschaftlichen Entwicklung*. Duncker and Humblot.
- Schumpeter, J. (1942). *Capitalism, Socialism, and Democracy* (3rd ed.). Harper and Brothers.
- Schumpeter, J. (1954). *History of Economic Analysis*. Oxford University Press.
- Seetannah, B. (2008). Financial Development and Economic Growth: An ARDL Approach for the Case of the Small Island State of Mauritius. *Applied Economic Letters*, 15, 809-813. <https://doi.org/10.1080/13504850600770889>
- Stiglitz, J., & Weiss, A. (1981). Credit Rationing in Markets with Imperfect Information. *American Economic Review*, 71, 393-410.
- Stone, M. (2003). *Inflation Targeting Lite*. IMF Working Paper WP/03/12. International Monetary Fund. <https://doi.org/10.5089/9781451842920.001>
- Subramanian, A., & Roy, D. (2001). *Who Can Explain the Mauritian Miracle: Meade, Romer, Sachs or Rodrik?* IMF Working paper WP/01/116. International Monetary Fund. <https://doi.org/10.5089/9781451853933.001>
- Svirydenka, K., & Petri, M. (2014). *Mauritius: The Drivers of Growth—Can the Past Be Extended?* IMF Working Paper 14/134. International Monetary Fund.
<https://doi.org/10.5089/9781498392372.001>
- Swamy, P. A. V. B., & von zur Muehlen, P. (2020). Cointegration: Its Fatal Flaw and a Proposed Solution. *Sustainable Futures*, 2, Article ID: 100038.
<https://doi.org/10.1016/j.sftr.2020.100038>
- Swamy, P. A. V. B., Chang, I., Von Zur Muehlen, P., & Achameesing, A. (2022). The Role of Coefficient Drivers of Time-Varying Coefficients in Estimating the Total Effects of a Regressor on the Dependent Variable of an Equation. *Journal of Risk and Financial Management*, 15, Article No. 331. <https://doi.org/10.3390/jrfm15080331>

-
- Turner, A. (2014). *Wealth, Debt, Inequality and Low Interest Rates: Four Big Trends and Some Implications*. Cass Business School.
- Turner, A. (2016). *Between Debt and the Devil: Money, Credit, and Fixing Global Finance*. Princeton University Press. <https://doi.org/10.1515/9781400873326>
- Voutsinas, K., & Werner, R. A. (2011). *Testing the Effectiveness of QE: Evidence from Japan*. CBFSD Discussion Paper No. 2-2011. Centre for Banking, Finance and Sustainable Development, University of Southampton.
- Werner, R. A. (1992). *Towards a Quantity Theory of Disaggregated Credit and International Capital Flows*. In *The Royal Economic Society Annual Conference in York*.
- Werner, R. A. (1997). Towards a New Monetary Paradigm: A Quantity Theory of Disaggregated Credit, with Evidence from Japan. *Kredit und Kapital*, 30, 276-309.
- Werner, R. A. (2005). *New Paradigm in Macroeconomics: Solving the Riddle of Japanese Macroeconomic Performance*. Palgrave Macmillan. <https://doi.org/10.1057/9780230506077>
- Werner, R. A. (2014). Can Banks Individually Create Money Out of Nothing?—The Theories and the Empirical Evidence. *International Review of Financial Analysis*, 36, 1-19. <https://doi.org/10.1016/j.irfa.2014.07.015>
- Werner, R. A. (2012). Towards a New Research Programme on “Banking and the Economy”—Implications of the Quantity Theory of Credit for the Prevention and Resolution of Banking and Debt Crises. *International Review of Financial Analysis*, 25, 1-17. <https://doi.org/10.1016/j.irfa.2012.06.002>