**CENTRALE BANK VAN SURINAME**

# Identifying Constraints to Financial Inclusion and their impact on GDP and Inequality: A case of Suriname

**Nancy Ong-A-Kwie-Jurgens**
nongakwie@cbvs.sr

**2016**

# Abstract

The recent financial crisis has re-highlighted the need for international financial inclusion as it is believed that financial exclusion of a large segment of society was one of the factors that contributed to this crisis. The exclusion and therefore non-familiarity of large groups in society with financial issues fueled the ignorance with regard to risks. Based on the principle of equality and inclusive growth, the focus of policy makers has shifted towards this agenda internationally.

Despite the worldwide acceptance that financial inclusion is important, it appears that priority for it remains low in some developing countries. Households and firms in developing countries continue to face barriers to access financial services. In Suriname, figures illustrate that from 2004 to 2013 the number of bank branches increased. In addition, the number of borrowers increased averaging 4% per year, indicating a low transfer of savings. It is well documented that the lack of financial services restricts the range and scope of entrepreneurial activities of households and firms, especially small and medium-sized entities. In addition, high levels of financial exclusion is an obstacle for enterprises to operate in the formal sector, to increase investment and trade, reduce poverty by lowering inequality, raise average income, diversify risks and boost economic activities.

This paper examines linkages between financial inclusion, GDP, and inequality. Moreover, a better understanding of the economic channels through which these relationships are sustained is needed. Given that financial inclusion is multi-dimensional, both participation barriers and financial frictions will be identified. A micro–founded general equilibrium model will be developed in order to identify constraints to financial inclusion. The focus will be on three segments of financial inclusion: access, depth and intermediation efficiency. This paper could support policy implementation and implications to foster financial inclusion.

**Table of Contents**

# 1. Introduction

In 2014 the Central Bank of Suriname added financial stability to its agenda alongside monetary policy. In order to pave the way to reach this stability goal the bank focused on a number of issues such as financial sector strengthening, increasing regulations and also creating public awareness. The awareness among the public was through financial literacy and education. As has been advocated in the literature financial literacy and education which are part of financial inclusion contribute to financial stability, they help to promote growth and reduce inequality.

A large body of literature recognized the relation between financial inclusion and growth and inequality. A widely held view is that a positive correlation exists between household's and business' access to credit and growth. Households with access to credit have the opportunity to increase spending, aggregate demand and therefore also growth. On the other hand, it enables businesses to expand investments, finance production and capital goods, and ultimately stimulating growth. Access to finance therefore stimulates the creation of jobs, innovation and growth. Moreover, it contributes to financial stability as more deposits increase the funding base of financial institutions.

It is well documented that the lack of financial services restricts entrepreneurial activities of households and firms, especially the small and medium-sized ones. Since economic agents' access to finance may be obstructed by either price or non-price barriers, it may be necessary to distinguish between the likelihood to have access to finance from the actual use of financial services. With regard to inequality access to finance can help particularly the poor in developing countries to strengthen their living standards. For example programs of NGOs can help the poor start a small business.

However, access to credit can also have negative externalities as it may increase financial risks if credit growth exceeds economic growth (e.g. Fisher 1911). In addition uncontrolled credit expansion could lead to instability of the financial sector through decline in financial buffer, leading to growth slowdown and worsening of inequality (Sahay, Čihák, N'Diaye, & Barajas, 2015; Mehrotra & Yetman, 2015).

Given the link between financial inclusion, economic growth and inequality, it is equally important for policymakers to get a good understanding of the

economic flow and its impact through which the relationship is permanent in an open small economy like Suriname. The purpose of this research is to fulfill this role for Suriname by employing a micro general equilibrium model that provides a framework explaining the link between financial inclusion, economic growth and inequality.

The methodological approach is employed by an analytic micro-founded model where agents are heterogeneous – divided by wealth and talent. This model is based on the model of Dabla-Norris, Ji, Townsend, & Unsal (2015) who employed it for 6 countries of which 3 developing countries and 3 developed countries. In each period agents choose if they want to become an entrepreneur or an employee. Furthermore the model has two "financial regimes", a credit and saving one. With financial frictions limitations added in the credit regime – limited commitment and asymmetric information- agents receive finance. The financial frictions disturb effective distribution of capital and entrepreneurial talent in the economy, declining aggregate total factor productivity (TFP). After the analytic model a numerical calibration is applied. The determinants of financial inclusion are the size of participation, collateral and interest rate spread. Higher interest rate means higher intermediation costs indicating inefficiency which may lead to financial exclusion.

The remainder of the research is structured as follows. The next section describes some stylized facts regarding some important variables. It is followed by the literature review of the subject. The subsequent sections look at the effects of financial inclusion on growth, stability, and inequality. The paper concludes with policy implications.

## 2. Some Stylized Facts

This section will focus on some stylized facts of the main variables of financial inclusion. The variables that will be addressed are interest rate spread, credit, bank deposits, the number of branches and the amount of borrowers. The first figure displays the development of the deposit and credit interest rate. As in shown in this figure before 2008 the interest rate spread was large ranging between the 10 and 13 percent. After the crisis period the spread narrowed and was less volatile reaching almost 5 percent in 2013, but increased afterwards. The increase in reserves requirements may possibly have played a role in the development of these rates. The central bank increased the reserves ratio as credit was too high under a low economic growth. The deposit rate declined from 2002 on, but the credit rate had more or less a

stable trend. In the last period both rates increased slightly. It should be noted that both credit and deposit rate is an average interest rate of all depository corporations. As the interest rate channel is weak in Suriname, most of its movement is determined by the reserve requirement ratio.

**Figure 1: Deposit and Credit rate**
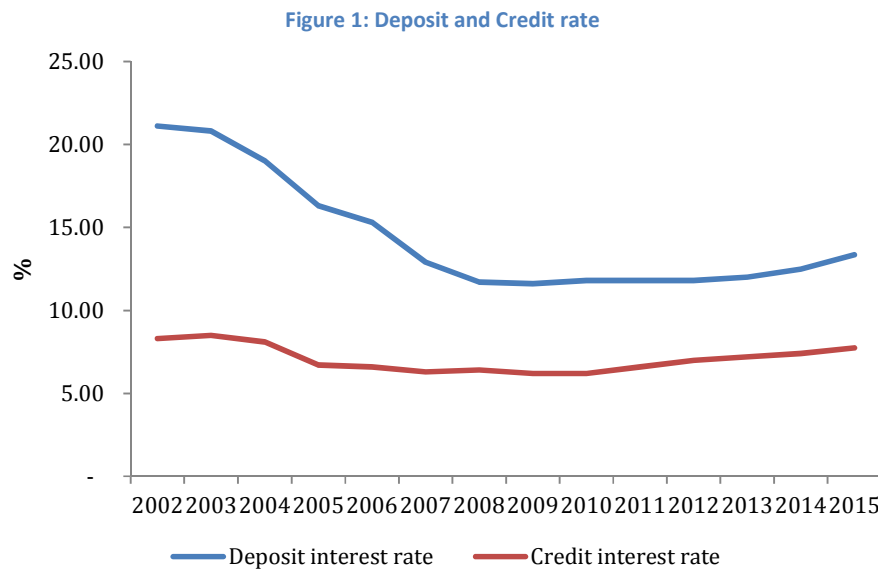


Source: Central Bank of Suriname

Financial inclusion is central to both firms and households respectively to finance its production and purchase capital goods and for households to increase their living standard and also to smooth consumption. Table 1 shows how private sector credit at commercial banks evolved since 2002. Overall it is clear that it is mostly enterprises that received most of the credit. Credit to firm ranged from 91 percent of total credit in 2002 to almost 70 percent in 2015. The decline in credit was during the crises period, but increased slowly afterwards. Most of this credit was extended to companies applying for current account credit, followed by the credit type "other enterprises" which consists of long-term (investment) lending to other companies and other types of credit. Households form the minority with mortgage loans having the largest share followed by personal loans. In average credit grew of households is almost 43 percent.

**Figure 2: Private sector credit by type in local Currency (Mln SRD)**
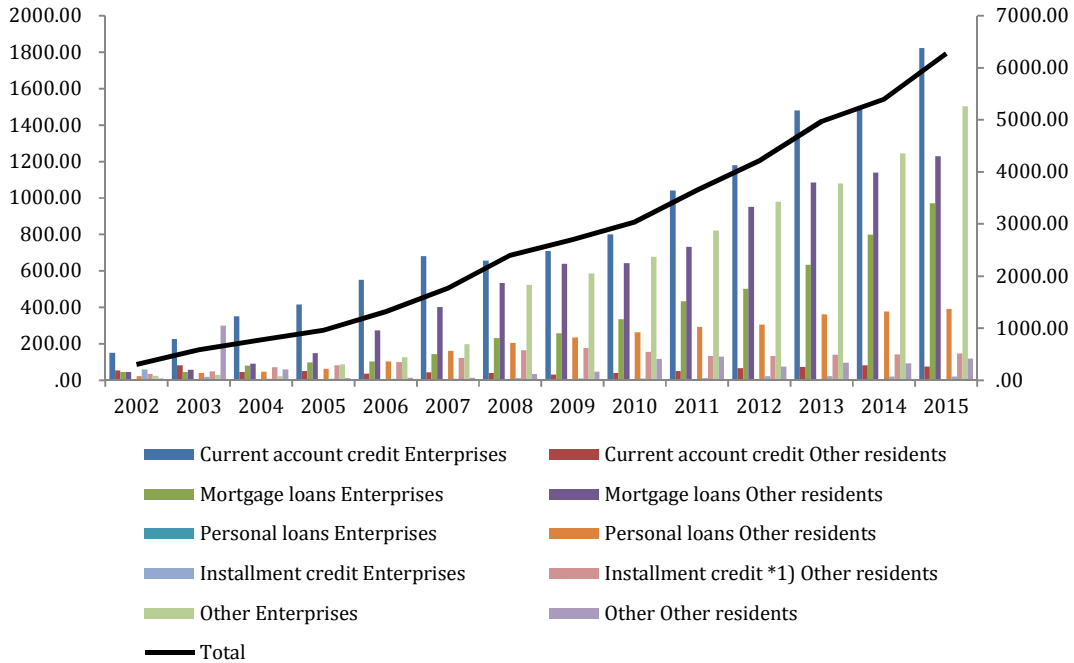
Source: Central Bank of Suriname

Total deposits grew on average with 22.1 percent for the period under review. The majority of the deposits are channeled to time deposit greater than one year, followed by time deposit less than one year. In addition the time deposit has an average growth of 33.1%. The limited growth indicates that people are not eager to deposits their money at banks. Maybe it is the interest rates which are not attractive enough of the awareness restricted the public to deposit money at banks. These deposits are not divided in households and firms who make it difficult to analyze it by firms and households.

**Figure 3: Development of total deposits at banks**
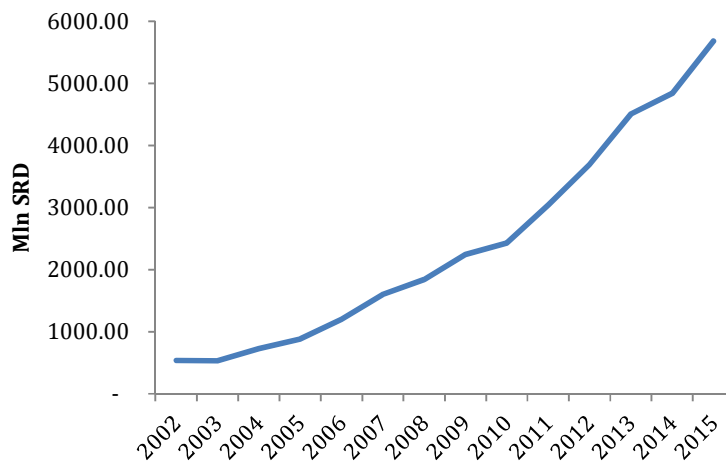


Source: Central Bank of Suriname

According to the access of the financial system measured by the number of branches of the sector it is clear that it is small. In Suriname only the commercial banks and insurance companies have branches. The data set for the number of branches is only available from 2004 -2013 and demonstrates that from 2004 the number of branches increased from 37 to 49 branches in 2013(see graph 5). During these 10 years span on average one branch was established in a year. Another variable that can proxy access is the amount of borrowers with a credit line. The available data only covers the commercial banks ranging from 2005-2013. The data showed that there is a growth of borrowers at the commercial banks (see graph 4). On average, the number of borrowers increased from 128,022 persons in 2005 to about 164,048 persons in 2013 representing a growth of 4% per year.

**Figure 4: Number of Borrowers at banks Figure 5: The numbers of branches at banks**
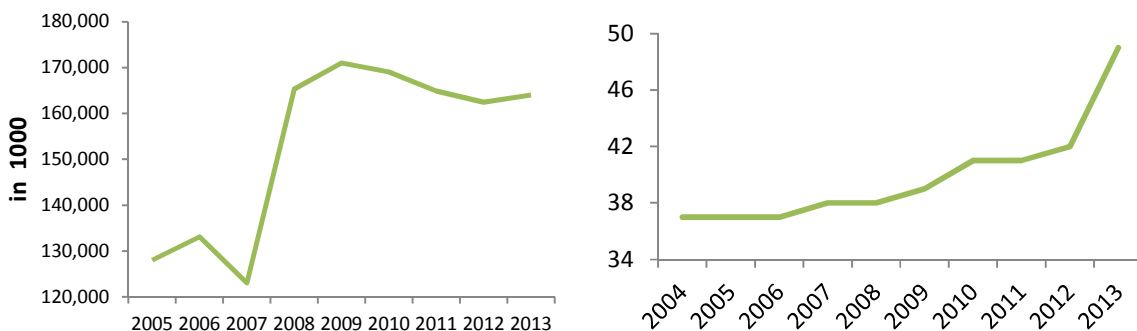


Source: Central Bank of Suriname

# 3. Literature review

## 3.1 Theoretical literature

The importance of financial inclusion is highlighted by a growing body of literature and backed by extensive evidence (Han & Melecky, 2013; Mehrotra & Yetman, 2015; Sahay, Čihák, N'Diaye, & Barajas, 2015; Roa Jose, 2015; Norris, et al., 2015). It is multifaceted, due to its nature. It has different definitions measured by different indicators and has an impact on some macroeconomic indicators.

The global Partnership for Financial Inclusion (GPFI) and the consultative Group to Assist the Poor (CGAP) defined it as the situation where all workers have effective access to financial services such as finance, savings payment and insurance that is provided by formal institutions (CGAP & WB, 2010). According to the two institutions access should be convenient and the services should be delivered at a responsible manner with the cost being affordable for the clients and sustainable for the one who provides it. García, Grifoni, López, & Mejía (2013) stated that the International Network on Financial Education (INFE) explains financial inclusion as the development in fostering reasonable, well-timed financial products and services. Also the public should have access to these products that are regulated. This should be available for all citizens everywhere in the country.

The Alliance for Financial Inclusion (AFI) stated that financial inclusion should concentrate on 4 indicators namely access, usage, quality and wellbeing (Roa Jose, 2015). According to this institute the indicator access represents the possibility to obtain financial services and products from formal institutions. Usage at the other hand proxies the performance, depth or extent of financial services and product being used. Quality should indicate whether the delivered products and services are in accordance with the needs of clients and if when financial products are being developed these needs are taken into considerations. At lasts, wellbeing signals the effect that financial services have had on consumers' living. Other scholars e.g. (Mehrotra & Yetman, 2015) just defined it as access to financial services. In conclusion, all the different definitions of financial inclusion end up with the access that the public, households and business, should have. Moreover it should enable them to increase their standard of living and give business the opportunity to expand their activities. All of this should happen at an affordable price and within minimum time.

As defined above, financial inclusion affects indicators such as economic growth and inequality. It also impacts financial development, financial stability and even monetary stability. According to the literature financial inclusion expands investments through the allocation of resources, reduces poverty by lowering inequality, can raise average income, mobilizes savings, and diversifies risks (World Bank, 2008; Levine, 2005). However, the extent, to which it affects different factors in the economy, varies across regions and countries depending on, among other factors, the level of development of the financial system, its depth, the regulatory framework, institutional arrangements, the income level and political environment.

### *Financial inclusion and economic growth*

According to theory, financial development enables conditions for economic growth through both a supply (financial development fuels growth) and demand (growth increases the demand for financial products) channel (Dabla-Norris, Ji, Townsend, & Unsal, 2015). Furthermore a good developed financial system enlarges access to funds, whereby economic agents have access to their own funds and do not have to knock at the door of informal sources such as money lenders at high cost.

An important attribute of finance also involves the extent to which individuals and firms can have access to financial services such as credit, deposit, payment, insurance and other finance-related services. It is well documented that the lack of financial services restricts the range and scope of entrepreneurial activities of households and firms, especially the small and medium-sized ones. During the 1900s there was the view that if much credit is granted to the public to start new business it will generate more income leading to economic growth and consequently reduce income inequality if the economic wealth is distributed equally (Adnan, 2011).

According to Schumpeter, finance reduces the cost of external resources to financially dependent firms which create opportunities for new firms and therefore enhance innovation and hence increase growth indirectly.
According to Levine (2005) finance implies improvements in factors such as:
- Production of ex ante information about possible investments and the allocation of capital;
- Facilitating trading, diversification, and the management of risk;

- Mobilizing and pooling savings;
- Easing the exchange of goods and services.

All these factors may affect savings and investment decisions and hence economic growth.

However for finance to have its way worked through there should be a stable financial system, because it enhances confidence and creates a favorable environment for investors and borrowers. Moreover, it functions as a monetary transmission mechanism, helping to sustain price stability. It also promotes efficient financial intermediation, fostering investment and growth. Also McKinnon (1973) highlighted the importance of an effective financial sector for economic growth. With inclusive finance a buffer can be created for financial institutions and capital can be accumulated. This accumulated capital can cover at least the short term liabilities and protect itself against various shocks.

### *Financial inclusion and inequality*
With total access to finance the vulnerable groups are able to improve their economic situation. Pagano and Pica (2012) show that by changing the economic structure and providing possibilities for more entry into the labor markets – in particular the most poor segment of the population - finance will decrease inequality and hence leads to poverty reduction. Also as people earn more money they can at least provide in their basic needs. Honohan (2003) support this view by stating that deep financial systems are linked with lower poverty. Thus appropriate financial services can ameliorate the welfare for the poor, because of its ability to ensure improvement in the provision of efficient services, creation of saving opportunities and facilitation of capital formation among the poor. In addition, access to finance at formal institution ensures that the lower income groups are safeguarded from informal money lenders. Hence the need for well-functioning micro credit programs that can stimulate the poor in increasing their income.

According to Karpowicz (2014) dissimilarity in acces to finance is identified as a determinant of income inequality. With more people have acces to finance the conncetration risk of banks reduces and in turn can decrease the intermediation costs enabling the poor to obtain finance at lower costs. With all the advantages that inclusive finance brings policy makers should put extra effort in eradicating restrictions to access to financial services and increase efficiency, depth and breath of financial instruments.

There are, however, contradictory views regarding the role that finance has in economic growth. According to Robinson (1952) companies are the first that come and then finance follows. Lucas (1988) argued that the role of the financial system in economic growth is "over- stressed". Orhangazi (2008) found an inverse association between financial development and real investment. He stated that the increasing size and profitability of financial investments crowd out real investments of firms by impacting their incentives for investment decision negatively. Also Stevens, (2010) doubted the link, because of the risks associated with growth of the financial system. Finance has its own cycle with its own risks, translating those risks to individuals. It became extremely risky for especially poor countries that lack the facilities, institutions and the capacity to protect the country.

Generally it can be concluded that despite the different definitions, financial inclusion just means that finance should be accessible for all citizens in particular the lowest people within the segment. It should be affordable and available on time. However, there is still critique on the role finance plays. Nevertheless, the dominant view is that finance is an important prerequisite to foster economic growth and lower inequality.

## 3.2 Empirical literature
Empirical studies focusing on financial inclusion have been conducted mostly for advanced and emerging economies and are frequently conducted for a panel of countries. On the other hand, fewer studies have been conducted for developing countries due to data shortage.

To capture the process of economic development studies has focused on financial intermediation in models of occupational choice and financial fictions (Banerjee & Newman, 1993). Other reserachers build on this framwork by enlarging the model by adding the distributional characteristics according the Kuznets hypothesis (Lloyed-Ellis & Bernhardt (2000). The authors included the development of the extent of entrepreneurship, the rate of rural-urban migration, the scale and structure of production and the degree of income and wealth inequality. With the model they tried to illustrate income inequality and that the Kuznets hypothesis exists. Also Cagetti & Nardi (2006) used this framwork in order to explain the advantages of bequests. These analysis showed that better financial intermediation can lead to larger entry into entrepreneurship, increased productivity and investment,

and a general equilibrium effect that expands wages. Moreover, the models indicated the importance of the distribution of wealth or the joint distribution of wealth and productivity.

Studies of (Gine & Townsend, 2004) (Jeong & Townsend, 2008) (Amaral & Quintin, 2010) (Buera, Kaboski, & Shin, Finance and Development: A Tale of Two Sectors, 2011) show that better financial intermediation has a great impact on aggregate productivity and income. These economists added forward-looking economic agents in a framework focusing on occupational choice. They demonstrated that cross-country differences in economic activity per worker and aggregate Total Factor Productivity (TFP) is caused mainly by frictions in financial services. In addition Buera & Kaboski ( 2012) employed the general equilibrium effects of micro finance. The results suggested that impact of micro finance on a larger scale is small, due to the redistribution of income from higher to lower savings. Moll (2014) at the other hand demonstrated with his general equilibrium model in which heterogeneous producers face collateral constraints, that financial frictions impacts' on GDP and TFP is determined by among other things the persistence of specific shocks. The results further show that the long-run impacts of financial frictions are less than the short-run impacts.

Though financial frictions such as moral hazard and adverse selection play an important role, studies like (Clementi & Hopenhayen, 2006) (Albuquerque & Hopenhayen, 2004) concentrated on their impact on other variables. According to these authors moral hazard and restricted commitment have various impacts on firms. Abraham & Pavoni (2005) and Doepke & Townsend (2006) at the other hand added that consumption allocations have a different effect under moral hazard with and without hidden save ups versus full information. Adverse selection was analyzed by (Martin & Taddei, 2013) who stated that by fostering unproductive investment, adverse selection can lead to both an increase in the economy's equilibrium interest rate and generates a negative impact between the marginal return to investment and the equilibrium interest rate. To account for these frictions different methods were applied in the literature. Kinnan (2014) employed an first-order condition model which is characterized on optimal insurance under moral hazard, limited commitment and hidden income. He also distinguished between these regimes using Thai's data. Moll, Townsend, & Zhorin (2014) assessed the equilibrium interactions between different frictions by applying an general equilibrium framework that included various types of frictions.

A great part of the literature also focused on real effects of credit. That financial deepening fosters economic growth is backed by empirical evidence (King and Levine, 1993; Levine, 2005). Also the strong link that exists between broad measures of financial depth (such as M2 or credit to GDP) and economic growth, poverty reduction and income inequality has been confirmed. (Beck et al, 2005; Ayyagari et al., 2008). (Beck et al., 2007; Clarke et al., 2006).

# 4. The Model

## 4.1. Model Specification

This research uses the model developed by Dabla-Norris, Ji, Townsend, & Unsal (2015) and applies Surinamese data for the calibration. The model builds on the occupational choice framework with modern features. The emphasis is on various perspectives of financial inclusion in the economy.

In the model the economy has agents of measure one. Agents are heterogeneous and can be wealthy (*b)* and talented (*z)*. The individual agents live for two periods. During the first period, people make different decisions like credit participation, occupational choice, and investment. In the second period the optimal consumption/bequest decision is taken as given. During the last period generally the individuals generates their earnings through wages or business revenues, which is determined by occupation. In addition, they make consumption and bequest decisions to maximize utility. Every individual has an offspring and his or her identical to the bequest. However, talent is calculated from a stochastic process[1]. The time sub-script (*t)* is neglected unless necessary.

### 4.1.1. Individuals

In the second period agents, achieve utility through consumption and a bequest to their offspring. Cobb-Douglas expresses the utility function as:

$$u(c, b') = c^{1-\omega} \ b'^{\omega} \quad \textbf{(1)}$$

c represents consumption and b' the bequest. The bequest decision channels wealth through periods that endogenously determines the economy's wealth distribution. The supposition that utility comes from bequest instead of the

---

[1] The successor of an agent can be interpreted as the reincarnation of the original agent with potentially new talent.

offspring utility makes the analysis easier. It is similar to a savings rate for the same person. By taking c and b' governed by the subject restriction c + b'= $W$, where $W$ proxy wealth in the second period the agent maximizes **(1).** $W$ is subject to the first wealth and actualized income of the first period.

Though the utility function $u(c, b')$ is a linear function of end-of-period wealth W, the Cobb-Douglas function therefore indicates that the optimal bequest rate is **ω**[2]. This implies that maximizing expected utility is equivalent to maximizing expected second-period wealth. Hence, the agent takes financial participation, occupation and investment to maximize its expected income in the first period. However, the individuals should choose between being a worker or an entrepreneur. Every employee gives one unit of labor and the earned income is equal to the wage equilibrium, **w.** On the other hand, the business man invests in capital and labor, and earns income via the business profit. Pareto distribution μ(z) is employed in order to generate talent with a tail parameter θ. The offspring is embedded in talent of the parents (or former self) with probability γ, if not, a another talent is developed from μ(z)[3].

As the businessman uses production technology, the productivity depends on the individuals' talent. The production function is all follows:
$$f(k, l) = z \left( k^{\alpha}\, l^{1-\alpha} \right)^{1-v} \qquad \textbf{(2)}$$
where $1 - v$ forms the Lucas span-of-control parameter which indicates the share of output that belongs to the variable factors. Hereof, a part α is capital, and $1 - \alpha$ is labor. Production displays declining returns to scale, with $v > 0$. Firms generate profits, while capital drops by δ after use. Furthermore production
Production missis its goal with probability p. hence output will be zero, while in the second period the agent is capable to recover only a part η< 1 of installed capital, net of depreciation. To make the calculation simple, only when production is profitable employees are assumed to receive income. Therefore, every employee gets a salary with probability $1 - p$.
The individual can deposit its money at the bank in order to channel income en wealth in period for consumption and bequest. However, agents are considered to pay a fixed credit participation fee, **ψ**, to get a borrowing contract from de bank. It is believed that an agent that lives in a"credit"

---

[2] The value of ω affects the amount of wealth transferred from the current period to the next period. Therefore, ceteris paribus a higher ω implies that the economy would have a higher level of wealth.
[3] The shock to talent is interpreted as changes in market conditions that affect the profitability of individual skills

regime is able to pay the cost **ψ** and can take a loan. Also the agent that lives in a "savings" regime, pays no **ψ** and hence can only saves. This cost is treated as a contractual fee or a bargaining cost at the bank. Because employees do not invest, they therefore cannot demand external credit. In equilibrium, the fixed entry cost ψ can exclude poor entrepreneurs from the market, since it is a big part of their initial wealth.

### 4.1.1.1. Savings Regime

In this regime, agents cannot obtain loans from banks, but should finance their activities with their own resources. The goal of the agents in the first period is to maximize their future earnings. The maximization of the expected income is similar as maximizing the expected wealth at the end of the period under a certain wealth W. The expected end-of-period wealth function for an entrepreneur at end period is denoted by π(b, z) of type (b, z). The savings regime variables are expressed as follows:

$$W^S = \begin{cases} (1 + r^d + (1+p)\omega & f & e \\ \pi^S(b,z) & f & e \end{cases} \qquad \textbf{(3)}$$

The employees receive income when production is successful, with a probability $(1 - p)$4. Because employees are risk neutral, they opt to be employees if $(1 + r^d)b + (1 - p)w > \pi^S(b, z)$, and entrepreneurs otherwise. Hence, the wealth at the end-of-period for an agent can be written as:

$W^S = \max \{(1 + r^d)b + (1 - p)w, \pi^S(b, z)\}.$

The wealth function $\pi^S(b, z)$ for businesses is estimated according to the following maximization problem:

$$\pi^S(b,z) = \max_{k,l}\{ (1-p) [z( k^\alpha\, l^{1-\alpha})^{1-v} - wl - \delta k + k ] + p\eta(1 - \delta)k + (1 + r^d)(b - k) \; ; \quad 4$$

$$\text{subject to } k \leq b \qquad \textbf{5}$$

With probability $1 - p$, production succeeds, and the entrepreneur gets revenue $(z (k^\alpha\, l^{1-\alpha})^{1-v}) - wl - \delta k)$ plus k working capital.

### 4.1.1.2. Credit Regime

Agents in this regime can obtain external credit via advance payments of by credit participation cost ψ. Because employees do not receive advantages

---

4 For simplification , the employees working at which firm is not traced in the numerical simulation

from external credit, they therefore do not demand capital. Hence, the entrepreneur's problem is therefore considered. Though this research is concentrated on macroeconomic influence on financial inclusion, the financial sector is perfectly competitive, driving profits from intermediation to zero. A profit margin for intermediation is then applied in order to take account of the no competitiveness of banking sectors in most developing countries. This will rise the interest rates for loans that entrepreneurs obtained. However, the quantitative predictions of the model stay the same.

When the individuals takes a loan they need to sign a Type equation here. contract with the bank. The financial contract has three variables, ($\Phi$, $\Delta$, $\Omega$), where $\Phi$ is the amount borrowed borrowing, $\Delta$ is the value of collateral, and $\Omega$ is the face value of the contract. The face value, $\Omega$, is the amount that must be repaid when there is no default and is determined by the bank's zero profit condition. There is interest attached to the collateral so therefore individuals obtain the deposit interest rate $r^d$ on the value of collateral. The interest rate is estimated as:

$$r^l = \frac{\Omega}{\Phi} - 1 \qquad \textbf{6}$$

The leverage ratio, which equals the amount of loan relative to the size of collateral, is calculated as follows: $\quad \bar{\lambda} = \frac{\Phi}{\Delta} \quad \textbf{7}$

Failure of production leads to no repayment of the debt face value $\Omega$ by entrepreneurs. Therefore the business will default and the bank takes the interest-bearing collateral, $(1 + r^d) \Delta$ and the regained value of diminished capital, $\eta(1 - \delta)k$. In order to account of the losses made, entrepreneurs have to pay higher interest rates in case of success, since they are able to default in case of failure.

In the model two types of financial frictions in the banking sector is used: (a) limited commitment, and (b) asymmetric information. The first one is a form of "credit rationing" on entrepreneurs, as they have to provide collateral in order to borrow. Sometimes the restriction is binding for some entrepreneurs. The credit rationing pushes the borrowing rate up for entrepreneurs with default possibilities.

In the limited commitment, some punishments are included. The punishment is that the agent will lose its collateral $\Delta$ and the interest earning on it. When the balance is reached, owner of the firm does not runs away only if $\Phi/\lambda < \Delta$.
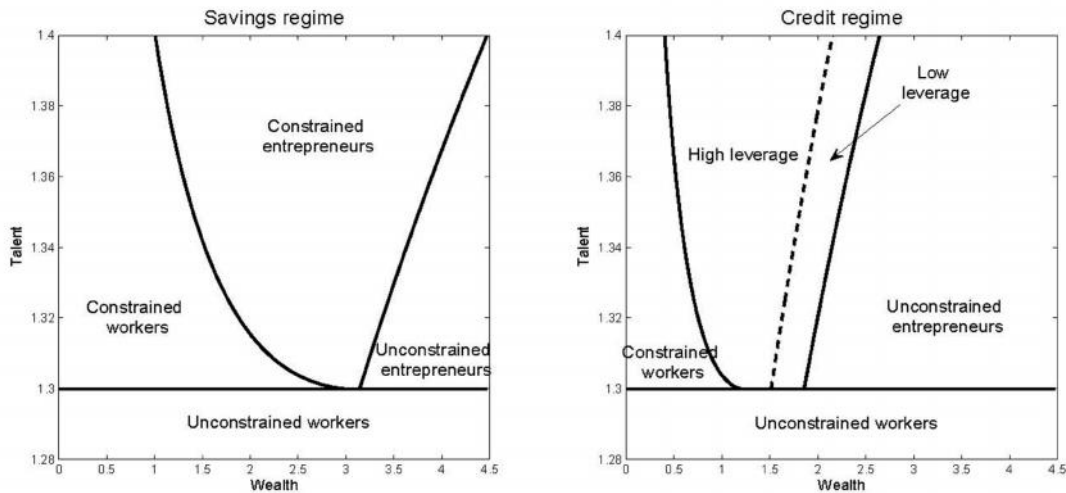
Hence, the financial institution is only willing to lend $\lambda\Delta$ to the entrepreneur if $\Delta$ units of collateral are posted. The parameter $\lambda \geqslant 1$ covers the degree of financial friction resulting from limited commitment. When $\lambda$ is equal to 1, it indicates that entrepreneurs cannot lend money from banks. Asymmetric information exits between entrepreneurs and banks and only the manager is aware of the production failure or success. The liabilities, which are restricted, provide businessman with a default option if production fails. For more detailed explanation about these two frictions see (Dabla-Norris, Ji, Townsend, & Unsal, 2015).

### 4.1.1.3. Occupational Choice

Following the choice of occupation for individuals with various talent z and wealth b, and if this choice is limited by wealth or not the occupation figure is depicted. Four categories of agents namely unconstrained workers; constrained workers, constrained entrepreneurs, and unconstrained entrepreneurs are used in the savings regime, divided by lines in the left graph of figure 3. As is clear in the figure, there exists a threshold level of talent (3), under which an individual will always prefer earning a salary above being an entrepreneur. These agents are categorized as unconstrained

employees, because they have such a low talent, which prevents them from becoming an entrepreneur. Beside the talent issue, the figure displays is three regions. In the left region, agents are talented, but are missing the needed

wealth in order to run a business. Therefore, they are categorized as employees, thus constrained employees. The second region takes account of agents with enough wealth in order to run a profitable firm of which the scale is still limited by wealth. These individuals are the constrained entrepreneurs. Those who are in the right region of the figure are the one who want to be an entrepreneur and managing a firm that is unconstrained and where the marginal return of capital is similar to the deposit interest rate. These agents are the unconstrained entrepreneurs.

The receipt of external credit changes the map to the right hand side graph of Figure 3. The parameters with similar values are used for the occupation map for the credit regime graph. The assumption is that there exists no credit participation cost, $\psi = 0$, or monitoring cost, $\chi = 0$[5]. The impact of the external credit is emphasized. The region of constrained employees declines and that of unconstrained entrepreneurs rises. This indicates that credit that stems from the banks increases the opportunity to become a businessperson and run his business at a larger scale. The area of constrained businessperson is divided into two sub-categories by the dotted line: low leverage ratio and high leverage ratio.

Those in the low-leverage area do not borrow a lot, suggesting that the face value of loan can be repaid even when production falls short. However, those in the high-ratio area default when there is production failure. Banks therefore manage and confiscate the recovered diminished working capital and after-interest collateral. The high-leverage, which denotes the preference of entrepreneurs to leverage more at a low level of wealth in order to benefit from the high marginal return of capital, is depicted to the left of the low-leverage area.

### 4.1.2. Competitive Equilibrium
The competitive equilibrium is based on a joint probability density distribution of wealth and talent $H_0(b, z)$, and includes allocations $\{c_t(b, z), k_t(b, z), l_t(b, z)\}_{t=0}^{\infty}$, series of joint distributions of wealth and talent

---

[5] The same wage and interest rate while plotting the occupation choice map for the credit regime

*{Hₜ(b, z)}* $_{t=1}^{\infty}$ and prices *{$r^d$(t),w(t)}*ₜ, so that

i.   Agent of type (b, z) optimally chooses the underlying regime, occupation, ct(b, z), kt(b, z), lt(b, z) to maximize utility at t $\geqslant$ 0

ii.  Capital market clears at all t $\geqslant$ 0

$$\iint_{(b,z)\in E(t)} k_t\ (b,z)H_t\ (b,z)dbdz = \iint_{(b,z)} bH_t\ (b,z)dbdz - \psi \iint_{(b,z)\in F\ (t)}^{\iint \int} H_t\ (b,z)dbdz$$

Whereby, E(t) is the set for all type (b, z), for those who wants to be entrepreneurs at time t; F in(t) is the set for all type (b, z), for those in the credit regime.

iii. Labor market clears at all t $\geqslant$ 0

$$\iint_{(b,z)\in E(t)}^{0} l_t\ (b,z)H_t\ (b,z)dbdz = \iint_{(b,z)\notin E(t)}^{0} H_t(b,z)dbdz$$

iv.  In accordance with the equilibrium mapping {Hₜ (b, z)} $_{t=1}^{\infty}$ is created.

$$H_{t+1}\left(\overline{b},\overline{z}\right)db = \gamma\mu\overline{z}\int_Z 1_{\{b'=b\}} H_t(b,z)dbdz + (1-\gamma)\int_b 1_{\{b'=b\}} H_t(b,\overline{z})db$$

where b' is the bequest for agent of type *(b, z)*, and $1_{\{b'=b\}}$ is an indicator function which equals 1 if b'= $\overline{b}$, and equals 0 otherwise. The steady-state of the economy is defined as the invariant joint distribution of wealth and talent *H(b, z)*,

$$H(b, z) = \lim_{t\to\infty} H_t(b, z)$$

## 5. Data and calibration

The Statistics Department and Supervision Directorate of the Central Bank of Suriname provided the data set. Developing countries have to deal with a lot of limitation such as collateral requirements, low credit share of companies as indicated in section 2.

In table one comparison is made with 3 other developing countries (Uganda, Kenya and Mozambique) mentioned in the paper of Dabla-Norris, Ji, Townsend, & Unsal (2015). As is presented in the table the percentage of

firms with credit and NPLs in Suriname is somewhat higher than the other developing countries, while the interest rate spread is less than Uganda. The collateral is in the order of Uganda and Kenya. The percentage of firms with credit is much higher than others. In general, most of the Surinamese data is close to the data of Kenya. Also the interest rate spread is in the same order.

Table 1: Data overview developing countries

| Countries | Suriname | Uganda | Kenya | Mozambique |
|---|---|---|---|---|
|  | 2006 | 2005 | 2006 | 2006 |
| Savings (% of GDP) | 17 | 8 | 15,4 | 7,1 |
| Collateral (% of loan) | 101,1 | 173 | 120,8 | 9,2 |
| Firms with credit (%) | 60,1 | 17,2 | 25,4 | 14,2 |
| Non-perfor. loan (%) | 12,6 | 2,3 | 10,6 | 3,1 |
| Interest rate spread | 8,7 | 10,9 | 8,5 | 5,2 |

Source: Central Bank of Suriname & (Dabla-Norris, Ji, Townsend, & Unsal, 2015)

For calibration the values used by Dabla-Norris, Ji, Townsend, & Unsal (2015) are applied. The one-year depreciation rate, δ, equals 0.06, while the share of output going to the variable factors in the production function, ν, is set at 0.21, and the share of capital, α, is 0.33. The probability that the offspring inherits the talent of his parents, γ, is 0.894. The remaining parameters are calculated by using the simulated part with real data.

The gross savings rate, which measures the overall resources that are available for financial intermediation in a closed economy, is paired with data and the model to calibrate the optimal bequest rate, ω. The average value of collateral as a percentage of loans is applied to calibrate the parameter λ. λ represents the degree of financial friction triggered by the limited commitment.

ψ, χ, p and, θ which respectively represents the financial participation cost, intermediation cost, the probability of failure, the parameter governing the talent distribution are calibrated together in order to match the moments of the percent of firms with credit, non-performing loans (NPLs) as a percentage of total loans, interest rate spreads, and the employment share distribution. For the employment share of distributions 4 levels are used namely 5%; 10%; 20% & 40%. All moments are affected by some specific parameters, even though the parameters ψ, χ, p and θ are jointly calibrated. The percent of firms with credit depends on the credit participation cost ψ. Therefore, a rise in the value of ψ pushes the percent of firms with credit upwards. The parameters χ,

and p determine respectively non-performing loan ratio and interest rates. If leverage ratio of the corporate did not change and the probability of project failure *(p)* rises, the non-performing loan ratio and interest rate spread should also rise.

The leverage ratio may declined by a high p, caused by the high monitoring costs which in turn lead to less defaults. In this case a low NPL ratio and interest rate spreads is expected. The value of parameter θ, that proxy the shape of the entrepreneurial talent distribution, is changed in order to achieve the employment share distribution. The parameter η has to some extent the same effect on all the moments as the parameter *p.* The parameter p is calibrated by putting its value close to but under $\frac{(\lambda-1)(1+r^d)}{\lambda(1-\delta)}$. Therefore interest rate spread moments and the non-performing loan ratios are more susceptible to the parameters p and χ. Hence, the parameter η could be seen as a scale parameter that is important to calibrate the other parameters and match the moments. Because the data of Suriname is more or less close to the data of Kenya, 0.37 is used for the parameter η.

Table 2: Data, Model and calibrated parameters

| | Suriname | | |
|---|---|---|---|
| | Data | Model | Parameters |
| **Savings (% of GDP)** | 17 | 17 | ω=0,12 |
| **Collateral (% of loan)** | 101,1 | 99 | λ =1,60 |
| **Firms with credit (%)** | 60,1 | 60,3 | ψ=0,06 |
| **Non-perfor. loan (%)** | 12,6 | 13 | p=0,20 |
| **Interest rate spread** | 8,7 | 9,1 | χ =0,40 |
| Top 5% emp. share | 55,1 | 59,5 | θ=4,25 |
| Top 10% emp. share | 60,8 | 66,1 | |
| Top 20% emp. share | 85 | 75 | |
| Top 40% emp. share | 90,3 | 83,4 | |

Source: Central Bank of Suriname

According to table 2, which gives an overview of the model results and calibrated parameters, the model performed well. As is shown in the data the difference between the real data and results of the model are small. The savings in percent of GDP and the percentage of firms with credit matched the model perfect. With regard to non-performing loans the model tends to be higher and less for collateral in percentage of loans. The employment share distribution is also well covered, but the model presented lower value for top 5% employment share and a higher value for the 40% employment share.

### 4.3. Impact on GDP and Inequality: A numerical equation

In this section a comparison is made on the response on Gross Domestic Product (GDP) and inequality. The values are estimated by differencing between the current state of the country and the eventual steady-state value when the economy's credit to investment ratio is increased by one percentage point.

According to literature financial inclusion should have an upward impact on GDP and TFP but reveals mixed result on inequality. TFP is a proxy of an economy's long-term technological change or technological dynamism. It pushes growth within an economy and beside labor and capital, it accounts for more than 60% of economic growth (Easterly & Levine, 2001). Its value is achieved by the efficient and intensive use of the inputs in the production. TFP is calculated as Y/ ($K^{\alpha}L^{1-\alpha}$), Y represents aggregate output, K proxy capital, and L is the size of labor force. Inequality is measured by the Gini coefficient. The literature stated that the Gini coefficient can be positive or negative with regard to decline in the credit participation costs, but depends on specific characteristics of the country.

Table 3: The impact of financial deepening of various forms on GDP per capita, TFP and income inequality

|         | Participation costs | Borrowing constraints | Intermediation Costs |
|---------|---------|---------|---------|
| GDP(%)  | 0,43    | 0,52    | 0.22    |
| TFP (%) | 0,41    | 0,37    | 0,30    |
| Gini    | 0,0012  | 0,0002  | 0,00    |

Note: the change of parameter that results in 1% increase in credit to investment ratio is used
Source: Central Bank of Suriname

Suriname GDP reacts more aggressive if the rise in credit to investment ratio is done by a decline in borrowing constraints. When these results are compared with Uganda, Kenya and Mozambique the results differs. In Uganda for example, the GDP responds more if the increase in credit to investment ratio comes from reduced participation costs. While in Mozambique it is the borrowing constraints. As is stipulated in the literature, it is the form of financial inclusion and some country characteristics that are important in determining the response of the economy. However, the response on the Gini coefficient is still positive.

## 4. Conclusions and policy implications

In this paper a micro-founded model is applied in order to assess the impact of financial inclusion on GDP and inequality in Suriname. The emphasis was

on three forms of financial inclusion namely access (as measured by the size of participation costs), depth (as measured by the size of collateral constraints resulting from limited commitment), and intermediation efficiency (as measured by the size of the interest rate spread, reflecting default probability and asymmetric information).

Analytical and quantitative calculations are applied with calibration methods. The determinants of financial inclusion are the size of participation, collateral and interest rate spread. Higher interest rate means higher intermediation costs indicating inefficiency which may lead to financial exclusion. The simulations suggested that different financial frictions have an impact on both GDP and inequality in many different ways. So therefore it is important that policy makers are aware of the key constraints that limit financial inclusion in the economy. The results indicated that Suriname's GDP reacts more aggressive if the rise in credit to investment ratio is done by a decline in borrowing constraints. However, the response on the Gini coefficient is still positive.

In order to increase financial inclusion the focus should be on provide more information to borrowers, establishment of credit bureaus and registries. These bureaus should provide enough data in time regarding the borrowers and their credit worthiness in order to assess the risk to default. The key is to provide the correct data so that it can be used to avoid any banking sector default.

# References

Abraham, A., & Pavoni, N. (2005, April). The Efficient Allocation of Consumption under Moral Hazard and Hidden Access to the Credit Market. *Journal of the European Economic Association, 2*, 370-381.

Adnan, N. (2011). Measurement of Financial Development: A Fresh Approach. Qatar: 8th International Conference on Islamic Economics and Finance.

Albuquerque, R., & Hopenhayen, H. (2004, April). Optimal Lending Contracts and Firm Dynamics. *Review of Economic Studies, 2*, 285-315.

Amaral, P., & Quintin, E. (2010). Limited Enforcement, Financial Intermediation and economic Development: A Quantitative Assessment. . *International Economic Review 51*, 785-811.

Arun, T., & Turner, J. (2004). Corporate Governance of Banks in Developing Economies: concepts and issues. *12*, 371-377. United Kingdom: Blackwell Publishing Ltd.

Banerjee, A., & Newman, A. (1993). Occupational Choice and the Process of Development. *Journal of Political Economy 101, 2*, 274-98.

Brooks, C. (2008). Introductory Econometrics fo Finance. *2nd*. Cambridge, United Kingdom: Cambridge University Press.

Buera, F., & Kaboski, J. (2012, March). The Macroeconomics of Micro Finance. *National Bureau of economic Research*.

Buera, F., Kaboski, J., & Shin, Y. (2011, August). Finance and Development: A Tale of Two Sectors. *American Economic review 101, 5*, 1964-2002.

Butts, H. (2009). Short Trem External Debt and Economic growth: Granger Causality- Evidence from Latin-America and the Caribbean. 93-111. Rev. Black Polit.

Cagetti, M., & Nardi, M. (2006, October). Entrepreneurship, Frictions and Wealth. *Journal of Political Economy 114, 5*, 835-870.

Calderon, C., & Liu, L. (2002). The Direction of Causality between Financial Development and Economic Growth. Banco Central de chile.

Caporale, G., Rault, C., Sova, R., & Sova, A. (2009). Financial Development and Economic Growth: Evidence from ten new EU members. 1-39. Deutshes Institut for Wirtschaftsforschung.

Centrale Bank van Suriname. (1960). *Jaarverslag* . Paramaribo: Centrale bank van Suriname.

CGAP, & WB. (2010). *Financial Access 2010, The State of Financial Inclusion Through the Crisis.* Washington D. C.: Group to Assist the Poor (cgap) and the World Bank (WB).

Clementi, G., & Hopenhayen, H. (2006, January). A theory of Financing Constraints and Firm Dynamics. *The Quaterly Journal of Economics, 2*, 229-265.

Dabla-Norris, E., Ji, Y., Townsend, R., & Unsal, F. (2015, Januari). Identifying Constraints to Financial Inclusion and TheirImpact on GDP and Inequality: A Structural Framework for Policy. D.C. Washington: International Monetary Fund.

Diego, C. (2006, August). Total Factor Productivity. New York University and NBER.

Dodge, D. (2005). Economic and Financial Efficiency: The Importance of Pension Plans. Montreal, Quebec, Canada: Bank of Canada.

Doepke, M., & Townsend, R. (2006, January). Dynamics Mechanism Design with Hidden Income and Hidden Actions. *Journal of Economic Theory, 1*, 235-285.

Easterly, W., & Levine, R. (2001). It's Not Factor Accumulation:Stylized Facts and Growth Models. *The World Bank Economic Review, 15*, 177-219.

Enders, W. (2010). *Applied econometric time series 3e.* NewJersey: Joh Wiley & Sons.

Engle, R., & Granger, W. (1987). Co-integration and Error Corection Representation, Estimation and Testing. *55, 2*, 251-276. Econometrica.

Fritz-Krockow, B., El-Masry, G., Nozaki, G., Tobias, M., Partillo, R., & Torres, M. (2009). *Suriname Towards Growth and Stability.* Washington DC: International Monetary Fund.

Gadanecz, B., & Jayaram, K. (2009). Mesures of Financial Stability- a review. *31*. Bank for International Settlements (BIS).

García, N., Grifoni, A., López, J., & Mejía, D. (2013). Financial Education in Latin America and the Caribbean: Rationale, Overview and Way Forward. OECD.

Gelbard , A., & Leite, S. (1999). Measuring Financial Development in Sub-Saharan Africa. Washington D.C.: International Monetary Fund.

Gersl, A., & Seidler, J. (2010/2011). *Excessive credit growth as an indicator of financial (in)stability and its use in macro economic polisy.* Czech Republic: Czech national Bank.

Gine, X., & Townsend, R. (2004, August). Evaluation of financial Liberalization: A General Equilibrium model with constrained occupation choice. *Journal of Development Economics 74, 2*, 269-307.

Han, R., & Melecky, M. (2013, August). Financial Inclusion for Financial Stability: Access to Bank and Growth of Deposits in the Global Financial Crisis. The World Bank.

Hasan, I., Koetter, M., Lensink, R., & Meesters, A. (2009). Bank Efficiency, Financial Depth and Economic Growth. Netherlands: University of Groningen.

Holden, P., & Howell, H. (2009). Enhancing Access to Finance in the Caribbean. 2-28. Inter-American development bank.

Honohan, P. (2004). Financial Development, Growth and Poverty: How close are the links? Washington, DC : World Bank.

Jeong, H., & Townsend, R. (2008, September). Growth and Inequality: Model evaluation based on an Estimation-Calibration strategy. *Macroeconomic Dynamics 12, S2*, 231.284.

Karpowicz, I. (2014). Financial Inclusion, Growth and Inequality: A Model Application to Colombia. Washington D.C.: International Monetary Fund.

Kinnan, C. (2014, January). Distinguishing Barriers to Insurance in Thai Villages. Northwestern University.

Krishnan, K. (2011). Financial development in emerging markets: The Indian experience. Manila, Philippines: Asian Development Bank.

Krishnan, K. (2011). Financial Development in emerging Markets: The Indian Experience. 1-34. Tokyo: Asian Development Bank Institute.

Levine, R. (2005). Finance and Growth: Theory and Evidence. In P. Aghion, & S. Durlauf, *Economic Growth* (pp. 866-923). United States: Elsevier B.V.

Levine, R., Norman, L., & Thorsten, B. (2000). Financial Intermediation and Growth: Causality and Causes. *Journal of Monetary Economics, 46.1*, 31-77.

Lloyed-Ellis, H., & Bernhardt, D. (2000, Januari). Enterprise, Inequality and Economic development. *Review of economic studies 67, 1*, 441-452.

Lynch, D. (1996). Measuring Financial Sector Development: A study of selected Asia-Pacific Countries. *The Developing Economies, XXXIV-I*, 1-33.

Martin, A., & Taddei, F. (2013). International Capital Flows and Credit Market Imperfections: A Table of two Frictions. *Journal of International Economics, 2*, 441-452.

Mayers, N., & Craigwell, R. (2000). Measuring Financial Development in barbados: 1978-1998. *Annual Review* (pp. 105-113). Barbados: Annual Review.

Mehrotra, A., & Yetman, J. (2015). *Financial inclusion-Isseus for central banks.* Bank for International Settlements.

Moll, B. (2014). Productivety Losses from financial Frictions: Can self-Financing undo Capital Misallocation? *American Economic Review*.

Moll, B., Townsend, R., & Zhorin, V. (2014, March). Economic Development and the Equilibrium Interaction of Financial Frictions. Working Papers.

Nguyen, C., Islam, A., & Ali, M. (2006). Asymmetries in the Lending-Deposit Rate Spread: The Case of Bangladesh. University of Houston-Downtown.

Norris, E., Deng, Y., Ivanova, A., Karpowicz, I., Unsal, F., VanLeemput, E., et al. (2015). Financial Inclusion: Zooming in on Latin American. United States: International Monetary Fund.

Özkök, Z. (2011). Breaking the misconceptions: An analysis of the effects financial liberalization on financial development using index measures. Madrid: University of Madrid.

Pasricha, G. (2010). Bank Competition and International Financial Integration: Evidence Using a New Index. ottawa: Bank of Canada.

Petrovska, M., & Mihajlovska, E. (2013). Measures of Financial Stability in Macedonia. *Journal of Central Banking Theory and practice*, 85-110.

Roa Jose, M. (2015). Financial Inclusion in Latin America and the Caribbean: Access, Usage and Quality. 1-42. Central Bank for Latin American Monetary Studies.

Robinson, J. (1952). The Generalization of the General Theory in the Rate if Interest. Macmillan, London.

Sahay, R., Čihák, M., N'Diaye, P., & Barajas, A. (2015, September). Financial Inclusion: Can it meet Multiple Macoeconomic Goals? United States: International Monetary Fund.

Stevens, G. (2010). The Role of Finance.

Stock, J., & Watson, M. (1993). A Simple Estimator of Cointegrating Vectors in higher order Integrated Systems. *35*, 143-159. Journal of Econometrics.

Stock, J., & Watson, m. (2011). *Introduction to econometrics.* Pearson Educations,Inc.

Suriname Business Forum. (2001). *Private Sector Development Diagnostic.* Paramaribo: Surinaname Business Forum.

Thangavelu, S., & Findlay, C. (2010). Bank Efficiency, Regulation and Response to Crisis of Financial Institutions in Selected Asian Countries. In C. Findlay, F. Parulian, & J. Corbett, *Linkages between Real and Financial Aspects of Economic Integration in East Asia* (pp. 288-315). Jakarta: Eria.

Valickova, P., Havranek, T., & Horvath, R. (2013). Financial Development and Economic Growth: A meta-Analysis. United States: William Davidson Institute.

Watson, W. (1994). Vector Autoregression and Co-integration. Elsevier Science (Handbook of Econometrics IV).

World Bank. (2008). *Finance for All?* Washington DC: World Bank.

World Bank. (2013). *Benchmarking Financial Systems around the World.* Washington, DC : World Bank.

World Economic Forum. (2011). *The Financial Development report.* World Economic Forum.

Yartey, C. (2008). The Determinants of Stock market development in Emerging Economies: Is South Africa Different? Washington DC: International Monetary Fund.