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Financial regulation and financial development in developing economies: case of South Africa

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Declaration

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I am ever humbled by the grace of God, Romans 5:3-5

Abstract

The study analyses financial regulation, specifically for the banking sector, set globally and implemented locally by different countries, and how it impacts financial development in the context of developing countries, considering the pace of reform since the 2008/9 financial crises and its technical nature. The regulatory framework affects advanced and developing economies the same and thus raises concerns on its efficiency in the later given the general level of financial development.

The scope was restricted to focus on key indicators including financial development, systemic risk, equilibrium credit and bank regulation. Time series data from 2017 to 2022 was modelled using the Auto Regressive Distributed Lag technique which presented strong evidence that the leverage ratio is likely to result in a contraction in the long run trend of bank credit to the private sector-to-GDP ratio and possibly distort equilibrium credit for the economy in the long run, resulting in restricted capacity for financial development. The model presented no short-term relationships.

A review of the microprudential regulatory framework may be required to achieve an optimum regulatory environment that protects and enables the country to grow and benefit from healthy development of the financial system that can foster greater financial depth and economic growth.

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List of abbreviations

ADF - Augmented Dickey-Fuller

AIC - Akaike Information Criterion

AICc - Akaike Information Criterion Corrected for Small Sample

ARB - Advanced Ratings Approach

ARCH - Autoregressive Conditional Heteroskedasticity

ARDL - The Autoregressive Distributed Lag

BA - Banks Act

BCBS - Basel Committee on Banking Supervision

BIC - Bayesian Information Criterion

B-G LM - Breusch-Godfrey Lagrange Multiplier

CoDI - Corporation for Deposit Insurance

COVID-19 - Coronavirus Disease 2019

DF - Dickey and Fuller

DSIB - Domestic Systemically Important Banks

DSTI - Debt-Service-To-Income Ratios

DW - Durbin-Watson

FSB - Financial Stability Board

G-20 - Group of 20

GDP - Gross Domestic Product

Global Systemically Important Banks GSIB)

GMM - Generalised Method of Moments

HP - Hodrick-Prescott

HQC - Hannan-Quinn Information Criterion

IMF - International Monetary Fund

IRB - Internal Ratings Based Foundational

LCR - Liquidity Coverage Ratio

LDC - Least Developed Countries

LIC - Low-Income Countries

LIDC - Low Income Developing Countries

LOLR - Lender of Last Resort

MPC - Monetary Policy Committee

MSE - Mean Square Error

MSMEs - Micro, Small and Medium Sized Enterprises

NBFI - Nonbank Financial Institutions

NSFR - Net Stable Funding Ratio

OLS - Ordinary Least Squares

PA - Prudential Authority

RWA - Risk Weighted Assets

SARB - South African Reserve Bank

SDG - Sustainable Development Goals

STA - Standardised Approach

Chapter 1

Introduction

1.1. Introduction

The paper seeks to explore and attempts to address a problem that stems from the issue of financial development and its impact on economic growth. Banking institutions are identified as key players in financial development in developing economies or countries and tend to dominate their financial systems.

Financial development needs to progress at the right level so not to overtake the economy and introduce excessive systemic risk thereto and thus must be linked to the real sector to serve the economy and foster growth. In the same way, a slow pace is not ideal as it would delay much needed growth, (Sahay et al., 2015), (Schwarcz, 2007) and (Lin et al., 2000).

The efficiency of banks in their role in the economy becomes very important. Structurally, and functionally interlinked therewith is financial regulation which aims, among other things, to control the level and extent of financial development, promote the generation of economic wealth, and protect the economy and taxpayer from systemic risk.

Due to the global nature of banking and bank regulation, different banks are connected to and exposed to each other in the very dynamic environment in which they operate. Thus, their local environments are connected to and affected by the global environment, especially from a risk perspective. However, inherent risk intensity and development differs in relation to the level of economic development, market maturity and sophistication as well as product offering, while the regulatory framework is driven by the global environment and applies uniformly (World Bank, 2019).

According to the scholars and industry practitioners whose work is explored in the sections that follow, compliance becomes a challenge for smaller economies with less sophisticated markets. This tends to have a negative impact on the positive contribution of financial development to the economy. This paper aims to explore empirical evidence to determine if a significant relationship between financial regulation for banks and financial development exists, as well as to define the type of relationship in case of the existence thereof, in its intention to strive for a safe and efficient system that will protect the economy from systemic risk.

1.2. Problem statement

There is very little prior academic research work, let alone recent, on understanding what optimal financial regulation in developing countries ought to be, some of the identified relevant work includes Jackson (2007), Brownbridge and Kirkpatrick (2000), Lin et al. (2000), Calderón-Rossell (1984).

Guidance on the determination thereof for the benefit of developing countries with less sophisticated market structures; to improve the understanding and appreciation of the impact of international financial regulation framework and reform on a developing economy's financial development, so to inform the establishment of a framework that will be more responsive to their industry needs and of efficiency and high impact on their imminent systemic financial risks is also lacking. The main identified source to this effect is IMF (2014) and BIS (2011).

1.3. Problem description

International regulatory framework may be too cumbersome and a burden for developing countries due to the complexities that come with implementing such framework, from the investment in information technology infrastructure and level of data availability, quality and completeness needed to produce and report the required results, to the skills, expertise, and capacity (both for the regulator and the regulated banks).

Since the 2008/09 crisis, there has been a significant reform of regulatory principles for banks, most of which is ongoing, with the aim of developing a more robust risk management framework to improve financial stability, among other objectives (with Basel accords II, III and IV which is currently underway globally).

This results in certain jurisdictions (particularly in developing economies) falling behind on the implementation of the updates to the framework. These countries never caught up with the implementation of the initial framework and principles (Basel I) and now the reform thereof is developing at a rapid pace (Ojo, 2015).

This results in them selectively applying certain principles from the available updated framework, for instance, countries still implementing Basel I will move to apply certain principles of capital management in the third accord while majority of their framework is still on the first. This may result in non-robust and inefficient regulatory environments and

frameworks and may carry additional difficulty where the implementation of the updated framework builds onto the previous work of the immediately preceding accords.

It also raises a question of whether, they will ever catch up, also, is their approach truly effective in terms of building a local robust framework to manage risk and maintain financial stability. Is it a question of ticking boxes in a highly globalised sector in order to remain competitive and recognised or one of responding to imminent risk, thus prompting the prioritisation of certain principles but in a sufficiently robust and balanced manner?

1.4. Research question

The question the study aims to address is one of

- the existence of a relationship between financial regulation and financial development in a developing country; and
- the nature of the relationship, in the presence thereof.

1.5. The research gap

Research show that given the broad and increasingly complex framework and range of regulatory principles, a subset thereof is crucial for financial development that enhances financial stability without conflict (Sahay et al., 2015).

Schwarcz (2007) in his work looking at Systemic Risk, is of the opinion that financial systems will function optimally under the right balance of regulatory framework to support and control financial development. "*Regulation can also disrupt the efficient evolution of markets and can be downright counterproductive if the market would naturally adjust to information that caused its failure and thus it is important to consider the feasibility of international regulation, and the extent to which regulatory solutions are universal or should be different for different countries*." (Schwarcz, 2007:209).

The view and argument of this paper supports these views, particularly in the context of developing economies. The appropriate calibration and identification of such principles that promote robust risk management for imminent risk in a methodical and structured manner that is comparable at least regionally is worth considering.

Scholars and policy makers below confirm that there is a place for financial regulation but also highlight a gap, that is the little evidence of research work focused on understanding how to strike the right balance in the implementation of the many, ever evolving, increasingly complex principles to achieve optimum regulation that fosters financial development without being unnecessarily punitive for institutions to comply and regulators to implement and supervise.

The other aspect of it is that most of the available work on optimal financial regulation is done in the context of developed economies and very little work is done on developing economies, as well as the fact that most of the literature is pre 2008/09 financial crises or just thereafter, after which regulatory reform developments has increased considerably in intensity and sophistication.

Majority of the coverage is mostly from a policy perspective rather than academic. However, the earlier related academic work that was done is cited in most of the policy research done more recently as a basis for policy developments, thus showing the importance of academic work in this field.

There are different views and aspects affecting these issues, some key arguments from global scholars and policy makers are summarised below.

> Brownbridge and Kirkpatrick (2000) have studied financial regulation in developing countries, focusing on Least Developed Countries (LDCs) and find that while considerable improvements have been made in implementing regulatory framework, "*many countries are yet to build robust prudential systems that can protect their banking systems from systemic crises*". Their work further finds weaknesses related to "*loopholes in the prudential regulations, shortages of skilled supervisors, and regulatory forbearance*."
>
> They also find that there are "*difficulties in applying the developed economies' model of regulation, which relies heavily on accurate financial information, highly skilled technicians, and an impartial bureaucracy, due to the fact that they operate in environments characterised by weak accounting and legal frameworks, acute shortages of skilled personnel and pervasive political interference in public administration*" (Brownbridge and Kirkpatrick, 2000:2). These aspects will significantly influence the structure, operational efficiency, and effectiveness of micro and macroprudential framework implemented.

Jackson (2007) finds that there is a lack of robust academic literature with clear implications on how a certain jurisdiction should determine its optimal level of financial regulation, his research work analyses the costs and benefits of financial regulation as well as difficulty in making international comparisons between noted levels of intensity in financial regulation, covering the United States of America, United Kingdom and Germany (Jackson, 2007). Even less work has been done on this topic in developing economies despite it being an area of note for policy makers therein.

Lin et al. (2000) finds that optimal structure is endogenous to an economy in that the stage of economic development of a country will determine the optimal industrial structure in the real subsectors. This will constitute the determinants of the endogeneity of optimal financial structure in line with its size distribution and risk features (Lin et al., 2000). Thus, optimal financial regulation thereof should also be closely aligned to the endogenous structure and respond directly to the imminent risks.

The authors further highlight the importance of bank and market size distribution in a financial system and structure, as they both serve various aspects of the economy that the other may not be able to effectively serve and therefore, are specialised in their services. This further adds to the concept of the endogeneity of the risk profile of a system and responses thereto. This concept should thus, principally, hold in the globalised financial system.

The World Bank, in its 2019 annual financial development report, obtained views of various market participants in a survey on regulatory reform. It indicated that 81% of the respondents believe that postcrisis regulation is effective in mitigating systemic risk. 68% believe that it is too expensive for financial institutions, resulting in inefficiencies in financial intermediation. This is reported to have led to a shift to shadow banking outside of the regulated financial system (figure 3). 45% believe that regulation is mostly positive in developing economies, whereas 19% believes it to be the opposite (World Bank, 2019).

The research work in this paper considers the responses of the 45% and 19% of respondents, employing a methodology that will provide a closer look at what could

possibly inform the views of the respondents in these categories within a focused context to hopefully identify loopholes or oversights of the international sentiment.

The report also stated that the G-20 has mandated the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS) to lead the Global Financial Reform Agenda to correct the mistakes of advanced economies during the 2008/09 crises.

The positive contribution of financial development to economic growth from which developing countries benefit may be hindered by unnecessarily heavy financial regulatory framework. *"The policy discussions regarding the right blend of regulation and supervision have become critical to the fate of billions of people in developing countries as these nations grapple with financial sector reforms shaped by the agendas of advanced economies"* (World Bank, 2019: ix).

Further research finds that financial systems should aim to find the right balance of regulatory framework to support and control financial development. While stricter regulatory framework can protect and improve financial stability, it may also be restrictive and costly, thereby holding back much needed advancement (Sahay et al., 2015).

On the other hand, weak or light touch financial regulation can result in financial instability. (National Treasury, 2011) and (National Treasury, Peaks, 2015). Striking the right balance would thus be contextually subjective to the level of development of the financial architecture and sophistication when localizing the international principles, which is the responsibility of local regulators.

Research further finds that the importance of banks in a financial system is dependent on a country's economic developmental state (Gambacorta et al., 2014) and (Sahay et al., 2015). Herring and Santomero (2000) project that banks in advanced economies are less important. As a result, regulation is potentially moving towards the removal of the safety nets afforded them due to their special status, with the lender of last resort (LOLR) structure and function of the central bank. This would mean the end of the distortions in their risk-taking practices which are not as optimal as they should be, due

to the distorted incentives leading to increased moral hazard. This will then result in no need for prudential regulation (Herring and Santomero, 2000).

Considering the views of the World Bank, that international regulatory framework reform is driven by the agenda of developed economies, this would pose a problem for developing economies given the role their banking industry plays in building a strong financial system and the benefits it has for local economic growth.

The World Bank defines, in its research, overall optimal state of financial regulation as one where government oversight is complemented by private monitoring by the institutions themselves and other stakeholders involved. Policies need to be designed to align incentives of the private sector (as the agent of the real economy) with interests of the public. Another big aid that complements regulatory supervision is market discipline of the financial institutions to keep themselves and peers accountable (World Bank, 2019).

Creating a culture of ethical behaviour and peer supervision may be an ideal way to regulate a dynamic and complex industry such as banking, due to the big operational gap that lies between the supervisor and the bank, where heavily complex and punitive frameworks may create a situation where regulation is reduced to a tick-box exercise to satisfy the supervisor's requirements while taking advantage of every blind spot the supervisor may have to the actual operations and practices of institutions, therefore allowing risk build-up.

Based on the work of Brunnermeier et al. (2009), optimal financial regulation can be seen as the interaction of macroprudential (concerned with the stability of the financial system as a whole) and microprudential (concerned with the stability of each individual institution (essentially Basel accord)) regulations, because while microprudential regulation remains valid and necessary; it is just insufficient on its own and is easier to manipulate each individual regulation on its own, than when they work together (Brunnermeier et al., 2009).

1.6. Principal objective

To understand and assess the efficiency and effectiveness of international microprudential regulatory principles and the progressive reform thereof for banks; taking into account the risk environment within a developing economy context; to inform an optimal calibration of regulatory principles and requirements that are fundamental to the build of a sufficiently robust and effective risk control and management framework to promote financial development.

These may be categorised into three main categories identifying eight most reported types of regulatory principles that have a high impact on financial stability, categorised accordingly, which include (Tchana Tchana, 2008):

- Principles affecting the structure of the banking industry.
  a) strict licencing criteria.
  b) caps on interest rates for deposits.
  c) restrictions on products and services.
- Principles affecting the balance sheet of banks.
  d) capital adequacy requirements.
  e) minimum reserve requirements.
  f) liquidity requirements.
- Principles affecting bank ownership and management.
  g) asset restrictions.
  h) deposit insurance.

The most challenging and technical aspect is the balance sheet of a bank, and the study will focus more on this aspect. This is mostly affected by microprudential regulation, but is considerably influenced by the other aspects, which influence may be best managed by macroprudential policy, market discipline and peer supervision as pointed out earlier, which may be far reaching in addressing possible blind spots the supervisor may have.

Understanding the extent of the role played by supervisors in setting regulatory principles and calibrating requirements as well as the incentives created to foster desirable practices in terms of the regulations, together with the impact they have on the overall risk management space is a worthy consideration to inform optimal regulatory framework.

1.7. The justification/contribution of the study

The study contributes to the design, mostly by banking regulatory authorities and banking institutions, of robust, effective, and efficient regulatory framework and policy that is context specific and aligned to the characteristics of a financial system to not unnecessarily overburden banks with arduous compliance requirements of less benefit and focus on those that foster growth, while protecting the financial system, economy and taxpayer.

It also contributes to academic research literature as well as highlight further studies necessary in a similar context and create awareness of the information gaps required to empower developing economies to better define and manage their risk environments in a robust and effective manner.

The particular focus is on capital management and requirements, to the effect that it is mostly the quantification (from a cost of doing business perspective) of the inherent risk a bank must accept and fund in order to operate as a stable business and thus, closely reflect the amount of risk in a banks' operations. Measuring identified risk accurately has a direct impact on this metric and consequently, risk identification becomes pivotal.

Non-risk sensitive standard measures also exist to capture the aspects that may not be accounted for in the risk sensitive measures. These also eliminate the technical and structural nuances of individual banks in risk management, that are applied by different banks to determine capital demand (like the advance approaches). They are thus simplistic in that they are reported and calculated in a uniform manner throughout the industry. These would be better suited to answer the above question.

Chapter 2

Literature Review

2.1. Introduction

The literature reviewed in this section covers work on related topics that feed into optimal financial regulation and financial development, with a few specifically focusing on developing economies while majority of the work focuses on international and advanced economies. This highlights the nuanced and rather complicated nature of these aspects that affect and influence the outcome of optimal financial regulation in particular.

2.2. Conceptual framework

The literature explored below is not an exhaustive coverage of areas and topics of impact and influence, but merely of some of the most prominent. It mainly serves as a collective view from opinions based on related various studies to solidify the concept of this study, that is, context specific optimal financial regulation for the benefit of financial development.

2.2.1. Financial regulation

Calderón-Rossell (1984) finds that there is little knowledge about the regulatory framework of developing countries. His analysis concurs with the view that regulations are so restrictive that they are reducing competition, limiting the mobilization of local resources, and inducing credit rationing in the financial system (Calderón-Rossell, 1984).

It is striking to note that forty years later, there still isn't considerable progress in breaching the gap that was identified by the author, as this still prevailed as one of the major challenges in this work.

The author further finds that the regulatory environment is usually influenced by historic developments, industry norms and judgements. However, the framework for developing countries tends to be modelled after that of industrialised countries (mostly developed) which are excessive and not well understood; if understood, it is not so practical where it is implemented in the absence of clear economic rationale, thus hindering the development of efficient and effective financial systems.

The author also characterises developing economies' financial systems as small and simpler in varying degrees in comparison to industrialised economies. It is however worth noting that the author was studying the optimal financial structure of a finance company which is a level down from what this paper is interested in, that is, an industry of a country.

The logical assumption in this paper is that there will be a spillover effect from the regulated industry to the regulated institution as it is a statutory requirement for the later to comply with the former, that is to say the industry framework will be implemented at bank level.

The current international framework is mostly reactive to the actions of the institutions in advanced economies which makes economic sense, but not so much in the context of developing economies as the framework tends to be pre-emptive so to have a preventative impact on undesirable industry practices. While it is theoretically sensible, the implementation timing is problematic for the most part if the risk being prevented is structurally not prominent, thus resulting in the impact discussed above.

Wartena (2012), finds that optimal regulation is a balanced mix between self-regulation and government regulation, but favours self-regulation (Wartena, 2012). Ojo (2016) is of the view that well-structured regulatory regimes are subject to gaps, where there is inadequate resource allocation and communication breaks (Ojo, 2016).

Ojo (2016) also states that there are multiple regulators in the financial services industry, all with different mandates and objective focus, although, all contributing to safeguarding the stability and integrity of the financial system. Due to this, there is usually a case of information asymmetry on the different levels of their monitoring processes and procedures and sometimes a duplication of efforts, thus increasing the compliance burden for regulated institutions. This accentuates breaks in coordination and collaboration among supervisors.

Government regulation's objective is to provide structure to the financial architecture of a system, by setting framework to be implemented and maintained by the regulated institutions, but also maintain the oversight role to assess and ensure adequate compliance. An end-to-end review of the regulatory framework can help identify gaps and inefficiencies and better coordinate efforts through the design of effective supervisory approaches and process designs, making best use of available resources.

Ojo (2015), in her study of, among other things, issues relating to long term funding that affects financial stability and development in Low Income Developing Countries (LIDC), identifies

systemic risk and information asymmetry as the fundamental issues linking financing and long-term funding (which are some of the core functions of a bank) to financial regulation (Ojo, 2015).

The author further studies factors causing LIDCs to lag in the implementation of regulatory standards. The author also cites the International Monetary Fund (IMF) as it highlights that one of its focal points in its engagement with LIDCs is the development of the financial sector, which further highlights small markets and limited supervisory resources and policies as key challenges for them. The author also mentions increased cost of capital as well as many such jurisdictions being insufficiently equipped to implement Basel regulations (the third accord in particular).

Another key finding raised by the author is that many financial activities are centred in the informal sector, making it difficult to monitor and supervise, thus creating loopholes, resulting in issues of undercapitalization, unsound risk undertaking, fraudulent practices, management, supervisory and regulatory inefficiencies to be prevalent.

These are the common challenging factors characterising financial systems of developing economies. From this, it can be seen how the complicated advanced regulatory regime and framework can present a challenge in terms of implementation for such countries. However, it is needed to assist in market development as the countries can benefit from stronger and more resilient markets.

The author also identifies one of the core principles that are pivotal in the build of an ideally functioning market as: an efficient global financial system which promotes economic growth through stable cross-border flows of long-term finance which is supported by appropriate global regulation (Ojo, 2015).

Given the globalised nature of financial markets and importance of financial regulation, it is noteworthy that if developing economies are to grow and be stable, they need to play in the international market. However, with the challenges discussed above, they may not be able to fully participate as they do not have the required robustness level of regulatory regime and framework. But at the same time, their efforts to implement such frameworks are hindered by the level of complexity and limited capacity while developments continue to unfold at a fast-paced rate and become ever complex.

Financial regulation thus becomes an important link between efficiently and effectively functioning financial markets (bank based) and financial development, both of which contribute to economic growth (Ojo, 2015). Financial regulation is thus particularly important for monitoring the pace of financial deepening which may introduce and involve higher risk taking and leverage, should the absence thereof be prevalent in the market, thus endangering financial stability. A good framework for regulation and institutional management becomes key to facilitate and monitor, among others, the depth of financial markets for financial development in the financial system.

2.2.2. Risk management

A discrepancy identified by Ojo in the implementation of Basel principles in certain developing countries (particularly relating to capital ratios) include different methods of calculating capital charges (Ojo, 2015). This, at the localised level may be impacted by limited expertise and market structure resulting in grey areas in interpretation and application of the principles. The author recommends that greater focus be aimed at providing additional support and training to improve LIDCs' understanding of risk management.

Central to systemic risk is credit risk, which is the risk of a bank making excessive loans that go bad and result in significant losses. This precipitates the maintenance of capital to absorb the losses to protect depositors and ensure the bank remains a going concern. The main source of these funds extended in the form of loans to the market is deposits accepted from customers in line with the licence awarded the bank to operate as such, among other activities.

The deposits undergo a maturity transformation process where they are classified and categorised according to their maturity, which process and results informs the transformation process into longer term assets which are invested and earn a return in the form of interest, both for the depositor and the bank. This process exposes the bank to liquidity risk – that there may be maturity mismatches resulting in the bank not having sufficient cash to honour short term obligations to depositors and other business counterparties.

This represents the other fundamental element of systemic risk. Thus, given the inherently fundamental nature of these processes to bank operations, the goal is to regulate the risk involved which regulation may, to an extent, impede on the bank's capacity to engage the market. The bank needs to consider the cost to itself and to the system in conducting its business

and operate within a certain appetite, thus creating an optimal position through risk identification, assessment and measurement.

However, this may also be a problem if the regulation is more advanced than it needs to be. It will make it too punitive on the operations of the bank and thus impede on growth and development opportunities. In this case, blind prevention (not commensurate with the imminent risk) is not likely to be better than cure, as the market will not grow and create opportunities.

Thus, risk assessment and measurement need to inform the optimal extent of the preventative measures required in the market and system, given the extent of development of, and activity in the system. Ojo (2012) summarises some of the challenges identified in the Basel II credit risk models. These were an improvement to the first accord and an attempt to focus more on credit risk assessment and measurement.

Recognising the difference in structure and severity, it provided three approaches to allow for some flexibility and to create an extent of optimality. These are the Standardised approach (STA), Internal Ratings Based (IRB) Foundational and the Advanced approach (Ojo, 2012).

They were found to be unduly sensitive to risk and tending to create procyclical effects which was an issue in the implementation of Basel II capital standards. This created a condition where banks were able to report healthy risk-based capital ratios while building up excessive on and off-balance sheet leverage. In a severe crisis, banks are forced to shed the leverage in a way that pushes down asset prices which negatively impacts capital and credit availability (Ojo, 2012).

This was improved with the countercyclical capital buffer, among other measures, introduced in Basel III which is "*considered to be fundamentally different from Basel accords I and II as it aims to combine micro and macroprudential reforms to address institutional and system level risks*" (Ojo, 2012:7).

This is a step in the direction of optimising the regulatory framework by considering different aspects affecting the financial sector and structural differences. The framework combining micro and macroprudential regimes will be discussed further in this section, in a review of the IMF's research work thereon.

While this is a good reform, at a lower level it comes with a host of challenges. In introducing different aspects to risk assessment and measurement, it is adding layers of complexity for markets with simpler structures and less sophistication. For the jurisdictions that are behind on

the implementation of Basel II principles, the ideal point of action, given the gaps and issues identified in implementing the framework, needs to be determined, and perhaps further consideration and strategizing may be necessary to coordinate a collective effort for developing economies to pay closer attention to the reform principles and do a localised impact analysis to properly understand the efficiency and effectiveness of the principles they are to implement.

For example, the procyclical effect of Basel II credit risk reform may create a prolonged potentially destabilising impact on a more fragile economy as they may not have the capacity, among other challenges, to implement the additional reforms of Basel III given the complexity it carries, while not updating the principles may result in their systems being considered unsafe and thus excluded (structurally) from certain market participation.

From the perspective of the subject country, achieving an optimal state by aligning and coordinating micro with macroprudential regulation becomes difficult and may create more complications in that aligning macroprudential regulation to the wrong level of microprudential regulation could for instance, put undue pressure on the macroprudential regulation, where had it been implemented on the right side at the right level, may increase synergistic benefits for the financial system and participants. For example, in a case where certain regulatory principles would have been more optimal if implemented at a microprudential level instead.

2.2.3. Micro and macroprudential regulation

Prudential policy in its entirety (both micro and macro) is believed to strengthen financial system stability whereas others believe that micro and macroprudential policies differ notably with the potential to result in tension between the two. It uses both banking and market indicators as these are two major components of a financial system (BIS, 2011).

While macroprudential regulation has a lot of external and structural influences, such as political pressure, legal framework, openness of the economy, and financial development among others, microprudential regulation is more technical, standardised and uniform and thus not as susceptible to external influences (while it may suffer from local political pressure, this will affect the extent of implementation and not the technicality thereof) and thus is most likely to be optimised with relative ease as compared to macroprudential regulation.

The IMF, in its 2014 Macroprudential policy paper, summarises the relationship between macro and microprudential policy and agrees that there is often tension between the two. While

microprudential regulation is focused on the soundness of individual institutions, macroprudential regulation is focused on containing financial system wide systemic risk that the former could not adequately address.

However, there is often an overlap in the tools used by both (see figure 2), but due to the different focus, there may be conflict in the objectives of both (IMF, 2014), thus resulting in similar tools used for different objectives, resulting in an arduous operational environment and confusion.

It further mentions that the supervisory element on the microprudential side is important to harmonise both, as it feeds information into macroprudential policy for risk assessment to ensure that it is adopted and enforced effectively. This is important to inform the decisions of macroprudential policy makers. Thus, sufficient and efficient supervisory and enforcement capacity is key.

While macroprudential policy is implemented at a national level, microprudential regulatory framework is aligned to international principles and does not usually consider individual local macroprudential policy. However, it may have built-in generic macroprudential provisions which may cause more conflict and create gaps when implemented locally.

Some criticism or scepticism on macroprudential policy as summarised in Boar et al. (2017) maintains that the effect thereof on macro-economic performance is an open debate in that the key outcome or objective against which to measure macroprudential intervention is its ability to limit financial crisis and reduce the build-up of systemic risk.

However, this is an elusive task due to the infrequency of crises and the difficulty of accurately identifying and attributing it to specific and fundamental factors. Existing attempts are subjective and limited, such as the evaluation of the impact on economic growth and volatility over the long run, which two aspects are closely linked to economic wellbeing (Boar et al., 2017).

When used effectively, macroprudential regulation can reduce the severity of crisis, instil stability, and reduce spillover to other countries, which benefit comes at the potential cost of reduced availability of financial services, a cost to the system for adjusting to macroprudential constraints and output growth (IMF, 2014).

The authors further state that while it is difficult to measure the benefits of macroprudential policy, its effectiveness can be measured against intermediate objectives such as "*increasing*

the resilience of the financial system as risks are building up, as well as to contain the procyclical feedback between credit and asset prices, and unsustainable increases in leverage that leads to overexposure to such risks" (IMF, 2014:13).

As mentioned earlier, the authors highlight some of the instruments measured and supervised at a microprudential level but monitored and influenced at a macroprudential level to include capital buffers (counter cyclical capital and capital conservation) and surcharges for systemically important institutions (which is structural). These are focused on addressing the issue of procyclicality and enhance the banks' resilience to solvency shocks as well as that of the financial system and reduce their likelihood of failure, while liquidity tools will enhance resilience to liquidity stress.

The authors note from past observation and experience that bigger capital buffers in times of strong credit demand may not necessarily slow down growth considerably. Additionally, tighter liquidity requirements to enhance resilience against systemic liquidity risk (such as the Minimum Leverage Ratio, Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) or tighter reserve requirements (Minimum Required Reserve and Liquid Asset Reserve)) can potentially slow down credit growth by limiting the build-up of financial imbalances during expansionary financial phases.

The non-interest-bearing minimum reserve regulatory requirement for liquidity risk is one of the oldest and is sometimes criticised for being a form of taxation for holding deposits. Over the years, some countries, both in developed and developing economies have abandoned it or reduced it substantially while focusing more on the new liquidity requirements (Tchana Tchana, 2008).

While LCR is concerned with banks maintaining an adequate level of unencumbered, high-quality liquid assets that can be liquidated within short notice to meet its cash requirements in a 30-day horizon (under severe liquidity stress conditions), NSFR aims to promote longer term funding of banks' activities and assets by setting the minimum level of stable funding over a 1-year horizon and arguably facilitate a diversification of liquid assets (Ojo, 2012).

Tighter Loan to Value ratios increases the customer's resilience to correlations in asset prices and thus protect banks from defaults in their loan books while tighter Debt-Service-to-Income ratios (DSTI) can assist in the maintenance of debt affordability during interest rate and income

shocks and in turn improve the resilience of banks (IMF, 2014), thus shifting the concentration in the source of funding from mainly customer deposits to include other asset classes.

The authors also notes that effective macroprudential regulation needs to look beyond the banking sector because if the measures explained above are tightened in the banking sector only, it will create demand of similar products in the more laxed nonbanking sector. Also, in the highly globalised system, market structures are dynamic and evolve and can thus undermine effectiveness if not duly adjusted.

Collaboration and coordination on the implementation and enforcement of measures and tools such as these, which inform and benefit both macro and microprudential regulation, is key to create an optimal regulatory environment to benefit both the system and banks. The implementation can consider input from both and eliminate duplication, as well as enhance efficiency by maintaining them at the same level and develop at the same pace.

Close cooperation between macro and microprudential policy on implementing and maintaining these tools will create synergies and strengthen both and thus result in wider and more holistic coverage, focus and direct attention on both sides and possibly eliminate additional or excessive measures that have little impact on systemic risk reduction in the system and bridge the gap and conflict between the two.

While the Basel framework is implemented at the operational level of each country, although internationally driven, it needs to be complementary to macroprudential framework. This is shaped by aspects of time dimension such as "*the availability of data and strength of supervisory capacity; level of debt to Gross Domestic Product (GDP) and pace of credit growth; the country's economic structure, such as its degree of diversification; and degree of capital account openness and financial integration*" as well as structural dimensions such as "*size, structure and complexity of the financial system*" (IMF, 2014:28), which aspects are of equal importance and input into macroprudential framework but is of very limited, if at all, influence to microprudential policy.

This already creates a misalignment in that microprudential framework is driven by an international agenda mostly comprised of issues not so prominent at the level of development of developing economies, which is met by macroprudential framework that is largely influenced by the local structure and environment.

This is the argument of this paper, to optimise the regulatory environment by achieving some alignment based on the typical characteristics of the subject environment and focusing on microprudential regulatory principles that address those characteristics directly and assigning priority to building a robust framework in those areas to foster financial development and growth.

In addition to the above referred paper by the IMF, they also published another paper solely focusing on developing or low-income countries (LIC) which shows recognition of the structural difference and the considerable impact on framework implementation.

The paper focuses on some key characteristics of such countries that include weak or limited supervisory capacity and data availability, shallow depth of the system and concentrated banking system, among others, and their implications on the implementation of macroprudential policy. While these characteristics are not unique to LICs/developing countries, they tend to be more prominent and the existence of more than one is likely to be observed in such.

The existence of these can help focus attention between increasing resilience to shocks and actively recalibrating policy to respond to financial condition changes. In the same tone, microprudential policy needs the same focus to build a robust environment that can create the requisite capacity to deepen markets for development.

An example given in the case of building up resilience in an environment characterised by a combination of limited data availability, volatile economic conditions, and weak supervisory capacity, is by taking a relatively simple and dynamic approach to provisioning requirements and relatively high capital and liquidity buffers where appropriate, and increasing loss absorbing capacity of larger institutions (IMF, 2014).

The IMF further states that institutional reforms, supervisory and monitoring capacity strengthening, filling information gaps for the supervisors and building statistical and analytical capacity will ensure compliance with implementation of microprudential framework which forms strong foundation for effective macroprudential policy framework.

This further highlights the importance of implementing appropriate microprudential regulatory principles with sufficient and effective supervision as a focal point of establishing appropriate and effective macroprudential policy and building sufficiently robust and optimal regulatory

framework that will foster the financial stability (risk resilience) and deepening (through increased credit intermediation) characteristics of financial development, among others.

LICs and other developing countries are in the ongoing process of financial deepening and institutional development which can result in unintended systemic risk build-up from excessive risk taking. Thus, the process needs to be closely managed to maintain and enhance resilience against shocks.

Research maintains that there is a threshold for the positive impact of financial development, particularly deepening, beyond which it will result in financial instability due to a moral hazard of excessive risk taking in a self-serving financial system (Gambacorta et al., 2014 and Sahay et al., 2015).

There needs to be a well-maintained link between the financial system and industry (real economy) so that growth in the former does not outpace that of the later, for the system to function optimally and for the bidirectional causal relationship (economic growth and financial development) to manifest (Akhtar, 2015, Dabla-Norris and Srivisal, 2013, Arcand et al., 2012 and Danthine, 2012).

Thus, the process of financial deepening needs to be well-considered, sequenced and paced consistently with a country's institutional and financial development (IMF, 2014). This view is considered further and expanded upon in the section below covering financial development and systemic risk.

2.2.4. Financial development and systemic risk.

The core function of a financial system, among others, is the efficient mobilization and allocation of financial resources, while minimizing systemic risk, this by allocating and mobilizing financial resources to the most profitable projects to improve the financial resource base and reduce systemic risk (Lin et al., 2000). However, in a case where systemic risk management measures exceed the imminent systemic risk, the system's allocative and mobilization capacity will be restricted, and profitable projects abandoned.

The authors further find that optimal financial structure is related to the stage of economic development of a country, where the composition and size distribution (i.e., mix of big and small, local and foreign banks) of financial institutions which will perform the core function better is determined in line with the needs of the real economy, which it ultimately services.

This suggests that, principally, the structure of a developed economy is different to that of a developing economy, before considering the endogeneity of the macro environment like policy, legal system, regulation, and supervision (Lin et al., 2000). The later can also, to an extent distort the former, which is the focus of this paper, particularly regulatory development with exogenous drivers in a globalised environment.

Principally, too much of anything is not good and the same applies to credit growth, this will result in an increase in the number of intermediaries (both local and foreign) which will require an increase in supervisory capacity, developments in the approach and an adjustment of the framework. These take time to build up and develop and thus stronger restrictions (to licencing, for example) may be necessary to control the pace and avoid financial crises.

However, as mentioned previously, LICs and developing economies need this expansion as it is key to their development, thus closely measuring the extent and pace thereof becomes particularly important. While managed from a microprudential framework perspective, it is effectively measured from a macroprudential perspective, considering the distinctive characteristics of the economic environment. Three approaches to measuring the appropriate level of credit growth include:

- the credit-to-GDP gap – "*(at or above ten percent) has been found to provide a strong early warning signal of an impending crisis for advanced and emerging market economies. This measure in principle, accommodates the need for financial deepening. It is the difference of the credit-to-GDP ratio and the long run trend thereof derived by a Hodrick-Prescott filter on quarterly data.*
  However, when applied to LICs, the standard credit-to-GDP gap may fail to capture the effects of frequent structural changes which may shift the long-term trend up or down" (Drehmann et al., 2010, 2011, and 2014 as cited in IMF, 2014a:6).

  Buncic and Melecky (2014) find the Hodrick-Prescott filter's pure statistical nature to neglect key changes in equilibrium credit due to economic and financial development. They also agree that there is substantial evidence that supports the view that financial deepening and growth in credit extension can improve access to finance and improve economic growth.

  The authors further state that excessive restrictions on credit extension in developing economies with greater financing needs is likely to impede on economic growth. They

propose that equilibrium credit determined by an economic fundamental based structural approach that accounts for an economy's level of financial development would be more appropriate. They also find a significant difference in the results of their proposed model and the Hodrick-Prescott filter, tested on advanced economies (Buncic and Melecky, 2014).

- Annual growth of the credit-to-GDP ratio - "*(at or above three percent) can also serve as an early warning signal, one to two years before a financial crisis for advanced or emerging market economies.*
  The use of this indicator is another way of judging the sustainability of a trend increase, especially where economies are not subject to large supply shocks. However, in the case of LICs, the growth of credit-to-GDP ratio can be misleading in the presence of volatile economic growth from frequent supply shocks including volatile commodity prices" (IMF, 2011 as cited in IMF, 2014a:6.)

- benchmarks derived from structural characteristics – "*a large change in the structural private credit gap*" (actual private credit exceeding a structural benchmark level) may indicate that the boom will be sub-par or end in crisis (Barajas at al., 2013 as cited in IMF, 2014a:6).
  The benchmark for private credit-to-GDP ratio is constructed by using the predicted value of a regression of private credit-to-GDP on structural country characteristics (for example, income, size of market, population density and demographic structure) from a cross-section or panel data of countries. However, in the case of LICs, the structural credit gap is less able to help assess whether a rapid catch-up relative to the structural benchmark may pose systemic risk.

  "*Data availability also constrains the calculation of these indicators, as the credit gap requires quarterly data over a long period, while the structural approach requires a large cross-country panel dataset*" (IMF, 2014a:6).

Other indicators that can provide further input include the analysis of the evolution of inflation adjusted credit growth, rapid credit growth to certain sectors, asset price deviations from long term trends, rapid increase in customer leverage, changes in lending standards. Credit growth expansion backed up by growth in access to credit (to new customers) as opposed to a

deterioration in lending standards for existing clients, together with monitoring lenders' capacity and ability to measure and manage associated risks is very important (IMF, 2014a).

Investing time and effort into healthy credit growth factors including improving the legal framework and the rule of the law to improve the creation, mobilization, and realization of collateral (which is an important aspect of the asset quality of a bank's loan book); improved insolvency procedures and effective institutional corporate governance can help maintain a steady pace in credit growth trends with controlled risk exposures.

McDonald and Schumacher (2007) as cited in IMF (2014) found that, among 37 sub-Saharan African countries, those with stronger creditor rights have deeper financial market development. Other observed successful efforts with a positive impact include, for example, Borrowers and Lenders Act (Ghana) and Collateral Registries to help improve lending against movable assets (Ghana and Honduras). This is an operational environmental mechanism that will help reduce reliance on financial regulation and develop a stronger market (IMF, 2014a).

World Bank Enterprise Survey (2014) as cited in IMF (2014) finds the percentage of the value of collateral to that of the loan book to be generally high in LICs in comparison to advanced economies as the security of their book tends to heavily rely on collateral. Schmitz (2013) as cited in IMF (2014) finds that information asymmetry issues emanating from weak accounting frameworks and standards result in more collateralised lending at short maturities which limits financial deepening due to the exclusion that results from limited lending to those with less acceptable collateral and it significantly increases procyclical lending (IMF, 2014a).

Improving information infrastructure for better data quality and availability is another factor of focal importance to help reduce information asymmetry in relation to customer creditworthiness for credit growth. Djankov et al. (2007) and Singh et al. (2009) as cited in IMF (2014) find that there is an improvement in the credit-to-GDP ratio where there is improved data mobilization in LICs (IMF, 2014a).

Uganda and Tanzania have implemented Credit Bureaus to collect and distribute credit rating information to help manage borrower over-indebtedness. Dabla-Norris et al. (2014) as cited in IMF (2014) finds that this can also improve financial inclusion and Galindo and Micco (2010) as cited in IMF (2014) adds that it will reduce the financing gap between small and large firms (IMF, 2014a).

Market development and improved transaction infrastructure also contributes positively to credit growth as payment systems are found to be a strong precondition for improved credit growth, a view maintained by Merrouche and Nier (2012) as cited in (IMF, 2014a).

Mlachila et al. (2013) finds that mobile payments and banking services enable wider access to financial services in remote rural areas like the use of M-Pesa in Kenya and neighbouring countries. This is an area of increased regulatory scrutiny to monitor any systemic risks that may arise from such platforms.

Most of the sustainable growth prospects of LICs and developing countries are in small business development and the funding thereof is a problem and an opportunity in such environments. Typical bank models tend to focus more on financial products for sophisticated and established customers such as mortgage and consumption products, thus leaving the financing of micro, small and medium sized enterprises (MSMEs) to nonbank financial institutions (NBFIs). Growth in these intermediaries represents a positive contribution to broader credit access. Regulatory and supervisory frameworks need to sufficiently consider these intermediaries to promote a more wholistic monitoring of potential systemic risk.

Another important aspect to closely monitor is concentration to a particular sector of the economy, depending on the economic structure of a country, which sometimes makes it difficult to diversify. LICs tend to depend on certain commodities which are susceptible to external shocks and can have an indirect impact on the financial system should there be reduced economic activity and an increase in defaults. The IMF found a 50 to 70 percent concentration in one or two sectors in 20 out of 24 sub-Saharan African countries (IMF, 2012b as cited in IMF, 2014a).

An effective widespread deposit insurance scheme can help in mitigating market trends that can cause a shock in the system. These are not very prominent in LICs and developing countries due to structural challenges and thus higher liquidity buffers can be considered effective in mitigating the impact of unexpected redemptions (IMF, 2014a).

Nketcha Nana and Samson (2014) find that banks in sub-Saharan Africa tend to hold high liquidity buffers as a precautionary measure and this is effective in environments characterised by underdeveloped and unreliable payment systems, lack of deposit insurance and underdeveloped capital markets. Deléchat et al. (2012) adds that this is also effective in cases of limited safety nets such as deposit insurance and lender of last resort.

IMF (2014) further states that the banking sector tends to be concentrated in LICs and developing countries, accounting for 80 percent of financial assets in the financial system, thus resulting in less complexity and limited interlinkages within the financial sector. There also tends to be a considerable amount of activity from foreign banks or cross border activity (IMF, 2014a).

While foreign bank presence can improve efficiency through increased competition (although opposing views exist based on empirical studies; Ariss (2010) as cited in IMF (2014) holds an opposing view while Moyo et al. (2014) as cited in IMF (2014) is in favour of this view) as well as improve domestic financial stability and may stabilise the environment during a crisis, it may also transmit international shocks dependent on the group funding strategy and home and host countries' macroeconomic conditions (IMF, 2014a).

Dabla-Norris and Srivisal (2013) find that financial development through financial depth significantly reduces volatility in output consumption, and investment growth to a certain extent, beyond which it increases, as observed in advanced economies (Dabla-Norris and Srivisal, 2013).

This finding suggests there is value in fostering financial development to culminate growth while paying close attention for it to not go beyond the optimal point. Furthermore, Cecchetti and Kharroubi (2012) also find that financial development is beneficial to economic growth of a country to a certain extent, once matured to the peak, its impact starts to reverse as it slows down growth (Cecchetti and Kharroubi, 2012).

Dabla-Norris and Srivisal (2013) also find strong evidence that financial depth improves the economy's ability to absorb shocks and mitigate negative effects of external shocks from the real sector on macroeconomic volatility, particularly for consumption, in environments where trade and financial openness is high. Characteristically, developing countries and LICs' value lies in increased industrialization to expand trade activity, thus this benefits them significantly (Dabla-Norris and Srivisal, 2013).

The authors also state that shallow financial systems in developing countries and LICs suggest inadequate and insufficient instruments for economic agents to diversify risk, manage volatility and insure against unexpected events. However, on the other hand, the danger of the excessive size of a financial system as observed in advanced economies results in highly leveraged economic agents leading to more risk and lower stability through increase volatility and may

potentially cause financial crisis (Smaghi, 2010, Shliefer and Vishny, 2010, Wagner, 2010, as cited in Dabla-Norris and Srivisal, 2013).

The authors further find a limitation in empirical evidence in the causal relationship between finance and growth at an aggregate level. They have observed that empirical evidence is sensitive to measures of financial development, sets of controls, time horizon, country samples and estimation techniques considered.

Levine and Beck (2004) also echo similar sentiments as they found that "*theory provides conflicting predictions about both the impact of overall financial development on growth and about the separate effects of stock markets on growth and banks on economic growth*"; both of which are major intermediaries for financial development. This could be due to the mix of both in a financial system and structure and thus sampling different countries with different structures and generalizing the numbers may provide a different view than when each country is considered separately.

They further state that "*many models emphasize that well-functioning financial intermediaries and markets ameliorate information and transactions costs and thereby foster efficient resource allocation and hence faster long-run growth. These models, however, also show that financial development can hurt growth. Specifically, financial development, by enhancing resource allocation and hence the returns to savings, may lower saving rates*." (Bencivenga and Smith, 1991, Bencivenga et al., 1995, King and Levine, 1993a as cited in Levine and Beck, 2004:423), which view concurs with that of Gambacorta et al. (2014) and Sahay et al. (2015) as discussed above.

The objective of this paper is based on the same observation and thus suggests a different approach to consider the basic characteristics of such countries and set a specific context to change the direction and scope of work done affecting these countries to establish better understanding.

The authors agree with literature in the view that deeper financial systems ease the constraints on borrowing and promote risk diversification thereby improving the economy's shock absorption capacity. Aghion et al. (1999) as cited in Dabla-Norris and Srivisal (2013) find that economies with poorly developed financial systems are more volatile, due to both the demand and supply conditions for credit being more cyclical amidst financial market imperfections and unequal access to investment opportunities (Dabla-Norris and Srivisal, 2013).

Braun and Larrain (2005) and Raddatz (2006) as cited in Dabla-Norris and Srivisal (2013) find that financial development reduces output volatility, especially in financially vulnerable industries, while Manganelli and Popov (2012) as cited in Dabla-Norris and Srivisal (2013) find that financial development affects the pace at which an economy's industrial composition converges to its optimally diversified benchmark level (Dabla-Norris and Srivisal, 2013).

Importantly, the authors also make note of a key problematic limitation or reverse causality where macroeconomic volatility may actually impede on financial development (as financial development absorbs the shocks) as well as the aspect of endogeneity where macroeconomic volatility and financial depth could be affected by other unobserved inputs in a dynamic environment.

2.2.5. Sovereign debt

Increased government spending is another option to stabilise the economy and control systemic risk. However, at the back of it, overindebted sovereigns can introduce more systemic risk to the financial system through defaults which will lead to low credit ratings for the country which is a problem/condition in developing countries (mostly African), thus optimising the framework may place less reliance on increased government spending to keep it under control (Ojo, 2012).

On the other hand, increased government interest spending, may require a reduction in non-interest spending when sources of surplus are limited, thus affecting economic development and service delivery, which increased interest spending may not yield the desired results of attracting more foreign capital inflows (contributing to more credit acquisition as an alternative source of funding instead) while limiting credit growth in the local economy due to increased local rates affecting affordability, and inflation remains high or continues to increase (where a targeting monetary regime is implemented) (Cochrane, 2003).

The new liquidity standards, particularly NSFR, is likely to encourage concentrated sovereign exposure for the Required Sable Funding element of the calculation, which could be an issue during a financial crisis. As cited in Ojo (2012), the Basel Committee finds that liquid asset holdings by banks are dominated by Sovereign exposures, Central Banks, and Public Sector entities, which bear between 0 and 85 percent risk weight, thus counteracting the objective to diversify asset class concentration and highlighting the limited capacity of the liquidity requirements to achieve this objective on their own. To this extent, the leverage ratios are expected to assist in this regard (Ojo, 2012).

2.3. Conclusion

From the discussion above, the multidisciplinary nature of the topic and extensive impact thereof shows some consistency with the agreeing view that systemic risk management is a collaborative effort between micro and macroprudential framework and that financial development through credit extension is associated with positive impact on economic growth to an extent, and the potential set back thereon from excessive regulation.

More importantly, scholars highlight the issue of contradictions in theory on the impact of financial development on economic growth due to structural aspects considered, models and parameters used. Of further note is the reiteration of the shortage in prior research work focused on financial regulation and its impact specifically on financial development that is country or region focused.

For this reason, taking into account the narrow scope of this paper, the review is mostly descriptive for the benefit of principle identification, to lay a foundation for the context specific conceptual framework.

It is also worth noting that most methodologies applied in studies of this nature, as cited above, favour quantitative models with varying degrees of complexity. This may suggest that different approaches and designs may help in this regard and introduce a different perspective to the contradictions and reaffirm the agreeing views.

Chapter 3

Methodology

3.1. Introduction

This section explains how the research is executed and why the chosen methodology was deemed appropriate, by detailing the prominent considerations pertaining to the practical nature of the field of study and subject matter. The research is focused on conducting an empirical analysis to determine if a significant relationship between financial regulation and financial development exists and the type thereof, in the context of a developing economy. The selected variables are also explained in detail in terms of what they measure and their interpretation in relation to the objective of the study.

3.2. Background

Scholars (some examples discussed below) in this field usually prefer quantitative methods, involving models ranging from simple to complex, depending on the underlying study measures, questions, and overall objective. Such methods are reasonably fit for purpose due to the quantitative nature of the field and thus, studying the numbers always provide useful insights.

In related studies summarised in chapter 2, Levine and Beck (2004), analyse the link or relationship between overall financial development (by particularly focusing on bank and market development) and economic growth, and critiqued the Ordinary Least Squares (OLS) approach as used by Levine and Zervos (1998), as cited, in their study of the impact of market and bank development on economic growth, to be coming short of considering the impact of simultaneity bias, country fixed effects and the typical use of lagged dependent variables in longitudinal cross panel regression models.

For this reason, a more prominently used improvement to this, the Generalised Method of Moments (GMM), which can help improve the problem of the absence of a causal link between the variable measures, among others; was used in addition to the OLS. The authors used OLS regression for economic growth to assess its link to bank and market development. They then used GMM with two step estimators to assess how the relationship between bank development and market development is with economic growth.

The two models discussed above are fit for longitudinal cross panel studies which are also common in this field. Levine and Beck (2004) studied a data sample of 40 countries from 1976 to 1998. Some of the countries in the sample included Germany, United Kingdom, United States of America, and France, which are classified as developed economies; South Africa, China, Brazil, India, which are classified as emerging market economies as well as Bangladesh among others which can be classified as least developed.

In another study by Gambacorta et al. (2014) which researched bank-based and market-based finance impact on economic growth where they used a simple regression model for a panel study sampling 41 countries in the 1990s and the 2000s, thus comparing the two periods instead of studying the series of years from 1990 to 2000.

The design and arrangement of the work in the above-mentioned papers is very different to that of this paper. The intention in this paper is to introduce some bias in the form of context, in relation to sophistication of a financial system and economic structure as well as banking sector developments. This is done by focusing on a single country to get a deeper understanding of the underlying nuances as opposed to studying a panel of countries. In addition, while OLS and GMM have merits, they still come short of a stronger causal link between variables as they are statistical models that rely on data standardization, generalization, and inferences.

Yet another study by Calderón-Rossell (1984), although quite old, is still relevent in that it is one of the very few studies that are designed to study a very specific context to focus on the underlying nuances thereof. The author stated that "*Paradoxically, the restrictive and rigid regulations usually imposed in developing countries permit the use of a simple deterministic one-period linear programming model*." The author further highlighted that its simplicity enhances context specific application (Calderón-Rossell, 1984:445).

Linear programming is based on mathematical models to denote and describe a problem. The term linear requires the mathematical functions in the model to be linear functions and programming simply means planning. It is therefore the planning of activities to obtain optimal results in comparison to other feasible alternatives (Hillier and Lieberman, 1972).

Different identified measures where denoted in linear mathematical models and solved using the TEMPO system which was run in the World Bank/IMS' computer system (B7800). This enabled the comparison of the optimal structure of all the variables against the current structures and highlight gaps and areas of focus. Another analysis method applied in the comparison was

the Mean Square Error (MSE), where the lower the MSE, the closer the actual structure is to the Optimal. Again, this methodology focused on one period at a time and required a different arrangement and designt of data models.

The design and arrangement of this paper is closely aligned to the above-mentioned paper in that they are both studying financial regulation within a developing economy specific context. A simple model is deemed sufficient in sampling one country as the need for generalization is limited by the need to study context and key non standard factors.

Another example of a different methodology employed by Wartena (2012) in their study of optimal financial regulation in the European Union, was a qualitative approach as they were seeking context to regulatory phenomena and possible regulatory alternatives to emerge through observations that are not bound by generalised numerical inferences (Wartena, 2012). The data collection was through semi-structured interviews with financial industry experts. This methodology was however empowered by the prior work of another author, whose work formed the basis of the work in question.

The above examples show that different methods have been employed over time and they all have their merits and short comings and thus are mainly justified by the research objectives and questions they seek to answer, from getting a quanitative view of the market through time and in different jurisdictions, getting a deeper understanding thereof during selected periods, standardising measures in order to compare different structures in a particular period, to getting a deeper social understanding from experts and participants in contrast to the numbers and to solicit possible alternatives and developments.

3.3. Research method

In light of the above discussion, purpose of the study and the multidimensionality of the topic, a quantitative approach will be followed. The appropriate model is discussed below.

3.3.1. Quantitative approach

The important aspects of consideration for a suitable model for the study is the type of data under study, its availability and structure. The focus in this study is one country and thus one industry as described in the unit of study section below.

The selected measures (predominantly the dependent variables) are macroprudential measures monitored at a country level on a quarterly basis, whereas the independent variable which is an externally (international) prescribed microprudential measure that is available at a bank level and is monitored monthly.

Given the simple structure and size of the South African banking industry from a composition perspective, the collection and aggregation of bank data becomes simplified with considerable accuracy, without the need for complicated models. The only challenge is full access thereto, which the regulator has. Thus, readily available data collected and used by the regulator is deemed reliable, complete, and accurate.

3.3.2. Empirical model specification

The aim is to determine if there is, and if so, define the kind and significance of a relationship between the bank credit-to-GDP ratio, long run trend and gap of a country and the leverage ratio of a country's banking industry. The Auto Regressive Distributed Lag (ARDL) approach will be used to achieve this as used by Alhassan and Fiador (2014) in their work studying the relationship between insurance penetration and economic growth from 1990 to 2010 in Ghana, in the long term. Their work studied one country and one industry, which is a similar design and structure to this study (Alhassan and Fiador, 2014).

To study the relationship between the selected independent and dependent variables, time series, secondary and readily available industry and country level data was collected. The hypothesis is somewhat a challenge in this case in that the regulatory measure which is the independent variable, is implemented to improve resilience of the industry and effectively maintain a link between real growth and financial development; and reduce procyclicality therein, as discussed in chapter two, however, there are views that very well generally challenge the necessity of this measure, given certain structural nuances and dynamics of a country's financial system.

Closely linked to financial development is the build-up of systemic risk at a macro level, where the dependent variables come in. The credit-to-GDP gap measures the build-up and signals an impending crisis before it occurs. It is almost two sides of the same coin (the gap and the leverage ratio). Generally, it is expected that it will be more effective for the one goal at the expense of the other, that is, managing systemic risk at the expense of financial development.

Three models denoted by the following three equations ware be analysed:

$ratio_t = \beta 0 + \beta 1 \text{lev}_t + \varepsilon_t$ ..... (1)

$trend_t = \beta 0 + \beta 1 \text{lev}_t + \varepsilon_t$ ..... (2)

$gap_t = \beta 0 + \beta 1 \text{lev}_t + \varepsilon_t$ ..... (3)

Where,

ratio is the equation for the first dependent variable, bank credit-to-GDP ratio (ratio),

trend is the equation for the second dependent variable, long run trend of the bank credit-to-GDP ratio (trend),

gap is the equation for the third dependent variable, credit-to-GDP gap (gap), and

lev represents the leverage ratio (lev) which is the independent variable.

β_0 represents the y-intercept (i.e., constant term),

β_1 represents the slope of the line.

t represents time series (quarters) and

ε represents the error term.

The null hypothesis (H*o*) can generally be expressed as there being no relationship between financial development, systemic risk and the microprudential regulation and the alternative hypothesis (H1), in line with the reasons for the implementation of the leverage ratio, is that there is a relationship therebetween. Some of the key elements of the model include the following, each consisting of models and equations to ensure robustness in the results.

Unit root test

This is an important step to assess the stationarity of the data before it can be modelled. Determining the presence of unit roots which are inherent in most time series data will help in correcting for this so not to end up with a model that yields spurious results. Stationary data is characterised by a constant mean, variance, and autocorrelation with time. This adds to the credibility and reliability of the model by ensuring that the data that is modelled is fit for the model (Granger and Newbold, 1974).

Dickey and Fuller (1979) (DF) and Augmented Dickey-Fuller (1981) (ADF) are widely used in determining the existence of unit roots with ADF being most preferred as it addresses some

of the issues associated with DF, relating to autocorrelation. It is an autoregressive model that applies critical values against the t- statistic, instead of the p-value. The test hypothesises that data is non-stationary (if the t-statistic is below the locritical value), with the alternative being that it is stationary, at a t-statistic that is above the critical value (Dickey and Fuller, 1979) and (Augmented Dickey-Fuller, 1981).

Optimal lag structure selection

This is a method of allocating the optimal lag lengths for the variables, taking into account the sample size. There are various well-known models developed over time, including those mentioned below. They allocate scores to different time lags and the time lag with the lowest score is deemed optimal.

- Akaike Information Criterion.
- Bayesian Information Criterion.
- Hannan-Quinn Information Criterion.
- Akaike Criterion Corrected for small samples.

Cointegration model

The Auto Regressive Distributed Lag (ARDL) approach to cointegration is a widely used technique to determine the existence of long-run causal relationships between variables, Pesaran and Shin (1999) and Pesaran (2001). The model is appropriate for small sample sizes and is suitable for both stationary and non-stationary data. It cointegrates time series at I(0) (at level) and I(1) (at first difference order) or a combination of both, but not beyond.

The three ARDL models are specified below:

$$\Delta \text{ratio}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{ratio}_{t-1} + \sum_{i=1}^{n} \beta_{2i} \Delta \text{lev}_{t-1} + \beta_{3i}\text{ratio}_{t-1} + \beta_{4i}\text{lev}_{t-1} + \varepsilon_t \cdots\cdots\cdots\cdots (4)$$

$$\Delta \text{trend}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{trend}_{t-1} + \sum_{i=1}^{n} \beta_{2i} \Delta \text{lev}_{t-1} + \beta_{3i}\text{trend}_{t-1} + \beta_{4i}\text{lev}_{t-1} + \varepsilon_t \cdots\cdots\cdots (5)$$

$$\Delta \text{gap}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \text{gap}_{t-1} + \sum_{i=1}^{n} \beta_{2i} \Delta \text{lev}_{t-1} + \beta_{3i}\text{gap}_{t-1} + \beta_{4i}\text{lev}_{t-1} + \varepsilon_t \cdots\cdots\cdots\cdots\cdots (6)$$

Where ∆ represents the differencing effect. The model hypothesis can be specified as follows:

H_0: $\beta_{3i} = \beta_{4i} = 0$ (no cointegration)

H_1: $\beta_{3i} \neq \beta_{4i} \neq 0$ (cointegration exists)

Bounds test

The bounds test is performed on the f-statistic of the cointegration model against the critical values of the lower bound at I(0) and upper bound at I(1). The null hypothesis is rejected if the f-statistic is above the upper bound and cannot be rejected if the f-statistic is below the lower bound. The results are deemed inconclusive if the f-statistic falls between the bounds.

Vector error correction model

This entails remodelling the ARDL to correct for errors and take into account the dynamics in the short run as well.

Model diagnostics

Tests for two of the most usual challenges with regression models involving time series data are performed to validate the model and credibility of results.

Autocorrelation

Due to the challenges brought about by the time series element in the sample, the models are assessed for autocorrelation in the errors using the Durbin-Watson (D-W) test, which is common and well known. The calculation divides the sum of squared differences of errors by the sum of squared errors in a first lag arrangement.

The tests hypothesizes that there is no autocorrelation. The closer the calculated value is to 2, the more it suggests that there is no autocorrelation. It also provides ranges (lower and upper) of significance or critical values relative to the sample size and number of independent variables on both ends (towards 0, indicating significant positive autocorrelation) and toward 4 (indicating significant negative autocorrelation). If the result fall between the critical values, the recommended conservative approach would be to not reject the null hypothesis as it falls outside the regions of significant autocorrelation.

A more robust model which can measure autocorrelation beyond the first order, to detect possible autocorrelation up to the fourth order is also applied. The Breusch-Godfrey Lagrange

Multiplier (B-G LM) model hypothesizes that there is no autocorrelation in the errors (*Ho*) where the observed errors are regressed by the original independent variable as well as lagged errors in addition. The null hypothesis is not rejected if the model p-value is above alpha.

Heteroskedasticity

The Autoregressive Conditional Heteroskedasticity test (ARCH) is used as it is deemed more appropriate for time series data, in comparison to the other models which are more appropriate for panel and cross-sectional data. The model regresses the squared errors with themselves, in the first lag. It then calculates the f-statistic and p-value as well as Chi squared statistic and p-value thereof. It has the same hypothesis as the B-G LM model.

3.4. Unit of study

As already alluded to above, the structure of financial regulation of the South African banking sector is studied as a single case, to exemplify the position of developing countries due to the limited resources (particularly time and access to key relevant data within different jurisdictions). This is done to enable the identification of foundational key factors which may be studied further or built upon in future research work, due to the limited availability of prior work of this nature or at the proposed level of detail.

The country is selected due to its advanced implementation of international regulatory framework and reforms, as issued by the Basel Committee on Banking Supervision (BCBS) and has considerably deeper and internationalised markets and features one of the most sophisticated financial systems in the world. However, it remains classified as a developing country or emerging market/economy, although one of the largest in the African context and larger developing country community. It can possibly present a more objective view of the benefits and challenges of implementing the framework.

It is acknowledged that a sole case (one country/ industry) may not be sufficiently representative of developing countries, however, it will provide considerable context to the inductive explanatory aspect of the research. The country's GDP is the output of 12 sectors including:

- Agriculture, forestry, and fishing,
- Mining,
- Manufacturing, Electricity, gas, and water,

- Construction,
- Trade, catering, and accommodation,
- Transport, storage, and communication,
- Finance, real estate, and business services,
- General government services, and
- Personal services.

Banking is a subsector of finance, real estate, and business services, a tertiary sector which makes up 24% of the total GDP as at the end of 2023, making it the largest sector in the South African economy (Statssa). It comprises (PA):

- 17 Registered banks,
- 5 Mutual banks,
- 5 Co-operative banks,
- 11 Local branches of foreign banks, and
- 30 Foreign banks with approved local representative offices.

The country has implemented Basel III and is in the process of updating to Basel IV.

3.5. Time horizon

Measures of risk should capture time and cross-sectional dimensions with the ability to signal the gradual build-up of vulnerabilities (also in shadow banking) which focuses more on the intermediation of credit, also considering entities and processes outside the regulated banking system as a way of circumventing the arduous process and red tape involved (BIS, 2011). It should also assess (context specific) likelihood and impact of events as well as flag risk concentration at various levels.

The selection of measures dictates the time horizon. The leverage ratio measure is a fairly new indicator, with the bank credit-to-GDP, long term credit trend and credit-to-GDP gap dating back to the year 2000 and the leverage ratio only to 2017, thus presenting a limitation to the extensiveness of the sample for a more informative study. The period covered includes at least one global stress case for the industry, the Coronavirus disease 2019 (COVID-19).

3.6. Data collection

As alluded to above, the sample covers quarterly data for the three dependent variables from 2017 to 2022 (SARB, 2023) as well as quarterly averages of the monthly data for the independent variable to match the other set, thus eliminating the use of a panel of banks as all data is already aggregated to industry level by the source who owns the data.

Data over a longer period for the dependent variables is preferred, while 22 years is considerable, longer would be ideal. The BIS has a data base for the credit-to-GDP ratio dating back to 1965, like the World Bank. However, their credit-to-GDP ratio uses total credit from all sectors to the private non-financial corporate sector; the World Bank's database has bank credit data like the South African Reserve Bank (SARB) (however, their private sector may include credit to public enterprises), which is more appropriate for this study. While BIS and SARB have quarterly data, the World Bank has annual data. Furthermore, notable differences exist in the data from the three sources thus favouring the use of SARB data for this study.

The leverage ratio data is collected by the SARB dating back to 2017. Directive 4 of 2014 promulgated the requirement from 1 September 2014 but was only submitted through supplementary templates and not the BA700 as it is now.

This is the usual practice for the regulator when implementing an amendment to the reporting framework, data quality during this time is usually a challenge as banks operationalise the reporting requirement and an amendment to the structure of the BA returns is being done, hence perhaps this was not published until 2017. This led to the disregard of the first 17 years of the dependent variables data as the independent variable was not then effective, for the purpose of the model.

3.7. Measures and variables

The study combines a macroprudential measure of domestic bank credit to the private sector as a percentage of GDP, to measure financial depth of financial institutions, as an indicator for measuring financial development (see financial development and systemic risk section above) and a microprudential regulatory measure for monitoring systemic risk build-up through excessive credit growth, among other things.

Independent variable

Leverage ratio (Tier 1 Capital-to-Total Exposure): an absolute non risk sensitive back stop measure concerned with limiting the balance sheet growth (on and off) relative to the capital base (Tier 1 capital). This represents the pace at which credit extension can grow in the economy.

In the case of risk measures, measurement approaches are not standardized, especially where complex models are concerned as used by some banks while others prefer to apply the standard risk weights prescribed per asset class, which brings an element of ambiguity when comparing institutions. They can result in a Risk Weighted Assets (RWA) value that is less than the gross exposure, equal to or greater than, when taking into account aspects such as impairments and the rate of provision therefore, and off balance sheet conversion factors, among other factors.

This thus provides a more standard simplistic measure which measures the appropriate pace at which a bank can grow its balance sheet relative to its capital as it is generally more expensive to increase the capital base beyond retained earnings, thus resulting in the balance sheet size being the most flexible factor to control in meeting the ratio requirement. It is assumed that customer loans and advances are one of the, if not the biggest asset on and off-balance sheet, as observed in most banks.

This is used as the regulatory measure which directly impacts the measure of financial development for the economy. With retained earnings as a considerable driver of the capital base, which is in turn dependent on the balance sheet size to raise more net interest income, it potentially creates a difficult position for banks to deepen and allocate assets to the productive economy where demand is generally expected to be greater due to available development projects and opportunities.

A bank in a loss position may require recapitalization, which is basically cash injected into the business by the shareholders to improve the capital base to allow for more capacity to grow the business. It is usually the case in an event of a change in strategy or to help a struggling business but cannot be a regular practice as it questions the stability of the bank.

Dependent variables

The three identified variables are calculated outputs measuring different aspects individually, and the combination of the last two are the outcome of the first (as discussed below), thus they are all closely related but can be used individually in different but related contexts.

- The macroprudential indicator of bank credit-to-GDP gap is used as a proxy measure for the extent of systemic risk buildup associated with financial development in relation to the requirement in the economy. The gap is calculated as the difference between the credit-to-GDP ratio (measuring credit growth relative to growth in the economy) and the long-run credit-to-GDP ratio trend (measuring stability). This was discussed in more detail in chapter two. These indicators are also used as early warning signs.

- Bank credit to private sector-to-GDP ratio: This represents the extent to which GDP is driven by private sector assets funded by banks, and thus the size of bank credit. This is traditionally the measure for financial development (although not necessarily only bank credit) as opposed to the gap. For the purpose of the study, it is used as a proxy measure for the rate of financial development in relation to the requirement in the economy.

- Long run credit-to-GDP ratio trend: This is the other input to the gap which is mostly used to measure the stability of credit growth and serves as the equilibrium credit level for the economy. It is also known as the Hodrick-Prescott (HP) filter and is applied to the credit-to-GDP ratio to measure the significance of the variance thereof from the filter as recommended by Basel III.

  It being a univariate statistical tool subjects it to criticism of inability to account for the possibility of an economy's financial needs to be aligned to its changing structure and development. An alternative, more detailed model considering the structure of the economy, among others is proposed by Buncic and Melecky (2014). For the purpose of this study, it is used as the benchmark of credit extension or the equilibrium level of credit that is optimal for the economy.

With that said, the study analyses whether financial regulation has a relationship with the measure of systemic risk, the rate of financial development and or the credit benchmark which are all aspects associated with bank growth and development in a financial system, among other things.

Taking into account the perspective that banks should only assume the amount of risk they can afford to maintain, if the minimum requirements are set higher than what is practical or optimal, this will halt business growth, however, macroeconomic dynamics, operational history and

fiscal safeguards should be given fair consideration to regulate the rate of forward-looking regulatory developments to what is practical. This emphasises more accurate and appropriate risk measurement based on the nature thereof to calibrate the optimal risk response levels. The level of financial openness to the global economy also influences the nature and extent of exposure to certain risks.

3.8. Reliability

Due to the highly technical nature of the concepts under study, availability of data and time constraints, the collection process does not include an extensive sample base. The SARB as the regulator of the banking industry and central bank is the best source for the selected variables and we have access to the same data they use in their reports, some of which is otherwise confidential and not easy to obtain with utmost accuracy, like Tier 1 capital data and leverage ratio as reported in the BA700 by banks.

3.9. Limitation

As mentioned above, the sample does not include an extensive dataset due to the recent implementation of the leverage ratio (more details on the structure of the sample is covered in chapter 4). This resulted in a total of 24 observations in the sample. The minimum requirement of observations for the OLS model ranges between 8 and 25, depending on model variance which takes into account multiple factors (Jenkins and Quintana-Ascencio, 2020). However, time series models are more flexible and have less assumptions in comparison, thus not too strict on sample size and normal distribution.

Although there is considerably high degree of data accuracy in the sample and there may be consistency in the model results, caution is taken in the presentation of the results. However, model validation tests have been performed to affirm the appropriateness and relevance as well as reduce some of the challenges in dealing with smaller samples, including false-positives and overestimated magnitude of association (Hackshaw, 2008), among other general assumptions of the model assumption violation.

Another factor of consideration for a small sample is that it is ideal for hypothesis generation, the results of which can warrant confirmatory studies (Hackshaw, 2008). Such as panel studies involving other countries and the use of more advanced models. Thus, a smaller size of reliable data, coupled with a simplistic model was deemed sufficient.

Another notable limitation, although by design, is the analysis of one independent variable to proxy financial regulation. More variables would provide more context and highlight interlinkages of the variables in the economy, however, due to the nuanced calibration and computation of the other regulatory variables, it could distort the accuracy of the results if risk sensitive and non-risk sensitive measures are combined, for the objective of the study.

Due to the simplicity of the data model and high quality of the data collected in its relevance and applicability in the selected context, control variables were not built in as some of them are accounted for in the dependent variables as they are computed at an economy wide level over time, providing some comfort to the accuracy of the results and interpretation in relation to unobserved variables.

3.10. Conclusion

Data availability has proven to be a challenge with the leverage ratio being fairly new. However, it is well organised and disclosed with relative ease of access. It also dictated the design of the simple empirical model to ensure that it is appropriate and in line with the objective of the study, to obtain context specific, real life empirical evidence into the inner operations of some aspects of the regulatory framework for risk management as well as its effectiveness and efficiency.

Chapter 4

Discussion of Findings

4.1. Introduction

Herein, a presentation of the model and application thereof to the hypothesis and theory is discussed. Details of sample design and modelling are provided first to set the context of the results and their interpretation as applies to the study.

4.2. Sample design

A relatively new microprudential industry measure is used to regress macroprudential measures, thus suggesting that, to an extent, an industry specific, internal measure is influencing a country's development. This extent highlights the importance of the industry to the country's development, to the effect that it is a conduit through which financial resources are channelled and mobilized.

Reliable data available for the leverage ratio dates back to 2017 and is published monthly by the SARB, however, monthly data was converted to quarterly averages as they were deemed appropriate, both to align to the frequency of the other variables, and due to the fact that the aim is to assess the behaviours over extended period of time, thus reducing the noise that comes with high frequency.

Structurally, the sample include time series data as we are studying the variables over time to assess the development and or consistency of the relationship and possible impact. This is known to introduce challenges to the general assumptions of regression models and may result in spurious results and error in inferences. Each of the equations and models were thoroughly assessed and validated through additional testing, particularly for autocorrelation and heteroskedasticity.

The reason for this design is to understand the identified measures, that is, the gap as a measure of systemic risk, the trend as the benchmark of equilibrium credit and the ratio as a proxy for the rate of financial development. The measures are related in measuring systemic risk build-up in a financial system possibly emanating from a deepening banking sector and thus make for informative indicators to assess against the leverage ratio which is a regulatory measure to help control systemic risk. There is an alignment in the function and objective of the gap and the leverage ratio measures.

4.3. Results

4.3.1. Descriptive statistics

The table below provides an overview of the characteristics and structure of the data included in the sample from 2017 to 2022 for the dependent variables (the ratio, trend, and gap) and the independent variable (Leverage ratio).

Table 1: Descriptive statistics

	Credit-to-GDP ratio	*Gap*	*Trend*	*Leverage*
Mean	67,3438	-0,3340	67,6778	6,5449
Standard Error	0,7357	0,7296	0,0221	0,0410
Median	66,7088	-1,0678	67,7261	6,5250
Standard Deviation	3,6042	3,5742	0,1081	0,2008
Sample Variance	12,9900	12,7749	0,0117	0,0403
Kurtosis	15,3192	15,8270	-0,5706	-0,8773
Skewness	3,5794	3,6679	-0,8818	0,1287
Range	19,0396	18,9497	0,3323	0,7000
Minimum	63,6602	-3,9501	67,4477	6,2133
Maximum	82,6998	14,9996	67,7800	6,9133
Sum	1616,2508	-8,0171	1624,2679	157,0767
Count	24	24	24	24

Source: Author's compilation

Generally, the skewness and kurtosis would present an improved view that is more in range between -/+ 2; and -/+ 7 respectively (Hair et al., 2010) and (Bryne, 2010), with a larger sample size for the ratio and gap, while they are acceptable for the trend and leverage ratio, at the same sample size. These are indicators of data characteristics in relation to normal distribution and don't validate or invalidate suitability or usability of data.

Characteristically, the first two variables are more responsive to short term structural shifts in the economy, with the trend being generally nonresponsive in the short term and the leverage ratio not moving drastically as the minimum requirement does not change. The observed level also indicates no drastic changes in banks' balance sheets in the observed period.

4.3.2. Correlation matrix

The table below presents the correlation coefficients between the variables. The leverage ratio is consistently strong (between 0.6 and 0.79) and negatively correlated with the ratio and gap, while it is moderate (between 0.4 and 0.59) with the trend. This highlights the generic direction of the type of relationship that could exist between the variables.

Furthermore, a very strong (above 0.8) positive correlation is reported for the ratio and gap while weak ((between 0.2 and 0.39) Papageorgiou, (2022)) correlation is reported between the trend and gap as well as between the trend and ratio. These results are limited to the sample size. This is interpreted wholistically in context in the model results.

A very strong correlation between the ratio and the trend is reported when a larger sample size spanning over a longer period is used (2000 – 2022) as opposed to the weak relationship noted in a smaller sample. This is more in line with the characteristics of the two variables generally, in that the one is a long-term trend of the other.

This suggests that the trend does not reflect short term economic changes but are rather almost smoothed out overtime. Further to this, the very strong relationship initially noted between the ratio and the gap reduced but remaining strong over a similar longer period. This also highlights the short-term impact of the ratio on the gap as the two tend to move closely and mirror each other.

Thus, in short, the gap and ratio are very strongly correlated in the short term while the ratio and the trend are weakly correlated. However, in the long term, the ratio and the gap are strongly correlated (from *** to **) while that between the ratio and trend becomes very strong from * to ***). These results will be given better context by the ARDL model results.

Table 2: Smaller sample (2017 to 2022).

	Credit-to-GDP ratio	*Gap*	*Trend*	*Leverage*
Credit-to-GDP ratio	1			
Gap	0,999582***	1		
Trend	0,291202*	0,263406*	1	
Leverage	-0,608971**	-0,601348**	-0,421013**	1

Source: Author's compilation

Table 3: Larger sample (2000 to 2022)

	Credit-to-GDP ratio	*Gap*	*Trend*
Credit-to-GDP ratio	1		
Gap	0,716211464**	1	
Trend	0,815894279***	0,180836	1

Source: Author's compilation

* *weak correlation*

** *moderate to strong correlation*

*** *very strong correlation*

4.3.3. Optimal lag level.

Various well-known tests were applied to determine the optimal length of lags for the models. These included the AIC, BIC, HQC, and AICc**.** The last model is deemed more appropriate for the study and will thus take priority in case of inconsistency.

The table below summarises the comparative results of the tests.

Table 4: Optimal lag length

	AIC	BIC	HQC	AICc
Ratio	1	1	1	1
Trend	2	2	2	2
Gap	1	1	1	1
Lev. Ratio	3	2	2	2

Source: Author's compilation

The results are consistent across the models except for the leverage ratio where AIC differs from the other three which are consistent.

4.3.4. Unit root tests.

Different models were applied to assess stationarity. Both the DF and ADF models were used for each of the models/equations. On default, both models assume drift and no trend. None of the variables are stationery at level but in first order differencing at the optimum lag level. The converted (quarterly average (#)) leverage ratio only reported stationarity in second order in ADF, and thus is non-stationary in the first order in all the models. However, in its original time series (monthly (##)), it is stationary in the first order, both of which arrangements are not used in the model.

Furthermore, both the ratio and gap are non-stationary beyond the first order. Stationarity is preferred as it suggests lower possibility of autocorrelation but is not a prerequisite of the ARDL model. To ensure that autocorrelation is not an issue, the model results are assessed therefore to confirm credibility thereof. All models are executed at the 95% confidence level.

An interesting observation is that the introduction of a trend makes the data non-stationary in the first order for all variables except the trend. It is however the inclusion of a trend that makes the data stationary in the second order for the converted leverage ratio in ADF, whereas is it is stationary in the normal DF model in the first order when not converted and without a trend.

When focusing on ADF as the most preferred model, only the trend and converted leverage ratio report stationarity. However, the second order converted and the first order non-converted test results for the leverage ratio are only included for interest' sake, converted leverage ratio (which was non-stationary and thus excluded from the table below) was applied in the first order in the ARDL model. The comparison of the different models indicates that, although preferred, augmentation can make otherwise stationary data (although with a higher chance of autocorrelation) non-stationary, hence the preference to test the model results for autocorrelation.

Table 5: Unit roots test

		Ratio (1st order)	Trend (1st order)	Gap (1st order)	Leverage Ratio# (2nd order)	Leverage Ratio## (1st order)
DF						
no drift	t-stat	-0,2172	-4,5751	-3,1021	-0,5430	-0,3641
		Non-stationary	**Stationary**	**Stationary**	Non-stationary	Non-stationary
Critical Value	-1,95					
drift	t-stat	-3,0130	6,0811	-3,0526	-0,2548	-3,3976
		Stationary	Non-stationary	**Stationary**	Non-stationary	**Stationary**
Critical Value	-3,00					
drift + trend	t-stat	-3,0066	-15,1483	-3,0254	-0,4094	-3,3084
		Non-stationary	**Stationary**	Non-stationary	Non-stationary	Non-stationary
Critical Value	-3,6					
ADF*	t-stat	-2,4627	-6,4720	-2,4763	-3,7134	-3,5760
		Non-stationary	**Stationary**	Non-stationary	**Stationary**	Non-stationary
Critical Value	-3,6					

Source: Author's compilation

**Argued superior model*

4.3.5. Cointegration and bounds test

The ARDL model was applied to determine the existence of a long run causal relationship in the models specified in chapter 3. The ratio and gap models reported no cointegration. This suggests that there is no long tern causal relationship between the leverage ratio and size of bank credit in the economy.

This could be due to a case where factors influencing GDP growth, filter through to bank credit size, as noted from the high corelation scores, thus potentially muting (from the perspective that the same factor has the same impact on both) the impact of one on the other, to that particular extent and context. Further to this, in the short run, with the trend remaining fairly flat, the movements in the ratio tend to be mirrored in the gap. Differently put, this thus suggests that there is no direct relationship between the pace and the rate of financial development as well as with the extent of systemic risk in the long run.

The trend model reported overwhelming evidence of a long run causal relationship between the leverage ratio and the long run trend of the bank credit to the private sector-to-GDP ratio, at all confidence levels. This suggests that the pace has a strong direct causal relationship with the equilibrium credit level and therefore is indirectly related to the rate (as it is a function of the equilibrium credit level) of financial development in the long run. Taking into account the results of the correlation matrix, the leverage ratio is suggested to be weighing down and possibly distorting the stable equilibrium credit level in the economy that banks can service.

The model also reported very negligible errors with a correlation coefficient of 1 (both general and adjusted). This suggests that, wholistically, to the extent that the leverage ratio contributes to the long run trend, with all other structural aspects (economy wide) remaining constant, the movements in the trend can be attributed to or explained by the leverage ratio. The model also suggests that there is no short-term relationship. The table below provides a summary of the results.

Table 6: ARDL model results and bounds test

	Ratio	Gap	Trend
Adjusted R Square	0,2719	0,2623	1
SSR	123,9303	119,4510	0,2569
SSE	172,8823	172,0249	5,74854**E**-08
SST	296,8126	291,4759	0,2569
F	2,8674	2,7775	14302941,6376
I(0)	3,79	3,79	3,79
I(1)	4,85	4,85	4,85
Ho= no cointegration	Fail to reject	Fail to reject	**Reject***

Source: Author's compilation

** cointegration observed/ confirmed*

4.3.6. Model validation

Tests for two of the most usual challenges with regression models involving time series data were performed to validate the model and credibility of results.

4.3.6.1. Autocorrelation

The model scored 1,5106 in the D-W test. The number is closer to 2 than 0 and falls between the lower and upper bounds but closer to the upper bound, thus suggesting the absence of autocorrelation in the first order, conservatively speaking. B-G LM model reported p-values above alpha at a 95% confidence interval, thus, resulting in the conclusion that we fail to reject *Ho*. The results are summarised below including adjusted f-statistic (to adjust for the lagged regressors as well as Chi squared statistic and p-value, which is deemed more dependable.

Table 7.1: D-W test

D-W score	1,5106
dL	0.863
dU	1.940

Source: Author's compilation

Table 7.2: B-G LM test

	F	Adjusted F	Chi-sq stat
Statistic	2,2853	2,7424	10,5065
P-value	0,0986	0,0593	0,0621
Ho=no autocorrelation	**Fail to reject**	**Fail to reject**	**Fail to reject**

Source: Author's compilation

4.3.6.2. Heteroskedasticity

The ARCH test was used as it is deemed more appropriate for time series data.

The test also reported scores above alpha at a 95% confidence interval resulting in failure to reject the *Ho*. The results are summarised below.

Table 8: ARCH results

	F	Chi-sq stat
Statistic	3,0516	2,8991
P-value	0,0977	0,0886
Ho= no ARCH effects	**Fail to reject**	**Fail to reject**

Source: Author's compilation

Both the tests thus confirm the model to be valid.

4.4. Further tests

For the two models that failed the cointegration test for a long run relationship, a Vector Auto Regression model was used to determine the existence of a short run relationship. Both the ratio and gap reported no meaningful relationship with the leverage ratio in the short run, at a 95% confidence level. The results are summarised below.

Table 9: Vector Autoregression model results

	Ratio	Gap
Adjusted R Square	0,1839	0,1770
SSR	89,5887	86,3081
SSE	208,5353	206,7148
SST	298,1240	293,0229
F	2,5777	2,5051
P value	0,0857	0,0918
Ho= no relationship	**Fail to reject***	**Fail to reject***

Source: Author's compilation

** no cointegration observed/confirmed*

4.5. Further discussion

The models and tests discussed above present a likelihood of the leverage ratio possibly distorting (reducing) the credit benchmark/equilibrium for the economy in the long run. This would suggest that a wider gap may be reported than what exists, which will signal grater deviation from the equilibrium point, thereby signalling excessive credit and thus systemic risk

build-up even if there is capacity for safe financial development. This may lead to restrictive measures to limit the build-up which will effectively slow down much needed financial development.

Another interesting result of note is the absence of a relationship in the short run. This could mean one of two things. The first being that the presence of the leverage ratio in the banking sector and economy is inconsequential to financial development and economic growth, which can then suggest that it is a harmless precautionary measure in this context, that its restrictive capacity to banks' balance sheet size is to the optimum level.

The second could suggest that it is not responsive to short term structural changes and could be seen as not very effective in its effort to limit systemic risk. This can thus suggest that there are other more responsive and effective measures in place that would better respond to changes in the short run and thus contribute to healthier long-term effects. That is to say if unsafe and excessive credit acquisition is effectively managed in the short run when it occurs, the cumulative effect in the long run is likely to be optimum, thereby reducing the need to blindly reduce it in the long run which could be too punitive than it needs to be. The presence thereof, if insisted upon would not need to be intrusive.

An example of this could be the intervention of the Monetary Policy Committee (MPC) which meets quarterly and monitors the economy closely and adjusts the interest rate accordingly. The interest rate directly affects the general affordability of credit, particularly for the private sector which may be reflected in the balance sheet size of the bank. The short-term impact of this measure or intervention could then be also accounted for in the long run trend of the ratio, which, together with the leverage ratio, would be overly punitive, thus explaining the results noted between the trend and the leverage ratio.

Furthermore, a possibility of reporting healthy leverage ratios while building up excessive risk in the short term could be likely, which would make it not effective. If macroeconomic policy can effectively adjust the pace of credit growth, relative to developments in the economy, which is thus likely to be more intuitive to actual demand, then perhaps the leverage ratio's necessity to manage systemic risk is suboptimal to the current structure. This could further suggest that banks balance sheet size could possibly achieve better optimality in servicing the financial sector and the economy.

4.6. Conclusion

The results of the study highlight the likelihood of a considerable negative impact on South Africa's financial development that is associated with the leverage ratio. It is further likely as per the evidence presented, that there are other measures that are more responsive to systemic risk in the short run, such as macroprudential measures as opposed to the leverage ratio.

Therefore, if macroprudential measures are more likely to be effective in managing systemic risk and influencing the pace of credit extension in response to the pace of economic growth, then perhaps having the leverage ratio at the current level could possibly be not ideal and thus requiring possible adjustment to enable the economy to benefit from the required financial depth that is likely to be achieved better without the possible impedance of the leverage ratio, with caution of course. This then suggests the likelihood of an excessively restrictive environment which is not optimal for development due to the distortion of credit equilibrium which will restrict financial development.

The results as summarised are also consistent with the conclusion of Davies et al. (2019), where they studied the impact of a higher leverage ratio on the South African economy, wherein they find that introducing higher leverage ratio requirements is likely to negatively affect the economy through attempts to reduce leverage by reducing the value of assets, in the short run.

Chapter 5

Conclusions and Recommendations

5.1. Introduction

The chapter provides a conclusion of the study in terms of the work conducted and provides a summary of the outcome and implications for the banking sector and the economy; as well as to make recommendations to address the outcomes. Opportunities for further studies in relation thereto are also highlighted.

5.2. Summary and conclusions

5.2.1. Summary

The study primarily looked at financial regulation, specifically for the banking sector, which is determined globally and implemented locally by different countries, and how it impacts financial development in the context of developing countries. This was in light of the pace of reform since the 2008/9 financial crises and its technical nature. Considering that the regulatory framework affects advanced and developing economies the same, it raised concerns on its efficiency in the later, given the general level of financial development.

Prior research has shown that financial development is good for a developing country, however, limited research exists that studies financial regulation in developing economies' banking sectors. However, the available work highlights that optimal financial regulation is important in achieving financial development in developing economies, to benefit from a stable financial system that can foster financial depth. It further finds that the definition of this concept is not a 'one size fits all', given the structural and operational nuances of advanced and developing economies.

The study then aimed at addressing this by studying the South African economy and its banking sector in a small-scale study. The scope was restricted to allow focus on the key indicators. For financial development, generally the credit to the private sector-to-GDP ratio is used as a proxy. Another closely associated measure is the long run trend of the ratio which measures the credit equilibrium (which can be seen as the ideal level of credit for the economy). It was noted that, depending on the data source the credit component is not always consistent and for this study we are mainly interested in bank credit.

It was also decided to look at the credit gap which is used as an early warning sign for an impending crisis due to excessive systemic risk build-up. Thus, the macro indicators were studied to determine the extent to which they respond to regulatory measures and were used to proxy the rate of financial development.

The leverage ratio was selected from a bank regulation perspective, a non-risk sensitive capital measure to effectively control the pace of balance sheet size and limit excessive credit extension and risk build-up. One, a microprudential tool to effectively control systemic risk build-up and the other/s, macroprudential indicators to monitor financial development and systemic risk build-up.

Data was collected from the SARB as opposed to the BIS and World Bank for better accuracy and the ARDL model was used. As the leverage ratio was relatively recently implemented, the sample size was not extensive with only 24 observations (quarterly). The study serves as a hypothesis generation tool, linking specifically the industry leverage ratio to the country credit gap and its inputs.

5.2.2. Conclusion

Acknowledging the simplicity of the model and the smaller sample size, a conservative approach is taken in interpreting the results as presented, to highlight likelihood instead of a more affirmative conclusion supported by overwhelming evidence (although the cointegration model reported overwhelming results), due to the limitations discussed previously. However, controls were built-in through further testing to establish validity of the models and results. The results of the model highlight that the leverage ratio is likely to be associated with or accompanied by a contraction in the long run trend of bank credit to the private sector-to-GDP ratio that is likely to prematurely signal excessive credit and systemic risk build-up.

In terms of the primary aim of the study, a hypothesis in response to the question summarised in chapter 1 was established or confirmed. A likelihood of the existence of a significant long run causal relationship was established, which associates the tested regulatory measure with a contraction in the rate of financial development through a distortion of the equilibrium credit level for the economy. In light of other economic factors, this suggests a suboptimal regulatory environment.

5.3. Implications and Policy recommendations

5.3.1. Implications

The impact of the conclusion summarised above is to the whole economy, covering the value chain from households to the regulator/government. It may also extend indirectly to neighbouring countries.

Financial system and Individual Customers

Financial depth also benefits from improved inclusion, an optimal operating environment will enable more inclusion initiatives of 'banking the unbanked' which still composes a lot of individuals. Currently, they are structurally excluded as banks focus on cautiously taking up business opportunities that will deliver high profitability for their balance sheet structures, thus neglecting the long-term development impact of investing in such areas. Current efforts prove arduous and are kept to a minimum.

Businesses

Reduced participation in the MSME sector wherein most growth potential lies, results in a slow release or realisation of growth benefits as reliance is placed on micro finance institutions, which have limited capacity whereas banks can leverage their large infrastructure and wider access to resources to easily support businesses while making a profit, in line with the Sustainable Development Goals (SDG).

Larger businesses which may require large funding for profitable investment opportunities may struggle in obtaining the full funding required from the sector as banks have to watch closely their balance sheet size (not necessarily due to riskiness of clients and projects) resulting in foregone opportunities for both economic development and growth.

Banks

Banks themselves increasingly invest a lot of money in compliance with regulations. From resources including, people, time, and systems to lost business. Suboptimal operating environments are punitive for them as they are expected to comply with all microprudential requirements that would not be as high (if implemented at all), if the monetary and fiscal policy can better address the underlying risk and concern, thereby enabling some breathing ground and flexibility to focus on servicing the economy.

Regulator

The regulators also have to invest in increased capacity to supervise an increasingly complex environment. Proper understanding and skill of calibrating the requirements at an appropriate level, as well as integrating micro and macroprudential policy as far as possible, become important in order to implement relevant and appropriate requirements and effectively execute efficient and meaningful supervision beyond mere compliance.

Government and neighbouring countries

More reliance is place on the government to deliver certain services that can be more effectively delivered by the private sector to benefit consumers beyond mere consumption. Also, a productive and effective environment would invite more Foreign Direct Investment (FDI) and increase the capacity to learn, replicate and implement learnings locally. The benefits could also be extended to neighbouring countries where local banks operate, thus benefiting the constituents of those countries and allowing their subsidiaries to pursue unique local opportunities.

A case of this was seen in the Barclays PLC and Barclays Africa Group LTD separation, where it was becoming too expensive to consolidate the subsidiaries into the parent and at the same time more restrictive for some of the subsidiaries to effectively grow in their local markets in keeping up with compliance requirements at group level.

5.3.2. Recommendations

Primarily, the key driver of regulatory measures is the regulator who prescribes and enacts regulation. It is noted that it is mostly in consultation with the industry, however, they bear the final authority.

In the South African context, the establishment of the Prudential Authority (PA) under the twin peaks model is a step in the direction of consolidating supervisory efforts, better oversight, and optimal supervision.

The establishment of the Corporation for Deposit Insurance (CoDI) is yet another improvement, the effective operation of which may assist with potentially easing some of the regulatory requirement as well as easing the reliance on the central bank as a lender of last resort in times of trouble.

However, increased integrated analysis of existing and potential prudential measures is key to optimising the regulatory environment and avoiding ineffective replication of complicated measures but instead, focus attention on consolidating efforts at the level where it will be effectively and efficiently supervised, monitored, and implemented.

From a macro perspective, there is an effective inflation targeting and interest rate policy that is more responsive to the economy, that is mostly implemented through the banking sector to control risk build-up, which is monitored closely by the Monetary Policy Committee (MPC) that consistently adjusts the effective rates in line with wider economic and structural drivers. This can be leveraged upon to influence change to microprudential regulation. Similarly, and in addition thereto, the countercyclical capital buffer is more responsive to the economy and shocks and has some flexibility in response thereto. A combination of which could likely address the imminent risk more optimally.

Already implemented risk sensitive capital add-ons and buffers could potentially be adjusted up and the leverage ratio down. In a proposed directive by the PA and the SARB, to implement a positive cycle-neutral countercyclical capital buffer that can be easily released to provide relief to banks during times of stress without the need to reduce the pillar 2A capital requirement, which was not intended to be adjusted down in times of stress (PA, 2023a), it was stated that BCBS observed more willingness by banks to utilise buffers when released by the regulators, indicating that any form of relief is appreciated by banks.

Furthermore, the PA proposes the implementation of a leverage ratio buffer initially intended for Global Systemically Important Banks (GSIB) for compliance by Domestic Systemically Important Banks (DSIB), where a buffer equivalent to 50% of its high loss absorbency requirement is to be maintained (PA,2023b). Although a proposal, in light of the study, it is perhaps not ideal, at least in the interim.

The main aim of the leverage ratio is to close the loop where banks can build up more credit risk while reporting satisfactory risk sensitive capital ratios. In a crisis, banks shed leverage in a manner that destabilizes the economy by putting pressure on asset prices. In light of the NSFR requirement which has been implemented, this risk is addressed to an extent but introduces over reliance of the banking sector on government assets, which the leverage ratio is also expected to help diversify. A recalibration of this requirement or improvement thereto may better serve to the benefit of at least a reduced leverage ratio, given its impact.

Perhaps the banking sector could collectively provide evidence as to the impact of the requirements in the consultative process and push back on some of the proposals or make counter proposals to satisfy the regulator while obtaining some flexibility and relief, and the regulator could perhaps give more consideration to such.

The government can collaborate with commercial banks to fund development with the hybrid goal of safety and some profit but largely prioritizing development, in line with the Sustainable Development Goals (SDG). An arrangement similar to the loan guarantee scheme which was introduced during COVID-19 to stimulate lending can be redesigned with slightly relaxed requirements and score cards to enable broader reach. Similar products exist in some banks and are guaranteed by international development finance institutions. This can be leveraged for grater reach to the economy.

Supplemental or redesign of quantitative impact studies carried out by the SARB to gather data prior to implementation of reforms can be considered to not only include prepopulated/ structured templates, but other more engaging input from the banking sector to reduce the burden of it being yet another compliance requirement for banks.

The creation of working groups composing collaborative efforts of both regulators and banks to practically analyse the implication of implemented reform and proposals thereto may also better serve to optimise financial regulation for banks.

5.4. Avenues for future research

The study was designed for the purpose of establishing the existence of a considerable relationship, as well as determine the type thereof between financial development and financial regulation to generate or confirm a hypothesis expressed in some discussions, even internationally (as detailed in chapter 2), that excessive regulation is restrictive to financial development, especially in the context of developing countries.

Hence a specific context was used, the South African banking industry in relation to the country's GDP. The study is different in that is not yet another financial development and economic growth study but is context specific and a level lower for better understanding of the underlying factors.

This contributes to the limited body of research work of this nature, focusing on developing economy issues by its constituents, instead of applying generalizations of advanced economies

with a different focus. The studies tend to overlook certain structural nuances that can influence the outcome thereof if studied in a specific context, however, sufficiently serve the purpose for which they are carried out.

More larger scope studies can be carried out to further assess or establish optimal financial regulation. Noting the challenge of data availability, especially with new reforms, more proxies and innovative sample designs may be required, like the inclusion of monetary policy measures like inflation and interest rates to test how they perform in comparison to the leverage ratio.

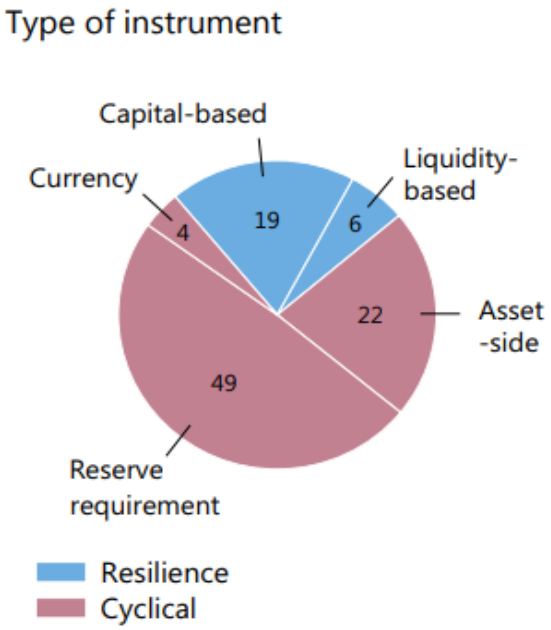
Figures

Figure 1: SA Regulatory land scape for financial Institutions

Banks	Insurance	Market Infrastructures	Mutual banks	Co-operative financial institutions (CFIs) and co-operative banks
• Banks Act 94 of 1990 (Banks Act) • Banks regulations • Basel Committee on Banking Supervision – 29 Core Principles (Basel II, Basel 2.5 and Basel III Frame-works) • Resolution Frame-work • Companies Act 71 of 2008 (Companies Act)	• Insurance Act 18 of 2017 • Insurance standards • International Associa-tion of Insurance Supervisors – Core Principles • Solvency II (SAM) • Companies Act	• Financial Markets Act 19 of 2012 (FMA) • FMA Regulations • Committee Principles for Financial Market Infrastructures • Companies Act	• Mutual Banks Act 124 of 1993 (Mutual Banks Act) • Prudential standards for Mutual banks – to be developed • Companies Act	• Co-operative Banks Act 40 of 2007 (Co-operative Banks Act) • Transitional arrange-ments for CFIs • Transitional standard for co-operative banks • Co-operatives Act 14 of 2005

PA

Figure 2: Macroprudential policy instruments



Macroprudential policy instruments (Boar et al., 2017).

Figure 3: Financial Development Barometer(a)

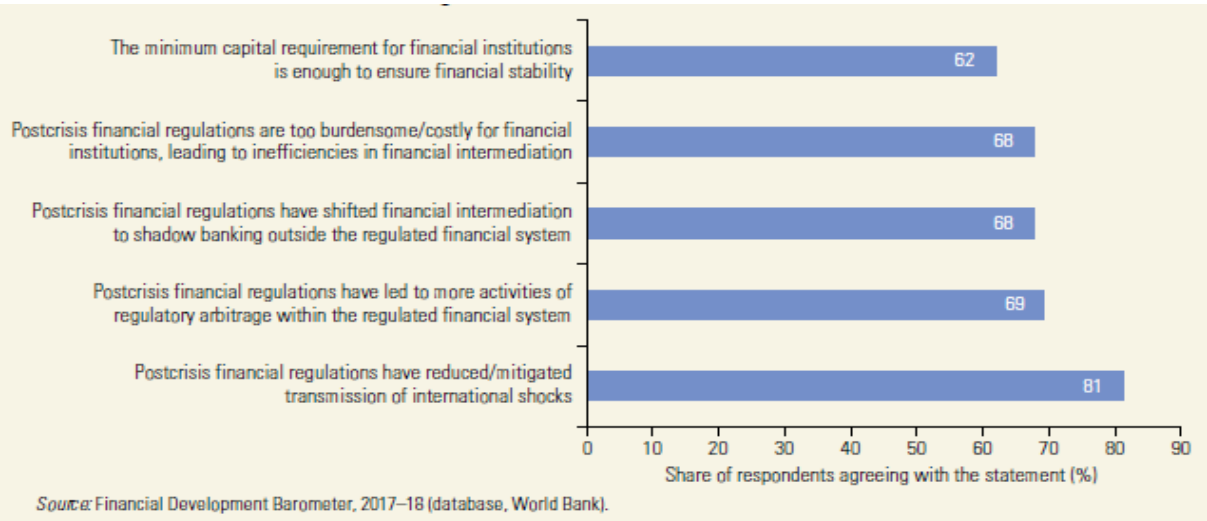


Figure 4: ***Financial Development Barometer(b)***

TABLE BO.3.1 Views on Net Impact of Postcrisis Regulatory Changes

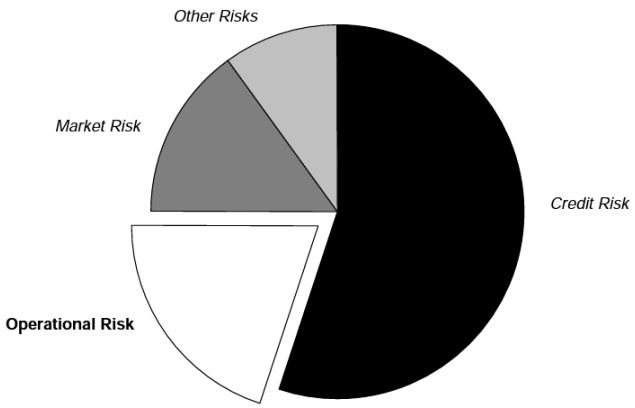
What is your view on the likely net impact of regulatory changes postcrisis for developing countries?

The likely net impact of regulatory changes after crisis for developing countries is	Percentage of respondents agreeing with the statement
Mostly detrimental	19
Little impact	36
Mostly positive	45

Source: Financial Development Barometer, 2017–18 (database, World Bank).

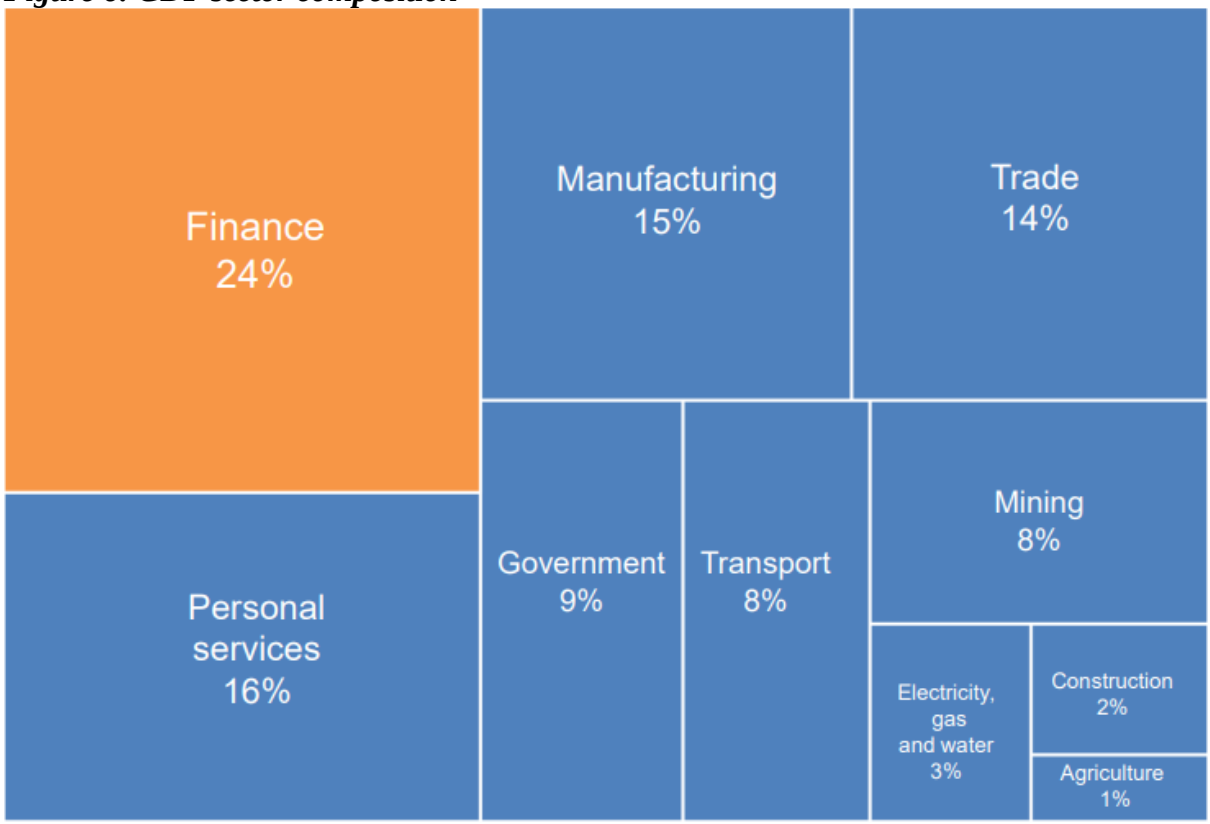
Figure 5: Bank risk types

Operational risk is one of the three major risks that banks face. Credit risk is generally thought to be a bank's biggest risk.



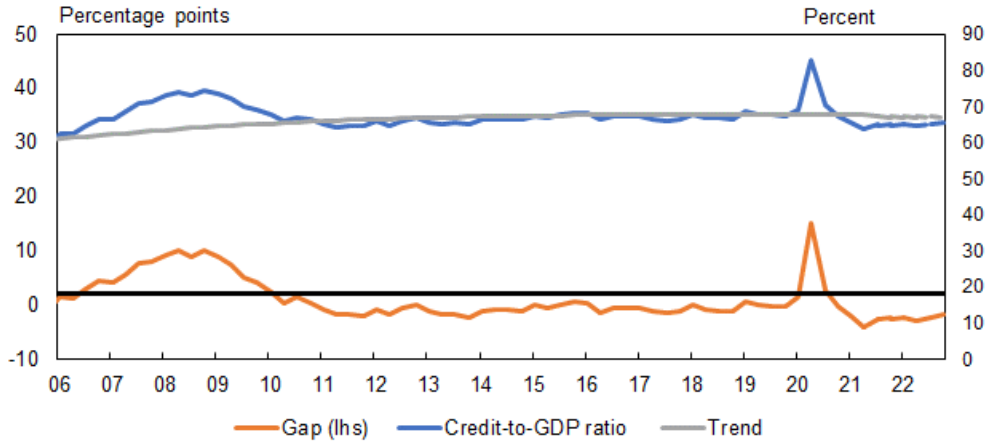
OpRisk Advisory LLC (Samad-Khan, 2006)

Figure 6: GDP sector composition



Stassa

Figure 7: Credit Gap



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