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Financial inclusion, shadow economy and financial stability: Evidence from emerging economies

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A Thesis Submitted to

The Department of Management

in partial fulfillment of the requirements for

the degree of Master of Science in Finance

by Nevine Essam Elsherif

(under the supervision of Dr. Neveen Ahmed)

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ABSTRACT

This study analyzes the interrelation between financial inclusion, the size of the shadow economy (SE) and the level of financial system stability on a panel sample of 20 emerging economic from 2004-2014. Using on panel fixed effects Two-Stage Linear Regression (2SLS), we find that different levels of financial inclusion lead to different levels of financial stability, and the size of the SE can greatly influence this relationship. We use two models: one for assessing the SE-inclusion tradeoff and the other for assessing the stability-inclusion tradeoff respectively. To measure inclusion and stability, we have computed two different indices using the same methodology employed by Sarma (2008). Our main findings show that financial inclusion has no significant effect on the size of the SE, however, both inclusion and SE can significantly increase the level of financial instability. Other variables were found to have a significant positive relation with SE like income inequality, age dependency ratio and credit to government and state-owned enterprises. While, income levels, unemployment, secondary school enrollment, and trade openness had a significant negative effect on the size of the SE. Regarding the impact on our computed index of financial instability and its determinants, concentration in the banking sector, competition in the banking sector, concentration in the banking sector, and financial openness were found to have a positive effect on the level of instability. Income levels were found to have mixed effects on the three measures of financial instability, while broad money to GDP (%); as a proxy for size of financial sector, bank overhead costs; as a proxy of banks' inefficiency had significant negative effects on level of financial instability.

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Chapter I

1. INTRODUCTION

One of the most important lessons in the 2008 global financial crisis was the cruciality of maintaining financial stability and containing systematic risk. Meanwhile, most of the developing economies world wide are aiming at increasing the inclusiveness of their financial systems; in other words, easier access to financial services of the more vulnerable firms and households in an economy. This raises an important question regarding the nature of the relationship between financial inclusion and financial stability.

In recent years, financial inclusion [1] has been on top of official and social initiatives agendas that advocates developmental goals. Although financial inclusion is not considered a development goal by itself, however, it is as important as any of the goals. Financial Access for households and businesses is crucial for their day-to-day activities, as they will be able to financially plan their long-term goals, short-term goals and unexpected events. People can then be able to use financial services to start new businesses, expand existing ones, invest in health or education, become able to manage risks, all of which improve life quality. However, the importance of financial inclusion in any economy didn't prevent the fact that it is one of the most deficient characteristics in many of the worlds' economies. According to the GPFI (2011), there is about 2.5 billion people in the world that are excluded from the usage of formal financial services, which means that approximately 30% of the world's population have no access to the formal financial sector and thus are more prone to financial instabilities that may arise. Moreover, approximately only 50% of the adult population have an account at a formal financial institution when analyzing data from

[1] Financial inclusion is defined as the ability of individuals and businesses to access affordable and useful financial products and services that can match their needs delivered in a sustainable and responsible way (World Bank, 2017)

148 countries, which means that nearly half of the adult population do not have an account.[2] Those excluded from using formal financial services have cited high costs as the main reason for their exclusion, followed by lack of decent documentation and far physical distance as barriers.

The World Bank (2017) has estimated that 59% of the 2 billion adults who have no bank accounts refer to lack of money as the main reason. This reflects the inability of current financial services policies to fit low income users. Other obstacles in opening accounts were cited like the distance from the service provider, distrust in financial services providers, religion principles, and deficiency of necessary documentation papers. Additionally, an estimate of more than 200 million formal and informal MSMEs in emerging economies don't have access to adequate finance required for growth due to lack of collateral, insufficient credit history, and business informality. Moreover, some society groups can be more financially excluded than others like women, rural areas, poor people, informal business and remote populations.

According to the above statistics, it is very crucial to closely shed a light on the effect of financial inclusion on any economy where it is claimed to reduce poverty levels, enhance more income equality, promote sustainable economic growth and thus higher level of financial stability. Financial Inclusion is considered an intervention tool that aims at overcoming frictions that form an obstacle for markets to operate in favor of the underprivileged and the poor, so they can have access to a range of financial services at a fair price without discrimination. In other words, financial inclusion offers primary and complementary solutions to reduce poverty and encourage inclusive development.[3] In fact the United Nations' 2017 Sustainable Developmental Goals (SDGs) will only be reached if there is a sufficient level of financial inclusion. In fact, due to the importance of financial inclusion, on 2011, the Alliance for Financial Inclusion (AFI) announced

[2] Kunt, A. D., & Klapper, L. (2012)
[3] Chibba, M. (2009).

the MAYA declaration that represented the first platform to set financial inclusion targets for member countries. The need to take serious actions that encourage higher levels of financial inclusion is increasing given the current financial and economic global environment. It is believed that higher levels of financial inclusion promote global financial stability and hence boost economic prosperity through increasing level of asset accumulation, smoothing consumption patterns, increasing economic growth and decreasing poverty levels [4]. Moreover, World Bank Group's Universal Financial Access 2020 initiative was set to target the wide availability of Transaction Accounts to people worldwide. Enabling access to Transaction Accounts is an initial step to more comprehensive financial inclusion as it allows households to save money, send/ receive payments and opens the door for other financial services (World Bank, 2017).

Moreover, a more inclusive financial sector will create higher levels of greater political and social legitimacy. When a large portion of the society are financially excluded from the system, they start viewing legal financial institutions, like banks, to be serving the rich for the benefit of other rich people.[5] Furthermore, financial inclusion can encourage the creation of a more representative customer base, and thus legitimizing the industry in the eyes of the public and the activists. When financial institutions become less of a political issue, the risk of threatening claims and policies advocated by the public decrease, therefore enhancing financial system stability. According to the review of literature, the higher the financial inclusion, the lower the size of the SE (Schneider, F. (2013), Rahman, A. (2014)) since the main aim of financial inclusion is to attract the unbanked into the formal financial system through moving from a cash-economy to a bank-economy (Khan, H. R. (2011) & Chibba, M. (2009)) thus enabling easier surveillance of the transactions taking place in the economy and decreasing the size of the SE.

[4] Boukhatem, J., (2016)
[5] Rahman, A. (2014)

On the other hand, Financial stability is also affected by the size of the SE. One of the arguments state that the monetary and fiscal remedial policies of a country approaching a financial shock will not be completely passed through if the size of the SE is big, therefore, it acts as an obstacle in the path of financial stability. Moreover, the bigger the size of the SE the bigger the chances for political and social instability and thus the higher the probability of financial instability (Rahman, A. (2014)).

Therefore, the relationship between financial inclusion and financial stability cannot be analyzed without including the size of the SE in the picture. It should be stated that the size of the global SE represented around 23% of global GDP in 2011, and it is expected to decline to 21% in 2025, however, this decrease is not uniform across all countries. Emerging market economies are predicted to witness a fall in the size of SE as they have potential to improve their institutional quality and governance while countries with limited capacity will witness an increase in SE size (ACCA, June 2017). Additionally, in the Global Financial Stability Report by the IMF (2014) it was stated that emerging market economies has witnessed a strong rate of growth of the size of banking SE that has outpaced the rate of growth of the traditional banking system, thus implying the large size of SE in emerging economies. Emerging economies are of great potential to improve international trade relations, increasing global economic growth, and enhancing global living standards. [6]

Accordingly, this thesis aims to utilize the importance of the figures and analysis above in order to study the effect of financial inclusion and the size of the Shadow Economy (SE hereafter) on the level of financial stability in a sample of 20 emerging economies [7] from 2004-2014, while

[6] Hanson, G. H. (2012)

[7] A*rgentina, Brazil, Chile, China, Colombia, Egypt, Hungary, India, Korea, Malaysia, Mexico, Nigeria, Pakistan, Peru, Philippines, Poland, South Africa, Thailand, Turkey, and Venezuela.* This group of countries was selected based on the availability of data.

controlling for selected macro and micro economic variables. Our analysis will start with reviewing previous literature to build a theoretical and empirical framework so that we can analyze the channels of the interrelation between inclusion, stability and SE. We utilize the output of this theoretical analysis to construct our model and methodology. This thesis uses a panel fixed effects two stage linear regression model (2SLS), since the literature reviewed a potential correlation between the size of the SE and the level of financial inclusion. Our data set covers 20 emerging economies from 2004-2014. Our first stage model is used to create an instrumental variable that represent the residual series of the SE, this will be used to project a new fitted variable for the size of SE whose error terms are independent of the level of financial inclusion. In the second stage model, the fitted variable will be regressed along with financial inclusion and other control variables against the degree of financial system instability. Our main findings show that financial inclusion has no significant effect on the size of the SE, however, both inclusion and SE can significantly increase the level of financial instability.

Chapter II

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

As previously mentioned, the main aim of this thesis is to analyze the effect of financial inclusion on the level of stability of the financial sector. In order to do so, we had to build empirical and theoretical channels between both variables, and other contributing variables as well. In building the theoretical foundation, section 2.1 will start with explaining the concepts of financial inclusion, informal (shadow) economy, and financial stability. In section 2.2, a detailed review of previous literature will explain the links between financial inclusion and how it contributes to decreasing the size of the SE through decreasing intermediation costs and enhancing socio-economic variables and thus making it easier for previously financially excluded agents to enter the formal sector. In section 2.3, the main factors affecting the financial stability of an economy will be analyzed, one of those is the level of financial inclusion, where it influences households' financial stability, banking sector diversification of risks and the economy's ability to improve the efficiency of financial intermediaries and the monetary policy. Other factors influencing financial stability are the level of banking sector competition, the quality of the regulation, and the size of the SE. Lastly section 2.4 will include a review of previous empirical studies and the hypothesis development.

2.1 Conceptualizing Financial Inclusion, SE and Financial Stability

Financial inclusion is a wide ranging-concept of the process that guarantees availability and ease of access to the services provided by the formal financial system as defined by Sarma, M. (2008). Kim, D.W. et al. (2018) defined it as the easiness for all the participants in an economy to access formal financial services like credit, insurance and bank deposit. Where a high level of

inclusiveness will allow the economy to operate in an environment that makes the participants benefit from the use of those financial services and thus reach capital and financial stability.

In the analysis of financial inclusion, it is crucial to differentiate between involuntary and voluntary exclusion. Voluntary exclusion is the state where some of the economic agents choose not to use formal financial services due to religious or cultural beliefs or sometimes they are not in need for those services. On the other hand, involuntary exclusion happens due to income constraints and high-risk profiles faced by some economic agents or due to market inefficiency that leads to discrimination. The World Bank (2014) advocates that research and policy initiatives must clearly focus on involuntary financial inclusion as it can be addressed and reduced using various economic programs. Norris E.D. et al. (2015) classified three main constraints to financial inclusion in an economy, first participation costs; determined by transaction costs and documentation requirements, second borrowing constraints; determined by collateral requirements and borrowing costs, and third intermediation costs; determined by interest rate spreads and fees, and banks' monitoring costs. The higher those three constraints are, the more the level of financial exclusion in an economy.

On the other hand, SE is another multifaceted concept that is extremely hard to measure and define since agents operating under a SE do their best to remain unidentified. SE can also be named hidden economy, black economy, cash economy or informal economy. All those names reflect the presence of informal economy that is defined by Schneider, F. et al. (2018) as: all economic activities that are hidden from official authorities and institutions for regulatory, institutional and monetary reasons. Institutionally, SE can arise due to weak rule of law, extensive corruption and low quality of political institutions. Regulatory reasons can vary from the high burden of the regulatory framework to avoiding bureaucratic practices. Monetary reasons include tax and other

social payments evasion. It is of great importance for the governments and policy makers to measure the size of the SE as total economic activities; including formal and informal production of goods and services is a necessity for designing sound economic policies. Accordingly, SE measures used in their analysis mostly reflect legal economic and productive activities that if were recorded would be able to contribute in measuring the national GDP, therefore, their definition of SE excludes any criminal and illegal activities.

Since the recent global financial crisis, the notion of financial stability has been put under the spot light by policy makers. They have been trying to determine what are the factors that contribute to a more stable financial system, in order to prevent potential crises. Since, the most vulnerable to the adverse effect of those crises are the poor, financial inclusion is expected to play a significant role in stabilizing and minimizing the losses. However, there has been little empirical evidence on the linkages between financial inclusion and financial stability as stated by Cull, R. et al. (2012).

The excess credit creation in 2008 has significantly harmed economic growth rates; thus, financial stability, in many of the advanced economies like France, Germany, and the UK, while other emerging economies like India and China sustained their high growth rates amidst the crisis. Therefore, the choice of this thesis to the emerging economies was made from curiosity of this interesting co-integration between financial inclusion and growth in the long run.

There are various studies that analyze the effect of financial inclusion on major economic variables, however, only few studies analyze its effect on financial system stability and efficiency. This goes back to the fact that financial inclusion importance has been highlighted by the world governments only recently and specially after the latest global financial crises. The below literature shows that higher levels of financial inclusion can have positive or adverse effect of the stability of the financial system. The positive effects can be represented by higher diversification of bank

assets thus decreasing the risks associated, less volatility in the banks' deposit base thus reducing liquidity risks and a better transmission of monetary policy and objectives. The adverse effects can be represented by the attrition of credit standards, the inefficient application of regulations guiding financial institutions and the increased risk of eroding banks reputation. Using an extensive review of previous theoretical and empirical literature, this thesis will try to build a framework that links financial inclusion, SE and financial stability to proceed with the analysis.

2.2 Financial Inclusion and the Shadow Economy

The more the financial system is able to include economic agents under its umbrella, the smaller the size of the SE. However, for an economic agent to be included in the formal financial system, several factors have to be considered, like the cost of financial services, the level of income acting as a collateral and the sustainable growth of the real and formal economic sector. The section below discusses how can the level of financial inclusion affect the size of the SE through its impact on intermediation costs reduction and other socio-economic variables like inclusive growth, employment and equality.

2.2.1 Intermediation Costs

Financial and credit markets characteristics play a crucial role in determining the size of SE where low levels of financial development; determined by high costs of financial intermediation, can create incentives for economic agents to partially distribute their wealth on formal and informal sectors. Blackburn, K., et al. (2012) stated that those incentives can be represented in avoidance of paying taxes on wealth, earning a black-market rate of return on investments and exemption from official rules and regulations, all on the cost of sacrificing the benefits they might earn if engaged in the formal economy.

The level of financial development also plays an important role in reducing the size of the SE as firms can reduce the cost of credit through the full or the partial disclosure of their assets as collateral. This disclosure can increase the amount of taxes paid by firms and reduces the probability of tax evasion, but at the same time it decreases the size of the informal economy (Capasso, S. et al., 2013).

2.2.3 Social legitimacy

Financial inclusion can also offer mechanisms to decrease the size of the SE through regaining the trust of economic agents in the formal financial sector. These mechanisms are all directed to increase the monitoring ability of a customer in any undertaken financial transaction. According to Schneider, F. (2013) engaging in SE is enhanced the more convenient it is to pay in cash, since cash payments cannot be easily traced. Therefore, the more financially included households and SMEs are, the higher their contribution to a cashless economy is, and the less is the SE development. In other words, since SE is a cash-based economy where cash transactions are one of its pillars, and since SE provides incentives for market players to save outside the formal financial system, contributing to this cash-based informal sector can allow people to get away with tax payments, social security payments, labor regulations and required paperwork. Thus, the higher the cost of saving, the lower the financial inclusion and the larger the size of SE. Moreover, Bachas, P., et al. (2016) argued that the increased usage of debit cards due to higher financial inclusion offers an efficient mechanism to bank account owners to monitor their balances leading to more trust in the financial system, discouraging the dependence of informal financial sector and thus improving financial system efficiency and stability.

It is a widely known behavior when a crisis emerges, people tend to turn against their once so-trusted financial institutions, without putting into account their own actions that have caused the

crises to emerge. In fact, this behavior was so apparent in the most recent global financial crises, where the client's anger was directly put at bankers, regardless the fairness of this action. Rahman, A. (2014) attributed this to the fact that the public always subconsciously see financial institutions as tools of created by the rich people to serve their own interest, however, this will not be the way of thinking if more and more were included in the financial system so that the customer base becomes unbiased and more representative, especially in low-income and rural segments. Once higher levels of financial inclusion can be reached, people will re-trust the financial system and view it as a tool for helping people, increasing the legitimacy of the financial system and thus enhancing the stability if the economy faces a potential down turn.

2.2.4 Socioeconomic variables

Higher levels of financial inclusion, thus financial development leads to the allocation of the economy's resources in a way that not only allows higher capital accumulation but also enhances productivity growth. In their study, Rioja, F., & Valev, N. (2004) concluded that in higher income countries, finance primarily boosts growth through accelerating productivity growth, on the other hand, finance in lower income countries boosts growth through speeding-up capital accumulation. Higher financial inclusion can be a key determinant of a more stable financial sector specially when this increase is targeting small firms in the services sector [8]. In this view, Prasad, E. (2010) argued that lack of access to finance for small businesses and entrepreneurs in the services sector might have adverse effect on the rate of employment in this sector, which can then threaten the economic and financial stability.

[8] As operations in the services sector are relatively more labor intensive.

Access to finance for the less privileged classes in the economy can offer an opportunity for them to start their businesses and guaranteeing a stable stream of income that wasn't attainable before as discussed by Burgess, R., & Pande, R. (2005) and Levine, R. (2005). This will reduce income inequality and unfair concentrations of wealth across economic agents, that in most cases lead to rapid credit growth rates, asset price bubbles and social instability, encouraging the refute of those vulnerable economic agents to the informal sector for meeting their basic needs.

In an analysis developed by Norris, E.D., et al. (2015) for Costa Rica and Peru, the two countries have witnessed a decrease in the level of inequality as the credit constraint fell. This is based on the reasoning that a decline in the cost of credit (participation costs) can represent a great benefit for new entrants, therefore decreasing the size of the SE. Since previously constrained talented entrepreneurs are now able to expand and hire more workers whom in turn will take higher wages, income inequality and size of SE can furtherly be reduced. However, when the analysis was applied to Uruguay and Guatemala, relaxing the borrowing constraints has only served the privileged and talented entrepreneurs, raising their profits and therefore, increasing the GINI coefficient and increasing the chances of the dominance of the SE. In other words, a decrease in the required collateral to increase financial inclusion will allow agents who were already included in the formal financial system to benefit more relative to the benefit that they can acquire from the reduction in the cost of credit, since this cost constitutes a negligible and relatively fixed share of their income. While on the other hand, furtherly excludes the less vulnerable from the formal system.

Honohan, P. (2004) stated that the socio-economic impact of increased financial inclusion might only be witnessed in the long run. In fact, the effects of higher financial inclusion can have an intertemporal and multidimensional characteristic. Beegle, K., et al. (2003) analysis of Tanzania

showed that better access to financial services by households was found to substitute child labor according the micro-survey data. The analysis has shown that the long-run consequences on the levels of income, education and thus the degree of financial literacy might only be witnessed by coming generations. The additional increments of income to a household; due to the easier access to credit, might be used to decrease child labor and increase schooling years, where a better qualified and educated labor force will be able to decrease income inequality and thus the participation int the informal sector. Better financial inclusion can empower the poor through enhancing their wellbeing and community status.

2.3 Factors Affecting Financial Stability

Since financial stability is a multidimensional concept, there exists many factors that can directly and indirectly influence it. In the following section, we construct a theoretical framework showing the main factors that affect the stability of the financial system in an economy. We start with financial inclusion, that not only influences the size of the SE as discussed in section 2.2, but it also influences banking sector, household and country characteristics that affect the level of financial stability. The effect of the level of banking sector competition (concentration), the quality and strength of laws and regulation and the size of the SE are also believed to affect the level of financial stability.

2.3.1 Financial Inclusion

The level of financial inclusion can affect financial stability through several channels. Those channels can be country-level i.e. efficiency of financial institutions and monetary policy, bank-level i.e. diversification of customer base, and household-level i.e. stabilizing households financial position. Those channels are thoroughly discussed below.

i. Diversification of deposit and loan bases

Increased financial inclusion is claimed to create a more stable financial system through the more diversified division of risk it creates. In fact, Financial inclusion promotes the creation of a more diversified funding and deposit bases thus helping in solving liquidity crises while enhancing the financial institutions ability to retain funds and/or attract new funds. Theory suggests that when there are numerous small depositors and borrowers, the financial system can divide the risk on many small clients instead a small number of large corporate clients. Rahman, A. (2014) attributed that to the fact that small clients, either households or micro enterprises, tend to abide to a given financial service provider, opposing to large clients that tend to shop around. Since small clients are less prone to be affected by adverse news or rumor about their service providers. Therefore, the larger the number of retail depositors/borrowers there are, the more stable a financial institution tends to be. This diversification of risk can also benefit the financial institutions from a risk management stand point, since modeling a portfolio of a large number of small loans is much easier; therefore, leading to better prediction of loan losses, more accurate loan pricing and more stable stream of profits for the banking system. Moreover, offering SMEs better access to financial services; lending in particular, will decrease the probability of default and provisions to non-performing loans of financial institutions.

Morgan, P.J. & Pontines, V. (2014) claim that diversified loans to small businesses tend to represent less systemic risk than other more concentrated large loans. Additionally, Financial inclusion makes the intermediation process between savings and investments more stable through facilitating the diversification of the transactions that take place, the client base, the risks created, and the financial institutions involved (see also Khan, H.R. (2011); Hannig, A., & Jensen, S. (2010); Denizer, C., et al. (2002)). Additionally, according to Prasasd, E. (2010) higher levels of

financial inclusion encourage higher domestic savings, therefore, enhancing the funding of domestic investments while decreasing the economy's dependence of foreign financing. Moreover, Financial inclusion is able to attract depositors whose financial behavior can alleviate instabilities at times of distress according to Hijalee, M. et al. (2017). In other words, with higher levels of financial inclusion, the financial sector's balance sheet will then include a wider range of economic agents.

ii. Efficient allocation of Resources

Since a high degree of financial development enhances financial inclusion and vice versa, it is of great importance to analyze the nature of relation between financial development and the efficiency of the financial sector. Levine, R. (2005) argued that the financial system plays a key role in the provision of information, and in the reduction of decision-making and transaction costs. Gheeraert, L., & Weill, L. (2015) explained the channels by which higher levels of financial development can reduce information asymmetry. First, one of the major functions of the financial system is the provision of projected information about potential investments. Consequently, banks; as major players in any financial system, are able to utilize this information in decreasing the evaluation costs of potential investments, allowing for a more efficient use of capital, and thus enhancing productivity. Second, financial institutions can enhance productivity through decreasing costs of transactions that are accompanied with the transfer of funds between different economic agents. This is mainly due to the ability of the financial system to pool savings which reduce the information costs for lenders and savers.

Additionally, financial inclusion is able to alleviate information asymmetry as the higher availability of bank branches and ATMs, the smaller the distance between the FI and customers is, and the better information banks receive regarding the quality of the client base. Consequently,

better information about customers greatly aids FI in making judicious lending and borrowing decision while setting a representative and fair price for the services provided, which can greatly reduce the problems of moral hazard and adverse selection (Sharpe, S.A. (1990); Buch, C.M. et al. (2013); Petersen, M.A. et al. (1994)).

According to Norris, E.D., et al. (2015) viewed that reducing credit constraints was found, i.e.; lower costs of participation, increases productivity as the credit offered to talented entrepreneurs is being allocated more efficiently, meanwhile fewer credit will be wasted in the inefficient and unproductive processes of contract negotiations. Adding to that, Subbarao, D. (2009) explained that higher financial inclusion can improve the efficiency of government payments as those can be electronically deposited directly to the beneficiaries' bank accounts, therefore decreasing transaction costs, leakages and pilferages. This can lead to a more efficient allocation of government funds towards more productive channels.

iii. Monetary Policy Effectiveness

Financial inclusion is crucial for central banks to stabilize the financial systems and to efficiently manage the monetary policy, as higher financial inclusion can greatly alter consumers' and firms' behavior. Since financial inclusion enables the participation of a larger sector of the economy in the formal financial system, therefore it creates a positive externality in the economy since it allows a more effective monetary policy implementation and transmission.

In fact, higher financial inclusion allows interest rates to become an effective policy tool, it also facilitates the mechanism through which Central Banks can stabilize price levels according to Mehrotra, A., & Yetman, J. (2014). Since inclusion allows higher levels of consumption smoothing, households are then better able to respond to changes in interest rates through adjusting

their level of savings and loans. Higher financial inclusion can also encourage households to convert their savings into deposits and away from physical assets. Khan H.R. (2011) and Tombini, A. (2012) agreed that higher levels of financial inclusion makes interest rates a relatively strong and primary policy tool. As financial inclusion increase, money stock starts to be converted from currency in circulation to interest bearing deposits in the banking system. This allows a large portion of the economic activity (i.e. broad money) to be under the control of interest rates.

Khan H.R. (2011) argues the bigger the informal sector is, the harder it is for a monetary policy to be implemented and transmitted, as the decisions of larger number of households and small business owners will be independently without putting into consideration the central banks' monetary policy actions. Additionally, financial inclusion encourages people to move from cash economy to bank economy, so their financial transactions can be surveilled. Consequently, anti-money laundry guidelines can be efficiently implemented to the majority of financial transactions in the economy.

Difficulties in smoothing consumption is thus attributed to limited access to formal financial services, the thing that can influence the efficiency of monetary policy through three dimensions. First, the bigger the number of financially excluded agents in an economy, the stronger the required change in interest rate to stabilize a shock in aggregate demand and price levels (Galí, J., 2004). Second, financial inclusion can influence the output-inflation volatility trade-off. Mehrotra, A., & Yetman, J. (2014) clarified that when more agents are included in the formal financial system, output volatility will rise relative to inflation volatility, as financial included agents are then better able to alter their investment and saving decisions so that they partially insulate their consumption levels form volatilities in output. Therefore, as financial inclusion increases, central banks become better able to focus on prices stabilization and thus enhancing financial stability. Thirdly, in some

countries central banks focus on core inflation as a measure to determine its' inflation objectives, however, the choice of this price index can sometimes be misleading.

Mbutor, M. O., & Uba, I. A. (2013) analyzed the impact of the level of financial inclusion on the effectiveness on the monetary policy in Nigeria from 1980 to 2012. Their results advocate the claim that higher levels of financial inclusion play an important role in making monetary policy more effective. However, this result was not applicable when the variable of number of bank branches was included, in fact depicted a negative relation. This goes to the fact the aim of banks when opening new branches is mainly pursuing higher profits but not for increasing financial inclusions. Consequently, new branches start to open in locations that bring more profits even if those new branches are underutilized, while unfavorable locations for profits remain underbanked, thus decreasing financial inclusion. Since financial inclusion is a policy objective, lower financial inclusion makes the central banks unable to influence savings, consumption, and investment behavior through monetary policy tools (i.e. interest rates and exchange rates), therefore decreasing the effectiveness of those tools on the financial system.

In their study, Anand, R., & Prasad, E. S. (2012) argued that some inflation measures like "core-inflation" excludes prices of food products which inaccurately guides policymakers in economies with high levels of financial exclusion. The reason behind this claim is that high levels of financial exclusion are usually present in rural areas that depend on agriculture and food products as a main source of income. When prices of food products increase, financial excluded economic agents will be more prone to increase their consumption as their incomes rise. Consequently, an overall increase in consumption due to an unaccounted-for increase in prices of food products will lead to further increases in inflation induced from increases in aggregate demand. Under these conditions, the central bank objective to stabilize price levels can be very hard since changes in food prices

are unaccounted for. Not only does financial inclusion improve the effectiveness of the monetary policy of the government, but it also greatly advances the monetary strategic behavior of households and firms, therefore, leading to a further increase in the monetary policy effectiveness. Bhaskar, P. V. (2013)

iv. Households financial Stability

Higher financial inclusion increases the poor households' ability to withstand income shocks that could temporarily or permanently make their consumption levels near or sometimes below the poverty line. Moreover, access to better insurance can indirectly increase those households' confidence to engage in riskier; thus, more rewarding, economic activities that increase their income and their productivity as argued by Matin L. et al. (2002). Additionally, higher access to credit can induce poor households to accumulate capital; whether human or physical, that can potentially yield a return that exceeds the cost of credit itself, therefore generating higher income. Lastly, better financial accessibility reduces the cost of financial transactions, domestically and abroad on a secure basis.

In fact, access to financial services for the poor will lead to the provision of a more stable and diversified retail deposits base since low income households who engage in saving or borrowing transactions; tend to preserve a proportionally steady financial behavior, thus enjoying a higher level of immunity against the business cycle fluctuations. Hannig, A., & Jensen, S., (2010) attributed this to the increased ability of low income depositors in preserving the level of their deposits at times of crises. In fact, they act as a continuous source of funds to the financial system even when other channels of credit become harder to maintain. Higher rate of financial inclusion for the poor can then reduce dependence of banks on "non-core" financing. In other words, it will

increase deposit and loan stability since financial institutions might lose their ability to lend if those sources of deposits stop.

Financial Inclusion can indirectly affect financial stability as argued by Rahman, A. (2014) and Khan, H. R. (2011) through its effect on the financial stability of poor households. Financial inclusion can promote financial household stability through offering them a safe place for their savings thus encouraging an increase in their saving ratio relative to their disposable income. These savings are crucial for households' financial stability in that they smooth consumption patterns in periods of low income and provide necessary funds for unexpected and necessary consumption, therefore decreasing the probability of falling into debt or even defaulting. Moreover, granting financial access to households and the less privileged improves their ability to receive government transfers during times of economic distress without the threat of being lost if those transfers were in the form of cash-in-hand. By the same scope, Denizer, C., et al. (2000) argued that financial inclusion improves households' financial position and stability, creates a more efficient channel of the provision of transfer payments that are crucial for the vulnerable to survive economic cycle fluctuations, and prevents the loss of those payments in the informal sector. In fact, economies that tend to make financial services more available to the unbanked in order to reduce market fluctuations, is thus more able to increase funding sources and efficiently allocate credit.

Additionally, financial inclusion affects the severity of the business cycle fluctuations through its effect on increasing the financial stability of the market as well as that of the poor households. Financial inclusion sometimes affects the business cycle in the short run through its role in changing in supply and demand of available resources for investments which can lead to short run variations as argued by Hijalee, M. et al. (2017). For instance, the sudden supply of investment resources like credit can lead to a surplus of deposits therefore affecting lending interest rates.

However, in the long run, increased financial inclusion can lead to a higher and a more sustainable growth due to higher investment levels in productive capacities

Not only does financial inclusion improve the effectiveness of the monetary policy of the government, but it also greatly advances the monetary strategic behavior of households and firms, therefore, leading to a further increase in the monetary policy effectiveness. Bhaskar, P. V. (2013) argued that financial inclusion leads to higher stability through the enhancement of the financial education it causes, and the interaction between those three elements represents the demand and supply side of the financial market. Higher financial inclusion for households and firms means that it will subject them to events that enhances their financial literacy. Financial literacy will then create higher demand for financial services since it provides awareness and knowledge about the available financial services, while, easier access to finance represent the supply side. Both demand and supply elements will then lead to higher financial stability of the economy and the society. Aziz, Z. A. (2005) stated that high levels of financial inclusion can make households better able to manage their risks through financial literacy that makes them better judges on deciding their capacity to borrow, save and spend, and deciding on the most optimal financial service that meets their needs. Allen, F. et al. (2016) argued that higher levels of financial inclusion are associated with higher political stability and stronger rule of law due to the positive impact of financial inclusion on business activities, self-employment, household consumption and wellbeing.

2.3.2 Banking Competition/Concentration

There exist two contradicting views regarding the relationship between concentration and financial stability, the competition-fragility view and the competition-stability view. The competition-fragility hypothesis claims that although higher market power of banks will increase interest charged, boost profits, and improve stability as argued by Boyd, J. H., & De Nicoló, G. (2005).

However, this claim can be distorted by the fact that an increase in interest will subject borrowers and firms to higher credit risks and larger bankruptcy probability, therefore, increasing the potential for non-performing loans. Moreover, it is believed that policymakers treat bank failures more seriously when there are few banks in the market as the default of one bank can lead to the collapse of the whole market. However, this might not always be in favor of financial stability as Mishkin, F. S. (1998) argued that this will induce governments to provide more subsidies to the few big banks in the market, which encourages them to perform operations in a riskier way and increase the system's fragility.

The competition-fragility view is based on the reasoning that in an increasingly competitive financial environment, profits witness more pressures and banks are more induced to take higher risks, resulting in higher banking sector fragility according to Beck, T. (2008). Moreover, Allen, F., & Gale, D. (2001) viewed that the higher the level of concentration of banks, the smaller the number of banks, and therefore reducing the government's burden of supervision and enhancing the stability of the banking system. A countervailing point of view claims that the complexity of a bank is positively related to its size, so a big bank will be harder to monitor than a small one due to the complexity of its operations. In a competitive market where all banks are price takers, competition impedes any incentive for a bank to provide liquidity to a defaulting bank, thus greatly contributing to more fragility.

Since financial institutions can benefit from economies of scale due the increase in the availability of information as financial inclusion increase, some institutions can exploit this benefit to achieve higher market power. Market power is generally measured by the difference between market price and the marginal cost of an extra unit as a percentage of the market price, therefore, higher market power can give an indication whether FI are able to minimize costs or not. Petersen, M. A., &

Rajan, R. G. (1994) stated that if a bank enjoys a lower marginal cost, it should be able to decrease the degree of excessive risk taking through providing credit to small and medium clients, therefore leading to higher levels of financial stability.

2.3.3 Quality of Regulations

The effect of the level of financial inclusion on financial stability strictly depends on the quality of regulation and supervision of the banking sector. When access to credit is expanded with no proper regulation or supervision, financial stability risk starts to emerge. According to Sahay, R. et al. (2015), under a strong banking supervision, extending credit is accompanied with higher bank buffers, thus enhancing financial stability. Conversely, under weaker banking supervision, extending credit leads to fall in financial stability due to lower bank buffers (see also Mehrotra, A., & Yetman, J. (2015)).

2.3.4 Size of the Shadow Economy

The existence of a large parallel economy encourages the use of unstable and informal saving channel which can adversely affect the stability of the financial system. In countries with low formal financial sector penetrations, alternative saving channels usually emerge as stated by Rahman, A. (2014). For example, during the 1990s, Albania's formal financial sector was not easily accessible by households and microenterprises. This has paved the way for the emergence of "Pyramid Schemes"; an alternative saving channel that promises higher returns for participants the more they bring others into the scheme. Pyramids Schemes usually collapses when the pool of potential participants dries up, thus when the scheme collapsed, participants rioted. The instability caused by participants frustrations led to many casualties, high inflation rates, depreciation of domestic currency and a 7% decrease in output in one year. Adding to Albania, Kenya and

Bangladesh have also suffered from low financial inclusion that directed the financially excluded to use informal investing channels leading to financial instability.

The prevalence of SE can impede the stability of the financial system through the extent of which people are able to acquire credit from the informal sector. The higher their ability to acquire credit informally, the lower the demand on credit in the formal sector, which might create financial market distortions according to Gobbi, G., & Zizza, R. (2007). Additionally, a decrease in financial inclusion can adversely affect financial stability due to the anti-cyclical behavior of participants in the underground economy. The participation in the informal financial sector can make participants suffer from lack of capital and credit, thus making it more unfeasible to invest and/or consume up to their full potential. This in return can lead to reducing economic growth in expansionary periods, forcing those participants to be locked in this anti-cyclical behavior and never reaching neither optimum production nor consumption potential.

Albulescu et al. (2016) argued that financial stability can affect the size of SE, where higher stability means better access to finance and encourages investments. One the other hand, lower financial stability can diminish the overall level of income thus forming an obstacle for easier access to finance; i.e. lower income means higher collateral needed to be included in the formal financial system. Consequently, economic agents will be induced to develop unauthorized activities, to evade tax payments and to engage in the informal sector.

2.4 Empirical Literature and Hypothesis Development

This section will review most of the empirical studies that analyzed the relation between financial stability, financial inclusion and the size of the SE regarding the data used, the variables chosen, and the econometric methodology applied. From this review we compose the hypotheses employed in this thesis that chapters 3 and 4 will be build upon.

2.4.1 Financial Inclusion and the Size of the Shadow Economy

Berdiev, A. N., & Saunoris, J. W. (2016) examined the relation between the level of financial development and the size of the SE for 161 countries from 1960-2009. By using a panel VAR, their findings show that higher levels of financial development will reduce the size of the SE. In measuring the multidimensional variable of financial development, domestic credit provided to the private sector was included as a dimension of financial inclusion. Moreover, the study found that there is an evidence for a reverse casual relation between financial development and the size of the SE, where a shock to the SE led to lower financial development. This reverse causality was clear among countries that has low financial development.

Using a unique firm level data of 54 countries, Beck, T., et al. (2005) investigated the effect of the financial and legal constraints as well as corruption on rate of growth of firms. They argued that higher financial inclusion to firms decreases liquidity constraints and encourages higher levels of investment. Moreover, the distribution of credit among firms in low income countries within the same sector significantly impacts the structure and the competition of the industry as well as the level of informality in the sector. As portrayed by Harrison, A. E., & McMillan, M. S. (2003) in Cote d'Ivoire, the largest firms or multinational corporations can sometimes reap most of the increased financial inclusion, opposed by the smallest local firms that usually are crowded out from funding.

In their analysis, Capasso, S. & Jappelli, T. (2013) have tested the relation between the level of financial development defined as the reduction of cost of external credit and the size of the informal economy, using Italian microeconomic data. Their findings show that higher local levels of financial development are indeed accompanied with smaller size of informal economy.

According to the previous literature we build our first hypothesis:

H_{01}: Financial Inclusion has a significant negative effect on the size of the SE.

2.4.2 Financial Inclusion, Shadow Economy and Financial Stability

As previously mentioned, the empirical research on this topic is very limited. Below are some of the studies that tried to tackle the relation from different points of view. Han, R., & Melecky, M. (2013) found that an increase in percentage of people who have bank accounts by 10% led to a decrease in the deposit withdrawal rates (proxy for financial instability) by 3-8% during economic downturns. Sahay, R., et al. (2015) analyzed the relation between inclusion and stability from 2004-2011 using number of borrowers per 1,000 adults as a proxy for financial inclusion and bank z-score as a proxy for financial stability. Using panel regression with country fixed effects they found that, higher financial inclusion led to a decrease in the bank z-score, thus leading to higher instability in the financial system. While higher level of banking system supervision led to a higher bank z-score and a more stable financial system.

Morgan, P.J. & Pontines, V. (2014) have analyzed this relation using a GMM dynamic panel estimator and found that there is a positive relation between inclusion and stability. Their evidence was that higher share of lending to SMEs as a percentage of total lending enhanced the financial system stability through decreasing the NPL and Z-score of the analyzed sample. Their findings also state that higher GDP per capita leads to higher financial stability while an increase in the private bank credit to GDP ratio has the opposite effect.

According to Neaime, S. (2018) the empirical evidence from 8 MENA countries suggests that financial inclusion positively affect financial stability, though uncoordinated financial inclusion contributes to higher financial instability. One factor that has been contributing to the increased financial instability in the MENA region is the insufficiency of robust economic and political

institutions to regulate and supervise the financial markets. The lack of those institutions could result in economic and financial crisis, thus increasing poverty and inequality levels.

Moreover, Norris, E.D. et al. (2015) tested the claim of the potential stability-growth trade off which is based on the effect of reducing borrowing constraints on GDP and NPL in Guatemala and Peru. The findings showed that as the constraints to borrowing became more and more relaxed, the GDP of both countries have significantly increased, but at the same time, the NPL ratio has increased. This means that as the borrowing constraints fell, more external credit was being provided to potential and existing entrepreneurs as soon as they pay the cost of credit, which attracts more investors. At the same time, and due to the relaxation of the loans' collateral constraints, potentially riskier small-sized entrepreneurs who are more leveraged enter the market, and therefore increasing the value of NPLs.

In their analysis, Čihák, M., et al. (2016) concluded that increase financial inclusion can provide factors that aids in mitigating medium-term instabilities and expected loss like reducing the NPL ratio to total loans and reducing the volatility of deposit growth rates. Their findings also show that financial inclusion can sometimes create an extensive usage of credit which leads to higher risks and increasing the probabilities of unexpected losses to arise; represented by diminishing liquidity and capital buffers). Moreover, the relation between inclusion and stability is significantly affected by country-level characteristics like the degree of fiscal freedom, financial openness, education and the development of credit information systems. Financial openness was found to enhance the trade-off between stability and inclusion, while fiscal freedom, information system development and education were found to enhance the positive relation between stability and inclusion.

By using GMM dynamic panel model on panel date from 2001-2013, Siddik, N. A., & Kabiraj, S. (2018) has concluded that financial inclusion measured by ration of SME loans outstanding and ratio of SME borrower to total borrower, had a significant positive relation with a country's level of financial stability measured by its bank Z-score. The study also concluded that GDP per capita, private credit to GDP and liquidity are positively related to financial stability, while domestic credit to private sector and financial crises dummy were found to be negatively related to financial stability.

Aahmed, M. M., & Mallick, S. K. (2017) used an international sample of 2635 banks in 86 countries from 2004-2012 in analyzing the relation between financial inclusion and banking stability. Their findings show that financial inclusion is positively related to banks stability, specifically the banks who have lower marginal costs, higher shares of customer deposit funding, and who operate in countries with better quality of institutions.

Osvaldo, A. et al. (2006) have studied the Chilean banking system and concluded that the probability of the frequent occurrence of large losses was more severe when analyzing the NPL ratio of small firms relative to large ones. This was represented in by a quasi-normal distribution of loss of small firms and a fat-tailed loss distribution for large ones. Those conclusions reflect the lower systematic risk of the small loans when compared to large loans, which brings up the importance of increasing the financial inclusion of SMEs to enhance financial stability.

According to the above literature, we build the following hypotheses

H_{02}: Financial inclusion has a significant negative effect on financial instability.
H_{03}: The size of the SE has a significant positive effect on financial instability.

2.4.3 Banking Competition and Financial Stability

Keeley, M. C. (1990) studied the US banking system degree of competition in the 1990s and found that higher competition reduces the capital cushion for banks and increased risk premiums. He explained that an excessively competitive banking system creates higher pressures on banks to maintain their profits inducing a riskier behavior and thus a more fragile financial system. Moreover, Allen, F., & Gale, D. (2001, 2004) found that the higher the banking sector competition, the greater the probability of borrower to switch between banks, indicating a lower incentive for banks to keep its customers and consequently, not screening the borrowers as effectively as before. Therefore, hindering the banking sector stability.

Ben Ali, M. S., et al. (2018) have analyzed the relation between concentration of the banking sector and financial stability from 1980-2011 for a sample of 156 developing and developed economies. Their results show that there is no direct relation between concentration and stability, however, there was two indirect channels through which concentration significantly affects stability. Banking concentration has a stabilizing positive effect on stability through profitability where concentration leads to higher revenues, increases the capital of banks and thus the ability of banks to absorb shocks increases. On the other hand, lower banks competition means that banks can lend borrowers at higher rates of interest, which has a destabilizing negative effect. Higher interest rates crowd out customers with the least risk appetite, attract more risky customers whom behavior can decrease the sectors stability, and increase the prevalence of borrowers defaulting (see also Boyd, J. H., & De Nicoló, G. (2005)).

Cuestas, J.C. et al. (2017) assessed the tradeoff between financial stability and the banking sector competition for a sample of commercial banks in the Baltic region from 2000 to 2014. The assessment was conducted through using Lerner Index and the market shares of top banks as two

alternative measures for the banking sector competition, while using banks Z-scores and loan loss reserves as alternative measures for the banking sector risk; proxy for financial system stability. The results show that the lower the competition in the banking sector, the higher the banks' risk-taking behavior and probability of default, since the excessive increase in banks' market power will induce individual banks to be involved in risky transactions, thus threatening the stability of the financial system.

Kasman, S., & Kasman, A. (2015) analyzed the relationship between the level of competition and concentration of banks in Turkey from 2002-2012 and found that more competitive the banking system is the higher bank Z-score and the lower the NPL; where bank Z-score and NPL where used as proxies for financial stability. In measuring competition, they used Lerner Index adjusted for efficiency and the Boone indicator as proxies. Their results indicate that higher levels of banking sector concentration increase the NPL ratio and decreases the Z-score, thus increasing the level of financial stability. Moreover, it was found that sometimes higher competition levels, and a lower market power of each bank, can be associated with decreasing profit margins and increasing the incentives of banks to take risks, thus hindering the stability of the banking sector.

According to the above literature we build our fourth hypothesis:

H_{04}: Banking sector competition has a significant negative effect on financial instability.

Chapter III

3. DATA AND RESEARCH METHODOLOGY

In this chapter, the used data, data sources and research methodology will be discussed. To explain the relationship between financial stability, financial inclusion and size of SE, our analysis will be conducted on a group of 20 emerging countries from 2004-2014[9]. Section 3.1 will start with describing the selected variables, along with its sources and reference to previous studies. In performing our empirical analysis, we construct an index for financial inclusion and an index for financial instability respectively, therefore, in section 3.2 and 3.3 a full description of the methodology used to construct those indices will be stated. In section 3.4, the selected econometric methodology that will be used in conducting our empirical analysis will be thoroughly discussed. Section 3.5 will represent the econometric model and the selection of the dependent and the independent variables. Section 3.6 will include summary statistics of the variables used in the analysis.

3.1 Data Sources

For **Financial Stability**, we use 2 key variables to measure the level of financial system stability, the variables and their potential effects on financial stability are stated below. The data for the following variables was retrieved from GFDD, and were employed by number of scholars (Morgan, P.J., et al. (2014); Čihák, M., et al. (2016); Sahay, R., et al. (2015); and Kasman, S., & Kasman, A. (2015)). (1) Banks non-performing loans to gross loans is a measure of exposure to credit risk and indicates adequate provisioning taking into account the banks' previous

[9] *Argentina, Brazil, Chile, China, Colombia, Egypt, Hungary, India, Korea, Malaysia, Mexico, Nigeria, Pakistan, Peru, Philippines, Poland, South Africa, Thailand, Turkey, and Venezuela.* This group of countries was selected based on the availability of data.

performance and potential expected losses, higher value of NPL to gross loans reflects higher instability.; (2) Bank-credit-to-deposit ratio is an indicator of the amount of financial resources provided to the private sector by domestic commercial banks as a share of the total deposits in these banks, higher values indicate that banks are lending out more money than they are receiving in the form of deposits, thus indicates a higher liquidity risk and a less stable financial system. Variables (1) and (2) will be used in the computation of an index for financial instability (FSTX). In our analysis, we will regress the model three times, each against FSTX, NPL and CR2DP separately as robustness check.

For **Financial inclusion**, we use 4 key variables to estimate the level of financial inclusion, all were retrieved from GFDD and IMF (FAS & IFS), employed by Neaime, S., & Gaysset, I. (2017); Kim, D. W., et al. (2018); Sharma, D. (2016). We start with variables representing the availability of financial services like (1) Number of ATM's per 100,000 adults as a proxy for the availability of banks and bank branches. Then we used variables indicating the penetration of financial services like (2) Depositors with commercial banks (per 1,000 adults)[10] indicating the ability of economic agents to open and sustain a bank account. Finally, we use variables representing the usage of financial services like (3) domestic credit by financial sector to GDP (%); (4) Financial system deposits to GDP (%) both representing the usage of financial services employed by Morgan, P.J., et al. (2014); Berdiev, A. N., et al. (2016); and Sarma, M. (2008).

For **Shadow Economy Size**, we employ a data set developed by Schneider, F., et al. (2018) that measures the size and the development of shadow economies. Using Multiple Indicators, Multiple Causes (MIMIC) approach, they estimated the size of SE in 158 countries from 1999-2015. This

[10] Data directly representing bank account ownership by WB is limited to 2011 only.

is the single most recent data set that measure the size of SE for a complete time-period for 158 countries. The MIMIC method is a theory-based approach that explicitly takes into account several exogenous causal variables and their effects on the SE, were it utilizes the relation between the observable causes and their effects on the unobservable variable (i.e.SE) to estimate the variable itself. The model is estimated by measuring the extent of which tax and regulatory burdens, currency/cash outside banks, unemployment rates, self-employment rates, economic freedom and business freedom affect the development of informal economy.

Several **control variables** will be used in running our regression and can be divided into bank-level data and country-level data. The country-level data will be extracted from the World Development Indicators and following previous studies conducted by Neaime, S., & Gaysset, I. (2017); Kim, D. W., et al. (2018); Sharma, D. (2016); Morgan, P.J., et al. (2014); Čihák, M., et al. (2016); Sahay, R., et al. (2015); Kasman, S., & Kasman, A. (2015); and Siddik, N. A. et al. (2018). We utilize the following throughout our analysis: (1) GINI index; (2) logarithm of GDP per capita; (3) Unemployment rates; (4) Age dependency ratio (% of working-age population); (5) Gross enrolment ratio, secondary, both sexes (%); (6) Credit to government and state-owned enterprises to GDP (%) as an indicator for the crowding out of private sector; (7) Trade openness as (% of GDP); (8) Broad money to GDP as a proxy for the size of the financial system and inflation; (9) Financial openness index (0-1) developed by Chinn, M.D. and Hiro, I (2006).

The bank-level data will be extracted from GFDD and following previous studies conducted by Sarma, M., & Pais, J. (2011); Kasman, S., & Kasman, A. (2015); and Pham, T., (2017), we will use (10) Boone indicator as a measure for the level of competition in the banking sector; (11) 5-bank asset concentration as a measure for bank concentration; and (12) Bank overhead costs to total assets (%) as a measure for banking inefficiency.

3.2 Measuring Financial Inclusion

According to Sarma, M. (2008) definition of financial inclusion "*it is a process that ensures the ease of access, availability and usage of formal financial system for all members of an economy"*. Although there are many variables that represent a measure of the level of financial inclusion in a country, however, each of those variables relate to a specific dimension of financial inclusion like, access, availability, usage, affordability and timeliness. According to the literature review, financial inclusion plays a crucial role in enhancing the level of financial development. Additionally, vulnerable members in the least developed economies report financial exclusion as a major obstacle for their wellbeing as they are not only excluded financially, but socially as well. Consequently, financial exclusion is a main problem in countries with less than developed financial systems, where the unavailability of data makes it even harder for scholars and policy makers to tackle it effectively, the thing that increases the severity of the problem. In fact, availability of complete and comprehensive data sets is a usual problem faced scholars who study financial inclusion, which makes many refute to measuring it using one or few of its dimensions. Accordingly, this thesis will follow Sarma, M. (2008) and the UNDP in measuring Human Development Index [11] to calculate a comprehensive multidimensional financial inclusion index for 20 emerging economies. This methodology was utilized by other scholars to create an index for financial inclusion Gupte, R., et al. (2012); Sarma, M., & Pais, J. (2011); and Pham, T., et al. (2017). To start with, Sarma, M. (2008, 2012) used banking system inclusion as a proxy for financial system inclusion since banks are the main source of most of the basic financial services. Three dimensions for measuring the index will be utilized following Sarma, M. (2012), those

[11] For more details about the computation of UNDP indices (HDI, GDI, and HPI) see UNDP Technical Note of HDR available on UNDP's website.

dimensions are D_P: Penetration of the banking system using depositors with commercial banks per 1000 adults ; D_A: Availability of banking Services using ATMs per 100,000 adults; and D_U: Usage of banking services using private credit and banking system deposits per GDP[12]. The choice of variables was decided following Sarma, M. (2012) and according to the availability of data. Each of those dimensions will be measured in a separate independently according to the following equation that ensures the $0 \leq d_i \leq 1$;

$$d_i = \frac{A_i - m_i}{M_i - m_i}$$

where d_i is the dimension index (d) for the i^{th} dimension. A_i is the actual value of dimension i, m_i is the minimum value of dimension i, and M_i is the maximum value of dimension i. Then the index of financial inclusion for country *x* will be measured by the normalized inverse Euclidean distance of d_i from its ideal point [13] following the below formula;

$$FNCXi = 1 - \frac{\sqrt{(1-d_1)^2 + (1-d_2)^2 + \ldots. + (1-d_n)^2}}{\sqrt{n}}$$

where n is the number of dimensions used.

3.3Measuring Financial Stability

Like financial inclusion, the concept of financial system stability is complicated and hard to measure. A stable financial system can be one characterized by the absence of excessive stress, crises or volatility. However, this limited definition might fail to reflect the positive contributions

[12] For details about list of variables used in the computation of each dimension, see Annex 1 table 1.

[13] If *n* dimensions of financial inclusion are considered, then country *x* will be represented by point $D_X = (d_1, d_2, \ldots, d_n)$ on the n-dimensional Cartesian space, where point O= (0,0,…,0) represented the worst scenario, while point I=(1,1…,1) represents the best scenario for all dimensions. The normalization is done in order to ensure that all values are between 0 and 1, while the inverse distance is considered so that a higher value indicates higher level of financial inclusion.

of a stable and well-functioning financial system on the economy as a whole. Consequently, broader definitions of financial stability are emerging, where the González-Páramo, J. (2007) defined it as*:*

"a condition in which the financial system-comprising financial intermediaries, markets and market infrastructure- is capable of withstanding shocks and the unravelling of financial imbalances, thereby mitigating the likelihood of disruption in the financial intermediation process which are severe enough to significantly impair the allocation of savings to profitable investment opportunities."

Therefore, for measuring the level of financial stability, this thesis will use two variables to compute our index for financial instability, those are NPL to gross loans (NPL) and Bank-credit-to-deposit ratio (CR2DP). First, we use the computed index of financial system instability discussed below. Second, we use both variables NPL and CR2DP to run two regressions separately. Therefore, our model will run three times using each measure individually as a robustness check.

The methodology introduced by Sarma, M. (2008) and used in the computation of the financial inclusion index discussed above will be used in the computation of the financial instability index as well. Two dimensions for measuring the resilience of banks and their liquidity exposure will be used, d_I: Leverage Risk; and d_Q: Liquidity risk [14]. Each of those dimensions will be measured in a independently according to the following equation that ensures the $0 \leq d_i \leq 1$;

$$d_i = \frac{A_i - m_i}{M_i - m_i}$$

[14] For a detailed description about the variables used in each dimension see table 2 in Annex 1.

where d_i is the dimension index (d) for the i^{th} dimension. A_i is the actual value of dimension i, m_i is the minimum value of dimension i, and M_i is the maximum value of dimension i.

Then the index of financial stability for country *x* will be measured by the normalized inverse Euclidean distance of d_i from its ideal point [15] following the below formula;

$$FSTXi = 1 - \frac{\sqrt{(1-d_1)^2 + (1-d_2)^2 + \ldots . + (1-d_n)^2}}{\sqrt{n}}$$

where n is the number of dimensions used.

3.4Methodology

The hypotheses development of this thesis proposes that there is a potential relation between the size of the SE in a country and the level of financial inclusion. Additionally, both variables might affect the level of financial system stability. We examine the impact of financial inclusion and the size of the SE on financial stability using a Two-Stage Linear Square regression (2SLS) with country fixed effects on data of 20 emerging economies from 2004-2014. Since there is a possibility that the results of this analysis might be biased due to problems of endogeneity between financial inclusion and the size of the SE as previously discussed in the literature, we use an instrumental variable technique with two-step linear square regression following Aahmed, M. M., & Mallick, S. K. (2017). A 2SLS regression analysis is a statistical technique that is used in the analysis of structural equations. 2SLS is considered an extension to OLS and mainly used when

[15] If *n* dimensions of financial inclusion are considered, then country *x* will be represented by point $D_X = (d_1, d_2, \ldots, d_n)$ on the n-dimensional Cartesian space, where point O= (0,0,…,0) represented the worst scenario, while point I=(1,1…,1) represents the best scenario for all dimensions. The normalization is done in order to ensure that all values are between 0 and 1, while the inverse distance is considered so that a higher value indicates higher level of financial inclusion.

the response variable's error term is correlated with the explanatory variables error terms, moreover, it is of great use when there are feedback effects in the model.

In OLS, there is a basic assumption that the error terms of the dependent and the independent variables are independent of each other, however, when this assumption is voided, problems of endogeneity and bias start to arise. The 2SLS aids in solving those problems through the projection of a fitted value of the dependent variable using an instrumental variable that corrects the dependent variable to its error term. Therefore, the projected predictor is then assumed to be independent of the error term and correlated to the problematic predictor where it extracts the exogenous component of financial inclusion, reducing concerns about endogeneity.

With respect to the scope of this research, the following steps will be used. In the first stage (model 1), a projected variable that substitutes the problematic causal variable is created through an instrument variable. Through regressing our computed financial inclusion index and other control variables against the size of the SE. Through this regression, we create an instrumental variable that represents the residual series of the SE. Using this residual series as an instrumental variable will enable us to project a new fitted variable for the size of the SE.

In the second stage (model 2), the new fitted variable will be regressed along with financial inclusion and other control variables against the degree of financial system instability. We run three regressions using the fitted value of SE, the financial inclusion index and other control variables including country-specific and banking-system-specific data against our computed index of financial instability, NPL ratio, and credit-to-deposit ratio separately. The estimation output of the three models using three different dependent variables individually will act as robustness test for one another.

3.5Model

In this section the two employed models and the hypothesis that each model will test are described. A brief description of the data used in each model will be given with the choice of the dependent and the independent variables.

3.5.1 Model 1

The size of the SE will be regressed against financial inclusion and other country level control variables for a sample of 20 emerging economies[16] from 2004-2014, to estimate the validity hypothesis (01). The following hypothesis will be tested;

H_{01}: Financial Inclusion has a significant negative effect on the size of the SE.

Using panel least squares regression on the following equation;

$$SHDWEC_{i,t} = \alpha + \beta_1(FNCX_{i,t}) + \beta_2(GINI_{i,t}) + \beta_3(LGDPC_{i,t}) + \beta_4(UNEMP_{i,t-1}) + \beta_5(AGEDP_{i,t}) + \beta_6(SCNROL_{i,t}) + \beta_7(CRGOV_{i,t}) + \beta_8(TROPEN_{i,t}) + \varepsilon_{i,t}$$

where $(FNCX_{i,t})$ is a composite index measuring the degree of financial inclusion[17], measure of income inequality $(GINI_{i,t})$, Logarithm of GDP per capita $(LGDPC)_{i,t}$, Unemployment rates $(UNEMP_{i,t-1})$ lagged by 1, Age dependency ratio as a percentage of working-age population $(AGEDP_{i,t})$, Gross enrolment ratio in secondary schools for both sexes $(SCNROL_{i,t})$, Credit to government and state owned enterprises as a percentage of GDP $(CRGOV_{i,t})$, and degree of trade openness $(TROPEN_{i,t})$. β are a set of nuisance parameters, $\varepsilon_{i,t}$ is an error term; $i = 1,\ldots,N$

[16] *Argentina, Brazil, Chile, China, Colombia, Egypt, Hungary, India, Korea, Malaysia, Mexico, Nigeria, Pakistan, Peru, Philippines, Poland, South Africa, Thailand, Turkey, and Venezuela.* This group of countries was selected based on the availability of data.

[17] For details about the computation of this index, see ch.3

represents the country; and *t = 1,…,T* represents time. Finally, β_1 is the coefficient of interest to us, where it will measure the impact of financial inclusion on determining the size of the SE.

3.5.2 Model 2

The degree of financial instability was regressed against the level of financial inclusion and other bank-level and country-level control variables for a sample of 17 [18] emerging economies from 2004-2014, to estimate the validity of hypothesis (02), (03) and (04). The following hypotheses will be tested;

H_{02}: Financial inclusion has a significant negative effect on financial instability.
H_{03}: The size of the SE has a significant positive effect on financial instability.
H_{04}: Banking sector competition has a significant negative effect on financial instability.

Using panel least squares regression on the following equation;

$$FSTX_{i,t} = \alpha + \beta_1(FNCX_{i,t}) + \beta_2(Y\text{^}SHDWEC_{i,t}) + \beta_3(BOON_{i,t}) + \beta_4(BCONC_{i,t}) + \beta_5(OVHC_{i,t}) + \beta_6(LGDPC_{i,t}) + \beta_7(M2GDP_{i,t}) + \beta_8(FNOPN_{i,t}) + \varepsilon_{i,t}$$

where $(FSTX_{i,t})$ is a composite index measuring the degree of financial instability; where higher levels indicate higher financial instability $(FNCX_{i,t})$ is a composite index measuring the degree of financial inclusion [19], projected fitted values of the size of the SE obtained from model 1 ($Y\text{^}SHDWEC_{i,t}$), Boone Indicator as a measure of banking system competitiveness $(BOON_{i,t})$ where higher levels indicate a deterioration in the level of competitiveness of the financial system , assets of the five largest banks as a percentage of total assets of commercial banks as a measure of banking system concentration ($BCONC_{i,t}$) where higher levels indicates higher concentration ,

[18] Countries excluded due to unavailability of data for the variable covered in model 2 were India, Poland, and Turkey.
[19] For details about the computation of the indices, see ch.3

bank overhead costs $(OVHC_{i,t})$ where higher levels indicate lower efficiency, Logarithm of GDP per capita $(LGDPC)_{i,t}$, broad money to GDP $(M2GDP_{i,t})$ as a measure of financial liberalization, and degree of financial openness (0-1) $FNOPN_{i,t}$ as a measure of capital account financial integration. β are a set of nuisance parameters, $\varepsilon_{i,t}$ is an error term; $i = 1,\ldots,N$ represents the country; and $t = 1,\ldots,T$ represents time. As previously mentioned, we utilize NPL to gross loans (NPL) and Banks credit-to-deposit ration (CR2DP) along with our computed index (FSTX) to run three separate regressions as robustness check.

3.6 Descriptive Statistics

Tables 1 and 2 below reports the descriptive statistics and the correlations of the variables used in the empirical analysis that follows. The table is divided accordingly, the first variable reflects the size of the SE. While the second section represents financial inclusion measures; that include the index computed (FNCX), and the dimensions used in measuring the index; i.e. number of deposit account holders, ATMs and private credit & deposits to GDP. In the third section, we have financial instability measures that include the index computed (FSTX) and its dimensions i.e. bank credit to deposits and bank NPL to gross loans. The fourth section include variables related to the banking system of a country like the Boone indication, 5 bank asset concentration, and Banks overhead costs. The fifth section include country-related variables like the GINI coefficient, GDP per capita, unemployment rates, age dependency ratio, secondary school enrollment, credit to government and state-owned enterprises, level of trade openness, broad money to GDP and the level of financial openness. One important note on table 1 is that the number of observations varies according to the regression model each belongs to. Since this thesis will run 2 separate regression models, the number of observations will vary according to the combination of variables used.

Table (1)

Descriptive Statistics (2004-2015)

	Mean	Median	Maximum	Minimum	St.Dev.	No.of Obs
SHDWEC	30.40393	29.99500	54.68000	1.670000	10.62962	112
Financial Inclusion Variables						
FNCX	0.505897	0.492116	0.826306	0.355552	0.115214	112
Number of Deposit account holders (per 1,000)	940.3912	861.1600	4522.180	8.090000	826.4177	112
Automated teller machines (ATMs) (per 100,000)	55.49968	43.07325	265.3754	0.750167	50.25925	112
Sum of private credit and deposits to GDP	95.50723	81.78500	245.8300	25.17000	57.91919	112
Financial Instability Variables						
FSTX	0.153570	0.144519	0.443858	0.059401	0.068522	98
CR2DP (%)	100.7331	86.87690	279.7639	45.25945	47.07230	98
NPL (%)	4.784831	3.063505	37.30000	0.588001	5.160662	98
Banking System Variables						
BOON	-0.079714	-0.080460	0.543273	-3.196120	0.363597	98
BCONC	69.02382	65.68865	100.0000	43.23730	13.68022	98
OVHC	3.425652	2.969910	10.03910	0.927641	1.679368	98
Country-level Variables						
GINI	42.93777	41.80000	66.10000	29.80000	8.461427	112
LGDPC	8.798278	8.939911	10.04589	6.476672	0.769155	112
UNEMP	7.210598	7.405000	24.69000	0.490000	4.442334	112
AGEDP	51.23556	51.58416	87.85667	35.59041	10.05246	112
SCNROL	88.00463	93.37472	106.9244	25.21502	17.34480	112
CRGOV	13.87945	11.66725	41.33550	0.703272	10.10449	112
TROPEN	62.27086	50.12832	171.5659	22.10595	36.31737	112
M2GDP	63.73418	52.49989	185.8942	21.02095	38.18516	98
FNOPEN	0.392588	0.414513	1.000000	0.000000	0.280592	98

Source: Author's calculations

The table below shows the correlation matrix of all the variables used in our regression.

Table (2)

Correlation Matrix

Corr.	SHDWEC	FNCX	FSTX	BOON	BCONC	OVHC	GINI	LGDPC	UNEMP	AGDEP	SCROL	CRGOV	TROPEN	M2GDP	FINOPN
SHDWEC	1.0000														
FNCX	0.0267	1.0000													
FSTX	-0.1291	0.1897	1.0000												
BOON	-0.2375	0.1070	-0.4121	1.0000											
BCONC	0.1712	0.0505	0.2409	-0.0852	1.0000										
OVHC	0.2307	-0.4909	-0.2685	-0.4819	-0.0843	1.0000									
GINI	0.0474	0.0633	-0.1373	-0.0918	0.2107	0.1135	1.0000								
LGDPC	-0.3751	0.2831	-0.2093	0.2171	-0.3216	0.0426	0.1655	1.0000							
UNEMP	-0.4038	-0.0433	-0.0411	-0.0159	0.1904	0.0968	0.6224	0.2051	1.0000						
AGDEP	0.2458	-0.6714	-0.0661	-0.4188	0.2356	0.5609	-0.0099	-0.6003	0.1192	1.0000					
SCROL	-0.2812	0.1821	-0.2047	0.2333	-0.2345	0.0007	0.4279	0.7689	0.2922	-0.6038	1.0000				
CRGOV	0.0271	0.2032	-0.0835	-0.0204	-0.1229	-0.0345	0.0781	0.0606	0.0433	-0.1537	0.1059	1.0000			
TROPEN	0.1557	0.6216	0.1839	0.0903	-0.0630	-0.2062	-0.3772	0.1522	-0.2695	-0.3927	0.0242	-0.1614	1.0000		
M2GDP	-0.2214	0.7313	0.3634	0.1466	-0.0534	-0.6297	-0.2378	0.1117	-0.2721	-0.6809	0.0383	0.1847	0.4034	1.0000	
FINOPN	0.1914	-0.1400	0.0945	0.0258	0.3536	0.0977	0.1191	0.0401	-0.0734	-0.0329	0.2922	-0.0474	0.1646	-0.1923	1.0000

Source: Author’s estimates

Chapter IV

4. RESULTS

4.1 Results of Model One

The regression output of model 1 is represented in table (3) below. Financial inclusion in a country as measured by out computed index ($FNXC$) had no significant effect on the size of the SE, therefore accepting our null hypothesis that financial inclusion does not affect the size of the SE. This finding opposed that of Berdiev, A. N., & Saunoris, J. W. (2016) which can be attributed to their usage of a larger data set with a more inclusive measure for financial inclusion.

In terms of the control variables, we obtained the following results. Inequality as measured by $(GINI_{i,t})$ had a significant positive effect, that is, the higher the inequality in a certain country the larger the size of the SE. Income levels as measured by log GDP per capita ($LGDPC$) had a significant negative effect on SE, where higher income levels make people less prone to refute to the informal sector for their economic activities.

Lagged values of unemployment rates ($UNEMP$) were found to have a significant negative relation with SE, where higher levels of unemployment reduce the size of the SE, which can be explained that the unemployed voluntary choose to remain unemployed whether in the formal or the informal sector. Moreover, being unemployed by itself means that the person is still seeking a job in the formal sector and didn't yet enter the informal sector for living.

The ratio of the financially dependent people to the working age population as measured by the age dependency ratio ($AGEDP$) had a significant positive effect of SE. The higher the ratio of

people who are economically dependent on certain economic agents for living, the higher the probability of those agents to refute to the informal economy to meet their own and the dependents needs. In other words, the productive population seeks working full time or part time jobs in the informal sector to be able to maintain the upbringing and the pensions of the economically dependent members. The ratio of people enrolled in secondary education as measured by Gross secondary enrollment ratio ($SCNROL$), is a significant determinant of SE size. Besides the fact that higher school enrollment means lower child labor and thus smaller participation in the SE, higher school enrollment can reflect the fact that potential labor will be better qualified for basic market needs and better able to distinguish the adverse effects of participating in an informal economic activity. It was found that the higher levels of secondary school enrollment significantly decreased the size of the SE.

In order to measure the crowding out effect of lending to the public sector, credit to government and state-owned enterprises as a percentage of GDP ($CRGOV$) was found to have a significant positive effect with the size of the SE. Increased lending to government enterprises means less available funds for the private sector; households and firms, which contributes to them being crowded out. The private sector can then refute to external sources, or sometimes to the informal economy for funds, thus increasing the size of the SE. The level of international trade exposure as measured by percentage of total trade over GDP ($TROPEN$) was found to have a significant negative effect on the size of the SE, which can be attributed to the fact that trade openness creates jobs, increases innovation, enhances the rule of law and improves the regulatory framework.

Table (3)

Dependent Variable:	SHDWEC
Variable	Coefficient
Constant	20.80015 (20.92840)
FNXC	10.13058 (7.263186)
GINI	0.264778** (0.120849)
LGDPC	-2.983845** (1.350551)
UNEMP(-1)	-0.526143*** (0.167240)
AGEDP	0.780209*** (0.178012)
SCNROL	- 0.082022* (0.046411)
CRGOV	0.172628** (0.072511)
TROPEN	- 0.190217*** (0.032154)
Observations	112
R-squared	0.979046
Adjusted R-squared	0.972311

(1) Parenthesis imply St. Error.
(2) *, **, *** indicate statistical significance at the 10,5 ,1% levels respectively

The above regression was conducted using the following equation

$$SHDWEC_{i,t} = \alpha + \beta_1(FNCX_{i,t}) + \beta_2(GINI_{i,t}) + \beta_3(LGDPC_{i,t}) + \beta_4(UNEMP_{i,t-1}) + \beta_5(AGEDP_{i,t}) + \beta_6(SCNROL_{i,t}) + \beta_7(CRGOV_{i,t}) + \beta_8(TROPEN_{i,t}) + \varepsilon_{i,t}$$

4.2 Results of Model Two

The regression output of model 2 is shown in table (4) where the level of financial inclusion, size of SE and other control variables were regressed against measures of financial instability; including our computed index of financial instability, and the two variables used in the computation of this index separately (NPL to gross loans and Bank Credit to Deposit). Column (1) and (3) show that the level of financial inclusion in a country $(FNXC)$ has a significant positive effect on the level of financial system instability; $(FSTX)$ and $(CR2DP)$, therefore rejecting our null hypothesis that financial inclusion does not affect the size of the SE. Higher financial inclusion can lead to a more instable financial system when the credit expansion is unregulated. This finding is in line with that of Norris, E. D., et al. (2015), Sahay, R., et al. (2015) and Čihák, M., et al. (2016).

Additionally, the projected fitted values of the size of the SE obtained from model 1 $(Y\hat{}SHDWEC)$ was found to have a significant positive relation to financial instability $(FSTX)$, that is, the larger the size of the SE, the more unstable the financial system becomes. This finding conforms with that of Rahman, A. (2014).

In terms of the bank-level conditioning variables, we obtained the following results represented in columns (1) and (2). The level of bank competitiveness as measured by the Boone indicator $(BOON)$ was found to have a significant negative relation with financial instability $(FSTX)$ and (NPL) . An increase in BOON indicates a lower competitive environment, therefore, the lower the competition in the banking sector, the more stable the financial system is. Therefore, we can reject our null hypothesis that competition has no effect on financial system instability. On the other hand, while using the assets of the five largest banks to total commercial banks as a measure for

banking system concentration ($BCONC$), a significant positive relation with level of financial instability ($FSTX$) and (NPL) was found. This indicates that the higher the degree of banking concentration the less stable the financial system is, those findings conform with Kasman, S. & Kasman A. (2015) and Ben Ali, M. S., et al. (2018).

The level of banking system efficiency as measured by the operating expenses of the banking system as a percentage of total assets held through bank overhead costs ($OVHC$) was found to have a significant negative relation with the level of instability ($FSTX$).

Income levels as measured by log GDP per capita($LGDPC$) depicted a significant positive effect on financial instability ($FSTX$) and ($CR2DP$), therefore, the higher households income levels in a country, the less stable the financial system is. This can be explained through the notion that higher GDP per capita, doesn't necessarily mean that all members of an economy will have higher incomes. In fact, this increase in income can be concentrated in the hands of a few, where extreme concentrations of wealth can be a cause of financial instability in line with Beck, T. et al. (2007). Opposite results where obtained when regressing against (NPL) as a measure of financial instability, where ($LGDPC$) was found to have a significant negative relationship with the level of instability (non-performing loans to gross loans).

The amount of money supply and a proxy of size of the financial sector as measured by broad money to GDP ($M2GDP$) was found to have a significant negative effect on financial instability ($FSTX$) and ($CR2DP$), where the bigger the amount of money supply, the bigger the size of the financial sector, and thus the more stable it becomes. The degree of capital account exposure to the international markets as a proxy for financial openness ($FNOPN$) was found to have a significant positive relation with the level of financial instability ($FSTX$) and ($CR2GDP$). The

higher financial exposure to international financial and capital markets can make an economy more sensitive to changes in those markets, and thus increasing instability levels.

Table (4)	Dependent Variable		
	Measures of Financial Instability		
	(1) FSTX	(2) NPL	(3) CR2DP
Constant	-0.433825** (0.202845)	20.96429 (15.77841)	-207.7293** (99.38391)
FNXC2	0.439272*** (0.131449)	8.406491 (11.41033)	288.2968*** (64.40330)
Y^SHDWEC	0.004560** (0.002061)	0.025102 (0.166803)	0.758965 (1.009900)
BOON	-0.069150*** (0.015457)	-3.240211*** (0.879288)	-5.307246 (7.573100)
BCONC	0.001062*** (0.000398)	0.060536* (0.035115)	0.214862 (0.195157)
OVHC	-0.011730*** (0.004856)	-0.162666 (0.392829)	-1.144107 (2.379434)
LGDPC	0.032256* (0.018075)	-2.85185** (1.312252)	18.22550** (8.855611)
M2GDP	-0.002009*** (0.000646)	-0.020344 (0.054340)	-0.659114** (0.316648)
FNOPN	0.088380*** (0.032494)	2.555114 (2.492288)	28.79254* (15.92042)
Observations	98	104	98
R-squared	0.929944	0.895554	0.964365
Adjusted R-squared	0.902922	0.858448	0.950620

(1) Parenthesis imply St. Error.
(2) *, **, *** indicate statistical significance at the 10,5 ,1% levels respectively

The above regression was conducted using the following equation

$$FSTX_{i,t} = \alpha + \beta_1(FNCX_{i,t}) + \beta_2(Y\text{^}SHDWEC_{i,t}) + \beta_3(BOON_{i,t}) + \beta_4(BCONC_{i,t}) + \beta_5(OVHC_{i,t}) + \beta_6(LGDPC_{i,t}) + \beta_7(M2GDP_{i,t}) + \beta_8(FNOPN_{i,t}) + \varepsilon_{i,t}$$

where the dependent variables used were FSTX, NPL & Credit-to-Deposit alternatively.

CHAPTER V

5. CONCLUSION

This thesis aims to analyze the relation between the level of financial inclusion, financial system stability and the size of the Shadow Economy (SE). In order to do so, our review of related literature has compiled a sound theoretical framework describing the channels by which this complex relationship works. First, under a strong regulatory and supervisory legal framework, financial inclusion was argued to decrease the size of the SE through many channels. For instance, higher financial inclusion was stated to decrease intermediation costs, increase the social legitimacy of financial institutions, and enhance various socioeconomic variables that affects long run economic stability, like equality, fair distribution of resources and income levels.

Second, a framework about the main factors that affect financial stability was presented. For instance, financial inclusion was said to impact the stability of the financial system through the offering a more diversified deposit and loan bases, higher efficiency of financial institutions, more stable household financial position and more effective monetary policy. The level of banking concentration and competition can also affect the level of financial stability, through creating pressures on banks' profits, thus creating an incentive for the banks to alter their risk-taking behavior and interest rates. The level of concentration of the banking sector can also alter the government's regulatory burden and quality of supervision, consequently affecting the stability of the financial sector. Moreover, financial stability can be affected by the size of the SE since credit and saving channels provided by the informal sector can significantly impede stability.

In order to understand the interrelationship between financial inclusion, SE, financial stability, this thesis has employed panel data for 20 emerging economies over the period 2004-2014. Our

methodology depends on panel fixed effects Two-Stage Linear Regression (2SLS), that aims to cure the endogeneity problem between financial inclusion and the size of the SE in assessing their effects on financial stability, through the creation of a fitted value of SE using an instrumental variable. Our empirical methodology is based on regressing two models, one assesses the relation between inclusion and SE and the other assesses the relation between inclusion, SE and financial stability. After regressing the first model, we found that financial inclusion had no significant effect on the size of the SE. Moreover, income inequality, age dependency ratio and credit to government and state-owned enterprises were found to significantly increase the size of the SE. On the other hand, income levels, unemployment, secondary school enrollment rates and level of trade openness were found to significantly impede the size of the SE.

In our second model, we assessed the relation between financial stability, financial inclusion, the size of the SE and banking system competition, while controlling for bank-specific and country specific variables. Higher levels of financial inclusion, level of competition of the banking sector, levels of concentration of the banking system, degree of financial openness, and bigger size of SE, were found to lower the degree of financial stability. On the other hand, banking system inefficiency as measured by bank overhead costs to total assets, and broad money to GDP were found to significantly increase the financial system stability.

The findings of this thesis can have important policy implications since the inclusion-stability and SE- stability tradeoffs were found to be significant. The relations concluded in this thesis can highlight important factors for policy makers and governmental agencies to focus their efforts. Increasing financial accessibility of poor and more vulnerable economic agents, and thus driving them away from the informal sector and its adverse effects can pave the road for reaching a more stable financial system and a more sustainable welfare.

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Annex 1

Table 1A

Data used in computing financial inclusion index FNCX.

	Dimension	Description	Source
D_P	Penetration	Depositors with CB (per 1,000 adults)	IMF-FAS
D_A	Availability	Automated teller machines (ATMs) (per 100,000 adults)	GFDD
D_U*	Usage	Private credit by deposit money banks to GDP (%)	GFDD
		Financial system deposits to GDP (%)	GFDD

*D_u was calculated; following Sarma, M. (2012), as the sum of Private credit by deposit money banks to GDP and Financial system deposits to GDP, then converting the result into a dimension whose values are between 0 and 1.

-The dimensions above were given the following weights 0.5,0.5,1 respectively. This was done due to the limited availability of data D_A and D_p in a number of observations.

Table 1B

Data used in computing financial stability index FSTX.

	Dimension	**Description**	**Source**
D_I	Leverage risk	Bank nonperforming loans to gross loans (%)	GFDD
D_Q	Liquidity risk	Bank credit to bank deposit (%)	GFDD

-The dimensions above were given the following weights; 1,1 respectively.

Annex 2

The table below presents all the variables used in this thesis, along with their description and sources.

Data sources			
	Variable Name	**Description**	**Source**
SHDWEC	Shadow Economy Size	Using MIMIC model, a data set of the size of shadow economy in 158 countries from 1999-2015 was estimated, through measuring the extent of which tax burden, regulatory burden, currency/cash outside banks, unemployment rates, self-employment rates, economic freedom and business freedom affect the development of informal economy.	Schneider, F., & Medina, L. (2018)
		Financial Inclusion Variables	
Depositors at Commercial Banks	Number of Deposit account holders (per 1,000)	Denotes the total number of deposit account holders that are resident nonfinancial corporations (public and private) and households in commercial banks for every 1,000 adults in the reporting country. Calculated as: (number of depositors)*1,000/adult population in the reporting country.	IMF-FAS
ATMs per 100,000 adults	Number of Automated teller machines per 100,000 adults	Automated teller machines are computerized telecommunications devices that provide clients of a financial institution with access to financial transactions in a public place.	IMF-FAS
Private credit to GDP	Private credit by deposit money banks to GDP (%)	The financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	GFDD
Bank deposits to GDP	Financial system deposits to GDP (%)	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP.	GFDD
		Financial Instability Variables	
CR2DP (%)	Bank credit to bank deposit (%)	The financial resources provided to the private sector by domestic money banks as a share of total deposits. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits. Total deposits include demand, time and saving deposits in deposit money banks.	GFDD
NPL (%)	Bank nonperforming loans to gross loans (%)	Ratio of defaulting loans (payments of interest and principal past due by 90 days or more) to total gross loans (total value of loan portfolio). The loan amount recorded as nonperforming includes the gross value of the loan as recorded on the balance sheet, not just the amount that is overdue.	GFDD

Banking System Variables			
BOON	Boone indicator	A measure of degree of competition based on profit-efficiency in the banking market. It is calculated as the elasticity of profits to marginal costs. An increase in the Boone indicator implies a deterioration of the competitive conduct of financial intermediaries. A measure of degree of competition, calculated as the elasticity of profits to marginal costs. To obtain the elasticity, the log of profits (measured by return on assets) is regressed on the log of marginal costs. The estimated coefficient (computed from the first derivative of a trans-log cost function) is the elasticity. The rationale behind the indicator is that higher profits are achieved by more-efficient banks. Hence, the more negative the Boone indicator, the higher the degree of competition is because the effect of reallocation is stronger.	GFDD
BCONC	5-bank asset concentration	Assets of five largest banks as a share of total commercial banking assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax, discontinued operations and other assets.	Bankscope and Orbis Bank Focus, Bureau van Dijk (BvD)
OVHC	Bank overhead costs to total assets (%)	Operating expenses of a bank as a share of the value of all assets held. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax assets, discontinued operations and other assets.	Bankscope and Orbis Bank Focus, Bureau van Dijk (BvD)
Country-level Variables			
GINI	GINI index of income inequality	Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus, a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	WB and WIID
LGDPC	Logarithm of GDP per capita (current US$)	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.	WB
UNEMP	Unemployment Rates, total (%)	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.	ILO- ILOSTAT Data Base
AGEDP	Age dependency ratio (% of working-age population)	Age dependency ratio is the ratio of dependents--people younger than 15 or older than 64--to the working-age population--those ages 15-64. Data are shown as the proportion of dependents per 100 working-age population.	WB
SCNROL	Gross enrolment ratio, secondary, both sexes (%)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.	WB

CRGOV	Credit to government and state-owned enterprises to GDP (%)	Ratio between credit by domestic money banks to the government and state-owned enterprises and GDP.	IMF- IFS
TROPEN	Trade openess as (% of GDP)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	WB
M2GDP	Broad money to GDP	Broad money (IFS line 35L..ZK) is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.	IMF-IFS
FNOPEN	The chinn-ito index of Financial openness	The Chinn-Ito index (KAOPEN) is an index measuring a country's degree of capital account openness KAOPEN is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).	Retrieved from http://web.pdx.edu/~ito/Chinn-Ito_website.htm