MONETARY POLICY IN THE SADC REGION:

THE NEXUS BETWEEN PRICE STABILITY AND FINANCIAL STABILITY

By

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Monetary Policy in the SADC Region: The Praxis between Price Stability and Financial Stability

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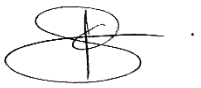

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DEDICATION

I dedicate this work to three very important people: my two best friends, Phethehile and Lesedi, as well as my late brother, Blessing, who breathed his last in January 2021 whilst he was still on the PhD journey.

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ABSTRACT (ENGLISH)

Historically, most central banks have tended to prioritise price stability over financial stability. The study focused on members of the Southern African Development Community (SADC) from 2009 to 2018. These members were Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. This study investigated the relationship between price stability and financial stability. Global economic developments, namely global financial crises, have demonstrated that financial instability can occur during periods of price stability. Consequently, it was necessary to quantitatively investigate the nature of the above relationship. There have been instances of global financial crises occurring during periods of low inflation. This study sought to analyse the relationship between these two important central bank objectives, with a focus on the banking sectors of 15 SADC nations.

The study was premised on the following research questions:

a) How do changes in financial stability indicators affect the inflation rate in the SADC region?

b) What is the nature of the causal relationship between price stability and financial stability?

The research followed a positivist hypothetico-deductive methodology. Due to the quantitative nature of the variables and the methodology adopted by most empirical studies, it was determined that a quantitative approach was appropriate. The modelling software EViews was utilised. The period covered by the data analysis for the banking sectors of the 15 SADC countries was from 2009 to 2018. The inflation rate was used as a measure of price stability in this study. Capital adequacy ratio, deposits to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets and return on equity are all measures of financial stability. A fixed effects regression model was employed to assess the impact of changes in

financial stability indicators on price stability in the SADC region from 2009 to 2018 for SADC member states. The Granger causality test was used to examine the relationship between price stability and financial stability variables. Even though the financial system comprises both banking and non-bank financial institutions, this study was limited to banking institutions. The focus was, therefore, on entities that fall under the financial sector oversight mechanisms of central banks.

The study reveals a significant negative relationship between the liquidity ratio and inflation, but a significant positive relationship between return on equity and inflation. An R-squared value of 0.5234 indicates that 52.34 per cent of changes in price stability as measured by inflation can be explained by changes in the selected indicators of financial stability. Other indicators of financial stability were deemed insignificant, as evidenced by probability values greater than 0.05 in the model. Non-performing loans to total loans ratio, return on assets and return on equity had a unidirectional causal association with price stability. It was observed that past inflation had a high probability of causing future non-performing loans, while past return on assets and return on equity had a high probability of causing inflation. According to the study's findings, the relationship between price stability and financial stability has significant policy implications, including ensuring that the macro-economic convergence agenda adopts a harmonised approach to financial stability with the same clarity given to price stability, whose convergence criteria are based on an inflation target range of 3-7 per cent. Regional harmonisation of policies aimed at financial stability and a subsequent regard to the same in the macro-economic convergence agenda will ensure, among other things, that monetary policy in the SADC region not only pursues price stability through inflation targeting, but also deliberately and intentionally addresses financial stability issues, which would be assessed at national and regional levels using unified criteria and clearly specified indicators of financial stability.

Key words: Price stability, Financial stability, Monetary policy, Inflation, SADC

OKUCASHUNIWE (ISIZULU)

Ngokomlando, amabhange amakhulu amaningi abejwayele ukubeka phambili ukusimama kwentengo kunokusimama kwezezimali. Lolu cwaningo belugxile kumalungu Omphakathi Wentuthuko YaseNingizimu Afrika (SADC) kusukela ngo-2009 kuya ku-2018, okuyi-Angola, Botswana, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, iNingizimu Afrika, Swaziland, Tanzania, Zambia kanye ne Zimbabwe. Lolu cwaningo luphenye ubudlelwano phakathi kokusimama kwentengo nokusimama kwezezimali. Intuthuko yezomnotho emhlabeni wonke, okuyizingqinamba zezimali zomhlaba wonke, ibonise ukuthi ukuntengantenga kwezezimali kungenzeka ngezikhathi zokusimama kwentengo. Ngakho-ke, bekudingeka ukuthi kuphenywe ngokwesilinganiso uhlobo lobudlelwano obungenhla. Kube nezimo zezinkinga zezimali zomhlaba ezenzeka ngezikhathi zokwehla kwamandla emali. Lolu cwaningo belufuna ukuhlaziya ubudlelwano phakathi kwalezi zinhloso ezimbili ezibalulekile zamabhange amakhulu, kugxilwe emikhakheni yamabhange yamazwe ayi-15 e-SADC.

Ucwaningo belusekelwe emibuzweni yocwaningo elandelayo:

c) Ushintsho lwezinkomba zokusimama kwezezimali lulithinta kanjani izinga lokwehla kwamandla emali esifundeni se-SADC?

d) Luyini uhlobo lobudlelwano oluyimbangela phakathi kokusimama kwentengo nokusimama kwezezimali?

Ucwaningo lulandele indlela yencazelo ehlongozwayo yendlela yesayensi. Ngenxa yesimo sobuningi bezinto eziguquguqukayo kanye nendlela eyamukelwa ucwaningo oluningi olunobufakazi, kwanqunywa ukuthi indlela yokulinganisa yayifanelekile. Isofthiwe yesifanekiso se-E-Views sasetshenziswa. Isikhathi esihlanganiswa nokuhlaziywa kwemininingwane yemikhakha yamabhange yamazwe ayi-15 e-SADC sasuka ngo-2009 kuya ku-2018. Izinga lokwehla kwamandla emali lisetshenziswe njengesilinganiso sokusimama

kwentengo kulolu cwaningo. Isilinganiso sokulingana kwemali mboleko, isilinganiso sediphozithi emalini ebolekiwe, imali ebolekiwe engasebenzi esilinganisweni sesamba semali mboleko, isilinganiso semali mboleko, imbuyiselo yezimpahla kanye nembuyiselo ekulinganeni konke kuyizinyathelo zokusimama kwezezimali. Kusetshenziswe isifanekiso sokwehla kwemiphumela engaguquki ukuze kuhlolwe umthelela wezinguquko zezinkomba zokusimama kwezezimali ekusimameni kwamanani esifundeni se-SADC kusukela ngo-2009 kuya ku-2018 emazweni angamalungu e-SADC. Ukuhlolwa komqondo wezibalo ka-Granger kwasetshenziswa ukuhlola ubudlelwano phakathi kokusimama kwentengo nokuhlukahluka kokusimama kwezimali. Nakuba uhlelo lwezezimali luhlanganisa izikhungo zezimali zamabhange nezingezona ezamabhange, lolu cwaningo belukhawulelwe ezikhungweni zamabhange kuphela. Ngakho-ke kwakugxilwe ezinhlanganweni eziwela ngaphansi kwezindlela zokwengamela umkhakha wezezimali wamabhange amakhulu.

Ucwaningo luveza ubudlelwano obubi obubalulekile phakathi kwesilinganiso semalimboleko kanye nokwehla kwamandla emali, kodwa ubudlelwano obuhle obubalulekile phakathi kwembuyiselo kukulingana nokwehla kwamandla emali. Inani eliyisikwele esingu-R lika-0.5234 libonisa ukuthi u-52.34% wezinguquko ekusimameni kwentengo njengoba kulinganiswa nokwehla kwamandla emali kungachazwa ngezinguquko zezinkomba ezikhethiwe zokusimama kwezezimali. Ezinye izinkomba zokusimama kwezezimali zithathwe njengezingabalulekile, njengoba kufakazelwa amanani okungenzeka angaphezu kuka-0.05 esifanekisweni. Izimali mboleko ezingasebenzi esilinganisweni sesamba semali mboleko, imbuyiselo ezimpahleni kanye nembuyiselo ekulinganeni kube nokuhlotshaniswa kwesizathu esingaqondile nokusimama kwentengo. Kwaqashelwa ukuthi ukwehla kwamandla emali esikhathini esidlule kwakunethuba elikhulu lokubangela imali ebolekiwe engasebenzi esikhathini esizayo, kuyilapho imbuyiselo yesikhathi esidlule yezimpahla nembuyiselo kukulingana kwakunethuba elikhulu lokubangela ukwehla kwamandla emali. Ngokwalokho okutholwe ocwaningweni, ubudlelwano phakathi kokusimama kwentengo nokusimama kwezezimali bunemithelela ebalulekile yenqubomgomo, okuhlanganisa nokuqinisekisa ukuthi

uhlelo lokufana komnotho wamazwe ahlukene lusebenzisa indlela evumelanayo yokusimama kwezezimali nokucaciswa okufanayo okunikezwa ukusimama kwentengo, okusekelwe ekuguquguqukeni kwentengo, uhla okuhlosiwe ngalo kusuka ku-3 kuya ku-7%. Ukuvunyelaniswa kwezinqubomgomo zesifunda okuhloswe ngazo ukusimama kwezezimali kanye nokubhekwa okulandelayo ohlelweni lokufana komnotho wamazwe ahlukene kuzoqinisekisa, phakathi kokunye, ukuthi inqubomgomo yezimali esifundeni se-SADC ayigcini nje ngokuphishekela ukusimama kwamanani ngokuqondisa ukwehla kwamandla emali, kodwa futhi ngamabomu nangenhloso ibhekana nezindaba zokusimama kwezezimali, ezizohlolwa emazingeni kazwelonke nawesifunda kusetshenziswa indlela yokunquma ebumbene kanye nezinkomba ezicaciswe ngokucacile zokusimama kwezezimali.

Amagama asemqoka: Ukusimama kwentengo; Ukusimama kwezezimali; Inqubomgomo yezimali; Ukwehla kwamandla email; Umphakathi Wentuthuko yaseNingizimu Afrika

KGUTSUFATSO (SESOTHO)

Ho latela nalane, boholo ba dibanka tse bohareng di na le tshekamelo ya ho etelletsa pele botsitso ba theko ho feta botsitso ba ditjhelete. Thuto ena e ne e tsepamisitse maikutlo ho Setjhaba sa Dinaha tse ka Borwa ho Afrika (SADC) ho tloha ka 2009 ho isa 2018, e leng Angola, Botswana, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, Afrika Borwa, Swaziland, Tanzania,Zambia le Zimbabwe.

Thuto ena e ile ya batlisisa kamano pakeng tsa botsitso ba theko le botsitso ba ditjhelete. Dintshetsopele tsa moruo wa lefatshe, e leng mathata a ditjhelete a lefatshe, di bontshitse hore ho se tsitse ha ditjhelete ho ka etsahala nakong ya botsitso ba ditheko. Ka lebaka leo, ho ne ho hlokahala ho batlisisa ka mokgwa wa mofuta wa kamano e ka hodimo.

Ho bile le diketsahalo tsa mathata a ditjhelete a lefatshe a hlahang nakong ya theko e tlase. Thuto ena e ne e batla ho sekaseka dikamano dipakeng tsa dipheo tsena tse pedi tsa bohlokwa tsa banka e bohareng, ho tsepamisitswe maikutlo ho makala a dibanka a dinaha tse 15 tsa SADC.

Thuto e ne e itshetlehile ka dipotso tse latelang tsa dipatlisiso:

e) Ho fetoha ha matshwao a botsitso ba ditjhelete ho ama sekgahla sa infleishene jwang lebatoweng la SADC?

f) Ke mofuta ofe wa kamano ya sesosa pakeng tsa botsitso ba theko le botsitso ba ditjhelete?

Dipatlisiso di ile tsa latela mokgwa wa ho bokella dintlha tse ngata ka ho sebedisa mekgwa ya ho etsa dipatlisiso e fapaneng. Ka lebaka la sebopeho sa palo ya mefutafuta le mokgwa o amohetsweng ke dithuto tse ngata tse nang le matla, ho ile ha etswa qeto ya hore mokgwa

wa dipalopalo o nepahetse. Ho ile ha sebediswa sete ya ditaelo tse sebediswang ho tsamaisa khomphutha ya mohlala wa E-Views.

Nako e akareditsweng ke tlhahlobo ya dintlha bakeng sa mafapha a dibanka a dinaha tse 15 tsa SADC e ne e le ho tloha 2009 ho isa 2018. Sekgahla sa infleishene se sebedisitswe e le tekanyo ya botsitso ba theko thutong ena.

Karolelano ya tjhelete ya banka mabapi le thepa e lekantsweng ya kotsi le mekoloto ya hona jwale,depositi ho dikadimo karolelano, mekoloto e sa sebetseng ho kakaretso ya dikadimo, karolelano ya mokoloto, phaello ya thepa le ho kgutla ha tekano kaofela ke mehato ya botsitso ba ditjhelete. Ho ile ha sebediswa mohlala o tsitsitseng wa phokotso ya maemo ho lekola tshusumetso ya diphetoho tsa matshwao a botsitso ba ditjhelete mabapi le botsitso ba ditheko sebakeng sa SADC ho tloha 2009 ho isa 2018 bakeng sa dinaha tseo e leng ditho tsa SADC.

Teko ya Granger ya sesosa e ile ya sebediswa ho hlahloba kamano pakeng tsa botsitso ba theko le maemo a tsitsitseng a ditjhelete. Leha tsamaiso ya ditjhelete e kenyelletsa ditsi tsa ditjhelete tsa banka le tseo e seng tsa banka, thuto ena e ne e lekanyeditswe ho ditsi tsa banka feela. Ka hona, ho ne ho tsepamisitswe maikutlo hodima mekgatlo e welang tlasa mekgwa ya tlhokomelo ya lefapha la ditjhelete tsa dibanka tse bohareng. Thuto ena e senola kamano e mpe dipakeng tsa karolelano ya ditjhelete le infleishene, empa kamano e ntle e teng dipakeng tsa phaello ya tekano le infleishene. Palo ya *R-squared* ya 0.5234 e bontsha hore 52.34% ya diphetoho tsa botsitso ba theko e lekantsweng ke infleishene e ka hlaloswa ka diphetoho ho matshwao a kgethilweng a botsitso ba ditjhelete.Dipontsho tse ding tsa botsitso ba ditjhelete di ne di nkuwa di se na thuso, jwaloka di bontshitsweng ke ditekanyetso tse kgolo ho feta 0.05 moetsong. Dikadimo tse sa sebetseng ho palo ya dikadimo kaofela, ho kgutlisa thepa le ho kgutlisa tekano ho bile le kamano e sa lebellwang ya mabaka le botsitso ba theko. Ho ile ha hlokomelwa hore ho infleishene ya nako e fetileng e bile le monyetla o moholo wa ho baka dikadimo tse sa sebetseng nakong e tlang, athe puseletso ya nakong e fetileng ya thepa le phaello ya tekano e ne e e na le monyetla o moholo wa ho baka infleishene.Ho ya ka diphumano tsa thuto kamano pakeng tsa botsitso ba theko le botsitso ba

ditjhelete di na le ditlamorao tse kgolo tsa leano, ho kenyelletsa le ho netefatsa hore lenane la kgokahanyo ya moruo la thuto ya moruo ohle le amohela mokgwa o lumellanang wa botsitso ba ditjhelete ka ho hlaka ho tshwanang ho fanwang ka botsitso ba theko, ba mekgwa ya ona ya ho kopanya e itshetlehileng ka lebelo la infleishene la sepheo sa 3 ho isa ho 7%.Ho dumellana ha lebatowa ha maano a reretsweng botsitso ba ditjhelete le ho ela hloko lenane la kgokahanyo ya moruo ho tla netefatsa, hara tse ding, hore leano la ditjhelete lebatoweng la SADC ha le latele botsitso ba ditheko feela ho lebisitswe ho infleishene, empa le ho sebetsana le ditaba tsa ditjhelete ka boomo le ka moreo. ditaba tsa botsitso, tse tla hlahlojwa maemong a naha le a lebatowa ho sebediswa mekgwa e kopaneng le matshwao a hlakileng a botsitso ba ditjhelete.

Mantswe a bohlokwa: Theko e tsitsitseng, Botsitso ba ditjhelete, Leano la ditjhelete, infleishene,SADC

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

CAR	Capital adequacy ratio
CPI	Consumer price index
DLR	Deposit to loans ratio
ECB	European Central Bank
FSI	financial soundness indicators
HICP	Harmonised index of consumer prices
MPC	Monetary policy committee
NPLTL	Non-performing loans to total loans
ROA	Return on assets
ROE	Return on equity
SADC	Southern African Development Community
SARB	South African Reserve Bank
VAR	Vector autoregressive
VECM	Vector error correction model

CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

The 2007/08 global financial crises have resurrected the age-old question of whether financial stability can be achieved in the absence of a more active coordination with macroeconomic policies, especially monetary policies (Borio, 2011). Although there is little agreement in policy circles, the extant literature proffers contradicting views regarding the interplay between price and financial stability. One view, originally proposed by Schwartz (1998), contends that a monetary regime that limits price instability will also limit financial instability (Bordo et al., 2000). An alternative view argues that a monetary regime that solely focuses on price stability may not limit the occurrence of financial instability as the latter may still develop in environments without any perceptible price instability (Borio & Lowe, 2002). A third view, which is commonly touted as the "new environment hypothesis", submits a trade-off between price stability and financial stability (Borio et al., 2003). The thesis attempts to explore the interrelationship between price instability and financial instability within the empirical context of the Southern African Development Community (SADC), a setting that has not been examined in prior studies.

The need to investigate the nature of the relationship between the two forms of stability is necessitated by economic developments such as the global financial crises indicating that financial instability can occur during periods of price stability. In light of the pre- and post-global financial crises lessons learned, policymakers must therefore comprehend the nature of the connection between these two fundamental central bank goals.

1.2 BACKGROUND

Historically, most central banks have tended to prioritise price stability over financial stability. According to the website of the Southern African Development Community (SADC) member nations, this is true of central banks in the SADC region due to the belief that pricing stability leads to financial stability (Borio & Lowe, 2002). Experts such as Blinder (2018) and Goodhart (2018) believe that there is a trade-off between a central bank's goals of price stability and financial stability. For this reason, regulators establish institutional structures wherein a separate entity from the central bank carries out the financial stability objective, while the enforcement of monetary policy is left to the central bank. However, other experts claim that the two objectives mutually reinforce each other (Stark, 2010).

South Africa experienced an increase in non-performing loans and a deterioration of assets after the financial crisis. The economic recession resulted in an increase in non-performing loans, which had a significant impact on the banks' loan books causing a decline in total assets and liabilities (Maredza & Ikhide, 2013). The same scenario was experienced in countries like Namibia where the sovereign debt/GDP ratio had doubled against a backdrop of rising housing prices and household debt (IMF, 2018). In Zimbabwe, a significant rise in inflation in recent past decades and subsequent cash shortages resulting in a spiralling rise in product prices threatened economic stability as household debt increased significantly. A rise in borrowing for short-term consumption was noted, along with a rise in the volume of non-performing loans reaching a high of 16 per cent in 2015.

Following the tightening of global financial conditions, with the increase in policy interest rates and the risks of lower global economic growth, there is concern for ensuring financial stability in the SADC region. The persistent mounting financial instability has seen a spike in prices in Nambia (Bank of Namibia, 2022) and in Zimbabwe (Chitiyo, Dengu, Mbae & Vandome, 2019), making inter-country trading difficult, thereby necessitating efforts towards promoting macro-economic convergence in the SADC region.

1.2.1 SADC's Attempt at Macro-economic Convergence

SADC countries have been on the path towards macro-economic convergence meant for economic integration since the last century. Efforts have been made to ensure the attainment of integration milestones of Free Trade, a Customs Union, a Common Market, a Monetary Union and a Single Currency. According to Horner and Hulme (2019), economic convergence exists when member countries tend to reach a similar level of development and wealth; therefore, efforts have been made to ensure economic convergence towards stability for SADC member countries.

According to Ramanayake & Kasun (2019), considering Solow's economic growth model, an economy converges towards a steady state due to diminishing returns on investment in physical capital. Solow assumes equality of countries in all aspects, though they may have different initial levels of capital per capita with poor countries having higher marginal capital productivity than rich countries. In the end, the countries will eventually catch up and level up. Johnson and Papageorgiou (2018) affirmed Solow's argument when they found convergence among developed countries, though the poorest countries were less likely to converge. It is upon this basis for convergence that integration is envisaged in the SADC region, prompting member countries to transition towards economic integration.

In 2008, a Free Trade Area was launched in the SADC community following the SADC Regional Indicative Strategic Development Plan (RISDP). Subsequent efforts include the introduction of the Customs Union in 2010 and a Common Market in 2015. The formation of the monetary union and the introduction of a single currency is currently pending. These pending milestones have shifted several timelines ahead pending the member countries' ability to satisfy macro-economic convergence benchmarks such as a single digit and stable rate of inflation, reduction in the budget deficit to GDP ratio and reduction of the public and publicly guaranteed debt to GDP ratio. This makes it necessary to investigate the nature of

the relationship between price stability and financial stability to ascertain the preparedness of the SADC region in its quest for economic integration and the formation of a Monetary Union.

1.3 STATEMENT OF THE PROBLEM

This study's objective was to evaluate the relationship between price stability and financial stability to establish whether monetary policy in the SADC region should also seek the target of financial stability in addition to its typical objective of price stability. According to Borio and Lowe (2002), a fresh wave of research indicates that the prevalence of low inflation has ushered in a "new environment". Further, they note that the relationship between price stability and financial stability must be re-examined considering the aforementioned. According to other sources that support this position, the traditional understanding that price stability is beneficial for financial stability must be re-examined (Issing, 2003).

The relationship between price and financial stability has gained attention due to global economic developments such as the global financial crisis of 2007/08. The occurrence of these developments raises additional questions about the nature of the relationship between price stability and financial stability, necessitating a re-evaluation of the significance of the interaction between these two central bank policy objectives, and their policy implications for the soon-to-be-established SADC central bank.

A goal of the region's macro-economic convergence initiative is the establishment of a SADC Central Bank. To emphasise the importance of price stability, a maximum inflation rate of 3 per cent has been established as one of the major macro-economic convergence targets for all member states (Bank of Zambia, 2011). Financial stability is not mentioned in the macro-economic convergence criteria, which may be the result of its marginalisation as a central bank purpose, which is typically implicit rather than stated.

The onset of the global financial crisis added a new dimension to the discussion of price and financial stability. Consequently, the relationship between price stability and financial stability is interpreted differently. As a result, several African regional blocs, such as SADC and

COMESA, are actively creating prudential frameworks aligned to worldwide developments. To overcome the issues associated with the variables used as financial stability indicators so that the relationship between financial stability and price stability can be better understood, the preceding is provided (Chirozva, 2009). Not fully understanding the relationship between price stability and financial stability can lead to misdirected policy implementation by monetary authorities and a failure to implement central bank structures (e.g., a structure in which the monetary policy formulation function is separated from the supervisory or prudential function, or a structure in which these two functions are housed under the same roof) that promote both price stability and financial stability.

For this reason, the association between these two primary central bank objectives from a SADC-wide perspective is timely, given that the regional bloc has established goals that will foster regional integration, including the establishment of a SADC central bank and the introduction of a SADC currency (Harvey, 1999; Redda, 2021). A crucial question for SADC bloc would be whether the establishment of a sub-regional central bank could be a solution to the inadequacy of institutional arrangements that ensure the effective pursuit of price stability and adequate preparedness to avert financial crises resulting from financial instability that can easily spread to different member states due to the interconnectedness of the financial system. There are significant dangers of contagion in a monetary union such as the Eurozone during the global financial crisis. This study aimed to examine this link with a focus on the banking sectors of the 15 SADC nations.

1.4 RESEARCH OBJECTIVES

This research was based on the following objectives:

1.4.1 Primary Objective

The primary objective of this study was to analyse the relationship between price stability and financial stability to determine whether monetary policy in the SADC region should also pursue the financial stability objective in addition to its usual goal of price stability.

1.4.2 Secondary Objectives

The secondary objectives intended to achieve the main purpose of the study were:

g) To determine the effect of changes in financial stability indicators (capital adequacy ratio, deposits to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets, return on equity) on inflation as a proxy for price stability in the SADC region.

h) To assess the causal relationship between inflation and financial stability indicators.

i) To determine the implications of financial stability and price stability on the SADC region's economic integration.

1.5 RESEARCH QUESTIONS

The following questions were used to guide the study:

a) How do changes in financial stability indicators affect the inflation rate in the SADC region?

b) What is the nature of the causal relationship between price stability and financial stability?

c) What are the implications of financial stability and price stability on the SADC region's economic integration?

1.6 HYPOTHESIS OF THE STUDY

H_0 - There is no relationship between price stability and financial stability in the SADC region.

H_1 – There is a relationship between price stability and financial stability in the SADC region.

1.7 KEY TERMS

Price Stability, Financial Stability, Macro-Prudential Policy, Capital Adequacy, Deposits to Loans Ratio, Non-Performing Loans to Total Loans Ratio, Liquidity Ratio, Return on Assets, Return on Equity

1.8 SUMMARY OF RELATED LITERATURE

1.8.1 Price Stability

Price stability is one of the key terms used in the study hence the need to highlight how it is defined in related literature. Hartmann and Smets (2018) define price stability as a state of the economy in which the level of price is stable or the rate of inflation is considered acceptably low and stable. Likewise, according to Issing (2003), price stability refers to a steady level of price or a low level of inflation and not to steady individual prices. Furthermore, the Governing Council of the European Central Bank notes that the pursuit of price stability entails the maintenance of inflation rates below, but close to, 2 per cent over the medium term (European Central Bank, 2003).

1.8.2 Financial Stability

Another key term in this study is financial stability. Hollander and Lill (2019) define financial stability as the smooth functioning of the financial intermediation system between firms, government, households, and financial institutions. They further define financial stability in terms of its opposite counterpart, financial instability. Furthermore, financial instability manifests through the failure of banks, intense asset price volatility or a collapse of market liquidity and ultimately, in a disturbance in the working of the payment and settlement system. This definition fares well with that of Mishkin (1991) who defines financial stability as the

occurrence of a financial system, which in a prolonged way can ensure, and without major mishaps, effective distribution of savings to investment opportunities.

1.8.3 Macro-prudential Policy

Macro-prudential policy is a significant term used in the study. Galati and Moessner (2011) note that it is a policy aimed at ensuring that the financial system carries out its purpose of financial intermediation in a stable manner. They further highlight intermediation of credit, smooth functioning of payment systems and insulating the financial system against risks that cause financial instability.

1.8.4 The Link between Price Stability and Financial Stability

Different researchers have put forward different views on the link between price stability and financial stability. Below are some views on the association between the two forms of stability, divergent in some cases and convergent in other instances. The common view among researchers, on the association between price stability and financial stability, is presented by Bordo, Dueker and Wheelock (2000) who write that monetary authorities who successfully promote price stability resultantly witness financial system stability. This view fares well with Issing (2003) who states that high inflation is one of the major factors creating instability in the financial system. Similarly, Schwartz (1995) is of the view that price stability is almost an adequate ingredient for financial stability. Bordo and Wheelock (1998), on the other hand, are more cautious and merely state that price stability will tend to promote stability of the financial system.

Unlike the researchers cited above, Borio and Lowe (2002) argue that the vulnerability of the financial system can still develop without any perceptible rise in inflation although a low rate of inflation may encourage stability of the financial system. They additionally observe that the onset of financial instability which leads to crises is explained by the advent of irregularities building up in the financial system. Such irregularities may include inefficiencies in the

allocation of capital or shortcomings in the pricing and management of risk and excessive credit growth. Other proponents of the views against the conventional relationship between price stability and financial stability contend that the conduct of an optimal monetary policy may in some instances require flexibility in the pursuit of inflation targets in the short-term when there are strains in the financial system to ensure price stability in the medium to the long run (Kent & Lowe, 1997).

1.8.5 Evolution of Central Bank Objectives

Due to the global financial crisis of 2007/08, central bank mandates on financial stability have been the subject of heated debate. The idea that price stability should be the sole purpose of monetary policy appears to have been diminished because of the global financial crisis. Prior to the financial crisis, the notion that monetary authorities should only be concerned with volatility in the financial markets to the extent that it may have a short-term influence on inflation estimates appears to have been popular. Global financial crises, however, refuted this idea (Gali, 2011). It is evident that low and stable inflation will not definitely avoid the onset of financial instability (Subbarao, 2009).

Concerns regarding price stability and financial stability as objectives of central banks present some intriguing questions. One of the most important concerns among central bankers in general, and those in SADC member nations, is whether financial stability should be an extra objective of monetary policy or whether it should be an express objective of the reserve bank. Firstly, the central bank can easily monitor developments in the financial system and the economy due to its broad reach. Considering the preceding, Eichengreen, Prasad and Rajan (2011) proposed a dual mandate of financial and price stability so that monetary policy is part of the financial regulator's policy toolkit. Likewise, Woodford (2012) argued that monetary policy might help mitigate the severity of threats to financial stability but also noted that mandates of central banks should be made explicit. To avoid confusion in the implementation of the policies, it is essential to distinguish monetary policy from financial stability policy

(Svensson, 2010). According to Svensson, striking two birds with one stone may not be the most appropriate central bank policy posture.

Secondly, policymakers involved in the development of the SADC central bank should also consider how the pursuit of financial stability may be reconciled with an inflation-targeting framework for price stability. Prior research has shown a probable causality between these two constructs – financial stability and price stability – hence pursuance of one may be accomplished through achievement of the other. On this subject, researchers hold varying viewpoints. According to Svensson (2010), regardless of circumstances such as the global financial crises, flexible inflation targeting remains the optimum monetary policy approach. Other scholars advocated for the elimination of inflation targeting altogether, while the reformation of inflation targeting in ensuring that the interest rate policy becomes a more effective instrument for promoting financial stability was advocated (Woodford, 2012). In contrast, Svensson (2010) claimed that flexible inflation targeting remains the optimum monetary policy practice regardless of circumstances such as the global financial crises.

Thirdly, should the central bank be fully responsible for financial stability or should it be shared? According to the Bank for International Settlements (2009), financial stability mandates are typically not explicit, and several reserve banks are either fully responsible for financial stability or share the responsibility with other bodies. Price stability is a priority. According to researchers such as Cihák and Hesse (2010), the central bank's role in financial stability is less significant than in the case of price stability. The instruments of monetary policy in central banks have a limited effect on the purpose of financial system stability; therefore, financial stability should be a shared duty, according to the prevailing view. SADC bankers working in the macro-economic convergence programme should also inquire as to whether additional regulatory organizations at the regional level would then be involved in the sharing of responsibilities for financial stability. This may ensure a holistic approach to the attainment of financial stability, considering that several constructs are responsible for the attainment of financial stability.

Another concern is whether central banks have the policy tools necessary to ensure both price and financial stability. Simply using the short-term interest rate as a policy instrument, monetary authorities may not be able to easily achieve various objectives (Tinbergen, 1952). Accordingly, others such as Bernanke (2011) have suggested that financial stability issues may be difficult to address using the interest rate as a policy instrument. There may be instances where financial stability and price stability conflict particularly when central banks have just one monetary policy instrument (Goodhart, 2018). This presents an obstacle to achieving policy objectives.

The achievement of several monetary policy objectives can be enhanced by supplementing the interest rate instrument with other quantifiable or macro-prudential devices such as: credit – caps on the loan-to-value (LTV) ratio; liquidity – limits on net open currency positions/currency mismatch; or capital – counter cyclical/time-varying capital requirements (Mohanty, 2011). Some lessons learnt from the global financial crisis have led to a greater emphasis on adding new tools to the central banker's toolkit to achieve the objective of financial system stability. Financial crises throughout the past three centuries have resulted in differing interpretations of the central bank’s objectives of price stability and financial stability.

Financial stability has not been the primary objective of central banks, whose founding legislation in most cases expressly outlines a price stability mandate for the central bank. Prior crises in the global financial environment, according to Mohanty (2012), have caused the financial stability goal to transition from being an important goal to being overlooked and recently acknowledged as a policy area needing significant attention.

It is important to note, however, that recent research on the relationship between price stability and financial stability has focused on rich nations and some developing market economies. To the author's knowledge, there has been no discussion in preparation for the SADC monetary union on these issues with a concentration on the SADC region; hence, this study.

1.8.6 Developments in the SADC Region

To analyse the relationship between price stability and financial stability, it is crucial to understand which recent developments in the Southern African Development Community (SADC) region are pertinent to this analysis. The SADC ministers of finance and investments ratified a Memorandum of Understanding (MOU) on 31 July 2001, identifying macro-economic convergence metrics to be sought by member nations. The MOU also provided for monitoring the accomplishment of the essential convergence objectives on a regular basis (Bank of Zambia, 2011). These measures of macro-economic convergence are divided into major and secondary indicators. The key indicators are inflation, the budget deficit, and the national debt. The secondary measures include the real exchange rate, interest rate, real GDP growth, domestic debt, external debt and revenue/GDP (excluding grants) ratio, as well as the current account/GDP (excluding grants) and domestic investment/GDP ratios.

Regional economic convergence is expected to result in a monetary union with a single SADC Central Bank and a SADC currency. Masson and Pattillo (2004) note that the issue of a single African currency has long been regarded as the cornerstone of African unity, whose attainment its proponents hope will result from economic integration of the continent in accordance with the economic integration strategy of the African Union. In addition, they suggest that in August 2003, the Association of African Central Bank Governors aimed to establish a unified currency and a central bank by 2021, a goal that is yet to materialise.

Nevertheless, an essential question arises: why the fascination with a monetary union? Masson and Pattillo (2004) identify reasons for the enthusiasm around the construction of a monetary union that go beyond an economic desire for stronger growth and lower inflation among its members. Accordingly, they highlight that the successful launch of the euro has piqued the interest of other regional blocs in monetary unions. Kabamba and Mabi (2022), who argue that the European Union is seen as a positive example in the recent history of

economic integration, support this view by stating that it is, thus, a pacesetter whose steps are worth following.

According to the Reserve Bank of Malawi (2013), the development of a SADC central bank and a unified currency will have both costs and benefits for member nations. Therefore, this implies that the procedure must be carefully considered and examined (Masson & Pattillo, 2004). A SADC monetary union will have far-reaching economic effects, even from the perspective of financial system stability; therefore, it is necessary to inquire how it relates to price stability as one of the major macro-economic convergence indicators. Considering the above, it is important to note that the establishment of a single central bank will also affect the growth of SADC financial markets (Reserve Bank of Malawi, 2013).

Despite this, to the best of the author's knowledge, no financial stability metrics have been mentioned in pursuit of macro-economic convergence in the SADC, even though financial stability has become an essential central bank objective in the wake of the global financial crises. Therefore, it is uncertain how the SADC central bank will approach the financial stability part of monetary policymaking. Will there be a monetary policy committee that addresses pricing and financial stability? Or will a committee on financial stability policy be formed to address the stability of the SADC financial system? It is hoped that a comprehensive investigation of the relationship between these central bank objectives will contribute meaningfully to a number of these crucial concerns.

1.9 RESEARCH METHODOLOGY

1.9.1 Research Design

To determine the relationship between price stability and financial stability, this study employed the positivist hypothetico-deductive research philosophy which necessitates a quantitative econometric technique. A quantitative methodology was deemed appropriate because empirical investigations on the nature of this relationship employ a quantitative

methodology. EViews was utilised in the research approach for the estimate of the study's models. The period from 2009 to 2018 was covered for the data analysis of the banking sectors of the 15 SADC countries.

1.9.2 Population of the Study and Data Sources

The population covered by this study is the entire banking sector in each of the 15 SADC countries as captured by the secondary data available from the various reports of the respective central banks as well as statistics available in the International Monetary Fund (IMF), World Bank (WB) and the Bank for International Settlements (BIS) reports.

1.9.3 Measurement of Variables and Data Sources

The study used the inflation rate as a measure of price stability, which is in line with a study by Hartmann and Smets (2018) wherein they define price stability as a state of the economy in which the level of prices is stable or the rate of inflation is low and stable.

Empirical studies show that various financial stability indicators are used to assess financial system stability. The study used the following banking sector indicators as measures of financial stability: Capital Adequacy Ratio, Loan to deposit Ratio, Non-Performing Loans to Total Loans Ratio, Liquidity Ratio, Return on Assets and Return on Equity. The above variables are essential indicators of stability in the banking sector (Jakubik & Slacik, 2013). The Loan to Deposit Ratio and the Liquidity Ratio illustrate the capacity of banks to carry out their financial intermediation role while their respective Capital Adequacy Ratios show their ability to absorb losses and therefore resilience. These are essential reflectors of how stable the banking sector is hence the inclusion of these variables. This is in line with the approach used by researchers such as Allen and Santomero (2001), Berger (1995), and Pastory and Mutaju (2013).

The percentage change in real GDP was also used in the study because the empirical literature usually uses changes in real GDP to proxy economic growth (Elegbe, 2013; Durham,

2003). The inclusion of economic growth in modelling the stability of the financial system is justified by the fact that the change in real GDP is a key driver of many banking activities and indicators such as lending and total capital at the bank's disposal (Elegbe, 2013; Kar & Pentecost, 2000).

1.9.4 Econometric Model

The study involved estimating two sets of econometric models, namely, a model for the relationship between price stability and financial stability over the period 2009-2018 for SADC countries without considering structural changes and a second model which considers the structural changes in the countries included in the study. To test for causality among price stability and financial stability variables, the study used the Granger causality test. According to Granger (1969), a variable X causes Y if the predictability of Y increases when X is taken into consideration.

Therefore, X "Granger causes" Y if past values of X can help explain Y. However, if the Granger causality holds this does not guarantee that X causes Y. But it suggests that X might be causing Y. It is crucial to test for stationarity in time series data to avoid spurious regression.

The stationarity test (unit root test) procedures that were adopted in this study are the Augmented Dickey-Fuller (ADF) test and the Philips-Perron test where there are structural changes. The Johansen Cointegration test was used to analyse the possibility of cointegrated (or long-run) relationships among the variables under study.

1.9.5 The Model Specification

In line with previous studies, this study envisages the use of the following econometric model (Schwartz, 1998; Borio & Lowe, 2002; Blot et al., 2015):

$$PS_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 LDR_{it} + \beta_3 NPLLR_{it} + \beta_4 LR_{it} + \beta_5 ROA_{it} + \beta_6 ROE_{it} + \beta_7 PD_{it} + \beta_8 CPS_{it} + \alpha_i + \varepsilon_{it}$$

(Equation 1.1)

PS_{it} is the price stability measure which is the inflation rate or an index of inflation. The study proposes to use the following banking sector indicators as measures of financial stability: Capital Adequacy Ratio (CAR_{it}), Loan to Deposit Ratio (LDR_{it}), Non-performing loans to total loans ratio ($NPLLR_{it}$), Liquidity Ratio (LR_{it}), Return on Assets (ROA_{it}) and Return on Equity (ROE_{it}); α_i is the idiosyncratic part of the error term and ε_{it} is the error term.

1.10. JUSTIFICATION FOR THE STUDY

According to Blot, Creela, Huberta, Labondancea and Saracenoa (2015), the question of whether financial stability relates to price stability is extremely timely and crucial for policymakers as most central banks are now tasked with guaranteeing financial stability. They also emphasise that despite the topic's importance to policy implementation, there is minimal literature on the subject. Most of the existing material on the relationship between financial stability and price stability supports the notion that financial stability will prevail when inflation is low (Borio & Lowe, 2002).

Recent global financial developments have begun to put questions on the importance of financial stability, given that financial vulnerabilities in some of the countries most hit by the global financial crisis evolved during periods of price stability. This has sparked considerable debate regarding the relationship between these two primary central bank areas of focus. This paper aimed to contribute to that discussion, but with a concentration on the SADC region.

According to Smets (2014) and Woodford (2012), cited by Blot et al. (2015) in their study on the relationship between financial stability and price stability in the United States and Eurozone, the relationship between price and financial stability is crucial for ongoing discussions on monetary policy instruments and objectives. This raises the question of whether there should be as many central bank instruments (such as monetary policy) as there are goals or whether monetary policy should assist in the supervision of financial institutions by pursuing a financial stability objective in addition to its price stability objective.

Avgouleas and Arner (2017) observe that problems arise when regional blocs display financial convergence but regulatory measures enforcing the stability of financial institutions lag. In addition, they emphasise that the flaw manifested itself in the Eurozone during the financial crises. This paper aims to contribute to ongoing discussions on the relationship between price stability and financial stability from the perspective of the Southern African Development Community (SADC). In addition, the study will contribute to the macro-economic convergence considerations which include the formation of a SADC central bank by highlighting the need to consider financial system stability issues as an explicit rather than an implied central bank objective considering the lessons learnt from the Eurozone and other economic blocs. Given the recognised relationship between price stability and financial stability, the study will also provide insight into the institutional structure of the SADC central bank. The institutional architecture of the central bank will determine its ability to avert or effectively address financial crises. The design of the central bank's pursuit of these two types of stability is crucial (Avgouleas & Arner, 2017).

1.11 SCOPE AND LIMITATIONS OF THE STUDY

Both banking and non-banking financial institutions comprise the financial system's institutions. This study exclusively examined financial institutions because the supervisory structures of various central banks vary. Some arrangements at the Reserve Bank of Zimbabwe, for instance, exempt certain non-bank financial entities, such as insurance companies and pension funds, from the central bank's supervision.

This presents a constraint in that financial stability indicators in other countries, particularly Europe and other nations abroad, may be collected to include non-deposit-taking financial institutions that may be systemically significant from the regulator's perspective. Therefore, comparisons with these nations may become difficult. In addition, there would be data constraints in circumstances where empirical results from other researchers exclude countries that have undergone significant structural changes, resulting in the omission of their statistics

to prevent data set issues. This typically arises when certain statistical outliers are so extreme that they are likely to affect the results.

In terms of geographical scope, the study concentrated on all SADC nations, namely Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe.

1.12. ETHICAL CONSIDERATIONS

This research posed minimal ethical risks to the researcher, participants, and UNISA due to its extensive use of publicly accessible information. Secondary data was utilised in the study's research technique. Both price stability and financial stability variables for each country in the sample were gathered from their respective central banks and other renowned organisations such the IMF, the World Bank and the BIS. Despite this, a UNISA ethical clearance certificate was explicitly requested prior to data collection.

1.13. STRUCTURE/ORGANISATION OF THE THESIS

The study comprises of 5 chapters organised sequentially as outlined below:

Chapter 1 is an introductory chapter which gives the background that necessitated the research. It also contains the research objectives, research questions, research justification, research scope and limitations of the study.

Chapter 2 covers the literature review and some empirical findings from other researchers which formed basis for this research. It covers the theoretical framework underpinning this study.

Chapter 3 is a discussion of the methodology used in this study. It also includes a justification of the methodology, the sampling techniques used and statistical tools for analysing data to be collected in view of the research limitations.

Chapter 4 presents the research findings. A discussion of the findings ensues following an analysis of the research results.

Chapter 5 is the last chapter detailing the conclusions and recommendations. It gives the overall conclusion to the research. Lastly, it provides areas requiring further investigations.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1. INTRODUCTION

This chapter provides a review of the literature on price stability and financial stability. It aims to establish results and conclusions derived from prior studies in order to determine the research gap which the study is seeking to fill in. As such, the probable connection between price stability and financial stability is reviewed so as to ascertain relevant policy considerations. Several theories associated with the study variables: price stability and financial stability are critiqued. Additionally, the key measures of the price stability and financial stability are analysed.

2.2. DEFINITIONAL CONSIDERATIONS FOR PRICE STABILITY AND FINANCIAL STABILITY

2.2.1. Price Stability

According to Pianalto (2011), price stability could be considered as a situation where the level of inflation is low and predictable such that it is not a prominent consideration when firms and consumers make decisions. Related to the above definition, is the view echoed by Greenspan (1994) who notes that price stability prevails when both businesses and households do not have to incorporate anticipated price level changes in their decision-making process.

2.2.1.1. Measurement of price stability

The measurement of price stability is an important aspect of the policy-making process in central banks because of importance attached to the price stability objective. The foregoing is in line with Wynne (2008) who recognises that attaining price stability is considered imperative for the realisation of other central bank objectives.

Castelnuovo, Nicoletti-Altimari and Rodríguez-Palenzuela (2003) highlighted that the quantitative objective for price development has become a widespread practice in modern monetary policymaking. Wynne (2008) reiterated that central banks need to play a leading role in matters relating to the measurement of prices. It is, thus, very important to have close coordination between those handling inflation numbers and those employed at national statistical agencies so that figures used to compile price indices can be continuously improved thereby giving more accurate measurements of price stability and more informed policy input choices e.g., the choice between the use of headline inflation and core inflation.

Studies by Wynne (2008), Bryan and Pike (1991) and Becsi (1994) have shown that price stability, at a consumer level, is more effectively defined in terms of headline inflation measures that factor in the cost of living. Notwithstanding, there are other alternatives. Wynne (2008) weighs in by reiterating that the most ideal definition for price stability with respect to an index is one that effectively considers the manner in which society is impacted by inflation. Wynne (2008) identified 22 central banks that specify their price stability objective in terms of changes in consumer price inflation shown by movement in a consumer price index. This is shown in table 2-1.

Table 0-1: Numerical definitions of price stability

Country	Target specification in terms of Inflation (%)	Target Index
Australia	2 – 3	CPI
Brazil	4.5 ± 2	CPI
Canada	2 ± 1	CPI
Chile	2 – 4	CPI
Colombia	3 – 4.5	CPI
Czech Republic	3	CPI
Hungary	3	CPI
Iceland	2.5 ± 1.5	CPI
Mexico	3 ± 1	CPI
New Zealand	1 – 3	CPI
Norway	2.5	CPI
Peru	2 ± 1	CPI
Philippines	4 – 5	CPI
Poland	2.5 ± 1	CPI
South Korea	3 ± 1	CPI

South Africa	3 – 6	CPI
Sweden	2 ± 1	CPI
Thailand	2 ± 1	CPI core
United Kingdom	2	CPI (HICP)
Japan	0-2	CPI
Switzerland	< 2	CPI

(Source: Wynne, 2008)

Worth noting from table 2-1, is the recognition of the presence of price stability even though inflation rates are positive. This could be motivated by the need to ensure that deflation is avoided given its undesirable macro-economic implications.

Wynne (2008) also notes that another likely reason for not defining price stability where inflation is measured to be zero is the unlikelihood of downward revision in the price of labour. In his discussion on the measurement of price stability only one African country is included in Wynne's (2008) list, prompting the need for closer look at the African context.

2.2.1.2. The African context

Heintz and Ndkiumana (2010) note that the increased adoption of inflation targeting amongst developed countries and emerging market economies has led to a general acceptance of an inflation targeting monetary policy regime as best practice. Realising the need to better manage inflation from a cause-and-effect point of view, Heintz and Ndkiumana (2010) opine that any analysis of inflation management in Sub-Saharan Africa must consider the factors contributing to inflation and their relative importance and dynamics that recognisably differ across different countries. Considering the above, some studies such as Thornton (2008) and Barnichon and Peiris (2008) in Sub-Saharan African countries revealed that one of the factors contributing to inflation is the variance between demand for money and its supply.

Studies on individual countries have also addressed the question of what drives inflation in some African countries. For instance, continued inflationary pressures in Ghana over the period 1970 to 1990 were attributed to two factors i.e., money supply and real sector growth shortcomings particularly in the agricultural sector (Harrigan, Aryeetey & Harrigan, 2000). In a

study of sources of inflation in Ethiopia, liquidity, among other supply-side issues, was identified as contributing to persistent inflation (Loening, Durevall & Birru, 2009).

Studies of inflation dynamics in African countries tend to focus on a subset of these factors when exploring the determinants of inflation. An evaluation of inflation targeting monetary policy must consider all the factors that contribute to inflation to reach an informed conclusion. Inflation targeting has distinct implications for the economy, depending on the source of the inflation.

Table 0-2: Numerical definitions of price stability for some SADC Countries

Country	Target definition in terms of inflation (%)	Target index
Botswana	**3 – 6**	CPI
Democratic Republic of Congo	7	CPI
Eswatini	3 – 7	CPI
Malawi	5	CPI
Mozambique	5.6	CPI
Tanzania	5	CPI
Zambia	6 – 8	CPI

(Source: Centralbanknews.info, 2021)

Table 2-2 only reflects SADC countries whose inflation target information was available. Studies on the pursuit of price stability via monetary policy regimes such as inflation targeting reiterate the importance of policy evaluation with a focus on the determinants of inflation. Several factors have been identified as determining inflation; however, this study's focus is on a category of factors comprising that which constitutes financial system stability. Definitional considerations of financial stability bring to the fore some financial stability indicators of importance in the context of this study.

2.2.2. Financial Stability

The lack of a universally accepted definition for price stability makes it difficult to define financial stability with a similar level of lucidity. Issing (2003) acknowledges this and asserts that is it easier to define financial instability instead of financial stability because harmony on

its definition is yet to be established. Mishkin (1991) weighs in and notes that financial instability happens when there is disruption to the process of flow of funds from surplus regions to those in deficit.

According to the South African Reserve Bank, financial instability manifests through the failure of banks, financial market disturbances characterised by volatility in prices and liquidity problems resulting in an interference in the function of the payment and settlement system. Financial instability is also defined by Jakubík and Slacík (2013) in terms of a financial market collapse with potential adverse effects on macro-economic output. A good understanding of financial stability, thus, lays a firm foundation for a more unified appreciation of financial stability whose definitions differ and touch on varied aspects of the financial system.

Financial stability, according to Mishkin (1991), is the absence of material disturbances in the manner savings are allocated to investment i.e., the effective conversion of deposits into loans. Additionally, and related thereto, Hollander and Lill (2019) note that the South African Reserve Bank (SARB) defines financial stability as a smooth operation of the system of financial intermediation between households, firms, the government, and financial institutions. Cognisant of the need to consider the different elements of the financial system referred to by Mishkin (1991) and Hollander and Lill (2019), Crockett (1997) differentiates between the stability of financial markets and financial institutions. When asset prices reflect prevailing macro-economic fundamentals and do not vigorously change without those fundamentals having changed, financial markets are considered stable. On the other hand, financial institutions are stable to the extent which they can meet their demand deposits requirements and other financial instrument maturities without any assistance.

Closely related to the definition that refers to the prominent elements of a typical financial system is the view highlighted by Chirozva (2009) who proposes that financial stability means an array of circumstances where financial markets, institutions, and infrastructure, all of which constitute the financial system, are functioning well and continuing to uninterruptedly carry out their purpose. To facilitate harmonised measurement, and therefore assessment, of financial

stability across different jurisdictions, the IMF (2006) gives guidance on the indicators for financial stability and categorises them into groups depending on type of financial institution. For deposit taking institutions (i.e., Banks), which are at the core of this study, the following classifications are provided: capital adequacy (e.g., capital adequacy ratio), asset quality measures (e.g., non-performing loans to total loans ratio), earnings and profitability measures (e.g. return on equity and return on assets), liquidity (e.g. liquid assets to short-term liabilities) among other indicators.

2.2.3. The Conventional View of the Relationship Between Price Stability and Financial Stability

Bordo et al (2000) highlight the orthodox position on the link between price and financial stability by indicating that financial system stability will generally be a by-product of a policy framework that is able to produce in a lasting manner price stability. This view fares well with Issing (2003) who suggests that financial instability is largely a result of inflation in the economy. Similarly, Schwartz (1995) is of the view that price stability is a necessary ingredient for financial system stability. Other authors like Bordo and Wheelock (1998) are more conservative and only go as far as stating that financial stability will prevail in an environment characterised by price stability. This view would be the most comforting for central bankers because the likely policy stance to promote and maintain price stability will also be appropriate for financial stability. This is because there is, according to the conventional view, no trade-off between price and financial stability.

In support of the traditional view that price stability leads to financial stability is Schwartz (1995) who contends that a monetary policy framework that can maintain price stability would also result in the prevalence of financial stability. Financial instability, accordingly, has in many instances been propagated by oscillations in prices at an aggregate level. The way financial distress would result from price instability is explained by what other researchers call the Schwartz Hypothesis. Contrary to positions opined by proponents of the conventional wisdom

on the link between price stability and financial system stability, Borio et al. (2002) recognise that a different strand of research is emerging. This new view indicates that the attainment of low levels of inflation has produced what they call a “new environment”, in the view of which the association between price stability and financial system stability would have to be revisited with a possible need to do away with the conventional wisdom.

Accordingly, Kent and Lowe (1997) contend that with an effective monetary policy strategy it is difficult to avoid deviations from inflation targets in the interest of preserving financial stability by addressing strains in the financial system. These short-term deviations from desired inflation targets would be aimed at ensuring price stability over the medium-to-long term by avoiding market failure and thus ensuring proper functioning of the financial system.

Without ruling out the fact that price stability does contribute to financial stability, risks to financial stability could still emerge even in times of stable and low inflation (Issing, 2003). According to empirical studies by Borio and Lowe (2002), the United States experienced a 10 per cent reduction in inflation over the period 1925 to 1930 while asset prices surged. They also note that the 18th century was also characterised by the occurrences of banking crises, yet inflation was low. For example, the Australian banking crisis of 1893 occurred during low and stable inflation. Additionally, South Korea experienced dips in inflation from above 11 per cent to below 4 per cent in the 1990s just before the eruption of a banking crisis.

The examples above that show that financial instability can develop in an environment of price stability. This means that the focus on price stability by reserve banks is insufficient because financial imbalances must be addressed directly before they pose a serious threat to the health of the financial system. Failure to respond to these imbalances, either using monetary policy or another policy instrument, may ultimately increase the risk of financial instability. The ability of the central bank to respond appropriately to any threats to either the financial stability goal or the price stability goal depends on the horizon over which targets have been set e.g., an inflation target defined over a two-year horizon etc. It is important, therefore, to note that there

may be conflict between these two important central bank goals when the appropriate horizons are being set.

2.2.3.1. Theoretical linkages between price and financial (in)stability

According to Borio and Lowe (2002), there are reasonable grounds to rethink the conventional view of the link between price and financial system stability. They note that in as much as a stable and low level of inflation supports the stability of the financial system, disturbances in the financial markets and in the credit space can still develop with no observable uptick in the inflation rate. This means that financial instability can begin to emerge regardless of the prevailing price stability as reflected by a low level of inflation.

One of the ways to explain the theoretical linkage between price and financial stability is by considering the channel(s) through which the effects of one form of stability are transmitted to another form of (in)stability. Studies such as Borio and Lowe (2002), Borio et al. (2001) and Goodhart (2018) identify two main channels that explain this transmission.

2.2.3.2. The asset price channel and the credit channel

2.2.3.2.1. Asset price inflation channel

Asset price inflation is one the ways through which price instability is transmitted to financial instability. Borio and Lowe (2002) note that oscillations in prices of various assets such as equity and property, have historically preceded the emergence of financial instability. This, they note, prompted conversations on the link between price and financial stability in the context of how central bank policies should respond to asset price bubbles.

According to Bell and Quiggin (2004), an unsustainable uptick in asset prices happens often but the problem arises when the bubble bursts as this has adverse effects on the financial system and the economy as a whole. This reiterates the need for policymakers to be concerned with the build-up of bubbles as they pose a threat to macro-economic stability. The

challenge, however, is the policymaker's ability to identify this threat at an early stage (Greenspan, 2002).

Asset price bubbles become problematic when they blow-up. This, according to Bell and Quiggin (2004), results in losses to financial market participants carrying those assets in their portfolios. Furthermore, they note that the impact on investors extends to the banks that would have granted the investors credit. The issue with these negative impacts on investors and their lenders permeates to other financial institutions because of the interconnectedness of banks through overextended exposures in times of the boom. This systemic transfer to distress is eventually diffused into the real economy as evidenced by, among other things, liquidity problems at banks which results in an economy-wide recession. As a result, the taxpayer is affected as they have to fund recapitalisation programmes and bailouts, the cost of which can be considerably high. Macfarlane (1999) highlights that bank rescues in the 1990s cost between 5 and 40 per cent of Gross Domestic Product in various jurisdictions. Because banks are an important financial system participant involved in the transmission of price instability to financial instability and resultant problems in their credit granting function, necessitates an exploration of the effects of price instability via the credit channel.

2.2.3.2.2. The credit channel

The existence of a link between price and financial (in)stability remains apparent whether the economy is characterised by low or high inflation (Borio & Lowe, 2002). High inflation poses a threat to the stability of the financial system because it may encourage debt-financed asset purchases and more importantly too much risk-taking by lenders in their credit granting processes. This view is buttressed by Schwartz (1995) who notes that argues that high levels of inflation spurs unproductive credit extension because of the increased information asymmetries which make it difficult for banks to carry out accurate and effective risk assessments of their prospective borrowers.

Conversely, in environments of low and stable inflation, borrowers have a high appetite for credit which has largely been due to the availability of lowly priced credit (Bell & Quiggin, 2004). The attainment of low inflation in many countries results in reduced interest rates and borrowing costs. This encourages more borrowing leading to increased debt-financed asset purchases and subsequently recreates the asset price inflation problem. Crockett (2001) agrees and notes that increased credit provision tends to spur production and prop-up asset prices driven by debt-funded acquisitions, further promoting the expansion of credit. Studies such as Eichengreen and Areta (2000) as well as Bell and Pain (2000) find that there is a link between credit expansion and the emergence of crises in the banking sector.

2.2.3.3. United States and the Eurozone

Blot et al. (2015) study the relationship between price stability and financial system stability in the United States and the Eurozone. Blot et al. (2015) focused on assessing the relationship between price stability and financial stability using three methods, vector autoregression, simple correlation and dynamic conditional correlations. The assessment was done in the context of the Schwatz (1998)'s conventional wisdom that price stability leads to financial stability. The Eurozone was selected because of the successful formation of a monetary union characterised by a single currency, the euro, whose monetary policy is formulated by the European Central Bank (Subramanian, Taghizadeh-Hesary, & Kim 2020). The Eurozone is relevant to this study because the SADC region can learn important economic integration lessons therefrom. They found that there is no evidence of a continuous positive association between price and financial system stability for the United States and Eurozone countries in the 1990s. This shows that financial instability can develop even during times of low and stable inflation as cautioned by Kent and Lowe (1997). In some cases, a negative relationship is revealed. This further reiterates the need for policymakers to consider pursuing the two policy objectives of price stability and financial stability, independent of each other. Due regard should, however, be given to country specific circumstances.

2.2.3.4. Trinidad and Tobago

Raham, Mahabir, and Majid (2016) assessed the relationship between price and financial stability in Trinidad and Tobago over the period 2000 to 2015. The study's selection was premised on the use of the Granger causality tests which this study also adopts as well as simple correlation and Granger causality tests plus a Bayesian Vector Auto Regression (VAR) model (Raham et al., 2016). The results of the analyses show the presence of moderate to high correlation among variables with no causal association between them. Additionally, impulse response functions from the Bayesian VAR and reduced form VAR revealed that there was a weak link between price stability and financial stability. This brings to the fore the need to design policies that are not only clearly distinct in terms of desired outcomes, but also complementary considering that the goal of macro-economic stability is achieved through a proper mix of price stability and financial stability. This, therefore, emphasises the importance of good policy coordination between each of these two important central bank goals.

2.3. PRICE AND FINANCIAL SYSTEM STABILITY: A POLICY COORDINATION PERSPECTIVE

The interaction between price stability and the stability of the financial system cannot be ignored given their importance in promoting macro-economic stability. Hence, observations by researchers such as Spencer (2014) that financial stability is a necessary but inadequate condition for macro-economic stability. Another essential condition would, thus, be price stability. Given the interconnectedness of the two main central bank goals of price stability and financial stability, it is important to explore how policies of one objective promote the other. This leads to essential questions on the possible coordination between the policies.

Firstly, what can monetary policy aimed at achieving price stability do to facilitate the promotion and maintenance of financial stability? Secondly, what is it that financial stability policy (also referred to as macro-prudential policy) do to promote price stability? Figure 2-1 shows the interaction between financial stability and price stability from a policy point of view.

It distinguishes policies for promoting price stability and financial stability at three levels: instruments, transmission and objective.

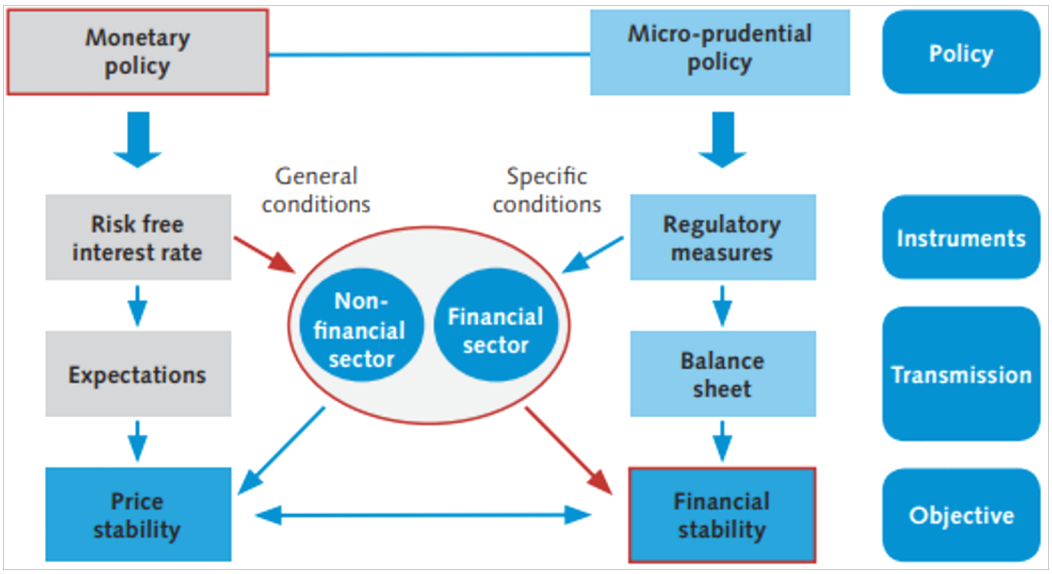

Figure 2-1. Macro-prudential and monetary policy interaction (Source: Adapted from Eisenschmidt & Smets, 2019)

Figure 2-1 suggests the probable coordination of the monetary policy and the macro-prudential policy. A monetary policy aimed at achieving price stability fosters the provision of risk-free interest rates meant to ensure price stability. On the other hand, a macro-prudential policy provides regulatory measures that ensure discipline meant for financial stability.

It is clear from the diagram that there is a critical interweaving of policies, instruments, transmission mechanisms and objectives in the association between price stability and financial system stability. The financial sector is at the epicentre of the interaction between price and financial stability policies, and its response to the same benefits both policy areas i.e., price stability and financial stability. This reiterates a non-negligible interaction between policies for promoting price and financial system stability which justifies the need to probe the relationship between the two central bank objectives.

2.3.1. Policy Considerations for the Interaction Between Price Stability/Monetary Policy and Financial Stability

Monetary policy by its nature has an impact on asset prices and the cycle of credit provision. This impact is affected via the bank lending rates channel. Therefore, and according to Spencer (2014), there is room to suggest that financial stability may be promoted by monetary policy among other determinants. To reiterate the undeniable widespread effects of monetary policy on other central bank focal areas such as financial stability, Stein (2013) notes that monetary policy permeates all the cracks of the financial system. According to Spencer (2014), the Reserve Bank of New Zealand (RBNZ) notes that it is important to uphold a high degree of clarity of the primary goals for both monetary and macro-prudential policy.

The key central bank goals are price stability and financial stability respectively. Furthermore, he notes that there is a need for coordinating policy around these goals to effectively execute the overall mandate of the central bank using the available policy toolkit. This notion by the RBNZ is echoed by Sibley (2019) who, albeit with a focus on the Irish financial system, emphasises the importance of a holistic approach to price and financial system stability by ensuring that there is some coordination between monetary stability (also referred to as price stability in other literature) and financial stability policies.

Sibley (2019) acknowledges the role played by financial stability policies in mitigating the undesirable effects of price instability. To promote financial stability, macro-prudential policy seeks to enhance the strength of the financial system in a way that ensures a cushioning against undesirable credit and asset price movements. This would enable the financial system to absorb shocks emanating from the foregoing (Sibley, 2019). Borio (2009) highlights that there are several ways through which monetary policy can affect financial stability as reflected by its effect on risk-taking behaviour and the resulting build-up of systemic risk. This view is echoed by Sibley (2019) who laments that the financial system is vulnerable to more than necessary risk-taking and fragility hence the need to continually work on, buttress and

enhance the interaction between monetary policy and financial stability. According to Spencer (2014), a period of protracted low interest rates can result in the emergence of risks to financial stability by heightening risk-taking, which in turn results in a search for yield and restriction on credit spreads. Similarly, a period of protracted low interest rates can also result in a high degree of laxity in lending standards (Spencer, 2014). An insight into the foregoing from another perspective, and to address the high lax lending standards, a contractionary monetary policy stance has more often resulted in bringing to a halt an unhealthy credit boom (Drehmann & Juselius, 2012).

These conditions can result in the distress of the financial system by threatening financial stability which reiterates the need to closely monitor the interaction between policies aimed at both central bank objectives. It is important to note that there are times when monetary policy initiatives are helpful from a financial stability point of view. An example of such circumstances is when there is volatility in the asset and credit markets, and financial stability policies alone have failed to contain the vulnerability of the financial system. According to Spencer (2014), the pursuit of price stability is anchored on an inflation-targeting framework. In circumstances where inflation is close to the set target, but asset prices are increasing exponentially, monetary policy can ensure a correction of the markets in a manner that results in the realisation of goals promoting financial stability.

There is, however, a need to ensure that financial stability aspirations do not divert monetary policy too far from its primary objective of price stability. This red flag is raised by Svensson (2010) who warns against compromising the credibility of monetary policy in pursuit of financial stability. Spencer (2014) further notes that the suitability of a tight monetary policy stance to promote financial stability in periods of excessive risk-taking by banks is an issue that is being debated. This study has the potential to provide insight into that debate because it quantitatively analyses the relationship between price stability and financial stability albeit within the geographic confines of the SADC region. Nonetheless, other countries are looking at how prolonged phases of loose monetary policy impact financial stability. For example,

monetary policy communication, particularly forward guidance, at the Bank of England has been refined to incorporate a financial stability knock-out (Kohn, 2008). On the issue of monetary policy responding to the emergence of financial instability, Spencer (2014) identifies two opposing views, the lean vs the clean argument.

2.3.1.1. The clean view

The “clean” view was prominent before the 2007/08 global financial crisis. According to Spencer (2014), this perspective laments that monetary policy must ignore upsurges in asset prices and excessive lending but only up to the point where these developments affect price stability as reflected by the level of inflation. The assumption is that monetary policy can mitigate risks to the real economy in the face of emerging financial instability and that a tight monetary policy needed to lean against a boom in credit or sharp increases in asset prices would result in an undesirable impact on the economy. This view supposes that financial stability or regulatory tools can considerably reduce the amount of harm to the financial system in a recessionary environment.

2.3.1.2. The lean view

The “lean” view seems to have gained more prominence in the aftermath of the global financial crisis primarily owing to two factors. Firstly, an asset price boom can be experienced in an environment characterised by low inflation, good fiscal discipline and small output gaps. Secondly, the adverse social and economic impact of the global financial crisis proved to be much more than what was expected by policymakers. The ‘lean’ view proposes a leaning against credit booms in the interest of financial stability and ultimately price stability. This view also assumes that a tight monetary policy can effectively constrain a credit boom and limit costs to the economy. It supposes that there can be instances wherein prudential policies are insufficient to mitigate or manage emerging financial system risks on their own.

There seems to be no consensus on whether monetary policy should respond to signs of financial distress. Instead, there is an overarching sentiment that financial stability is not a primary objective; therefore, responses from monetary policy may only be warranted when actions are in alignment with the primary objective of price stability (Smets, 2014).

2.4. INTERACTION BETWEEN FINANCIAL STABILITY POLICY (MACRO-PRUDENTIAL) AND PRICE STABILITY POLICY

Generally, central banks have macro-prudential instruments in their policy toolkit to help anchor the goal of price (Spencer, 2014). The monetary authority will in most cases welcome assistance from a range of other policies such as supportive fiscal policy. Smets (2014) suggests that attention to financial stability issues will come to the fore only to the extent to which risks are likely to negatively impact inflation or the economy. Smets (2014) flares well with the opinion expressed by Spencer (2014) who notes that this help from financial stability policies would be appropriate when monetary policy faces constraints and difficult policy trade-offs in taming inflation.

Macro-prudential instruments could have effectively complemented monetary policy during the 2007/08 global financial crisis. If the recession had hit banks at a time when they had a more constant supply of funding and better capital buffers, then the effects of severe lending cutbacks that ensued may have been mitigated, potentially reducing the need for loose monetary policy.

The maintenance of stability in the financial system ensures that there is an effective transmission mechanism so that the attainment of price stability goals is more efficient. Furthermore, as macro-prudential policies ensure the stability of the financial system they also help central banks avoid situations of loosening monetary policy to the extent of encountering the zero lower bound problem in addressing liquidity challenges in the financial markets (Smets, 2014).

There is also a view by researchers such as Gerlach, Alberto, Cédric, and José (2009) and the IMF (2006) that the interaction between monetary and macro-prudential policies pivots, as well as the "side effects" that one policy imparts on the aspirations of the other and how perfectly each operates in the pursuit of its own primary goal. Angelini, Neri and Panetta (2011) studied the interaction between macro-prudential and monetary policies and found that where there was an uncoordinated approach to pursuing financial stability and price stability, the likelihood of higher volatility in the instruments of the policies existed because both employed closely related variables to achieve divergent goals. Smets (2014) postulates that potential weaknesses in the financial system impact negatively on the transmission mechanism and the outlook for price stability. In this view, it is important to ensure that issues of financial stability are incorporated into the monetary policy strategy. There are others with a more radical view who argue that financial stability and price stability are so intricately intertwined that it is hard to make a clear distinction (Smets, 2014; Blinder, 2018). Policy coordination should, therefore, not be overemphasised. De Paoli and Paustian (2013) note that policy trade-offs and conflicts of interest may arise when policy instruments are used aggressively in opposite directions.

2.4.1. The Case of New Zealand

The New Zealand experience with policies aimed at price and financial stability is important for this study for two reasons. First, New Zealand is regarded as a success story and pioneer in specifying price stability in terms of a clear numerical target (Kabukçuoğlu, Martínez-García & Soytaş, 2017). Second, following New Zealand's adoption of inflation targeting in 1989, the central bank embarked on an aggressive macro-prudential regulation drive aimed at anchoring its financial stability aspirations. New Zealand is, according to Irrcher (2018), also considered a pioneer in promoting the importance of prudential regulation. The foregoing provides a basis for looking at the price and financial stability relationship in SADC through the lens of the New Zealand case as there are policy coordination lessons to be learnt therein. According to Spencer (2014), the set-up in New Zealand can be designated as a situational approach to policy coordination. Financial stability and price stability policies retain very clear separate

objectives but with room to assist the other policy goal, on condition that there is no compromise on their primary goals. He goes on to state that in New Zealand, this coordination is enabled by decision making on monetary and macro-prudential policy by the Reserve Bank of New Zealand but with separate and clear mandates for each of the policy focal areas. To ensure effective policy coordination, the Reserve Bank of New Zealand has gone as far as developing a Policy Targets Agreement that states that monetary policy should also have financial stability considerations. Additionally, as macro-prudential policies are crafted in pursuit of financial stability the Memorandum of Understanding (MoU) stipulates that they should also pay attention to the likely consequences for monetary policy.

Developing countries, particularly those in the SADC region, have several lessons to learn in matters regarding institutional settings for the effective execution of price stability and financial stability from their developed counterparts such as New Zealand. Different arrangements are adopted across various central banks of SADC member states as shown in the section that follows.

2.5. MONETARY POLICY AND FINANCIAL SECTOR STABILITY/SUPERVISORY ARRANGEMENTS IN SADC

During the period of the study, the following member states constituted the Southern African Development Community (SADC): Angola, Botswana, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe. This chapter focused on the institutional arrangements that are in place at the different central banks in the SADC region with regards to monetary policy and financial sector supervision to promote price stability and financial stability respectively. The chapter compares monetary policy objectives, instruments, and key money supply aggregates at each Central Bank in SADC. Furthermore, financial sector supervisory arrangements as well as the payment system set up which are essential determinants of financial stability, at the various central banks are also compared.

According to Kabamba and Mabi (2022), the financial systems in SADC member states are highly heterogeneous, as shown in the differences in terms of their performance of macro-economic convergence indicators and their levels of financial development. This necessitates the need to probe the central bank-specific set ups considering the relationship between price stability and financial stability. Table 2.3 shows the monetary policy (for the price stability goal) and financial sector supervisory arrangements (for the financial stability goal) in place at the central banks in SADC.

Table 0-3: Monetary policy (for the price stability goal) and financial sector supervisory arrangements

Central bank	Key function	Monetary policy (aimed at price stability)			Supervisory arrangements (aimed at financial stability)	
		Objectives	Instruments	Key money supply aggregate	Supervision of financial institutions	Supervision of the payment system
ANGOLA						
NATIONAL BANK OF ANGOLA (BNA)	• Promote and maintain monetary and financial stability	• To achieve stable national currency unit and price stability	• Reserve requirements • Central bank bills • Foreign currency sales to manage liquidity. • Rediscount rate • Open-market type operations	• M2	• Micro and macro-prudential supervision of banks • Non-bank financial institutions such as insurance companies and pension funds are supervised by the Insurance Supervision Authority	• Oversight over the Angolan payment, clearing and settlement system • House the clearing house, supervise and inspect activities
BOTSWANA						
BANK OF BOTSWANA	• Promote and maintain monetary and financial stability among other secondary roles	• To achieve a sustainable, low and predictable inflation	• Interest rates • Open-market operations • Reserve requirements	• Bank monitoring domestic credit growth and government expenditure as	• On and offsite risk-based supervision of banks • Non-bank financial institutions are	• Oversight over the settlement system, housed at the Bank of Botswana, where

Central bank	Key function	Monetary policy (aimed at price stability)			Supervisory arrangements (aimed at financial stability)	
		Objectives	Instruments	Key money supply aggregate	Supervision of financial institutions	Supervision of the payment system
				intermediate targets	supervised by the Ministry of Finance	banks hold settlement accounts
CENTRAL BANK OF CONGO	• To define and implement the monetary policy of the country; the policy's objective being to insure the general stability of prices	• To sustain the stability of the general price level and long-term inflation target within single digits	• Interest rate used for refinance operations • Reserve requirement ratio		• Regulator of the financial system • On and offsite supervision of banks	
LESOTHO						
CENTRAL BANK OF LESOTHO	• To achieve and maintain price stability	• To promote and maintain internal and external monetary stability	• Moral suasion • Repurchase operations • Open-market operations • Reserve requirements • Lombard rate	• Reserve money plays the main role in the conduct of monetary policy	• On and offsite supervision of banks • Non-bank financial institutions such as insurance companies are supervised by the central bank	• Operates the clearing house and supervises the clearing process. • Acts as a settlement agent of the clearing and settlement system
MADAGASCAR						

Central bank	Key function	Monetary policy (aimed at price stability)			Supervisory arrangements (aimed at financial stability)	
		Objectives	Instruments	Key money supply aggregate	Supervision of financial institutions	Supervision of the payment system
CENTRAL BANK OF MADAGASCAR	• To ensure exchange rate and price stabilities • Maintenance of price stability	• To ensure a stable purchasing power and price stability	• Selection of instruments for intervention depending on perspectives and economic situations, in particular prices i.e., approach is situational	• Money supply (M3) • Inflation as an intermediary target. • The monetary base becomes the operational target	• The banking and financial supervisory commission (CSBF) is the credit institutions' supervisory authority that is also responsible for monitoring compliance with legal and regulatory provisions.	• Management and administration of the clearing house
MALAWI						
RESERVE BANK OF MALAWI	• To maintain price and financial stability through formulation and implementation of sound monetary and macro-prudential policies	• To promote economic growth, employment, stability in prices	• Liquidity reserve requirements • Open-market operations • Bank rate	• The M2 aggregate	• Offsite analysis and risk-based onsite examinations • Non-bank financial institutions and the Malawi Stock Exchange are supervised by the central bank	• Promotion, maintenance and regulation of the efficient operation of the payment, clearing and settlement system
MAURITIUS						

Central bank	Key function	Monetary policy (aimed at price stability)			Supervisory arrangements (aimed at financial stability)	
		Objectives	Instruments	Key money supply aggregate	Supervision of financial institutions	Supervision of the payment system
BANK OF MAURITIUS	• Banker to government. • Advisor on monetary and financial matters • Depository of the official foreign exchange reserves of Mauritius	• To maintain price stability • To promote orderly and balanced economic development	• Indirect monetary management through purchase and sale of Bank of Mauritius securities • Conduct of Repurchase Transactions and Special Deposit Facilities	• Broad Money Liabilities (M3) used to assess monetary conditions	• Regulation and supervision of banks through offsite analysis and onsite examinations • Non-bank financial institutions and capital markets are supervised by the Financial Services Commission	• Regulatory oversight of payment systems and the clearing house
MOZAMBIQUE						
BANK OF MOZAMBIQUE (BM)	• Monetary and Foreign Exchange Authority of the Republic of Mozambique	• To reduce inflation	• Open-market Operations • Interest rates • Reserve Requirement Ratio • Moral suasion	• Reserve money as an operational target • M3 as the intermediate target.	• Onsite supervision and offsite analysis of bank and non-banks (except insurance companies and pension funds), in conjunction with the Ministry of Finance	• Operator, coordinator, settlement agent and overseer of the National Payments System
NAMIBIA						

Central bank	Key function	Monetary policy (aimed at price stability)			Supervisory arrangements (aimed at financial stability)	
		Objectives	Instruments	Key money supply aggregate	Supervision of financial institutions	Supervision of the payment system
BANK OF NAMIBIA	• Banker and financial advisor to, and fiscal agent of the government • Official depository of government funds • Fiscal agency through which Government deals with international financial organisations such as the IMF and the World Bank	• To support the fixed exchange rate between the Namibia dollar and the South African rand in order attain the ultimate objective of price stability	• Repo rate • Reserve requirements • Moral suasion	• M2	• On and offsite supervision of banks • The Namibia Financial Institutions Supervision Authority (NAMFISA) supervises all non-banking financial institutions, a function that was previously performed by the Ministry of Finance	• Oversight, inspection and monitors the national payment system
SEYCHELLES						
CENTRAL BANK OF SEYCHELLES	• Banker to government • Advisor on monetary and financial matters • Depository of the official foreign exchange reserves of Seychelles	• Price stability	• Deposit auction arrangement • Credit auction arrangement • Standing facilities • Foreign exchange auctions	• Reserve money is the operating target of Monetary policy	• Offsite and onsite supervision of banks and non-bank financial institutions	• Oversight of payment systems, entry and participation criteria, recognition and supervision of systems for the

Central bank	Key function	Monetary policy (aimed at price stability)			Supervisory arrangements (aimed at financial stability)	
		Objectives	Instruments	Key money supply aggregate	Supervision of financial institutions	Supervision of the payment system
	and of government funds.		• Foreign exchange swaps • Minimum reserve requirement			clearance and settlement systems.
SOUTH AFRICA						
SOUTH AFRICAN RESERVE BANK	• To protect the value of the currency in the interest of balanced and sustainable economic growth	• 3 to 6% inflation target (price stability) and financial stability.	• Repurchase agreement-based refinancing system • Cash reserve requirements	• None, uses an inflation target	• Offsite and risk-based onsite supervision of banks. • The Financial Services Board supervises non-bank financial institutions	• Monitoring, regulation and supervision of payment, clearing and settlement systems
ESWATINI						
CENTRAL BANK OF ESWATINI	• Formulation and implementation of monetary policy • Regulation and monitoring of commercial banks and other financial institutions	• To promote monetary stability and a sound financial structure to foster financial conditions conducive to the orderly and	• Discount rate, reserve • Liquidity requirements • Open-market operations • Moral suasion	• Money supply aggregates are underestimated due to the unknown volumes of South African	• The Central Bank of Eswatini is responsible for banking supervision through offsite monitoring and onsite inspections	• Oversight of the National Payment System by ensuring a safe and efficient payment system

Central bank	Key function	Monetary policy (aimed at price stability)			Supervisory arrangements (aimed at financial stability)	
		Objectives	**Instruments**	**Key money supply aggregate**	**Supervision of financial institutions**	**Supervision of the payment system**
		balanced economic development of Eswatini		Rands in circulation		
TANZANIA						
BANK OF TANZANIA (BOT)	• To achieve the economic objective of maintaining domestic price stability	• To maintain price stability	• Open-market operations • Foreign exchange market operations • Bank rate • Reserve requirement	• Reserve money	• Onsite examinations and offsite surveillance in supervising banks and financial institutions	• Participatory and regulatory role in payment systems
ZAMBIA						
BANK OF ZAMBIA	• To formulate and implement monetary and supervisory policies	• Maintenance of price stability to promote macro-economic stability	• Government securities • Open-market operations • Discount window • Overnight lending • Foreign exchange dealings	• Short-term interbank interest rates • The Bank aborted reserve money targeting in April 2012	• Supervision of banks through offsite analysis and onsite inspections • Supervision of non-bank financial institutions	• Management, administration, operation, supervision and regulation of payment, clearing and settlement systems

Central bank	Key function	Monetary policy (aimed at price stability)			Supervisory arrangements (aimed at financial stability)	
		Objectives	**Instruments**	**Key money supply aggregate**	**Supervision of financial institutions**	**Supervision of the payment system**
			• Core liquid asset ratio • Statutory reserve ratio			
ZIMBABWE						
RESERVE BANK OF ZIMBABWE	• Monetary policy formulation and implementation • Issuer of bank notes and coins • Banker and advisor to the government • Bankers' bank and lender of last resort	• Maintenance of price stability	• Reserve requirements • Open-market operations (OMO) • Bank rate	• Operating target is reserve money whilst intermediate target is M3	• Licensing and supervisory authority for banking institutions • The central bank does not supervise non-bank financial, save for microfinance institutions. • Insurance and pension companies are supervised by the Insurance and Pensions Commission	• Management, administration, operation, supervision and regulation of payment, clearing and settlement systems

Source: Central Bank Websites (2020)

The heterogeneity of institutional arrangements at the various SADC central banks while the region is also pursuing an integration agenda anchored on a macro-economic convergence framework warrants a regional approach to analysing the interaction between price stability and financial stability. This will ensure that policymaking at the regional level is conducted bearing in mind dynamics of this interaction. A quantitative methodology is adopted to probe this interaction. The succeeding section addresses the methodology aspect of the study.

2.6. EMPIRICAL REVIEW OF KEY VARIABLES

This section examines key variables that were used in this study, specifically focusing on the relationship between price stability and financial stability. Price stability is measured by inflation while proxies for financial stability include the capital adequacy ratio, deposits to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets, and return on equity. The section also discusses the gaps in knowledge and how this study contributes to closing this gap.

2.6.1. Relationship between Inflation and Proxies for Financial Stability

Wynne (2008) has shown that price stability is more effectively defined in terms of headline inflation measures that factor in the cost of living at a consumer level. This serves as a reference point for this study wherein price stability is assessed in terms of inflation rates for each country's financial institution.

2.6.1.1. Capital adequacy ratio

Researchers such as Gersbach and Volker (2009) have indicated that financial stability and inflation, expressed as the capital adequacy of banks, have an interesting relationship as reflected by their similarities when looked at from a policy perspective. Ogere, Peter and Inyang (2013) and Williams (2011) investigated the relationship between capital adequacy and inflation in Nigeria and concluded on the policy implications for the Central Bank of Nigeria. This, according to the study, is true for any central bank with both price stability and

financial stability responsibilities, represented in this case by inflation and capital adequacy, respectively. For instance, Ogere et al. (2013) established a significant relationship between inflation and capital adequacy ratio, with results demonstrating that a 1 per cent increase in inflation corresponds to a 0.952 per cent increase in the capital adequacy ratio. In contrast, Williams (2011) found a negative link between inflation and bank capital, albeit at a different time than Ogere et al (2013). Similarly, other studies (Allen & Santomero, 2001; Berger, 1995; Pastory & Mutaju, 2013) have found a negative relationship between capital adequacy and price stability, whcih necessitates additional research on this relationship.

Capital adequacy is identified as one of the variables that may influence a country's inflation rates. The purpose of capital adequacy rules is to limit the risk-taking of banking institutions and to aid regulators in determining the point at which to interfere in the management of a failing bank (Chikoko & Pierre, 2013). By limiting risk-taking, capital adequacy regulations may serve to reduce business risk allowing banks to charge fair rates for their products which in turn affects the pricing of goods and services in an economy.

2.6.1.2. Liquidity ratio

The liquidity ratio is another variable that may influence price stability as demonstrated in prior research. According to the IMF (2006), the indicator evaluates any liquidity mismatches between a bank's assets and its short-term liabilities, providing insight into how well a bank will meet short-term withdrawals without suffering liquidity issues. Regarding measurement, Laurine (2013) and Edem (2017) highlight two commonly used methods for gauging liquidity. They propose the liquidity ratio approach and the liquidity gap method but highlight that the liquidity ratio is more popular because it is standardised across different countries. This study used the liquidity ratio method.

In general, bank liquidity refers to the institution's ability to meet obligations that are due at a specific time such as demand deposits or executing payment instructions on behalf of a client (Vodová, 2016). It is vital to note that several factors influence a bank's capacity to meet these

conditions. Therefore, according to Eichengreen and Arteta (2000), a banking institution's liquidity situation is very vulnerable to swings in the macro-economic environment, among other factors. Consequently, inflation is identified as one of the macro-economic variables. Assfaw (2019) adds that in a climate characterised by high inflation rates, people are naturally discouraged from saving, and their ability to repay loans is also impacted by the time-value of money in which their money has greater value now than in the future. Consequently, the liquidity of banking institutions is impacted by this high inflation. Therefore, research has been conducted to better comprehend the relationship between Inflation and liquidity, with Vodová (2011) and Malik (2013) demonstrating that inflation has a detrimental impact on a bank's liquidity. Liquidity is negatively impacted since the rising cost of living reduces the availability of funds to deposit in banks, even though banks depend on these deposits to make loans. Nonetheless, Ahmad (2017) and Singh and Sharma (2016) discovered a positive correlation between inflation and bank liquidity.

Other studies have shown that when liquidity variables are considerable, they have positive and substantial effects on bank lending, which are transferred to the price level (Naceur, Katherine & Roulet, 2018). The default assumption would be a positive relationship between liquidity and inflation and a negative relationship with price stability. Too much liquidity is typically inflationary and high inflation rates undermine price stability, which is regarded as a low inflation rate.

2.6.1.3. Deposits to total loans ratio

This indicator also provides some insight into the liquidity situation, albeit with a greater emphasis on the role of the bank as an intermediary. The indicator is a comparison between deposits and loans. The IMF (2006) says that when deposits are low compared to loans, there is a large reliance on outside sources to deliver generally illiquid loans, leaving the bank vulnerable to liquidity issues in times of crisis. This contrasts with a scenario in which loans are supported by deposits.

Berg (2012) asserts that when banks engage in the process of allocating savings to investment opportunities or simply transmitting funds from surplus regions to deficit regions by converting deposits to loans, they should strive to fund the loan book with deposits from customers and minimise other market options. This ensures higher resilience and exposure to liquidity issues, hence contributing to the stability of the financial industry.

With a focus on stability issues, Berg (2012) notes the influence of inflation, particularly home price inflation, on the ratio of deposits to loans in Norway by highlighting the importance of the interaction between financial intermediation as reflected by the deposit to loan ratio and inflation. Rother (1999), whose research focused on factors that explained the changes in financial intermediation, observed that the relationship between inflation and financial intermediation was contingent on whether it was past inflation or anticipated inflation. The majority of central banks have an interest in inflation expectations as part of their price stability mission. Rother (1999) found a negative connection between projected inflation and financial intermediation based on the results of panel regressions on 19 transition nations. Depending on the frequency of data, the results for historical inflation revealed a positive link in some instances and a negative relationship in others.

Other studies elaborated on the relationship's significance for economic development. In a study on the relationship between financial intermediation and economic growth in Nigeria, Nwite (2014) noted the existence of a positive relationship between economic development and financial intermediation and cautioned the central bank to be wary of the consequences on inflation by, among other things, keeping the amount of liquidity injected into the market by banks via the financial intermediation process under control. This financial intermediation process, which demonstrates bi-directional causality with economic expansion, has unavoidable effects on price stability (Odhiambo, 2011). These liquidity dynamics adversely impact finance costs and, ultimately, price stability.

2.6.1.4. Non-performing loans to total loans ratio

The ratio of non-performing loans to total loans is another independent variable believed to influence price stability; it is used to identify any loan portfolio asset quality issues. A rise in the ratio indicates a decline in the quality of the credit portfolio (IMF, 2006). This deterioration could result in higher borrowing costs, which are considered into pricing models because they are passed on to consumers so affecting the general price level and, consequently, price stability. The relationship between non-performing loans and inflation is significant for central banks, and the SADC central banks, because of its implications for financial stability and its emphasis on the significance of macro-economic conditions, which are among other indicators, defined by inflation. Non-performing loans, as defined by Anjom and Karim (2015), are those that cease to generate revenue for a lending institution due to the borrower's failure to pay instalments and/or interest as stipulated in the loan agreement.

The increase in non-performing loans (NPLs), particularly in the aftermath of the 2008/09 global financial crisis, has piqued the curiosity of scholars attempting to comprehend this trend. Researchers such as Turan and Koskija (2014), Eliku and Luci (2003), and Anjom and Karim (2015), have examined the relationship between non-performing loans and key macro-economic variables such as inflation. A significant finding was that inflation and non-performing loans had a substantial inverse connection. In addition, according to Kurumi and Bushpepa (2017), inflation is a measure of price stability and is adversely correlated with non-performing loans because, during periods of high inflation, the real value of interest and/or payments a borrower must make to repay lending institutions declines. Nkusu (2011) disagrees with the foregoing and argues that an inflationary environment may reduce borrowers' real income leading to increased loan defaults, especially in cases where high inflation would have resulted in high interest rates because of monetary policy actions to curb inflation. This would result in more NPLs and a positive correlation between inflation and NPLs.

2.6.1.5. Return on assets and return on equity

Return on assets (ROA) was included as an additional indicator of financial stability that may influence price stability. According to the IMF (2006), ROA attempts to assess a bank's profitability-driven asset use efficiency. It is considered as one of the most important earnings/profitability indicators in the group of financial stability indicators and is, therefore, a critical among those believed to be related to price stability (Boyd & Champ, 2006). While ROA is the ratio of a bank's annual net income to its annual average total assets, return on equity (ROE) relates to a bank's net income (gross income minus gross expenses) to its average capital during the same fiscal year. ROE indicates the extent to which available capital is used profitably (IMF, 2006).

Inflation is one of the key variables used to evaluate the relationship between macro-economic conditions and bank performance, which is represented in this study by ROA and ROE. Other research, like Tan and Floros (2012), Boyd and Champ (2006), as well as Staikouras and Wood (2003), acknowledges the significance of the correlation between inflation and bank profitability, as assessed by ROA and ROE, among other metrics. According to Tan and Floros (2012), inflation has multiple effects on bank performance. Bank lending is one of the ways through which inflation influences bank profitability. Academics such as Boyd and Champ (2006) concur and emphasise that the manner in which the inflation rate is included in the price of loans and other products impacts a bank's profits. Moreover, Boyd and Champ (2006) prove the existence of a negative relationship between inflation and the profitability of banks, especially in cases when inflation was unanticipated, causing costs to increase more rapidly than revenues.

Inflation is one of the primary convergence metrics in the macro-economic convergence agenda sponsored by central banks. In light of the preceding, Guru, Staunton and Balashanmugam (2002) evaluated the profitability of the Malaysian banking sector from 1986 to 1995. Regarding macro-economic indices, they discovered a favourable correlation

between inflation and bank profitability. Ben and Goaied (2008) concluded that macro-economic variables have little impact on the profitability of Tunisian banks.

2.7. OTHER PROXIES FOR FINANCIAL STABILITY

The z-score is a popular indicator of stability at the level of specific organisations. To determine the solvency risk of a bank, it clearly contrasts risk (volatility of returns) with buffers (capitalisation and returns). Z-score is defined as:

$$Z \equiv (k+\mu)/\sigma,$$

where k is equity capital as a per cent of assets,

μ is return as per cent of assets, and

σ is standard deviation of return on assets as a proxy for return volatility.

The z-score's popularity is because it has a direct (negative) correlation with the likelihood that a financial organisation will become insolvent, or that the value of its assets will fall below the value of its debt. Thus, a higher z-score indicates a lower likelihood of insolvency.

The z-score for analysing bank stability was successfully used in studies by Beck, Demirgüç-Kunt, Levine (2007) Demirgüç-Kunt, Detragiache, and Tressel (2008), Laeven and Levine (2009), and Čihák and Hesse (2010). Table 2-2 is a summary of the measures for financial stability that are most often used.

Table 2-1: Financial stability measures

Sectors	Measure	What do they measure	Interpretation
Real Economy	GDP growth	• Indicative of the strength of the macro-economy • GDP is a key measure especially used in conjunction	• Negative, or low positive values would indicate a slowdown; excessively high values may show unsustainable growth

		with measures such as credit expansion, fiscal deficit	
	Fiscal position of government	• Ability of government to find financing • Vulnerability of sovereign debtor to unavailability of financing	• High deficit values relative to GDP can mean unsustainable government indebtedness and vulnerability of the sovereign debtor
	Inflation	• Rate of increase of various price indices	• High levels of inflation would signal structural weakness in the economy and increased levels of indebtedness, potentially leading to a tightening of monetary conditions. • Conversely, low levels of inflation could potentially increase the risk appetite in the financial markets.
Corporate sector	Total debt to equity	• Corporations' leverage	• Excessively high levels may signal difficulties in meeting debt obligations
	Earnings to interest and principal expenses	• Corporations' ability to meet payment obligations relying on internal resources	• Excessively low levels of liquidity may signal inability to meet debt obligations
	Net foreign exchange exposure to equity	• Currency mismatch	• High levels of this ratio may signal difficulties in the corporate sector arising from adverse currency moves
	Corporate defaults	• Insolvencies in the corporate sector	• High values can signal future problems in the banking sector, if insufficiently provisioned
Household sector	Household assets (financial, real estate)	• Assets and debt can be used to compute	• Net household assets and disposable income can measure

	Household debt	net household assets	households' ability to weather (unexpected) economic downturns
	Household income (labour income, savings income)	• Income, consumption and debt service payments can be combined to compute net disposable income	
	Household consumption		
	Household debt service and principal payments		

Source: Gadanecz and Jayaram (2016)

The measures above have been applied in various studies as shown in Table 2-3 along with respective indicators.

Table 2-3: Literature review – Financial stability indicators

Author (Year)	**Country**	**Categories (Indicators)**
Gersl and Hermanek (2007, 2008)	Czech Republic	• Capital adequacy (CAR) • Asset quality (NPL/TL) • Profitability (ROA, ROE) • Liquidity (LA/TA, LA/TD) • Interest rate risk (Net position/TA) • Foreign exchange risk (FX1, FX2)
Central Bank of the Republic of Turkey (2008)	Turkey	• Asset quality (NPL/TL, NPL/E, FA/TA) • Liquidity (LA/TA) • Exchange rate risk (FX1, FX2) • Profitability (ROA, ROE) • Capital adequacy (CAR, FC/TA) • Interest rate risk (Net position/E)

Albulescu (2010)	Romania	• Financial development index • Financial vulnerability index • Financial soundness index • World economic climate index
Bank of Albania (2010)	Albania	• Asset quality (NPL/TL, NPL/E, FA/TA) • Liquidity (LA/TA, STA/STL) • Exchange rate risk (FX1, FX2) • Profitability (ROA, ROE) • Capital adequacy (CAR, FC/TA) • Interest rate risk (Net position/E)
Maudos (2012)	Spain	• Profitability (ROA) • Solvency (CAR) • Efficiency (CI) • Asset quality (NPL/TL)
Ginevičius and Podviezko (2013)	Lithuania	• Capital adequacy (CAR) • Asset quality (NII, TL/TA, DELINQ, LD) • Management (NIE/GI) • Earnings (PPP/RWA, NI/RWA) Liquidity (TD/TL, LIQ)
Laznia (2013)	Slovakia	• Profitability (ROA) • Liquidity (TD/TL) • Capital adequacy (CAR) Asset quality (NPL/TL)
Petrovska and Mihajlovska (2013)	Macedonia	• Insolvency (CAR) • Credit risk (NPL/TL, GNPL) • Profitability (ROE, NIE/GI)

		• Liquidity (LA/TA, LA/TD) • Currency risk (Net FX/OF)

Source: Kristína (2014)

Numerous authors have presented the construction of the aggregate financial stability index in their writings. Albulescu (2013) created a reduced-form model for the Euro Area in order to meet the requirement for the financial stability objective to be taken into account when deciding on ECB monetary policy. Albulescu (2013) indicated that monetary policy decisions are founded on a broad range of financial and economic variables (the "second" pillar) in accordance with the ECB's status. Consequently, the ECB is interested in economic and financial data in addition to monetary indicators. Drawing from the foregoing discussion and tables, it is evident that in the evaluation of financial stability, attention is focused on four main areas: capital adequacy, asset quality, profitability, and liquidity.

2.8. THEORETICAL FRAMEWORK

The theoretical framework for this study was based on the possible linkages between price stability and financial stability, as derived from the following theories: traditional wisdom hypothesis, new environment hypothesis, endogenous optimum currency area (OCA) theory and the Solow growth model.

2.8.1. Traditional Wisdom Hypothesis

Schwartz (1995) created the traditional wisdom hypothesis, arguing that financial stability is strengthened and supported by price stability. Accordingly, the fundamental driver of financial instability is monetary policy measures that lead to price instability because they make the information flow between parties to a loan agreement unequal. Schwartz (1995) believed that it is challenging to determine the real returns of financial investments because of price

instability brought on by an increase in the money supply as a result of expansionary monetary policies.

Because of this, asset prices are excessively overvalued or undervalued which leads to financial instability. It is presumptive that monetary policy procedures that can guarantee price stability may avoid such informational, estimation and valuation issues as well as provide financial stability (Schwartz, 1995). Similarly, Bordo and Wheelock (1998) claimed that if there is a strong association between price and financial stability, unanticipated changes in the money supply can lead to financial instability. Fluctuations in the money supply that result in increases in the price of commodities and securities (such as real estate) lead to asset price bubbles and financial instability (Bordo & Wheelock, 1998). It is believed that monetary policy procedures that concentrate on regulating variations in the money supply concurrently promote price and financial stability (Bordo & Wheelock, 1998).

According to Issing (2003), monetary policy designs that employ a forward-looking strategy to achieve and maintain price stability over the medium-long term can also end financial instabilities. In this study, it was argued that even if there was a short-term trade-off between the primary goal of price stability and financial stability in such a future-oriented monetary policy design, that conflicting mechanism would vanish in the medium-long term and price stability would support financial stability (Woodford, 2012).

2.8.2. New Environment Hypothesis

The new environment hypothesis put forth by Borio and Lowe (2002) and Borio et al. (2003), contends that price stability may not always imply financial stability. Borio and Lowe (2002) provided an explanation of the connection between pricing and financial stability wherein they contrasted the fact that price stability alone does not guarantee financial stability and argued that monetary policies should be created with both financial stability and price stability in mind. High credibility monetary policies, according to Borio and Lowe (2002), can ensure price stability and raise the expectations of economic actors. Improved medium- to long-term

expectations lead to the development of debt asset price bubbles and, as a result, the accumulation of systemic hazards in the financial markets.

Therefore, it is argued that monetary policy designs that do not account for such events in financial markets through the expectations channel cannot prevent financial instability, but rather worsen it (Borio & Lowe, 2002). The IMF, Bank for International Settlements (BIS), and Financial Stability Board (FSB) (2009) defined systemic risk in its broadest sense as being caused by disruptions in some or all of the financial systems and having the potential to cause significant adverse effects on the real economy. It is referred to as the risk of financial services degrading. According to this definition, negative externalities can result from problems with any of the components of the financial system such as instruments, institutions and markets.

2.8.3. Endogenous Optimum Currency Area Theory

The endogenous optimum currency area (OCA) was derived from the traditional OCA theory which is based on countries having irrevocably pegged exchange rates. The single currency, or the pegged currencies, can fluctuate only in unison against the rest of the world. Thus, the essence of the OCA is based on independent countries choosing to adopt a single currency or to irrevocably peg their exchange rates. The driving force behind the OCA was that countries concerned needed to satisfy certain economic characteristics before joining a monetary union (Mira, 2015). However, the new theory of OCA focuses on changes in economic structure and performance that may result from participation in a currency union. According to the endogenous OCA theory, a currency union affects the economy's performance through increased trade integration and enhanced credibility (Roger, 2021).

2.8.3.1. Trade integration

Greater trade integration is believed to spur economic growth by enhancing allocative effectiveness and quickening the knowledge transfer process. According to the endogenous OCA theory, commerce and growth can be boosted by using a single currency rather than

several that are tied together with fixed exchange rates (Pamfili & Bignon, 2018). The fundamental premise of this theory is that having a diverse range of national currencies creates a sizable trade barrier.

In addition to eliminating the costs associated with a currency conversion, this viewpoint claims that a single currency and common monetary policy will prevent future competitive devaluations, increase price transparency, make foreign direct and portfolio investment easier, promote the development of long-term relationships, and may eventually promote political integration within the union (Egbuna, Ngozi Eunice et al., 2019). As such, these impacts boost labour and capital productivity, which raises potential production. Furthermore, it is hypothesised that greater trade integration will lead to more highly linked business cycles due to shared demand shocks and increased intra-industry trade that will reduce the need for country-specific monetary policies (Pamfili & Bignon, 2018).

2.8.3.2. Credibility

Credibility is often defined as the degree to which one accepts at face value the present declaration of future intentions made by a monetary authority (Mira, 2015). Even while a given country's characteristics such as openness, asymmetry of shocks, and labour market flexibility do not appear to be especially conducive for monetary unification, there can be significant benefits to joining a currency union with a reliable regional central bank.

2.8.3.3. Other considerations

One more finding from the OCA literature worth mentioning is that the criteria are somewhat endogenous. A point raised in the conventional OCA is that joining a single currency area may change an economy's features (Roger, 2021). As an illustration, it is likely to increase trade with nations that use that currency, raising the correlation between their economic results. For instance, the United Kingdom (UK) Treasury (2003) identified some indications of greater linkage between US areas. In this sense, a nation that first seems to fall short of the OCA

requirements could end up passing them after joining. The argument between those who believe economies should first achieve the convergence criteria before joining a regional currency union and others who believe this is less necessary because convergence will occur after an economy joins has some bearing on this endogeneity.

2.8.3.4. Development of financial markets

Local financial markets might grow because of the establishment of a single currency region. In theory, a currency region could aid nations in overcoming some drawbacks associated with having "small" financial systems (Mira, 2015). The regional currency area's capital market may be bigger and more liquid than the capital markets of the individual countries. Banks may have more chances to take advantage of economies of scale.

However, a variety of factors other than the usage of a regional currency determine how large such gains are in practice. According to Roger (2021), domestic financial institutions in the Eastern Caribbean Currency Union frequently limit their operations to their own nation. This tendency is supported by limitations on foreign ownership (including by firms from neighbouring member nations), various tax laws for non-members, and bans on citizens investing in foreign securities or real estate. Even in Europe, since the creation of the currency union, very few bank mergers have occurred outside of Europe.

Neither of the long-established regional currency regions in Africa has a very connected financial system. Interbank markets are underdeveloped, and international money transfers are a very lengthy to complete (Mira, 2015). Similar factors must be considered while developing deeper and more integrated capital markets. Larger markets typically have higher levels of liquidity and draw overseas investors. Specialised financial institutions will have greater room to operate in a wider financial market (Roger, 2021). Furthermore, it enables banks to spread credit risk without taking on foreign exchange risks. A regional currency, however, does not ensure the growth of such markets.

The need for convergence can be hampered by various market practices, various legal, tax, and regulatory frameworks, capital controls, and the desire of some nations to develop their own financial markets. The regional stock exchange for the countries of western Africa, for instance, has few listed companies and limited trading activities. Central African nations have a plan to create a regional stock market in Libreville, Gabon, but the Cameroonian government, which has the largest economy in the region, has decided to move through with the construction of its own stock exchange in Douala. The competition between the two exchanges is expected to impede the development of a truly regional financial market due to the tiny volume of existing and potential transactions.

The risk associated with national credit would not be eliminated even though a solid commitment to use another currency or to fix tightly to it would essentially eliminate currency risk. If it was believed that other participants in a regional currency area would aid avert a default, credit risk premia may also decrease. However, since a nation would no longer have the option of preventing default by creating its own money, it is likely that credit risk may even rise.

2.8.4. The Solow Growth Model

The Solow growth model, an exogenous model of economic growth, examines changes in an economy's output level over time as a result of variations in the rates of population increase, savings growth, and technological advancement (Munguía, Davalos & Urzua, 2019). The Keynesian Harrod-Domar model served as the foundation for Robert Solow's growth model, which was the first neoclassical growth model. The contemporary theory of economic growth is based on the Solow model.

According to the Solow Growth Model, the production function displays consistent returns to scale (CRS). According to this supposition, doubling the capital stock and the workforce causes the output to exactly double (Dapena, Rubiera-Morollon & Paredes, 2019). Because

of this, the Solow model's mathematical analysis concentrates on output and capital per worker rather than total production and total capital stock.

2.8.4.1. Implications of the Solow growth model

The Solow growth model predicts conditional convergence, which occurs when countries reach a steady state with the same population growth rate, savings rate, and capital depreciation rate (Sasaki, Fukatani, Imai & Kamanaka, 2022). A poorer nation grows quicker along this convergence path. The Solow growth model does not forecast absolute convergence because countries with differing savings rates have various steady states and will not converge (Dapena et al., 2019). Growth is not necessarily higher in a nation with a lower starting capital stock when savings rates are different.

According to a typical Solow model, economies eventually reach their steady state equilibrium and the only way to sustain development is through technical advancement. Long-term, changes in population growth and savings patterns have only level effects. (i.e. in the absolute value of real income per capita) (Dapena et al., 2019). Solow's concept has an intriguing conclusion that poor countries should develop more quickly and eventually catch up to affluent nations.

In an attempt to experimentally confirm the foregoing, Baumol (1986) discovered a very strong association between a country's initial wealth and its output growth over a lengthy period of time (1870 to 1979) (Ramanayake & Kasun, 2019). DeLong (1988) later refuted Baumol's findings, arguing that they were influenced by the non-randomness of the studied countries and the possibility of large measurement errors for estimates of real GDP per capita in 1870. DeLong (1988) concludes that the convergence theory is not well supported by the available data.

2.9. CHAPTER SUMMARY

The chapter presented a review of prior studies on price stability and financial stability. The studies reviewed suggested several indicators for evaluating financial stability which can be broadly categorised under capital adequacy, asset quality, profitability, and liquidity. Price stability was commonly evaluated in terms of the inflation rate. The studies suggested the possibility of bi-directional causality between price stability and financial stability, depending on a case-by-case, though majority of cases recommended a unidirectional causality where financial stability had a significant impact on price stability. The following chapter presents the research methodology adopted, detailing the justification for tools used, data collected and techniques and tests applied in the data analysis process.

CHAPTER THREE: METHODOLOGY

3.1. INTRODUCTION

This study aimed to examine the connection between price stability and financial stability. The study focused on the panel of nations in the SADC region from 2009 to 2018 to determine the extent of the relationship between their pricing stability and financial stability challenges. This chapter describes the research design, study population, data sources, estimated econometric models, and data analysis procedure used in this study. The chapter also includes tests conducted to determine the behaviour of individual series during the research period. This required an examination of the diagnostic tests used to prepare the data for panel regression analysis and Granger causality testing. The diagnostic tests include tests for normality, correlation analysis, and stationarity. The direction of causality between price stability (inflation rate) and the individual measures of financial stability was determined using a Granger causality test.

3.2. RESEARCH DESIGN

The evaluation of the impact of financial stability on price stability in the SADC region requires a quantitative approach, which is more suited to the nature of this study. Inflation rates, capital adequacy ratios, loans to deposits ratios, non-performing loans to total loans ratios, liquidity ratios, return on assets ratios, and return on equity ratios are quantitative variables used in the modelling. This method offers quantifiable, verifiable data that can be generalised to a larger population, which is excellent because the study is predicated on a quantifiable event.

To determine the relationship between price stability and financial stability, this study followed a positivist hypothetico-deductive research philosophy, which necessitated the employment of a quantitative econometric approach. Due to the quantitative character of the variables and the methodology used by most empirical studies in determining the relationship between price stability and financial stability, a quantitative approach was judged appropriate. Adopted is the

explanatory research design, which seeks to explain the links between the studied variables. It must be mentioned that the purpose of this study is not to collect data, but rather to deepen understanding of the greatest explanatory research (Saunders, Lewis & Thornhill, 2016). The EViews version 10 econometric modelling program was used to analyse data. This contributed to the creation of estimate models required for the panel data regression analysis and Granger causality tests. The analysis of the data spans the years 2009 to 2018.

3.3. DATA POPULATION AND SAMPLE

Quantitative data was collected from the websites of the central banks of the SADC nations, the World Bank, and the International Monetary Fund (IMF) for the period 2009 to 2018 on the indicators of price stability (inflation rate) and financial stability. Data obtained from the World Bank largely included the inflation figures, data on the liquidity ratio, deposits to loans ratio and non-performing loans to total gross loans. Information from the IMF included inflation figures and non-performing loans to total gross loans. From the central banks of SADC nations, the capital adequacy ratio, return on assets and return on equity were attained.

The study population consisted of all 15 countries in the Southern African Development Community (SADC) during the period covered by the study. These countries are Angola, Malawi, Botswana, the Democratic Republic of Congo (DRC), Lesotho, Madagascar, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. Thus, the study conducted a census of all the member states in the SADC. An almost similar panel approach is adopted by Chikoko and Pierre (2013) albeit on banks in Zimbabwe.

Data was obtained from each country on a quarterly basis, focusing on the aggregated ratios from the banking sector of each country. This was intended to ensure many data points to ensure consistency and reliability. An extensive dataset would ensure a representative sample size and an analysis that can cut through ‘noisy’ data. Also, having quarterly data points would

ensure that any trends or patterns discovered are not outliers and can account for seasonal variances.

3.4. DATA ANALYSIS AND THE EMPIRICAL MODEL

The empirical model for this study was based on static models as the essence was to establish relationship information that remained true over a period of time. The static model would also help in the segmentation and description of individual countries more than predicting the likelihood of individual countries behaving in a desired way.

In contrast to dynamic models, static models were preferable as they contain no time-dependent variables. The results are valid over time, within reason, as significant changes in country macro-economic and micro-economic parameters or new information may justify the building of a new static model (Alexander, Han & Meng, 2022). This is essential in the current scenario as SADC countries are expected to modify their economic policies to stir their nations towards macro-economic convergence for smooth integration in the region.

Further, studies have shown that where the state of the system changing with time is not an important consideration, static and dynamic models yield similar results (Rubio-Escudero, Harari, Cordón & Zwir, 2007). Hence, a static model is relevant as provision of the same set of input values always results in the same set of output values, when the situation is not dependent on all of the input values presented to the model at previous times as well.

The data was analysed using the EViews econometric modelling software (version 10). Before entering the data into the software, it was organised and cleansed. The study was premised on the following adapted model:

$$PS_{it}=\beta_0+ \beta_1 XCAR_{it}+\beta_2 DLR_{it}+ \beta_3 NPLLR_{it}+ \beta_4 LR_{it}+ \beta_5 ROA_{it}+\beta_6 ROE_{it}+\alpha_i+\mu_i$$

Equation 3.1

PS_{it} is the price stability measure which is the inflation rate.

The study used the following banking sector indicators as measures of financial stability: capital adequacy ratio (CAR_{it}), deposit to loans ratio (DLR_{it}), non-performing loans to total loans ratio ($NPLLR_{it}$), liquidity ratio (LR_{it}), return on assets (ROA_{it}), and return on equity (ROE_{it}), α_i is the idiosyncratic part of the error term and $\boldsymbol{\mu}_{it}$ is the error term.

3.4.1. Discussion of Variables

The study variables were derived from two major variables – price stability, the dependent variable, and financial stability, the independent variable.

3.4.1.1. Dependent variable

Price stability is the dependent variable, measured by inflation. As the construction of an economically stable environment has been the primary concern of governments in the SADC region, it is necessary to determine factors that may influence price stability, hence the consideration of price stability (inflation) as a dependent variable. This is indicated by the adoption by SADC member states of an inflation target range of 3-7 per cent per annum as one of the key macro-economic convergence indicators in the region's convergence agenda. This necessitates a price-stable environment, as price variations in a single nation might undermine efforts to foster trade links in the region. Inflation is used as a proxy for price stability since the stability of prices is often reflected in the rates of inflation in a country.

3.4.1.2. Independent variables and their links to the dependent variable

Independent variables comprised indicators of financial stability. These include the capital adequacy ratio, loans to deposits ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets ratio and return on equity ratio.

3.4.1.2.1. Capital adequacy ratio

Capital adequacy is selected as one of the indicators of financial stability (Gersbach & Volker, 2009). Capital adequacy requirements are there to limit risk-taking by banking institutions and

to assist regulators define the threshold at which to intervene in the management of failing banks (Chikoko & Pierre, 2013). In line with prior studies, (Ogere, Peter & Inyang, 2013; Williams, 2011), this study assumes a negative association between the capital adequacy ratio and inflation.

3.4.1.2.2. Liquidity ratio

The liquidity ratio is also considered another indicator of financial stability, measured as the proportion of total of liquid assets to total assets. This basically measures the ability of the bank to meet current liabilities with cash and cash equivalents. Prior studies have established that when liquidity variables are significant, they have negative significant impacts on inflation (Laurine, 2013; Edem, 2017). Conversely, this means liquidity shortages will result in higher interest rates which in turn increase product prices. Therefore, this study assumes a negative association between liquidity and price stability (Vodová, 2016; Assfaw, 2019). Higher liquidity results in a lower reduction in product prices.

3.4.1.2.3. Deposits to total loans ratio

The study also considered deposits to loans ratio as another indicator of financial stability. It is measured as the proportion of total deposits from customers to loans to customers. The increase in loans compared to amounts deposited imply that interest rates are favourable to the customers, hence they are more likely to borrow than deposit funds in the banks. The IMF (2006) says that when deposits are low compared to loans, there is a large reliance on outside sources to deliver generally illiquid loans leaving the bank vulnerable to liquidity issues in times of crisis. In line with prior studies, an increase in deposits to loans ratio is likely to result in product prices reduction, thereby reducing inflation.

3.4.1.2.4. Non-performing loans to total loans ratio

The ratio of non-performing loans to total loans is another indicator of financial stability which is used in the identification of loan portfolio asset quality issues. A rise in the ratio indicates a decline in the quality of the credit portfolio (IMF, 2006). This deterioration could result in higher

borrowing costs which are considered into pricing models because they are passed on to consumers so affecting the general price level and, consequently, price stability (Anjom & Karim, 2015). Prior studies confirmed that inflation and non-performing loans had a significant inverse connection (Anjom & Karim, 2015; Kurumi & Bushpepa, 2017). Thus, a rise in the non-performing loans to total loans ratio could result in product price increases pushing inflation to higher levels.

3.4.1.2.5. Return on assets

The research included return on assets (ROA) as an additional indicator of financial stability used in this study. This ratio assesses a bank's profitability-driven asset use efficiency which prior research prefers as a financial stability indicator (Guru, Staunton & Balashanmugam, 2002; Boyd & Champ, 2006; Ben & Goaied, 2008). An increase in the ratio suggests that available capital is used profitably (IMF,2006). This helps banks to lower fees and interest charges, which may in turn help promote economic development and ultimately reduce prices. This denotes an inverse relationship between return on assets and return on equity as well as inflation.

3.4.1.2.6. Return on equity

Return on equity (ROE) is a measure of the profitability of a bank when profits generated are compared to owners' funds. The aim is to ascertain the extent of the bank's effectiveness in utilising the owners' investment in generating profits. The IMF (2006) indicates that ROE attempts to assess a bank's profitability-driven capital use efficiency. The indicator is considered as one of the most important earnings/profitability indicators in the group of financial stability indicators and is therefore a critical indicator among those believed to be related to price stability (Boyd & Champ, 2006). The essence of the ROE in this study is derived from studies such as Tan and Floros (2012), Boyd and Champ (2006), and Staikouras and Wood (2003), who acknowledged the significance of the correlation between inflation and a bank's profitability, as assessed by ROE, among other metrics. Tan and Floros (2012)

highlighted that a bank's profitability can contribute towards inflation as poor performance may influence the bank's risk and its lending capacity, which has an effect on interest rates.

3.4.1.3. Error term

The last term in the regression model is the disturbance or the error term. Following Brooks' (2019) advice, it is recognised that including more than one explanatory variable in the model does not indicate the absence of missed variables from the model. Consequently, a disturbance term is included in each model to minimise the effect of missed variables from the model. This captures the effect of all other qualitative factors not included in the model.

3.4.2. Model Development

The study developed econometric models to address the research objectives.

3.4.2.1. Model 1 – Panel regression analysis

Model 1 was based on the first objective which sought to determine the effect of changes in financial stability indicators on inflation as a proxy for price stability in the SADC region. Drawing from the findings of prior studies (Rufus, Adekunle & Folorunsho, 2021), the model was developed on the assumption that a change in financial stability indicators is likely to result in a change in price stability. The relationship between price stability and the selected factors was derived from Dhal (2011), Adedamola (2015), and Khataybeh and Al-Tarawneh (2016), though the current study makes an additional factor, liquidity ratio. The liquidity ratio is an extension of the model used in the aforesaid studies. Liquidity issues have in the aftermath of recent financial sector crises gained prominence hence the need to take them into account. Furthermore, financial sector liquidity has in some countries, such as Zimbabwe, shown some important linkages to the real economy.

3.4.2.1.1. Panel data analysis technique

Panel data allows for the capturing of the differences between individual countries and the effects of changes in explanatory variables over time. Furthermore, the use of panel data is necessary to obtain a higher number of observations; time series and cross-sections are limited in the number of observations which might not provide a sufficient number of degrees of freedom to obtain high enough t-statistics to reach clear conclusions. Despite the availability of several methods for analysing multidimensional datasets, the panel data analysis technique is often considered to be the most efficient analytical method in handling econometric data (Wijesundera, Weerasinghe, Krishna, Gunawardena, Maliendra & Peiris 2015). The technique is often regarded as a superior methodology due to its improved capability to ensure sufficient degrees of freedom which are key in improving estimation efficiency.

3.4.2.1.2. Panel data estimators

Brooks (2019) identified regression estimators for panel data used in the panel data analysis technique, namely, the static, dynamic and Tobit panel estimators. The current study utilised only the static panel estimators as this was appropriate for addressing the first research objective. Furthermore, according to Brooks (2019), static panel data estimators are appropriate where the dependent variables do not exhibit temporal autocorrelation and are compatible with the least-squares linear regression models. Accordingly, the three main types include:

- Fixed effects model – when individual cross-section effects are fixed
- Random effects model – when individual cross-section effects are random
- Pooled ordinary least squares model – when individual cross-section effects are constant.

3.4.2.1.2.1. Fixed effects model

According to Brooks (2019), the fixed effects model is based on the elimination of the fixed effects term. Time averages are subtracted from all variables because it is constant in time. This is a static panel estimator in which the individual specific effect is a random variable that is allowed to be correlated with explanatory variables. It is because when using the technique, there is a need to assume that something within the individual variable may impact or bias the predictor or outcome variables hence the need to control this. This becomes the rationale behind the assumption of the correlation between an entity's error term and predictor variables. Fixed effects remove the effect of those time-invariant characteristics so we can assess the net effect of the predictors on the outcome variable.

The equation for the fixed effects model becomes:

$$\mathbf{Y}_{it} = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 \boldsymbol{X}_{it} + \boldsymbol{\alpha}_i + \boldsymbol{\mu}_{it} \ldots$$

Equation 3.2

Where.

$\mathbf{Y}_{it}$ = the dependent variable, price stability (inflation), where *i* = entity and *t* = time.

$\boldsymbol{\alpha}_i$ (i=1….n) = the unknown intercept for each country (n country-specific intercepts)

$\boldsymbol{X}_{it}$ = matrix of independent variables, the financial stability indicators (capital adequacy ratio, deposits to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets ratio, return on equity ratio)

$\boldsymbol{\beta}_1$ = the coefficient for that independent variable

$\boldsymbol{\mu}_{it}$ = the error term

3.4.2.1.2.2. Random effects model

The random effects model assumes that fixed effects are uncorrelated with explanatory variables. It assumes that the data being analysed are drawn from a hierarchy of different populations whose differences relate to that hierarchy (Wijesundera et al., 2015). In the random effects model, the individual-specific effect is a random variable that is uncorrelated with the explanatory variables.

The generic mathematical formula for the random effects model is:

$$Y_{it}=\alpha+\boldsymbol{\beta}X_{it}+\mu_i+\lambda_t+\nu_{it}$$

Equation 3.3

Where:

$\boldsymbol{\alpha}$ = the intercept

$\mathbf{Y}_{\boldsymbol{it}}$ = the dependent variable, price stability (inflation), where *i* = entity and *t* = time.

$\boldsymbol{\lambda_t}$ = the unobserved time series effects

$\boldsymbol{\mu_i}$ = the unobserved cross-sectional individual effects

$\boldsymbol{\nu_{it}}$ = the idiosyncratic error.

$\boldsymbol{X_{it}}$ = matrix of independent variables, the financial stability indicators (capital adequacy ratio, deposits to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets ratio, return on equity ratio).

Unlike fixed effects, the random effects model allows for explanatory variables that are constant in time. Furthermore, the random effects estimator is generally more efficient than the fixed effects or first differencing. It is also worth noting that the key assumption that fixed effects are uncorrelated with explanatory variables is very restrictive and is invalid for many

applications. Therefore, the decision between using a fixed effects estimator, first differencing or random effects model should be made based on whether this assumption holds in each of the cases. If the assumption holds, random effects are consistent and more efficient than fixed effects and thus should be used.

Although its results are only indicative, the Hausman test is commonly used to test the assumption that fixed effects are uncorrelated with explanatory variables. In many empirical studies, both fixed effects and random effects model estimations are used to get two sets of results for comparison. This approach is adopted in this study by using both the fixed effects and random effects models in interpreting the Hausman test in line with Chmelarova and Hill (2010) who noted that when testing for fixed effects (correlated errors) versus random effects for panel data, if the *p*-value is small (less than 0.05), we reject the null hypothesis that errors are correlated with the regressors.

3.4.2.1.3. Pooled ordinary least squares model

The pooled ordinary least squares model is applied when individual cross-section effects are constant. Pooled regression is standard ordinary least squares (OLS) regression without any cross-sectional or time effects. The error structure is simply where there are independently and identically distributed with zero mean and variance.

This study made use of the random effects and fixed effects only as the pooled ordinary least squares could produce biased coefficients that correlate with the error term as there are unobserved fixed effects.

3.4.2.2. Model 2 – Granger causality testing

Model 2 was based on the second objective which sought to assess the causal relationship between inflation and financial stability indicators (capital adequacy ratio, deposits to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets and return on

equity). The Granger causality test was performed to test whether price stability and individual indicators of financial stability Granger cause each other.

Granger causality testing is often adopted in cases where there is a likelihood that variables are influencing each other without a clear-cut independent or dependent variable. Granger (1988) highlighted that the presence of cointegration between dependent and independent variables suggests a likelihood for at least some aspects of causality. In view of the foregoing, causality is the ability of one variable to predict (and thus cause) the other variable.

In the case of the price stability and financial stability indicators, there is a possibility that past changes in one variable might result in future changes in the other culminating in a cause-and-effect relationship, hence the need to determine the direction of causation.

3.4.2.2.1. Granger causality in the absence of cointegration

Granger (1969) highlighted that following the conduct of diagnostic tests suggesting no cointegration amongst variables, a standard causality test is applied, specifically the vector autoregressive (VAR) model. This study applied the Granger causality test on two variables, price stability (inflation) and financial stability (represented by several indicators). As such, the VAR is made up of the Xt representing the independent variable over time *t*, and Yt representing the dependent variable over time *t*. Two VAR equations of causality are thus derived from this relationship as shown below:

Model 1: Testing if a financial stability indicator (X) Granger causes inflation rate (Y)

The following equation tests if a financial stability indicator (X) Granger causes inflation rate (Y). Therefore, a financial stability indicator is considered the independent variable while the inflation rate is the dependent variable.

$$y_t = a_1 + \sum_{i=1}^{n} \beta_i \, x_{t-i} + \sum_{j=1}^{m} \gamma_j \, y_{t-j} + e_{1t}$$

Equation 3.4

Stock and Watson (2011) noted that, in this case, Granger causality means that if X Granger-causes Y, then X is a useful predictor of Y. Therefore, if a financial stability indicator Granger causes inflation rate then the financial stability indicator is a useful predictor of the inflation rate and therefore, price stability.

Model 2: Testing if inflation rate (Y) Granger causes a financial stability indicator (X)

The following equation was used to test if inflation rate (Y) Granger causes a financial stability indicator (X). The inflation rate was considered the independent variable while the respective financial stability indicator was the dependent variable.

$$x_t = a_2 + \sum_{i=1}^{n} \theta_i \, x_{t-i} + \sum_{j=1}^{m} \delta_j \, y_{t-j} + e_{2t} \ldots$$

Equation 3.5

The advice of Stock and Watson (2011) was considered which suggests that Granger causality implies that if Y Granger causes X, then Y is a useful predictor of X. Therefore, if inflation rate Granger causes financial stability indicator, then inflation rate (price stability) is a useful predictor of that financial stability indicator.

Overall, an assumption was made regarding the error terms εyt and εxt as they were assumed to be uncorrelated. Therefore, Xt does not Granger cause Yt, if ***β1*** = ***β2*** =…. = ***βi*** = 0, when using the F-test to test the hypothesis.

3.4.2.2.2. Granger causality in the presence of cointegration

Granger (1969) highlighted that when the diagnostic tests suggest the presence of cointegration, a vector error-correction model (VECM) is adopted to determine causality. The VECM model used was as follows:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta y_{t-1} + \sum_{i=1}^{n} \alpha_{2i} \Delta x_{t-1} + \sum_{i=1}^{n} \alpha_3 \Delta EC_{t-n} + \varepsilon_i \ldots$$

Equation 3.6

The causality of the VECM can be tested with a consideration of whether it is short term or long term. According to Stock and Watson (2011), the Wald test (χ^2 test) is often used to test the short-term causality of the VECM.

On the other hand, the long-term causality of the VECM was tested by examining whether the error-correction coefficient **α3** in the model was significantly different from zero.

Granger-causality testing required the identification of an optimal lag length since the causal variable was considered in relation to its lags when entering the data series into a VAR model. This enabled testing the null hypothesis using standard F-tests with hypotheses stated as:

H_0: Financial stability indicator does not Granger cause price stability (inflation)

H_1: Financial stability indicator does Granger cause price stability (inflation)

H_0: Price stability (inflation) does not Granger a financial stability indicator

H_1: Price stability (inflation) does Granger cause a financial stability indicator

The decision criteria for Granger causality tests required a comparison of the *p*-value to the significance level. This study adopted a significance level of 5 per cent (Di Leo & Sardanelli, 2020); therefore, the null hypothesis is rejected if the *p*-value <0.05. The null hypothesis is not rejected if the *p*-value >0.05.

3.5. PRELIMINARY TESTS ON VARIABLES OF THE STUDY

Preliminary tests involved testing the data for normality, correlation and stationarity. This was intended to establish the nature of the variables before their adoption into the model for practical analysis.

3.5.1. Normality Test

A normality test is conducted to ascertain whether the relevant dataset can be well-modelled by a normal distribution and to compute how likely it is for a random variable underlying the

dataset to be normally distributed. In essence, normality is a condition whereby the model variables adopted follow the standard normal distribution (Brooks, 2019). Testing for normality is crucial as major statistical tests assume normality of the dataset. Non-normality arises when there is a deviation from normality and renders statistical tests assuming normality inaccurate. Therefore, it becomes imperative to understand whether the data under consideration is normal or non-normal.

Testing for normality in this study was conducted using the Jarque-Bera statistics with the view to assess the hypotheses:

Ho: The data series is normally distributed

H_1: The data series is not normally distributed

If the dataset is normal (that is it follows a normal distribution), a bell shape is noticeable in the histogram resulting in an insignificant Jarque-Bera statistic. At the 5 per cent significance level, a normally distributed series yields a Jarque-Bera statistic which is greater than 0.05. At the 10 per cent significance level, a normally distributed series yields a Jarque-Bera statistic which is greater than 0.1.

3.5.2. Stationarity Test

Stationarity in a time series is whereby a shift in time does not result in a change in the shape of the distribution. Therefore, the basic properties of the distribution like the mean, variance and covariance remain constant over time (Gujarati, 2004). The unit root test was conducted to test for the stationarity of the time-series data.

3.5.3. Unit Root Test

A unit root test is a preliminary step in the econometric analysis of time-series data as part of the cointegration tests. It is used to test whether the dataset is stationary (no unit root) or if it is non-stationary (unit root). In essence, the test results are obtained by assuming the

presence of a unit root in the null hypothesis (H_0), whereby the variable is non-stationary and no unit root in the alternative hypothesis (H_1), whereby the variable is stationary. In this regard, decisions were made based on the calculated statistic and McKinnon's critical value in comparison with the critical values. The significance of the unit root test lies in that it avoids the conduct of a dubious regression analysis. The use of non-stationary variables in performing a regression analysis produces spurious results leading to poor estimation (Brooks, 2019).

The unit root test for this study was performed based on the calculated statistic and McKinnon's critical value in comparison with the critical values. Where the calculated value of a variable was less than Mackinnon's critical value, it was considered non-stationary, thereby implying the existence of a unit root. On the other hand, where the calculated value was higher than the critical value, the series was noted as stationary as evidenced by the absence of a unit root. These values were generated using the Augmented Dickey-Fuller (ADF) test in EViews under the hypothesis:

H_0: Time series is not stationary (unit root present)

H_1: Time series is stationary (unit root absent)

Therefore, where the ADF statistic is higher than critical values at a particular level of significance, the null hypothesis was rejected in favour of the alternative and thus concluded that the dataset has no unit root and was, therefore, stationary.

Non-stationary data can be made stationary in several ways such as transforming the data using square roots, detrending (de-seasoning) the data and differencing. If the data used in this research was detected non-stationarity, the researcher only utilised the differencing technique (first difference). According to Brooks (2019), differencing is regarded as an appropriate way of making non-stationary data stationary.

3.6. CHAPTER SUMMARY

In this chapter, steps followed in the methodology were described and discussed. The chapter described the quantitative research methodology adopted for this study and the development of the econometric models. The panel regression analysis model was found appropriate for the analysis of the relationship between price stability and the indicators of financial stability. The diagnostic tests included of tests for normalcy, correlation analysis and stationarity. As the data was of order I (1), cointegration tests were also conducted which assisted in selecting the VECM for the Granger causality tests. Given the possibility of causal links, the Granger causality test was also found appropriate to determine the direction of causality between inflation and the individual indicators of financial stability. The following chapter presents the results, their analysis and discussion.

CHAPTER FOUR: RESULTS, ANALYSIS AND INTERPRETATION

4.1. INTRODUCTION

This chapter presents the results of the study as well as their analysis and interpretation. Secondary data was gathered from central bank websites, various IMF Country Reports, IMF Article IV Consultation Reports as well as the IMF Data Portal. An analysis of the secondary data was conducted about key areas outlined in the research objectives. The chapter presents several statistical tests and their respective results.

4.2. DIAGNOSTIC TESTS

Diagnostic tests were performed as a preliminary to the panel linear regression analysis. Additionally, the Granger causality tests for the panel data of countries in the SADC region included the Normality Test, Stationarity Test and the Cointegration Test.

4.2.1. Normality Test

Normality tests were performed as a preliminary step into the data analysis process. Standard deviations were computed to highlight the extent of variation in the dataset. Skewness and Kurtosis were also computed, while normality was tested using the JarqueBera (JB) statistic. The JB was performed using the hypothesis that the data series was normally distributed. The null hypothesis is rejected if the probability of the JB is less than 5 per cent, thus accepting the alternative hypothesis that the data series is not normally distributed. Table 4-1 shows the results obtained from normality tests performed.

Table 0-1: Normality tests

Variable	Obs.	Mean	Std.	Skew	Kurt	JB	Prob.
Inflation rate	584	7.31	7.09	2.20	10.72	1922.10	0.00
Capital Adequacy Ratio (CAR)	523	18.36	4.29	0.46	3.37	21.64	0.00
Deposits to Loans Ratio (DLR)	530	140.53	73.66	2.28	12.84	2600.20	0.00
Non-performing loans to total loans ratio (NPLTL)	552	6.90	4.48	1.33	5.74	334.08	0.00
Liquidity Ratio (LR)	539	48.36	37.78	2.87	12.81	2900.16	0.00
Return on Assets (ROA)	535	2.84	1.49	1.29	8.55	835.01	0.00
Return on equity (ROE)	531	24.52	12.28	0.85	6.82	385.78	0.00

Source: Author's computations

The results on the summary statistics show minimum variation across all the seven variables on the data from SADC countries during the period under study. In terms of normality, Capital Adequacy Ratio, Non-performing Loans to Total Loans Ratio, Return on Assets and Return on Equity mirrored normal skewness though they are leptokurtic as they had a kurtosis of more than 3. The inflation rate, Deposits to Loans Ratio and Liquidity Ratio had medium-right tails (positive skewness) and are leptokurtic as they have a kurtosis of more than 3 and a skewness greater than 2.

The variable JB was used in determining normality of the dataset by comparing the skewness and kurtosis of the series with those from the normal distribution. The JB test statistic shows that all the variables were not normally distributed ($p<0.05$), suggesting the possibility of outliers in the dataset of the variables. However, this would not affect interpretation of subsequent test results given that the normality assumption can be set aside when dealing with panel data (Brooks, 2019).

4.2.2. Correlation

Table 4-2 shows the Pearson correlation matrix for the seven variables used in this study.

Table 0-2: Pearson correlation matrix

	Inflation	CAR	DLR	NPLTL	LR	ROA	ROE
Inflation, r p-value	1.00 0.0000						
CAR r p-value	0.02 0.0030	1.00 0.0000					
DLR r p-value	-0.03 0.0001	0.10 0.0000	1.00 0.0000				
NPLTL r p-value	0.26 0.0001	0.25 0.0000	0.00 0.0000	1.00 0.0000			
LR r p-value	-0.13 0.0000	-0.14 0.0001	0.25 0.0005	-0.17 0.0000	1.00 0.0000		
ROA r p-value	0.27 0.0000	0.12 0.0045	0.12 0.0000	-0.05 0.0000	-0.02 0.0001	1.00 0.0000	
ROE r p-value	0.19 0.0000	-0.11 0.0000	0.25 0.0035	-0.24 0.0014	0.13 0.0000	0.75 0.0000	1.00 0.0000

Source: Authors own computations

Inflation had a positive correlation with capital adequacy $[r = 0.02;\ p < 0.05]$, non-performing loans to total loans ratio $[r = 0.26;\ p < 0.05]$, return on assets $[r = 0.27;\ p < 0.05]$ and return on equity $[r = 0.19;\ p < 0.05]$. This suggests that, for this dataset, the inflation rate and these variables moved in the same direction. An increase in these variables was likely to increase inflation or an increase in inflation may have led to an increase in these variables.

Inflation had a negative correlation with loans to deposit ratio $[r = -0.03;\ p < 0.05]$ and liquidity ratio $[r = -0.13;\ p < 0.05]$. This suggests that, for this dataset, the inflation rate and these variables moved in opposite directions. An increase in these variables was likely to result in a decline in inflation or an increase in inflation may have led to a decline in these variables.

In all cases, the absolute value of the Pearson correlation coefficient was less than 0.8, and it showed that collinearity was less likely to exist (Shrestha, 2020). As such, statistical analysis on this dataset would not be significantly influenced by a strong relationship amongst the independent variables.

4.2.3. Stationarity Tests

Stationarity tests were performed to eliminate non-stationarity in the dataset. This helped in assessing the possibility of changes in time which resulted in a change in the shape of the distribution of the variables (Gujarati, 2004).

The advice of Baltagi (2013) was followed who highlighted that including non-stationary panel variables in the estimation might lead to spurious regression results which cannot be trusted. A four-panel data unit root test was used for robustness, that is, the Levin, Lin and Chu (2002) (LLC), Im-Pesaran-Shin (2003) (IPS), Augmented Dickey–Fuller test (ADF) - Fisher and Phillips–Perron (PP) - Fisher. The IPS was preferred as it caters for individual country heterogeneity. The unit root tests were performed on the seven variables for level **I**(0) and the first difference **I**(1). These were computed for three specifications: 'no trend and intercept', 'with intercept only', and 'with intercept and trend'. The null hypothesis tested was that a variable is non-stationary (which means it has a unit root) for all four tests. Rejection of the null hypothesis meant that the variable is stationary (which means it does not contain a unit root). The null hypothesis was rejected when $p<0.05$. The stationarity test results using the unit root tests are shown in Table 4-3 below.

Table 0-3: Unit root test at level

Test statistics	Variables													
	Level data													
	Inflation		CA		LDR		NPLTL		LR		ROA		ROE	
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Pro.b	Statistic	Prob.	Statistic	Prob.
Case 1: No trend and intercept														
LLC	-5.15	0.00	1.30	0.90	-1.03	0.15	-0.60	0.27	-0.95	0.17	-0.25	0.40	-1.87	0.40
IPS	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ADF	102.82	0.00	9.86	0.99	52.49	0.01	19.73	0.92	29.55	0.49	25.32	0.61	32.95	0.61
PP	96.04	0.00	10.39	0.99	67.39	0.00	17.10	0.97	34.41	0.26	34.64	0.18	53.18	0.18
Case 2: With intercept only														
LLC	-4.03	0.00	-0.32	0.38	-2.57	0.01	1.06	0.86	-1.27	0.10	-2.10	0.02	1.26	0.90
IPS	-6.63	0.00	-0.87	0.19	0.05	0.52	1.75	0.96	-1.46	0.07	-3.14	0.00	-2.08	0.02
ADF	123.96	0.00	44.65	0.02	32.72	0.33	21.59	0.87	44.81	0.04	57.23	0.00	46.57	0.02
PP	97.87	0.00	80.07	0.00	49.34	0.01	37.00	0.18	85.57	0.00	68.81	0.00	107.07	0.00
Case 3: With intercept and trend														
LLC	-1.81	0.04	-2.93	0.00	-1.29	0.10	2.54	0.99	0.31	0.62	-1.20	0.11	2.94	0.99
IPS	-4.22	0.00	-2.48	0.01	0.03	0.51	2.34	0.99	-1.1	0.14	-1.94	0.03	-1.73	0.04

ADF	98.58	0.00	57.72	0.00	26.07	0.67	17.99	0.95	41.36	0.08	43.27	0.03	46.78	0.01
PP	63.57	0.00	104.82	0.00	46.17	0.03	61.90	0.00	102.55	0.00	50.39	0.01	109.92	0.00

Source: Author's computations

The results show that inflation was stationary for all the four tests for the three specifications on the 'no trend and intercept', 'with intercept only', and 'with intercept and trend'. Capital adequacy, loans to deposits ratio, non-performing loans to total loans ratio and the liquidity ratio were stationary for the three specifications. However, the preferred test, the IPS did not confirm stationarity for the 'with intercept only' and 'with intercept and trend' for the loans to deposits ratio, non-performing loans to total loans ratio and the liquidity ratio. Similarly, the LLC test did not confirm stationarity for capital adequacy on the 'no trend and intercept' and non-performing loans to total loans ratio and liquidity ratio for the 'with intercept and trend' specification.

The variables were first differenced to ensure they became stationary to enable statistical analysis. Table 4-4 shows the stationarity test results after first differencing the variables.

Table 0-4: Unit root tests at first difference

Test statistics	Variables											
	First difference data											
	CAR		LDR		NPLTL		LR		ROA		ROE	
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
Case 1: No trend and intercept												
LLC	-17.70	0.00	-15.70	0.00	-14.00	0.00	-21.65	0.00	-16.82	0.00	-17.56	0.00
IPS	--	--	--	--	--	--	--	--	--	--	--	--
ADF	338.81	0.00	267.82	0.00	262.14	0.00	497.39	0.00	333.40	0.00	363.22	0.00
PP	1126.63	0.00	705.95	0.00	663.36	0.00	1437.10	0.00	698.24	0.00	1041.70	0.00
Case 2: With intercept only												
LLC	-8.61	0.00	-8.11	0.00	-5.55	0.00	-13.75	0.00	-10.57	0.00	-3.89	0.00
IPS	-13.61	0.00	-12.04	0.00	-11.10	0.00	-18.05	0.00	-13.17	0.00	-14.37	0.00
ADF	221.84	0.00	195.68	0.00	184.02	0.00	308.04	0.00	210.62	0.00	233.73	0.00
PP	388.54	0.00	391.36	0.00	373.35	0.00	467.21	0.00	334.62	0.00	374.92	0.00
Case 3: With intercept and trend												
LLC	-6.64	0.00	-6.61	0.00	-3.92	0.00	-11.48	0.00	-8.95	0.00	-1.00	0.15
IPS	-12.25	0.00	-10.77	0.00	-10.75	0.00	-16.79	0.00	-11.22	0.00	-12.36	0.00

ADF	189.10	0.00	163.79	0.00	166.97	0.00	292.55	0.00	170.46	0.00	190.20	0.00
PP	1221.10	0.00	697.00	0.00	627.96	0.00	1715.07	0.00	662.21	0.00	1063.75	0.00

Source: Author's computations

The results show that first differencing assisted in making stationary the non-stationary variables as confirmed by the four unit-root tests for all three cases. In summary, the seven variables could now be considered to be integrated of order one, **I**(1), as they became stationary after first differencing following which they could now be used in the estimation of models.

4.3. OBJECTIVE ONE: EFFECT OF CHANGES IN FINANCIAL STABILITY INDICATORS ON PRICE STABILITY

This entailed finding the effect of changes in financial stability indicators on inflation as a proxy for price stability in the SADC region.

4.3.1. Correlated Random Effects – Hausman Test

The study considered both random effects and fixed effects since they are effective in discarding unobserved fixed effects often associated with panel data. The Hausman test was applied to inform the choice between random and fixed effects, and thus the model to be adopted. The Hausman test was based on the hypothesis that the random effects model was appropriate. The null hypothesis was rejected when $p<0.05$, which would imply acceptance of the alternative hypothesis that the fixed effects model was appropriate. The results are presented in Table 4-5.

Table 0-5: Correlated Random effects-Hausman test results

Test Summary		**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	**Prob.**
Cross-section random		21.265041	6	0.0016
Cross-section random effects test comparisons:				
Variable	**Fixed**	**Random**	**Var (Diff.)**	**Prob.**
Capital adequacy	0.037523	-0.005092	0.000397	0.0324
Deposits to loans ratio	0.003239	0.001990	0.000002	0.3798
Non-performing loans to total loans	0.093843	0.157863	0.000435	0.0021

Liquidity ratio	-0.081826	-0.050884	0.000161	0.0147
Return on assets	-0.287199	-0.044466	0.009115	0.0110
Return on equity	0.137510	0.125555	0.000074	0.1636

Source: Author's computations

The Hausman test results showed a Chi-Sq. statistic of 21.27 (p<0.05). This suggested that we reject the null hypothesis in favour of the alternative hypothesis suggesting that the fixed effects model was appropriate. This meant that the fixed effects model was an efficient and, therefore, preferred estimator of the data compared to the random effects model.

4.3.2. Regression Results

The Hausman test performed indicated the appropriateness of the fixed effects model for this study. This was applied in running data on the changes in financial stability indicators which may influence inflation as a proxy for price stability in the SADC region for the period 2009 to 2018. Table 4-6 shows the results of the fixed effects model.

Table 0-6: Fixed effects regression results

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Constant	6.409141	1.955684	3.277186	0.0011
Capital adequacy	0.037523	0.076304	0.491760	0.6231
Deposits to loans ratio	0.003239	0.004718	0.686600	0.4927
Non-performing loans to total loans	0.093843	0.071604	1.310587	0.1907
Liquidity ratio	-0.081826	0.020756	-3.942241	0.0001
Return on assets	-0.287199	0.362389	-0.792515	0.4285
Return on equity	0.137510	0.043048	3.194356	0.0015
	Effects Specification			
Cross-section fixed (dummy variables)				

R-squared	0.523407	Mean dependent var	7.128205
Adjusted R-squared	0.501595	S.D. dependent var	6.714938
S.E. of regression	4.740598	Akaike info criterion	5.994971
Sum squared resid	9820.819	Schwarz criterion	6.184194
Log-likelihood	-1351.848	Hannan-Quinn criteria	6.069496
F-statistic	23.99626	Durbin-Watson stat	0.340807
Prob (F-statistic)	0.000000		

Source: Author's computations

The fixed effects model showed an R-squared value of 0.5234 which suggests that 52.34 per cent of the changes in inflation (price stability) are explained by changes in the selected indicators of financial stability. This means that the other portion in price stability was explained by other factors encompassed by the standard error statistic.

The fixed effects model was found to be a good fit for the data $[F = 24.00;\ p < 0.05]$. The F-statistic was significant and suggests that all coefficients in the model are different and not equal to zero. Based on this result, we can therefore conclude that at least one of the variables in the model -- capital adequacy ratio, deposit to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets, return on equity – explain the changes in the financial stability in the SADC region.

Regression equation:

$$Inflation_{\ it} = \beta_0 + \beta_1 LR_{it} + \beta_2 ROE_{it} + \mu_{it} \ldots\ldots\ldots\ldots$$

Equation 4.1

The regression coefficients table illustrates that some variables are insignificant as their *p*-values are greater than 0.05; for instance, capital adequacy (*p=0.6231*); deposits to loans ratio (*p=0.4927*); non-performing loans to total loans (*p=0.1907*) and return on assets (*p=0.4285*).

Significant variables include Liquidity Ratio (LR) (*p=0.0001*) and Return on Equity (ROE) (*p=0.0015*). Therefore, the modified regression model was presented as:

$$Inflation_{it} = 6.41 - 0.08LR_{it} + 0.14ROE_{it} + \mu_{it} \ldots\ldots\ldots\ldots$$

Equation 4.2

4.3.3. Interpretation and Analysis of the Results

The fixed effects model indicated a constant value of 6.41. This suggests that price stability takes a certain value if all other factors included in the model take the value of zero. This implies that the selected indicators of financial stability are inexhaustive in explaining changes to price stability. As such, price stability is bound to take a certain value even if there are no changes in financial stability. This makes it imperative to investigate further other factors besides the selected indicators of financial stability which may also impact price stability.

The results show that the liquidity ratio [β=-0.08; $p<0.05$] statistically predicts price stability (inflation rate). This indicates that *ceteris paribus*, increasing the liquidity ratio by 1-unit results in a decline in the inflation rate. This suggests a negative relationship between the liquidity ratio and inflation as changes in these variables moves in opposite directions. This implies that increasing the liquidity ratio may help to reduce inflation, hence improving price stability. The results concur with Adedamola (2015), Vodová (2011) and Malik (2013) who found a negative relationship between inflation and liquidity. This result was, however, contrary to Ahmad (2017) and Singh and Sharma (2016) who noted a positive relationship.

However, Ajie and Nenbee (2010) caution authorities when it comes to the management of liquidity: too much bank liquidity encourages lending which in turn drives prices upwards as the people's spending capacity increases, hence their demand for more goods may increase. Ajie and Nenbee (2010) further note that when cash is costly to obtain due to scarcity, companies may resort to alternative ways of raising the needed cash at an additional cost. Such additional costs are often passed onto consumers in the form of price increases. This

makes it necessary to ensure stability in the liquidity ratio. While the essence of liquidity in the economy is an issue that requires separate investigation on its own, the results of this study suggest that the liquidity ratio is an important factor to consider when making decisions regarding price stability.

The results show that return on equity [$\beta=0.14$; $p<0.05$] statistically predicts price stability (inflation rate). A positive regression coefficient indicates that *ceteris paribus*, increasing return on equity by 1 unit may result in an increase in the inflation rate by 0.14. This suggests a positive relationship between the return on equity ratio and inflation rate as changes in these variables move in the same direction. This implies that increasing return on assets may increase the inflation rate, thus leading to a deterioration of price stability. These results are in line with Aghaee and Kazempour (2013) whose study established that an increase in return on equity suggests an improvement in the value of incomes which increases the spending power of individuals and corporates. By so doing, demand for goods may increase leading to suppliers temporarily increasing the prices of their products. In the long run, product prices may be pushed upwards resulting in a general increase which undermines price stability. The positive relationship established is consistent with Guru et al. (2002) but contrary to Boyd and Champ (2006), and Ben and Goaied (2008) who found a negative relationship and no relationship respectively.

4.4. OBJECTIVE TWO: CAUSALITY

After addressing the preceding objective which investigated the effect of changes in financial stability indicators on inflation as a proxy for price stability in the SADC region, an assessment of the causal relationship between inflation and financial stability indicators (capital adequacy ratio, deposits to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets and return on equity) was carried out as the second objective.

4.4.1. Cointegration Tests

Before conducting the Granger causality test, it was necessary to perform cointegration tests. Granger (2004) indicates that cointegration tests the presence of a long-run relationship between the study variables. The Pedroni (2004) panel cointegration test was used to examine the null hypothesis that the variables are not cointegrated against the alternative hypothesis. The decision criteria involved comparing the probability of the cointegration test with the 5 per cent significance level. A probability of less than 5 per cent would lead to a rejection of the null hypothesis and the conclusion that the variables are cointegrated.

Panel cointegration testing was performed on individual equations connecting the six indicators of financial stability to price stability (inflation). According to Gujarati (2004), the test is carried out prior to the conduct of the Granger causality tests because the cointegration test determines whether to the Granger causality will be based on the VAR or VECM approach. The VECM is adopted where results of the cointegration tests show that variables are cointegrated (Gujarati, 2004). Each variable (inflation) and the indicators of financial stability assumed the role of the dependent variable in turn. The results for all six equations are shown for inflation against each indicator of financial stability.

Pedroni (2004) suggests that in a small N and small T sample, the Group-ADF and Panel ADF statistics are the preferred test statistics among a list of seven (comprising Panel ADF-statistic, Panel v-statistic, Panel rho-statistic, Panel PP-statistic, Group-ADF statistic, Group rho-statistic, Group PP-statistic). As such, the cointegration tests were carried out accordingly. Notwithstanding the foregoing, the Panel v-statistic, Panel rho-statistic, Panel PP-statistic, Group rho-statistic and Group PP-statistic were also computed to augment observations from the two preferred test statistics.

The cointegration tests required before conducting the Granger causality tests between price stability (measured by inflation) and financial stability indicators, were done in six sets as follows: inflation vs capital adequacy, inflation vs deposit to loans, inflation vs non-performing

loans to total loans, inflation vs liquidity ratio, inflation vs return on assets and inflation vs return on equity. The cointegration test results are presented below.

4.4.2. Inflation and Capital Adequacy

The Panel cointegration tests for inflation and capital adequacy ratio are shown in table 4-7 below.

Table 0-7: Cointegration tests on inflation and capital adequacy

Test	Statistic	Dependent variable			
		Inflation		Capital adequacy ratio	
		Statistic	Prob.	Statistic	Prob.
Pedroni (1999, 2004)	Panel v-statistic	10.21	0.0000	1.68	0.0463
	Panel rho-statistic	-5.16	0.0000	-3.88	0.0001
	Panel PP-statistic	-4.48	0.0000	-2.81	0.0025
	Panel ADF-statistic	-3.01	0.0013	-1.28	0.0109
	Group rho-statistic	-3.07	0.0011	-3.47	0.0003
	Group PP-statistic	-3.91	0.0000	-3.44	0.0003
	Group ADF-statistic	-4.62	0.0000	-0.52	0.2999
Decision		Reject H_0		Reject H_0	
Inference		Cointegrated		Cointegrated	

Source: Author's computations

The results show that all seven statistics identified by Pedroni (2004) were statistically significant ($p<0.05$) when inflation was the dependent variable. Six of the seven were statistically significant, ($p<0.05$) when the capital adequacy ratio was the dependent variable. So, in both cases, we rejected the null hypothesis of no cointegration. This was also supported

by the Panel ADF-statistic ($p<0.05$) where we rejected the null hypothesis of 'no cointegration' in favour of the alternative hypothesis that the equations were cointegrated.

4.4.3. Inflation and Deposits to Loans Ratio

The Panel cointegration tests were performed on each of the two equations where the variables, inflation and deposits to loans ratio, assumed the role of the dependent variable in each case. Table 4-8 shows results obtained on the cointegration of inflation and deposit to loans ratio.

Table 0-8: Cointegration tests on inflation and deposits to loans ratio

Test	Statistic	Dependent variable			
		Inflation		Deposits to loans ratio	
		Statistic	Prob.	Statistic	Prob.
Pedroni (1999, 2004)	Panel v-statistic	11.25	0.0000	4.22	0.0000
	Panel rho-statistic	-7.67	0.0000	-2.91	0.0018
	Panel PP-statistic	-6.54	0.0000	-2.48	0.0065
	Panel ADF-statistic	-2.49	0.0063	-1.66	0.0486
	Group rho-statistic	-3.38	0.0004	1.14	0.8719
	Group PP-statistic	-4.27	0.0000	-0.14	0.4427
	Group ADF-statistic	-5.54	0.0000	0.58	0.7183
Decision		Reject H_0		Reject H_0	
Inference		Cointegrated		Cointegrated	

Source: Author's computations

The results show that all seven statistics identified by Pedroni (2004) were statistically significant ($p<0.05$) when Inflation was the dependent variable, and four of the seven were statistically significant ($p<0.05$) when the deposits to loans ratio was the dependent variable. We, therefore, rejected the null hypothesis of no cointegration in both cases. The Panel ADF-

statistic ($p<0.05$) confirmed the above inference where the null hypothesis of 'no cointegration' was rejected in favour of the alternative hypothesis that the equations were cointegrated.

4.4.4. Inflation and Non-performing Loans to Total Loans Ratio

Panel cointegration tests were performed on each of the two equations where the variables, inflation and non-performing loans to total loans ratio, assumed the role of the dependent variable in each case. Table 499 shows results obtained from the cointegration tests.

Table 0-9: Cointegration tests on inflation and non-performing loans to total loans ratio

Test	Statistic	Dependent variable			
		Inflation		Non-performing loans to total loans	
		Statistic	Prob.	Statistic	Prob.
Pedroni (1999, 2004)	Panel v-statistic	10.15	0.0000	-0.07	0.5268
	Panel rho-statistic	-6.37	0.0000	-1.33	0.0294
	Panel PP-statistic	-4.34	0.0000	-1.18	0.1197
	Panel ADF-statistic	-3.66	0.0001	0.25	0.5982
	Group rho-statistic	-3.73	0.0000	-0.28	0.3898
	Group PP-statistic	-4.57	0.0000	-0.96	0.1687
	Group ADF-statistic	-4.86	0.0001	2.13	0.9835
Decision		Reject H0		Fail to reject H0	
Inference		Cointegrated		Not cointegrated	

Source: Author's computations

The results show that all seven statistics identified by Pedroni (2004) were statistically significant ($p<0.05$) when inflation was the dependent variable in which case we rejected the null hypothesis of no cointegration. Additionally, considering the Panel ADF-statistic ($p<0.05$), we rejected the null hypothesis of 'no cointegration' in favour of the alternative hypothesis that the equation was cointegrated.

However, when non-performing loans to total loans ratio was the dependent variable, only one of the seven statistics was statistically significant ($p<0.05$) which resulted in a failure to reject the null hypothesis of no cointegration. Also, considering the Panel ADF-statistic (p=n.s.) and the Group ADF-statistic (p=n.s.), we failed to reject the null hypothesis of 'no cointegration' and concluded that the equation was not cointegrated. Hence, when non-performing loans to total loans ratio was the dependent variable, there were fewer chances of a long-term relationship where inflation influenced non-performing loans to total loans.

4.1.1. Inflation and Liquidity Ratio

Panel cointegration tests were performed on two equations where the variables inflation and the liquidity ratio assumed the role of the dependent variable in each case. Table 4.10 shows results obtained on the cointegration tests.

Table 0-10: Cointegration tests on inflation and liquidity ratio

Test	Statistic	Dependent variable			
		Inflation		Liquidity ratio	
		Statistic	Prob.	Statistic	Prob.
Pedroni (1999, 2004)	Panel v-statistic	7.82	0.0000	1.23	0.1086
	Panel rho-statistic	-4.94	0.0000	-3.35	0.0004
	Panel PP-statistic	-4.20	0.0000	-3.50	0.0002
	Panel ADF-statistic	-3.29	0.0005	1.24	0.8929
	Group rho-statistic	-3.62	0.0001	-3.16	0.0008
	Group PP-statistic	-4.06	0.0000	-4.50	0.0000
	Group ADF-statistic	-5.02	0.0000	-0.53	0.2964
Decision		Reject H_0		Fail to reject H_0	
Inference		Cointegrated		Not cointegrated	

Source: Author's computations

In the case where inflation was the dependent variable, the results showed that all seven statistics identified by Pedroni (2004) were statistically significant ($p<0.05$) which led to a rejection of the null hypothesis of no cointegration. The Panel ADF-statistic ($p<0.05$) also confirmed a rejection of the null hypothesis of 'no cointegration' in favour of the alternative hypothesis that the equation was cointegrated.

When the liquidity ratio was the dependent variable, the Panel ADF-statistic (p=n.s.) and Group ADF-statistic (p=n.s.) implied a failure to reject the null hypothesis of 'no cointegration' and it was concluded that the equation was not cointegrated. Furthermore, four of the Pedroni (2004) statistics were statistically significant ($p<0.05$) which also confirmed the decision to fail to reject the null hypothesis. Hence when the liquidity ratio was the dependent variable, there were fewer chances of a long-term relationship where inflation was influencing liquidity.

4.4.5. Inflation and Return on Assets

Panel cointegration tests were also performed for cases where inflation and return on assets assumed the role of the dependent variable. Table 4.11 shows the cointegration test results.

Table 0-11: Cointegration tests on inflation and return on assets

Test	Statistic	Dependent variable			
		Inflation		Return on assets	
		Statistic	Prob.	Statistic	Prob.
Pedroni (1999, 2004)	Panel v-statistic	5.02	0.0000	2.55	0.0054
	Panel rho-statistic	-2.59	0.0048	-3.35	0.0004
	Panel PP-statistic	-3.02	0.0013	-2.90	0.0019
	Panel ADF-statistic	-5.46	0.0000	-2.76	0.0029
	Group rho-statistic	-1.89	0.0294	-1.91	0.0282
	Group PP-statistic	-2.76	0.0029	-2.65	0.0040
	Group ADF-statistic	-5.85	0.0000	-2.45	0.0072
Decision		Reject H_0		Reject H_0	

Inference	Cointegrated	Cointegrated

Source: Author's computations

The results show that all seven statistics identified by Pedroni (2004) were statistically significant ($p<0.05$) when either inflation or return on assets was the dependent variable. So, in both cases, we rejected the null hypothesis of no cointegration. Also, according to the Panel ADF-statistic ($p<0.05$) and the Group ADF-statistic ($p<0.05$), we rejected the null hypothesis of 'no cointegration' in favour of the alternative hypothesis that the equations were cointegrated.

4.4.6. Inflation and Return on Equity

Panel cointegration tests were performed on each of the two equations where the variables, inflation and return on equity were taken to be the dependent variable in each case. Table 4-12 shows the relevant cointegration results.

Table 0-12: Cointegration tests on inflation and return on assets

Test	**Statistic**	**Dependent variable**			
		Inflation		**Return on equity**	
		Statistic	**Prob.**	**Statistic**	**Prob.**
Pedroni (1999, 2004)	Panel v-statistic	6.91	0.0000	2.82	0.0024
	Panel rho-statistic	-2.98	0.0014	-4.91	0.0000
	Panel PP-statistic	-2.71	0.0034	-4.90	0.0000
	Panel ADF-statistic	-4.08	0.0000	-2.23	0.0128
	Group rho-statistic	-2.51	0.0061	-4.21	0.0000
	Group PP-statistic	-2.91	0.0018	-5.45	0.0000
	Group ADF-statistic	-5.38	0.0000	-1.68	0.0467
Decision		Reject H_0		Reject H_0	
Inference		Cointegrated		Cointegrated	

Source: Author's computations

The results show that all seven statistics identified by Pedroni (2004) were statistically significant ($p<0.05$) when either inflation or return on equity was the dependent variable. So, in both cases, we rejected the null hypothesis of no cointegration. In particular, the Panel ADF-statistic ($p<0.05$) and Group ADF-statistic ($p<0.05$) confirmed a rejection of the null hypothesis of 'no cointegration' in favour of the alternative hypothesis that the equations were cointegrated.

4.5. GRANGER CAUSALITY MODEL

The Granger causality test was performed following the ascertainment of the existence of cointegration between price stability and the indicators of financial stability. Following the advice of Granger (1988), the vector error-correction model (VECM) was found appropriate in the determination of causality given the presence of cointegration amongst the study variables. The VECM used was adopted from the general VECM as follows:

$$\Delta \boldsymbol{y_t} = \boldsymbol{\alpha_0} + \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{\alpha_{1i}} \Delta \boldsymbol{y_{t-1}} + \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{\alpha_{2i}} \Delta \boldsymbol{x_{t-1}} + \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{\alpha_3} \Delta \boldsymbol{EC_{t-n}} + \boldsymbol{\varepsilon_i}$$

Equation 4.3

Detailed data on the results of the vector error-correction model is annexed in the Appendices section. Using the 5 per cent level of significance, the null hypothesis is rejected if *p<0.05*. Thus, it is accepted where *p>0.05*. Table 4-13 presents a summary of the results showing the Granger causality tests on price stability (inflation) and the individual indicators of financial stability, i.e., capital adequacy ratio (CAR), deposit to loans ratio (DLR), non-performing loans to total loans ratio (NPL), liquidity ratio (LR), return on assets (ROA), return on equity (ROE).

Table 0-13: Granger causality tests on price stability and financial stability

Null hypothesis	Model	Obs.	F-Statistic	Prob.	Decision
CAR does not Granger cause inflation	VECM	457	2.03	0.1324	Fail to reject
Inflation does not Granger cause CAR			2.40	0.0918	Fail to reject
DLR does not Granger cause inflation	VECM	474	0.87	0.4212	Fail to reject
Inflation does not Granger cause DLR			0.33	0.7185	Fail to reject
NPLTL does not Granger cause inflation	VAR	492	1.75	0.1747	Fail to reject
Inflation does not Granger cause NPL			9.25	0.0001	Reject
LR does not Granger cause inflation	VAR	477	0.57	0.5651	Fail to reject
Inflation does not Granger cause LR			0.69	0.5004	Fail to reject
ROA does not Granger cause inflation	VECM	472	14.27	0.0001	Reject
Inflation does not Granger cause ROA			1.90	0.1503	Fail to reject
ROE does not Granger cause inflation	VECM	464	13.12	0.0000	Reject
Inflation does not Ganger cause ROE			1.55	0.2129	Fail to reject

Source: Author's computations

4.5.1. Inflation and Capital Adequacy Ratio

The Granger causality test was performed to test whether there was a causality between inflation and the capital adequacy ratio. The results showed that we cannot reject the null hypothesis that capital adequacy does not Granger cause inflation $[F = 2.03;\ p > 0.05]$. There is less likelihood of past capital adequacy to cause future inflation. Similarly, we cannot reject the null hypothesis that inflation does not Granger cause capital adequacy $[F = 2.40;\ p > 0.05]$. There is less likelihood of past inflation to cause future capital adequacy. The results suggested that, based on the data available, there was no causality between inflation and capital adequacy and hence a failure to ascertain a significant line of causality between the two variables. The result differed from Ogere et al. (2013) and Williams (2011).

4.5.2. Inflation and Deposits to Loans Ratio

The Granger causality test was performed to test whether there was a causality between inflation and the loans to deposits ratio. The results showed that we cannot reject the null hypothesis that loans to deposits ratio does not Granger cause inflation $[F = 0.87;\ p > 0.05]$. There is less likelihood of past loans to deposits ratio to cause future inflation. Similarly, we cannot reject the null hypothesis that inflation does not Granger cause loans to deposits ratio $[F = 0.33;\ p > 0.05]$. There is less likelihood of past inflation to cause future loans to deposits ratio. The results suggested that based on the data available, there was no causality between inflation and loans to deposits ratio as we failed to ascertain a significant line of causality between the two variables. The result was consistent with the fixed effect regression results which showed the deposits to loans ratio as statistically insignificant albeit with a positive coefficient which was consistent with Nwite (2014). The lack of causality, however, was contrary to Odhiambo (2011) who noted a bi-directional causality.

4.5.3. Inflation and Non-performing Loans to Total Loans Ratio

The Granger causality test was performed to test whether there was a causality between inflation and the non-performing loans to total loans ratio. The results showed that we cannot reject the null hypothesis that the non-performing loans to total loans ratio does not Granger cause inflation $[F = 1.75;\ p > 0.05]$. There is less likelihood of past non-performing loans to total loans ratio to cause future inflation. However, we rejected the null hypothesis that inflation does not Granger cause non-performing loans to total loans ratio $[F = 9.25;\ p < 0.05]$. There is a high likelihood of past inflation to cause future non-performing loans to total loans ratio.

The results suggested that, based on the data available, there was a unidirectional causality between inflation and non-performing loans to total loans ratio. Past inflation has a high probability of causing future non-performing loans to total loans ratio. This result was in line with Kurumi and Bushpepa (2017).

To this end, it has been established that price stability (inflation) has a bearing on the level of non-performing loans, though non-performing loans may not influence price stability. To manage the occurrence of non-performing loans which threaten financial stability, there is a need for managing the level of inflation in a country. Inflation erodes incomes and reduces the people's spending power making it more difficult for them to service their loans, resulting in a high rate of defaults.

4.5.4. Inflation and Liquidity Ratio

The Granger causality test was performed to test whether there was a causality between inflation and the liquidity ratio. The results showed that we cannot reject the null hypothesis that liquidity ratio does not Granger cause inflation $[F = 0.57;\ p > 0.05]$. There is less likelihood of past liquidity ratio to cause future inflation. Similarly, we could not reject the null hypothesis that inflation does not Granger cause liquidity ratio $[F = 0.69;\ p > 0.05]$. There is less likelihood of past inflation to cause future liquidity ratio. The results suggested that based on the data available there was no causality between inflation and liquidity ratio as we failed to ascertain a significant line of causality between the two variables. The results differed from Ahmad (2017) and Singh and Sharma (2016).

4.5.5. Inflation and Return on Assets

The Granger causality test was performed to test whether there was a causality between inflation and the return on assets ratio. The results showed that we rejected the null hypothesis that the return on assets ratio does not Granger cause inflation $[F = 14.27;\ p < 0.05]$. There is a high likelihood of the past return on assets ratio to cause future inflation. However, we cannot reject the null hypothesis that inflation does not Granger cause a return on assets ratio $[F = 1.90;\ p > 0.05]$. There is less likelihood of past inflation to cause future return on assets ratio.

The results suggested that based on the data available, there was a unidirectional causality between inflation and return on assets. Past return on assets has a high probability of causing future inflation. The study has established that return on assets has a bearing on the level of price stability (inflation), though inflation may not influence return on assets. To manage price stability there might be a need to maintain return on assets within reasonably acceptable margins. As investments yield more returns, the spending power of individuals is increased, resulting in their demand for more products. By so doing, businesses are compelled to increase the prices of their goods culminating in a rise in inflation rates due to a general increase in product prices. Although the fixed effects regression results showed a statistical insignificance of the coefficient, the results were consistent with Aghaeea and Kazempour (2013) and Guru et al. (2002).

4.5.6. Inflation and Return on Equity

The Granger causality test was performed to test whether there was a causality between inflation and the return on equity ratio. The results showed that we rejected the null hypothesis that return on equity does not Granger cause inflation $[F = 13.12;\ p < 0.05]$. There is a high likelihood of past return on equity ratio to cause future inflation. However, we did not reject the null hypothesis that inflation does not Granger cause a return on equity ratio $[F = 1.55;\ p > 0.05]$. There is less likelihood of past inflation to cause future return on equity ratio. The results suggested that based on the data available, there was a unidirectional causality between inflation and return on equity. Past return on equity has a high probability of causing future inflation. The results were consistent with Aghaeea and Kazempour (2013) and Guru et al. (2002) which was confirmed by the fixed effects regression results which showed a statistical significance of the coefficient. The study has established that return on equity has a bearing on the level of price stability (inflation), though inflation may not influence return on equity. Efforts to manage price stability may require maintenance of return on equity within reasonable margins to avoid an adverse impact on the inflation rate which threatens price stability. As with return on assets, the potential of investments to yield more returns increases the spending

power of income earners which escalates the demand for products. As demand exceeds supply, prices of products may in turn increase thereby leading to a general increase in prices across the board, thus altering price stability in the region.

4.6. IMPLICATIONS OF FINANCIAL STABILITY AND PRICE STABILITY ON SADC ECONOMIC INTEGRATION

4.6.1. Influence of Financial Instability on SADC Monetary Policy

The findings imply that monetary policy objectives of maximum employment and stable prices for the SADC region may be significantly impacted by financial instability. For instance, financial stability can have an impact on monetary goals of policymakers by producing high unemployment and deflationary forces that may be challenging to counteract. The latter is especially important in a setting when equilibrium interest rates are low. The nominal rate of interest that we would anticipate the economy to function at in equilibrium is currently estimated to be in the range of 2.5 per cent, which is less than half its level in the late 1980s (Ryan-Collins, Werner & Castle, 2016). This is due to the prolonged slowdown in economic growth and shifting demographics.

Monetarists had no control over the structural changes that led to this drop in equilibrium interest rates (Caraballo, 2018). Although these structural changes may limit the SADC's ability to respond to negative shocks by cutting the lending rates below this equilibrium level, they are important for the conduct of monetary policy. A modified Taylor rule suggests that if it were not for the fact that interest rates could not be reduced significantly below zero (the "effective lower bound"), it would have been appropriate to reduce interest rates (Mupunga, Ngundu & Makena, 2019).

4.6.2. Effect of Monetary Policy on Financial Stability

The links between monetary policy and financial stability are important because they are bi-directional: while financial instability can affect how well monetary policy "cleans up" after a

credit boom, lax monetary policy can also help a credit boom develop. This has caused a significant body of scholarship to examine the advantages of maintaining monetary policy that is tighter than is necessary given the macro-economic environment at the moment in order to “lean against the wind”.

Financial stability may be impacted by discretionary monetary policy choices in a variety of ways. The fact that studies in the SADC community are undecided on how monetary policy and financial stability issues may interplay makes this task more challenging. Following the global financial crises, developed countries took unprecedented steps to support a sluggish but steady economic recovery and to avert their economies from suffering much more harm.

Short-term interest rates were lowered to their effective lower bound as part of these measures, along with extensive liquidity support, forward guidance, and large-scale asset purchase programmes (also known as "quantitative easing") which helped stimulate the economy and thaw frozen asset markets. The decrease in equilibrium interest rates that we have seen over the past few decades makes it difficult to use traditional policy tools and may lead to the regular use of measures like quantitative easing by monetary officials. It is, thus, evident that the increased use of unconventional monetary policy tools could exacerbate the vulnerabilities of the SADC economy if not complemented by suitable macro-prudential measures.

Thus, the financial stability committee in SADC may be interested in running a monetary policy stance that is appropriate in light of current macro-economic conditions without worrying about contributing to a credit boom. Consequently, the SADC community may need to ensure that any financial stability risks are being addressed effectively for managing credit, liquidity and capital.

4.6.3. SADC community and Macro-economic Policy Convergence

There are compelling arguments in favour of a macro-economic policy convergence within a shared currency region. For instance, the European Union recognised these arguments when

implementing the Euro. However, it does not seem necessary that the creation of a free trade area be subject to the same restrictions. In line with the Endogenous OCA theory, this idea is supported once more by the experience of the European Union, which was established and shown to be viable even in the absence of convergence in macro-economic policy and, in fact, while some fairly weak currencies coexisted with very strong ones.

Different inflation rates, fluctuating nominal exchange rates, and budget deficit levels can exist among nations in a free trade area. However, if nation A has a higher rate of inflation than country B, nation A must permit its currency to decline in value relative to currency B; otherwise, a fluctuating bilateral real exchange rate between the two currencies will imbalance trade.

4.7. CHAPTER SUMMARY

This chapter reported and analysed the study's findings. Using a fixed effects regression model, the impact of financial stability indicator changes on price stability in the SADC region was investigated. Price stability was represented by the dependent variable inflation, while financial stability was represented by six independent variables: capital adequacy ratio, deposits to loans ratio, non-performing loans to total loans ratio, liquidity ratio, return on assets, and return on equity. In addition, Granger causality tests were undertaken to determine whether an association existed between inflation and each of the financial stability variables.

An R-squared value of 0.5234 means that 52.34 per cent of variations in price stability, as measured by inflation, can be explained by changes in the specified financial stability indicators. Similarly, the study indicated that the liquidity ratio had a significant negative relationship with inflation, whereas the return on equity had a significant positive relationship with inflation. Based on the model's probability values surpassing 0.05, the remaining financial stability indicators were declared insignificant.

In terms of the causative relationship between price stability and financial stability indicators, the study indicated that only three of the six financial stability indicators were causally

associated to price stability. This includes the ratio of non-performing loans to total loans, return on assets, and return on equity. In addition, the direction of causality for each of the three variables was unidirectional, with past inflation having a high likelihood of causing future non-performing loans and past return on assets and return on equity having a high probability of causing inflation.

The outcomes of this study have significant policy implications not just for the central banks of SADC member states, but also for the macro-economic convergence plan of the Regional Bloc. The following recommendations are based on these policy repercussions.

CHAPTER FIVE: CONCLUSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER STUDY

5.1. INTRODUCTION

This chapter presents the conclusions and recommendations of the study, along with recommendations for further research. The overarching purpose of this study was to analyse the relationship between price stability and financial stability to discover whether, and how, monetary policy in the SADC region should be conscious of financial stability concerns in addition to its usual objective of promoting price stability.

5.2. CONCLUSIONS AND RECOMMENDATIONS

Given the significance of the relationship between price and financial stability, as indicated by the R-squared value of 52.34 per cent, it is recommended that the SADC region's macro-economic convergence efforts include a regional approach in the pursuit of financial stability with the same clarity as price stability. As evidenced by the stated inflation targets (3 to 7 per cent) that central banks of member states should pursue, price stability is a key element of the SADC's macro-economic convergence objective. Accordingly, the plan is to develop a dashboard of financial stability indicators that will serve as the basis for the SADC central banks' adoption of standardised financial stability evaluation standards. This will ensure that monetary policy in the SADC region not only pursues price stability through inflation targeting, but also focuses on financial stability issues which would be evaluated at country and regional levels using unified criteria and clearly specified indicators of financial stability.

Some nations may not have included financial stability as an official central bank objective in their statutes due to considerations such as definitional difficulties with the term. Given the interdependencies between price stability and financial stability, it is recommended that a coordinated approach be adopted at a country level in which the monetary policy of a central

bank considers not only inflation risks, but also risks to the stability of the financial system. In addition, markets, infrastructure, inflation risks must also be considered for financial stability.

The observation regarding the significance of the liquidity ratio in explaining fluctuations in inflation highlights the need for policymakers to pay close attention to this indicator as an indispensable policy instrument. In the same way that interest rates are an important monetary policy instrument, the liquidity ratio should be viewed as an essential macro-prudential/financial stability policy instrument when central banks execute a coordinated approach to price and financial stability policymaking.

The report so further urges a clear separation of monetary policy and macro-prudential measures focused on price stability and financial stability correspondingly. Given the mutually reinforcing character of the two central bank objectives, however, this should take place within a coordinated policy framework. Given the foregoing and the policy considerations of central banks of SADC member states, institutional arrangements should examine separating policymaking frameworks for price stability and financial stability. Consequently, the role of the Monetary Policy Committee in formulating policy aimed at achieving and maintaining price stability should be distinct from the role of a committee aimed at achieving and maintaining financial stability, known as the Financial Policy Committee in some central banks such as the Bank of England. Given the requirement to ensure effective policy coordination, the areas of reference for the two distinct policy committees would be well defined and complimentary. In forming both committees, it was proposed that their membership overlap and that the governor of the central bank chairs both to insure a united focal point.

5.3. SUGGESTIONS FOR FURTHER STUDY

Following the observation of a 6.41 constant from the Fixed Effects Regression Model, which implied that price stability has a certain value if all other factors included in the model have a value of zero, it is suggested that additional research be conducted to include more financial stability indicators as explanatory variables as well as other variables reflecting conditions in

the macro-economy in order to better comprehend changes in price stability. This is the case because the presence of a constant indicates that the selected independent variables do not fully explain changes in the dependent variable.

In addition to banking institutions, which this study focused on, the conventional financial system also includes non-banking financial enterprises that, in some countries, are not subject to central bank supervision. It is recommended that additional research be conducted to include non-banking financial institutions such as pension funds and insurance companies, which are a crucial component of contractual savings that facilitate medium- to long-term investments and may have substantial implications for price stability and financial stability practice. Incorporating other non-banking financial institutions will also facilitate a more accurate comparison with the central banks of other advanced economies, where the central bank is responsible for insurance regulation and supervision among other forms of financial regulation and supervision.

Furthermore, is it suggested that a follow-up study that incorporates public debt in the price and financial stability praxis be carried out. In talks concerning the relationship between financial stability and price stability in an integrated market, public debt seems to be an additional crucial factor. According to the Reserve Bank of Malawi (2013), Africa's central banks are plagued by a variety of institutional issues including a governmental debt problem which in some cases is noted as having compromised central bank independence and contributed to high inflation as central banks finance public deficits. In debates on a monetary union, as advocated by the SADC area, it is consequently impossible to overlook government borrowing. To emphasise the significance of public debt, the Bank of Zambia (2011) identifies a public debt-to-GDP ratio of less than 60 per cent as a main indicator of macro-economic convergence in the SADC macro-economic convergence criteria. Future study recognising public debt as a factor affecting price stability would add value to conversations on the relationship between price stability and financial stability in the SADC area.

REFERENCES

Adedamola, SL. (2015). An empirical analysis of price stability effect of Nigerian monetary policy (1981-2012). *Public and Municipal Finance*, 4(1), 37-42.

Aghaee, M. & Kazempour, M. (2013). A study on the relationship between inflation rate and changes in profitability ratios in Tehran Stock Exchange. *Management Science Letters*, 3, 2787-2794. Available at https://www.researchgate.net/publication/271068391_A_study_on_relationship_between_inflation_rate_and_changes_in_profitability_ratios_in_Tehran_Stock_Exchange. [Accessed on 15 March 2022].

Ahmad, F. (2017). Determinants of bank liquidity: Empirical evidence from listed commercial banks with SBP. *Journal of Economics and Sustainable Development*, 8(1), 47–55.

Ajie, HA. & Nenbe, SG. (2010). An econometric analysis of monetary policy and stock prices in Nigeria: 1986-2008. *International Journal of Economic Development Research and Investment, Vol 1(1)*191, 175-192.

Albulescu, CT. (2013). Financial stability and monetary policy: A reduced-form model for the EURO area. *Journal for Economic Forecasting,* 16(1), 62–81.

Alexander, C., Han, Y. & Meng, X. (2022). Static and dynamic models for multivariate distribution forecasts: Proper scoring rule tests of factor-quantile versus multivariate GARCH models, *International Journal of Forecasting* (2022)

Allen, F. & Santomero, AM. (2001). What do financial intermediaries do? *Journal of Banking & Finance*, 25(2), 271-294

Angelini, P., Neri, S. & Panetta, F. (2011). Monetary and macroprudential policies. Banca d'Italia Discussion Paper, No. 801.

Anjom, W., Karim, AM. (2015). Relationship between non-performing loans and macroeconomic factors: A case study on loan portfolios – SAARC countries perspective. *Asia Pacific Journals of Finance and Risk Management*. 15(3), 84-103.

Assfaw, A. (2019). Firm-specific and macroeconomic determinants of banks liquidity: empirical investigation from Ethiopian private commercial banks. *Journal of Accounting Finance and Auditing Studies (JAFAS) 5(2)*,

Avgouleas, E. & Arner, DW. (2017). The Eurozone debt crisis and the European Banking Union: 'Hard choices,' 'intolerable dilemmas,' and the question of sovereignty. *The International Lawyer*, 50(1), 29–68.

Baltagi, BH. (2013). *Econometric Analysis of Panel Data.* England: John Wiley & Sons.

Bank for International Settlements (2009). Issues in the governance of central banks. A report from the Central Bank Governance Group. Available at: www.bis.org/publ/othp04.htm [Accessed on 18 July 2017].

Bank of Zambia (2011). Re-examination of the SADC macroeconomic convergence criteria. SADC, CCBG Working Paper. Available at: https://www.sadcbankers.org/Lists/News%20and%20Publications/Attachments/148/Re-exam%20of%20MECcriteria%20BoZ.pdf [Accessed on 18 July 2017].

Barnichon, R. & Peiris, SJ. (2008). Sources of inflation in sub-Saharan Africa. *Journal of African Economies* 17(5),729-46.

Baumol, WJ. (1986). Productivity growth, convergence, and welfare: What the long-run data shows. *The American Economic Review,* 76(5), 1072–1085.

Becsi, Z. (1994). Indicators of the general price level and inflation. *Federal Reserve Bank of Dallas Economic Review, issue Q IV,* 27-39.

Bell, J. & Pain, D. (2000). Leading indicators of banking crises – a critical review. *Bank of England Financial Stability Review*, 9(3), 113-129

Bell, S., & Quiggin, J. (2006). Asset price instability and policy responses: the legacy of liberalization. *Journal of Economic Issues*, 40(3), 629–649.

Ben, NS. & Goaied, M. (2008). The determinants of commercial bank interest margin and profitability: Evidence from Tunisia. *Frontiers in Finance and Economics*, 5(1), 106-130.

Berg, SA. (2012). The Declining Deposit to Loan Ratio – What Can the Banks Do? Central Bank of Norway, Staff Memo Nr.28.

Berger, AN. (1995). The relationship between capital and earnings in banking. *Journal of Money, Credit, and Banking*, 27(2), 432-456.

Bernanke, B. (2011). The effects of the great recession on central bank doctrine and practice. Speech at the Federal Reserve of Boston 56th Economic Conference, Massachusetts, United States of America.

Blinder, AS. (2018). Through a crystal ball darkly: The future of monetary policy communication. *AEA Papers and Proceedings*, 108(May), 567-71.

Blot, C., Creela, J., Huberta, P., Labondancea, F. & Saracenoa, F. (2015) Assessing the link between price and financial stability, *Journal of Financial Stability,* 16(C), 71–88.

Bordo, MD., Dueker, MJ., Wheelock, DC. (2000). Aggregate price shocks and financial instability: A historical analysis. Federal Reserve Bank of St. Louis Working Paper 2000-005. Available at: https://doi.org/10.20955/wp.2000.005 [Accessed on 21 June 2018].

Bordo, MD. &. Wheelock, DC. (1998). Price stability and financial stability: The historical record. *Review, Federal Reserve Bank of St. Louis*, issue September, 41-62. Available at https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.199.3142&rep=rep1&type=pdf [Accessed on 9 August 2017].

Borio, C. (2009). Implementing the Macroprudential Approach to Financial Regulation and Supervision. Banque de France Financial Stability Review, Issue 13, 31-34.

Borio, C. & Lowe, P. (2002). Asset prices, financial and monetary stability: Exploring the nexus BIS Working papers, July. Available at https://www.bis.org/publ/work114.htm. [Accessed on 18 July 2017].

c, JH., & Champ, B (2006). Inflation, banking and economic growth. *Federal Reserve Bank of Cleveland*. Available at: https://www.clevelandfed.org/en/newsroom-and-events/publications/economic-commentary/economic-commentary-archives/2006-economic-commentaries/ec-20060515-inflation-banking-and-economic-growth.aspx [Accessed on 23 February 2021].

Brooks, C. (2019). *Introductory Econometrics for Finance*. Cambridge University Press, UK.

Bryan, MF. & Pike, C. (1991). Median price changes: An alternative approach to measuring current monetary inflation. *Federal Reserve Bank of Cleveland Economic Commentary*, December 1.

Caraballo, J. (2018). Does the monetarist theory of inflation fit the data? Time to replace a 'paradigm'. *American Review of Political Economy*, 12(1). doi: https://doi.org/10.38024/arpe.149.

Castelnuovo, E., Nicoletti-Altimari, S. & Rodriguez-Palenzuela, D. (2003). Definition of price stability, range and point inflation targets: The anchoring of long-term inflation expectations. ECB Working Paper No 273, September 2003. *African Journal of Business Management, 6*, 87-96.

Central Bank of The Republic of Turkey (2008). *Financial Stability Report*. Ankara: Central Bank of the Republic of Turkey.

Chikoko, L., & Pierre, LR. (2013). The impact of minimum capital requirements on Zimbabwe Commercial Banks lending. *International Journal of Finance and Accounting*, 2, 131-137.

Chirozva, G. (2009). Frameworks for Financial Stability Assessment and Monitoring Compliance with the Basel Core Principles for Effective Banking Supervision, Research Paper for COMESA Financial System Development and Stability Sub-committee. April, Harare, Zimbabwe.

Chitiyo, K., Dengu, C., Mbae, D. & Vandome, C. (2019). *Forging Inclusive Economic Growth in Zimbabwe.* Insights from the Zimbabwe Futures 2030 roundtable series. Chatham House.

Chmelarova, V. & Hill, RC. (2010). The Hausman pretest estimator. *Economics Letters*, 108(1), 96-99.

Čihák, M. & Heiko, H. (2010). Islamic banks and financial stability: An empirical analysis. *Journal of Financial Services Research,* 38 (2-3), 95–113.

Crockett, AD. (1997). *W*hy is financial stability a goal of public policy? *Economic Review, Federal Reserve Bank of Kansas City*, 82(Q IV), 5-22.

Dapena, AD., Rubiera-Morollon, F. & Paredes, D. (2019). New approach to economic convergence in the EU: a multilevel analysis from the spatial effects perspective*. International Regional Science Review,* 42(3-4), 335-367.

DeLong, JB., 1988. Productivity growth, convergence, and welfare: Comment,", *American Economic Association*, 78(5), 1138-1154.

De Paoli, B. & Paustian, M. (2017). coordinating monetary and macroprudential policies. *Journal of Money, Credit and Banking*, 49(2-3), 319-349.

Demirgüç-Kunt, A., Enrica, D. & Thierry, T. (2008). Banking on the principles: Compliance with Basel Core Principles and Bank Soundness. *Journal of Financial Intermediation*, 17(4), 511–542.

Dhal, S. (2011). Financial Stability, Economic Growth, Inflation and Monetary Policy Linkages in India: An Empirical Reflection. Reserve Bank of India Occasional Papers, 32(3), 1-35

Di Leo, G. & Sardanelli, F. (2020). Statistical significance: p value, 0.05 threshold, and applications to radiomics—reasons for a conservative approach. *Eur Radiol Exp* 4, 18.

Drehmann, M. & Juselius, M. (2012). Do debt service costs affect macroeconomic and financial stability? *BIS Quarterly Review*, September, 21-34.

Durham, B. (2003). Foreign Portfolio Investment, Foreign Bank Lending, and Economic Growth. Board of Governors of the Federal Reserve System, International Finance Discussion Papers, Number 757, February 2003, Washington DC, United States of America.

Edem, DB. (2017). Liquidity management and performance of deposit money banks in Nigeria (1986 – 2011): An investigation. *International Journal of Economics, Finance and Management Sciences*, 5(3), 146–161.

Egbuna, NE., Jarju I., Bawa, S., Diallo, I., Odeniran, O.S., Mendy, I., & Nyarko, E. (2019). Optimum currency area index for the economic community of West African states (ECOWAS). WAMI Occasional Paper Series, No. 16, West African Monetary Institute (WAMI), Accra

Eichengreen, B., Eswar P. & Raghuram R. (2011). Central banks need a bigger and bolder mandate. Opinion, Brookings Institution, October. Available at: https://www.brookings.edu/opinions/central-banks-need-a-bigger-and-bolder-mandate/. [Accessed on 20 July 2017]

Eisenschmidt, J. & Smets, F. (2019). “Negative interest rates: Lessons from the euro area”, in Aguirre, Á., Brunnermeier, M. & Saravia, D. (eds.), *Monetary Policy and Financial Stability: Transmission Mechanisms and Policy Implications*, Vol. 26, Central Bank of Chile, 13-42.

Elegbe, A. (2013). Bank failure and economic development in Nigeria: An empirical approach *British Journal of Economics, Finance and Management Sciences* 8 (1), 46-63.

Gadanecz, B. & Jayaram, K. (2016). Measures of financial stability – *a review.* Monetary and Economic Department, Bank for International Settlements, Volume 31, 365-380. Available at: https://www.bis.org/ifc/publ/ifcb31ab.pdf [Accessed on 20 April 2023]

Galati, G. & Moessner, R. (2011). *Macroprudential Policy – A Literature Review*. BIS Working papers No. 337, February. Available at https://www.bis.org/publ/work337.pdf [Accessed on 17 May 2019].

Gali, J. (2011). Monetary policy and rational asset price bubbles. *American Economic Review*, 104(3), 721-752. Available at https://www.aeaweb.org/articles?id=10.1257/aer.104.3.721 [Accessed on 21 June 2018].

Gerlach, S., Alberto G., Cédric T. & José V. (2009). Are the golden years of central banking over? The crisis and the challenges. Geneva Reports on the World Economy 10. CEPR Press, London. Available at https://cepr.org/chapters/introduction-are-golden-years-central-banking-over-crisis-and-challenges [Accessed on 10 March 2021].

Gersbach, H. & Volker, H. (2009). Inflation targeting and bank equity rules: Parallels and lessons. CEPR Available at https://cepr.org/voxeu/columns/inflation-targeting-and-bank-equity-rules-parallels-and-lessons [Accessed on 15 March 2020].

Gersl, A. & Hermanek, J. (2008). Indicators of financial system stability: Towards an aggregate financial stability indicator. *Prague Economic Papers*, 17(2), 127–142.

Ginevičius, R. & Podviezko, A. (2013). The evaluation of financial stability and soundness of Lithuanian banks. *Ekonomska istraživanja*, 26(2), 191–208.

Goodhart, C. & Lastra, R. (2018). Populism and central bank independence. *Open Econ Rev* 29, 49–68.

Granger, CWJ. (1969). Investigating causal relations by econometric models and cross-spectral methods, *Econometrica,* 37(3), 424-438.

Granger, CWJ. (1988). Some recent development in a concept of causality. *Journal of Econometrics*, 39, 199-211.

Granger, CWJ. (2004). Causality: Some new thoughts on an old topic. Econometric Society 2004 Australasian Meetings 351, *Econometric Society*. Available at https://ideas.repec.org/p/ecm/ausm04/351.html [Accessed on 20 October 2021].

Greenspan, A. (1994). Opening remarks, Proceedings - Economic Policy Symposium - Jackson Hole, Federal Reserve Bank of Kansas City, Available at https://www.kansascityfed.org/Jackson%20Hole/documents/7648/1994-S94-full-publication.pdf [Accessed on 12 March 2021].

Greenspan, A. (2002). International financial risk management. Remarks by Chairman Alan Greenspan, Before the Council on Foreign Relations, Washington, D.C. Available at https://www.federalreserve.gov/boarddocs/speeches/2002/20021119/default.htm [Accessed on 18 April 2023].

Gujarati, DN. (2004). *Basic Econometrics*. 4th Edition, New York: McGraw-Hill.

Guru B., Staunton, J. & Balashanmugam, B. (2002). Determinants of commercial bank profitability in Malaysia. Paper presented at the 12th Annual Australian Finance and Banking Conference, 16-17 December, Sydney, Australia.

Harrigan, J., Aryeetey, EN. & Harrigan, M. (2000). *Economic Reforms in Ghana: The Reality and the Mirage*. James Currey, London, Accra.

Hartmann, P. & Smets, F. (2018). The European central bank's monetary policy during its first 20 years. Working paper series 2219, European Central Bank Available at https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2219.en.pdf [Accessed on 14 April 2023].

Harvey, C. (1999). Macroeconomic policy convergence and a SADC Free Trade Area Paper. BIDPA working paper 21, Gaborone: BIDPA.

Heintz, J. & Ndikumana, L. (2010). Is there a case for formal inflation targeting in Sub-Saharan Africa? Working paper series, Number 218, African Economic Research Consortium (AERC), Nairobi, Kenya.

Hollander, H. & Lill, D. (2019). A review of the South African Reserve Bank's financial stability policies. Working Papers 11/2019, Stellenbosch University, Department of Economics.

Horner, R. & Hulme, D. (2019). Global Development, converging divergence and development studies: A rejoinder. *International Institute of Social Studies*, 50(2), 495-510.

International Monetary Fund. (2006). *Financial Soundness Indicators: Compilation Guide*. Washington, D.C.: International Monetary Fund, United States of America.

Irrcher, T. (2018). Enriching disclosures: The bank financial strength dashboard. Ninth IFC Conference on "Are post-crisis statistical initiatives completed?" 30-31 August 2018, Basel, Switzerland.

Issing, O. (2003). Monetary and financial stability: Is there a trade-off? European Central Bank. Available at https://www.ecb.europa.eu/press/key/date/2003/html/sp030329.en.html#:~:text=According%20to%20the%20conventional%20view,between%20monetary%20and%20financial%20stability. [Accessed on 25 October 2015].

Jakubík, P. & Slacík, T. (2013). Measuring financial (in)stability in emerging Europe: A new index-based approach. *Financial Stability Report,* Oesterreichische National Bank (Austrian Central Bank), 25, 102-117.

Johnson, P. & Papageorgiou, C. (2018). *What Remains of Cross-Country Convergence?* Vassar College, International Monetary Fund.

Kabamba, AM. & Mabi, EM. (2022). Financial development and economic growth in the Southern African Development Community (SADC): The role of institutional quality*. Journal of Financial Risk Management,* 11, 296-310.

Kabukçuoğlu, A., Martínez-García, E. & Soytaş, A. (2017). Exploring the nexus between inflation and globalization under inflation targeting through the lens of New Zealand's experience. Koç University-TUSIAD Economic Research Forum Working Papers (No. 1709).

Kar, M. & Pentecost, J. (2000). Financial development and economic growth in Turkey: Further evidence on the causality issue. Department of Economics, Loughborough University, Loughborough

Kent, C. & Lowe, P. (1997). *Asset-Price Bubbles and Monetary Policy*. Economic Research Department, Reserve Bank of Australia, Research Discussion Paper 9709.

Khataybeh, M. & Al-Tarawneh, A. (2016). Impact of monetary policy on financial stability evidence from Jordan. *Administrative Sciences Journal*, 43(1), 301-312 Available at: https://journals.ju.edu.jo/DirasatAdm/article/view/8298/5156 [Accessed on 20 September 2021].

Kohn, DL. (2008). Panel remarks. in *Asset Prices and Monetary Policy*, National Bureau of Economic Research, 397-405. Available at: https://ideas.repec.org/h/nbr/nberch/5377.html [Accessed on 11 August 2018].

Kristína, K. (2014). *Banking Stability Index: A Cross-Country Study*. Technical University of Košice. 5th INTERNATIONAL CONFERENCE ON FINANCE AND BANKINGAt: Praha, Czech Republic Available at https://www.researchgate.net/publication/293823055_Banking_Stability_Index_A_Cross-Country_Study [Accessed on 23 April 2023]

Kurumi, L., Bushpepa, O. (2017). Do macroeconomic variables affect the level of nonperforming loans? Sixth Conference of Students of the Agricultural University of Tirana. Tirana.

Laeven, L. & Levine, R. (2009). Bank governance, regulation, and risk-taking. *Journal of Financial Economics*, 93(2), 259–275.

Laurine, C. (2013). Zimbabwean commercial banks liquidity risk determinants after dollarisation. *Journal of Applied Finance & Banking*, 3(6), 97–114.

Laznia, M. (2013). Where can we find the most stable banks? *Slovenská banková asociácia*. Retrieved from: http://www.sbaonline.sk/sk/presscentrum/aktuality/tema-kde-najdeme-najstabilnejsie-banky.html (13.01.2022).

Loening, J. & Durevall, D. & Birru, Y. (2009). Inflation dynamics and food prices in an agricultural economy: The case of Ethiopia. *World Bank*. Available at: https://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-4969 [Accessed on 23 July 2019].

MacFarlane, IJ. (1999). The Stability of the Financial System. Reserve Bank of Australia Bulletin.

Malik, MF. (2013). Commercial banks liquidity in Pakistan: Firm-specific and macroeconomic factors. *The Romanian Economic Journal,* 16 (48), 139–154.

Maredza, A. & Ikhide, S. (2013). Measuring the impact of the global financial crisis on efficiency and productivity of the banking system in South Africa. *Mediterranean Journal of Social Sciences*, 4 (6), 553–568.

Masson, P. & Pattillo, C. (2004). A single currency for Africa? Washington DC. IMF External publications, Finance and Development Quarterly Publication, 41(004), 9-15

Maudos, J. (2012). Financial soundness indicators for the Spanish banking sector: An international comparison. *SEFO-Spanish Economic and Financial Outlook*, 1(4), 24–32.

Mira, A. (2015). The Optimum Currency Area Theory: An Analysis of the Pacific Alliance. HIM 1990-2015. 1792.Available at https://stars.library.ucf.edu/honorstheses1990-2015/1792 [Accessed on 20 April 2023]

Mishkin, F. (1991). Asymmetric information and financial crises: A historical perspective, in RG. Hubbard, ed., *Financial Markets and Financial Crises*. Chicago: University of Chicago Press, 69-108.

Mohanty, D. (2011). Lessons for monetary policy from global financial crisis: An emerging market perspective. Paper Presented in the Central Banks Conference of the Bank of Israel, Jerusalem, RBI Bulletin, April.

Mohanty, D. (2012). Price stability and financial stability – An emerging market perspective. Paper Presented in the in the Central Bank of Nigeria Board Retreat, Cape Town, South Africa.

Munguía, R., Davalos, J. & Urzua, S. (2019). Estimation of the Solow-Cobb-Douglas economic growth model with a Kalman filter: An observability-based approach. *Heliyon,* 5(6),1-8

Mupunga, N., Ngundu, T. & Makena, P. (2019). External debt dynamics and implications for monetary policy in the SADC region. Paper Prepared for the SADC Committee of Central Bank Governors (CCBG). RBZ Working Paper Series Number 1/ 2019.

Naceur, B. Katherin, M. & Roulet, C. (2018). Basel III and bank-lending: Evidence from the United States and Europe. *Journal of Financial Stability*, 39(C.),1-27.

Nkusu, M. (2011). *Nonperforming loans and macro financial vulnerabilities in advanced economies*. IMF Working Papers, 161, Washington DC, International Monetary Fund.

Nwite, SC. (2014). Determinants of financial intermediation and its implications on economic growth in Nigeria. *British Journal of Marketing Studies,* 3(9), 49-56.

Odhiambo, M. (2011). Financial intermediaries versus financial markets: A South African experience. *International Business and Economic Research Journal*, 10(2), 77-84.

Ogere, GA., Peter, Z. & Inyang, EE. (2013). Capital adequacy ratio and banking risks in the Nigeria money deposit banks. *Research Journal of Finance and Accounting*, 4(17), 17-25.

Pamfili, A. & Bignon, V. (2018). Whither economic history? Between narratives and quantification*. Revue de l'OFCE,* (3), 17–36.

Pastory, D. & Mutaju, D. (2013). The influence of capital adequacy on asset quality position of banks in Tanzania. *International Journal of Economics and Finance*, 5(2), 179-194.

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61, 653-670. https://doi.org/10.1111/1468-0084.61.s1.14.

Pedroni, P. (2004). Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory*, 20, 597-625. https://doi.org/10.1017/S0266466604203073.

Petrovska, M., Mihajlovska, EM. (2013). Measures of financial stability in Macedonia. *Journal of Central Banking Theory and Practice*, 2(3), 85–110.

Pianalto, S. (2011). Price stability: Why we seek it and how best to achieve it. Federal Reserve Bank of Cleveland, Annual Report 2010.

Raham, A., Mahabi, R., & Majid M. (2016). Price stability and financial stability in Trinidad and Tobago: Is there a relationship? What is the direction of this relationship? Working Paper Series WP03/2016, Central Bank of Trinidad and Tobago.

Ramanayake, RA. & Kasun, D. (2019). Critical introduction of Solow Growth theory. *Journal of Humanities and Social Sciences, 7(1), 43-56*

Redda, EH. (2021). Convergence criteria-guided regional economic integration in SADC and EAC: Lessons from Europe's experience. *Journal of African Union Studies*, *10*(3), 39–65.

Reserve Bank of Malawi (2013). Single central bank: Macroeconomic costs and benefits for the monetary union. SADC, CCBG Working Paper.

Roger, HV. (2021). Essays on currency unions and the international monetary system from a historical perspective. The London School of Economics and Political Science. Available at http://etheses.lse.ac.uk/4362/ [Accessed on 20 April 2023]

Rother, PC. (1999). Explaining the behavior of financial intermediation: Evidence from transition economies. IMF Working Paper WP/99/36 (Washington: International Monetary Fund).

Rubio-Escudero, C., Harari, O., Cordón, O. & Zwir, I. (2007). *Modelling Genetic Networks: Comparison of Static and Dynamic Models*. Berlin Heidelberg: Springer-Verlag.

Rufus, AA., Adekunle, OD. & Folorunsho, MA. (2021). Monetary policy and financial stability in Nigeria. *Ilorin Journal of Economic Policy,* 8(2), 17-35.

Ryan-Collins, J., Werner, RA. & Castle, J. (2016). A half-century diversion of monetary policy? An empirical horse-race to identify the UK variable most likely to deliver the desired nominal GDP growth rate. *Journal of International Financial Markets, Institutions and Money*, 43 (July), 158-176.

Sasaki, H., Fukatani, N., Imai, D., & Kamanaka, Y. (2022). Sustainable economic growth in an economy with exhaustible resources and a declining population under the balance-of-payments constraint. MPRA Paper 113559, University Library of Munich, Germany.

Saunders, M., Lewis, P. & Thornhill, A. (2016). *Research Methods for Business Students.* 7th Edition. Pearson, Harlow.

Schwartz, A.J. (1995). Why financial stability depends on price stability. *Institute of Economic Affairs,* 15 (Autumn), 21-25.

Shrestha, N. (2020). Detecting Multicollinearity in Regression Analysis. American Journal of Applied Mathematics and Statistics, 8(2), 39-42.

Sibley, ED. (2019). Monetary and financial stability – the implications for prudential supervision. Central Bank of Ireland, at the 46th OeNB Economics Conference "European Economic and Monetary Union: The First and the Next 20 Years", in Cooperation with SUERF, Vienna, 2 May 2019. Available at https://www.bis.org/review/r190503b.htm [Accessed on 23 March 2021]

Singh, A. & Sharma, AK. (2016). An empirical analysis of macroeconomic and bank specific factors affecting the liquidity of Indian banks. *Future Business Journal*, 2(1), 40–53.

Smets, F. (2014). Financial stability and monetary policy: How closely interlinked? *International Journal of Central Banking*, 102, 263–300.

Spencer, G. (2014). Coordination of monetary policy and macro-prudential policy. Speech to Credit Suisse Asian Investment Conference in Hong Kong.

Staikouras, C. & Wood, G. (2003). The determinants of bank profitability in Europe. Paper Presented at the European Applied Business Research Conference, 9 June-13 June, Venice, Italy.

Stark, J. (2010). In search of a robust monetary policy framework. Keynote Speech at the 6th ECB Central Banking Conference, "Approaches to Monetary Policy Revisited – Lessons from the Crisis", Frankfurt am Main, November 19.

Stein, JC. (2013). Overheating in credit markets: Origins, measurement and policy responses. Speech Delivered at "Restoring Household Financial Stability after the Great

Recession: Why Household Balance Sheets Matter," a symposium sponsored by the Federal Reserve Bank of St. Louis, February 7.

Stock, J. & Watson M. (2011). *Introduction to Econometrics.* 3rd edition. Boston, Addison Wesley Longman.

Subbarao, D. (2009). Financial stability: Issues and challenges. Bank for International Settlement Review 106/2009, 1-10 Available at https://www.bis.org/review/r090915b.pdf [Accessed on 22 June 2018]

Subramanian, MF., Taghizadeh-Hesary, F., & Kim, CJ. (2020). Creation and evolution of European economic and monetary union: Lessons for Asian economic integration. ADBI Working Paper 1126. Tokyo: Asian Development Bank Institute. Available at: https://www.adb.org/publications/creation-evolution-european-economic-monetary-union. [Accessed on 20 April 2023]

Svensson, L. (2010), Monetary policy after the financial crisis. Speech at the Second *International Journal of Central Banking (IJCB)* Fall Conference, Tokyo, September.

Tan, Y. & Floros, C. (2012). Bank profitability and inflation: The case of China. *Journal of Economic Studies*, 39(6), 675-696.

Thornton, J. (2008). Money, output, and inflation in African economies. *South African Journal of Economics,* 76(3), 356-766.

Tinbergen, J. (1952). *On the Theory of Economic Policy*. 2nd Edition. North-Holland, Amsterdam.

Turan, G. & Koskija, A. (2014). Nonperforming loans in Albania. *Academic Journal of Interdisciplinary Studies*, 3(3), 491-500.

Vodova, PK. (2011). Determinants of commercial banks' liquidity in Hungary. *Acta Academica Karviniensia*, 13(1), 180–188.

Vodová, PK. (2016). Bank liquidity and profitability. *Scientific Journal WSFiP*, (1), 19–33.

Wijesundera, A., Vidurangi, A., Weerasinghe, D., Krishna, T. & Gunawardena, M., & Peiris, H. (2016). Predictability of stock returns using financial ratios: Empirical evidence from the Colombo stock exchange. *Kelaniya Journal of Management,* 4(2), 44-55.

Williams, HT. (2011). Determinants of capital adequacy in the banking sub-sector of the Nigeria economy: Efficacy of camels. (A model specification with co-integration analysis). *International Journal of Academic Research in Business and Social Sciences*, 1(3), 234-248.

Woodford, M. (2012). Inflation targeting and financial stability. NBER Working Paper 17967, National Bureau of Economic Research.

Wynne, MA. (2008). Core inflation: A review of some conceptual issues. *Federal Reserve Bank of St. Louis Review*, May/June.

APPENDICES: EVIEWS OUTPUT

Case 1: No trend and intercept

Panel unit root test: Summary

Series: INFLATION

Date: 03/03/22 Time: 13:46

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.15483	0.0000	15	551
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	102.822	0.0000	15	551
PP - Fisher Chi-square	96.0386	0.0000	15	567

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: CAR

Date: 03/03/22 Time: 13:48

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				

Levin, Lin & Chu t*	1.29626577 7276099	0.90255803 26368939	14	473

Null: Unit root (assumes individual unit root process)

ADF - Fisher Chi-square	9.86184039 3457909	0.99938835 81298584	14	473
PP - Fisher Chi-square	10.3914251 7031703	0.99899951 16245109	14	490

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: DLR

Date: 03/03/22 Time: 13:50

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.03235	0.1510	15	486
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	52.4926	0.0067	15	486
PP - Fisher Chi-square	67.3860	0.0001	15	504

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: NPLTL

Date: 03/03/22 Time: 13:52

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.60325	0.2732	15	508
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	19.7289	0.9234	15	508
PP - Fisher Chi-square	17.1012	0.9713	15	527

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: LR

Date: 03/03/22 Time: 13:52

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.95373	0.1701	15	493
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	29.5454	0.4891	15	493
PP - Fisher Chi-square	34.4107	0.2647	15	511

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: ROA

Date: 03/03/22 Time: 13:53

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.24943	0.4015	14	476
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	25.3181	0.6105	14	476
PP - Fisher Chi-square	34.6407	0.1806	14	493

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: ROA

Date: 03/03/22 Time: 13:53

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.24943	0.4015	14	476
Null: Unit root (assumes individual unit root process)				

ADF - Fisher Chi-square	25.3181	0.6105	14	476
PP - Fisher Chi-square	34.6407	0.1806	14	493

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Case 2: With intercept only

Panel unit root test: Summary

Series: INFLATION

Date: 03/03/22 Time: 13:55

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.03269	0.0000	15	551
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.63315	0.0000	15	551
ADF - Fisher Chi-square	123.959	0.0000	15	551
PP - Fisher Chi-square	97.8723	0.0000	15	567

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: CAR

Date: 03/03/22 Time: 13:56

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.31695	0.3756	14	473
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.86987	0.1922	14	473
ADF - Fisher Chi-square	44.6495	0.0239	14	473
PP - Fisher Chi-square	80.0653	0.0000	14	490

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: DLR

Date: 03/03/22 Time: 13:57

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.56695	0.0051	15	486
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.05378	0.5214	15	486
ADF - Fisher Chi-square	32.7206	0.3348	15	486
PP - Fisher Chi-square	49.3408	0.0145	15	504

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: NPLTL

Date: 03/03/22 Time: 13:58

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	1.06435	0.8564	15	508
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	1.75385	0.9603	15	508
ADF - Fisher Chi-square	21.5894	0.8686	15	508
PP - Fisher Chi-square	36.9999	0.1771	15	527

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: LR

Date: 03/03/22 Time: 14:01

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.27000	0.1020	15	493
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.45866	0.0723	15	493
ADF - Fisher Chi-square	44.8102	0.0402	15	493

PP - Fisher Chi-square	85.5662	0.0000	15	511

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: ROA

Date: 03/03/22 Time: 14:01

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.09914	0.0179	14	476
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.14440	0.0008	14	476
ADF - Fisher Chi-square	57.2269	0.0009	14	476
PP - Fisher Chi-square	68.8118	0.0000	14	493

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: ROE

Date: 03/03/22 Time: 14:01

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				

Levin, Lin & Chu t*	1.26121	0.8964	14	468
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.08310	0.0186	14	468
ADF - Fisher Chi-square	46.5737	0.0152	14	468
PP - Fisher Chi-square	107.065	0.0000	14	485

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Case 3: With intercept and trend

Panel unit root test: Summary

Series: INFLATION

Date: 03/03/22 Time: 14:03

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.80784	0.0353	15	551
Breitung t-stat	-2.15054	0.0158	15	536
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.22493	0.0000	15	551
ADF - Fisher Chi-square	98.5777	0.0000	15	551
PP - Fisher Chi-square	63.5713	0.0003	15	567

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: CAR

Date: 03/03/22 Time: 14:04

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.93476	0.0017	14	473
Breitung t-stat	1.08083	0.8601	14	459
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.48323	0.0065	14	473
ADF - Fisher Chi-square	57.7233	0.0008	14	473
PP - Fisher Chi-square	104.817	0.0000	14	490

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: DLR

Date: 03/03/22 Time: 14:04

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.29383	0.0979	15	486
Breitung t-stat	1.16328	0.8776	15	471

Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.03371	0.5134	15	486
ADF - Fisher Chi-square	26.0723	0.6714	15	486
PP - Fisher Chi-square	46.1697	0.0299	15	504

** Probabilities for Fisher tests are computed using an asymptotic

Chi-square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: NPLTL

Date: 03/03/22 Time: 14:05

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	2.53719	0.9944	15	508
Breitung t-stat	5.87802	1.0000	15	493
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	2.34488	0.9905	15	508
ADF - Fisher Chi-square	17.9867	0.9587	15	508
PP - Fisher Chi-square	61.9055	0.0005	15	527

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: LR

Date: 03/03/22 Time: 14:05

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	0.31061	0.6220	15	493
Breitung t-stat	-2.09806	0.0179	15	478
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.09666	0.1364	15	493
ADF - Fisher Chi-square	41.3574	0.0811	15	493
PP - Fisher Chi-square	102.550	0.0000	15	511

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: ROA

Date: 03/03/22 Time: 14:06

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.20427	0.1142	14	476
Breitung t-stat	-1.24268	0.1070	14	462
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.93996	0.0262	14	476
ADF - Fisher Chi-square	43.2692	0.0328	14	476
PP - Fisher Chi-square	50.3917	0.0058	14	493

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: ROE

Date: 03/03/22 Time: 14:06

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	2.93730	0.9983	14	468
Breitung t-stat	-1.23128	0.1091	14	454
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.73430	0.0414	14	468
ADF - Fisher Chi-square	46.7770	0.0145	14	468
PP - Fisher Chi-square	109.917	0.0000	14	485

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

UNIT ROOT TESTS AT FIRST DIFFERENCE

Case 1: No Trend and Intercept

Panel unit root test: Summary

Series: D(INFLATION)

Date: 03/03/22 Time: 14:08

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-14.0672	0.0000	15	536
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	239.287	0.0000	15	536
PP - Fisher Chi-square	290.536	0.0000	15	551

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(CAR)

Date: 03/03/22 Time: 14:09

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-17.6981	0.0000	14	458
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	338.809	0.0000	14	458
PP - Fisher Chi-square	1126.63	0.0000	14	473

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(DLR)

Date: 03/03/22 Time: 14:09

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-15.7027	0.0000	15	470
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	267.816	0.0000	15	470
PP - Fisher Chi-square	705.952	0.0000	15	486

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(NPLTL)

Date: 03/03/22 Time: 14:10

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-13.9976	0.0000	15	491
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	262.144	0.0000	15	491
PP - Fisher Chi-square	663.364	0.0000	15	508

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(LR)

Date: 03/03/22 Time: 14:10

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-21.6525	0.0000	15	477
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	497.393	0.0000	15	477
PP - Fisher Chi-square	1437.10	0.0000	15	493

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(ROA)

Date: 03/03/22 Time: 14:11

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-16.8239	0.0000	14	461
Null: Unit root (assumes individual unit root process)				

ADF - Fisher Chi-square	333.402	0.0000	14	461
PP - Fisher Chi-square	698.235	0.0000	14	476

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(ROE)

Date: 03/03/22 Time: 14:11

Sample: 2009Q1 2018Q4

Exogenous variables: None

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-17.5559	0.0000	14	453
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	363.218	0.0000	14	453
PP - Fisher Chi-square	1041.70	0.0000	14	468

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Case 2: With Intercept Only

Panel unit root test: Summary

Series: D(INFLATION)

Date: 03/03/22 Time: 14:12

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.97647	0.0000	15	536
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-8.95341	0.0000	15	536
ADF - Fisher Chi-square	152.242	0.0000	15	536
PP - Fisher Chi-square	193.916	0.0000	15	551

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(CAR)

Date: 03/03/22 Time: 14:13

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.61272	0.0000	14	458
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-13.6059	0.0000	14	458
ADF - Fisher Chi-square	221.836	0.0000	14	458
PP - Fisher Chi-square	388.537	0.0000	14	473

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(DLR)

Date: 03/03/22 Time: 14:14

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.10919	0.0000	15	470
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-12.0400	0.0000	15	470
ADF - Fisher Chi-square	195.681	0.0000	15	470
PP - Fisher Chi-square	391.359	0.0000	15	486

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(NPLTL)

Date: 03/03/22 Time: 14:14

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.55114	0.0000	15	491
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-11.1022	0.0000	15	491
ADF - Fisher Chi-square	184.020	0.0000	15	491

PP - Fisher Chi-square	373.350	0.0000	15	508

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(LR)

Date: 03/03/22 Time: 14:14

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-13.7527	0.0000	15	477
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-18.0463	0.0000	15	477
ADF - Fisher Chi-square	308.037	0.0000	15	477
PP - Fisher Chi-square	467.214	0.0000	15	493

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(ROA)

Date: 03/03/22 Time: 14:15

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				

Levin, Lin & Chu t*	-10.5665	0.0000	14	461

Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-13.1467	0.0000	14	461
ADF - Fisher Chi-square	210.623	0.0000	14	461
PP - Fisher Chi-square	334.619	0.0000	14	476

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(ROE)

Date: 03/03/22 Time: 14:15

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.89222	0.0000	14	453
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-14.3725	0.0000	14	453
ADF - Fisher Chi-square	233.729	0.0000	14	453
PP - Fisher Chi-square	374.915	0.0000	14	468

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Case 3: With Intercept and Trend

Panel unit root test: Summary

Series: D(INFLATION)

Date: 03/03/22 Time: 14:16

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.80851	0.0353	15	536
Breitung t-stat	-1.15365	0.1243	15	521
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.82489	0.0000	15	536
ADF - Fisher Chi-square	114.239	0.0000	15	536
PP - Fisher Chi-square	153.609	0.0000	15	551

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(CAR)

Date: 03/03/22 Time: 14:16

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.64061	0.0000	14	458
Breitung t-stat	-3.03827	0.0012	14	444
Null: Unit root (assumes individual unit root process)				

Im, Pesaran and Shin W-stat	-12.2511	0.0000	14	458
ADF - Fisher Chi-square	189.096	0.0000	14	458
PP - Fisher Chi-square	1221.10	0.0000	14	473

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(DLR)

Date: 03/03/22 Time: 14:17

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.60883	0.0000	15	470
Breitung t-stat	-6.58293	0.0000	15	455
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-10.7722	0.0000	15	470
ADF - Fisher Chi-square	163.789	0.0000	15	470
PP - Fisher Chi-square	697.002	0.0000	15	486

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(NPLTL)

Date: 03/03/22 Time: 14:17

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.92339	0.0000	15	491
Breitung t-stat	-4.61145	0.0000	15	476
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-10.7538	0.0000	15	491
ADF - Fisher Chi-square	166.974	0.0000	15	491
PP - Fisher Chi-square	627.956	0.0000	15	508

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(LR)

Date: 03/03/22 Time: 14:18

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-11.4838	0.0000	15	477
Breitung t-stat	-4.96252	0.0000	15	462
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-16.7938	0.0000	15	477
ADF - Fisher Chi-square	292.547	0.0000	15	477
PP - Fisher Chi-square	1715.07	0.0000	15	493

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(ROA)

Date: 03/03/22 Time: 14:18

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.94723	0.0000	14	461
Breitung t-stat	-5.08685	0.0000	14	447
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-11.2225	0.0000	14	461
ADF - Fisher Chi-square	170.455	0.0000	14	461
PP - Fisher Chi-square	662.207	0.0000	14	476

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary

Series: D(ROE)

Date: 03/03/22 Time: 14:19

Sample: 2009Q1 2018Q4

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.00216	0.1581	14	453
Breitung t-stat	-4.94672	0.0000	14	439

Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-12.3580	0.0000	14	453
ADF - Fisher Chi-square	190.200	0.0000	14	453
PP - Fisher Chi-square	1063.75	0.0000	14	468

** Probabilities for Fisher tests are computed using an asymptotic

Chi -square distribution. All other tests assume asymptotic normality.

FIXED / RANDOM EFFECTS AND HAUSMAN TEST

Dependent Variable: INFLATION

Method: Panel Least Squares

Date: 03/03/22 Time: 14:32

Sample: 2009Q1 2018Q4

Periods included: 40

Cross-sections included: 15

Total panel (unbalanced) observations: 458

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.409141	1.955684	3.277186	0.0011
CAR	0.037523	0.076304	0.491760	0.6231
DLR	0.003239	0.004718	0.686600	0.4927
NPLTL	0.093843	0.071604	1.310587	0.1907
LR	-0.081826	0.020756	-3.942241	0.0001
ROA	-0.287199	0.362389	-0.792515	0.4285
ROE	0.137510	0.043048	3.194356	0.0015

Effects Specification
Cross-section fixed (dummy variables)

R-squared	0.523407	Mean dependent var	7.128205
Adjusted R-squared	0.501595	S.D. dependent var	6.714938
S.E. of regression	4.740598	Akaike info criterion	5.994971

Sum squared resid	9820.819	Schwarz criterion	6.184194
Log likelihood	-1351.848	Hannan-Quinn criter.	6.069496
F-statistic	23.99626	Durbin-Watson stat	0.340807
Prob(F-statistic)	0.000000		

Dependent Variable: INFLATION

Method: Panel EGLS (Cross-section random effects)

Date: 03/03/22 Time: 14:36

Sample: 2009Q1 2018Q4

Periods included: 40

Cross-sections included: 15

Total panel (unbalanced) observations: 458

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.476802	1.993088	2.747897	0.0062
CAR	-0.005092	0.073657	-0.069134	0.9449
DLR	0.001990	0.004498	0.442335	0.6585
NPLTL	0.157863	0.068498	2.304643	0.0216
LR	-0.050884	0.016430	-3.096995	0.0021
ROA	-0.044466	0.349586	-0.127196	0.8988
ROE	0.125555	0.042183	2.976398	0.0031

Effects Specification

	S.D.	Rho
Cross-section random	3.153138	0.3067
Idiosyncratic random	4.740598	0.6933

Weighted Statistics

R-squared	0.078406	Mean dependent var	1.846730
Adjusted R-squared	0.066145	S.D. dependent var	5.010031
S.E. of regression	4.830666	Sum squared resid	10524.24
F-statistic	6.394933	Durbin-Watson stat	0.318129
Prob(F-statistic)	0.000002		

Unweighted Statistics			
R-squared	0.098327	Mean dependent var	7.128205
Sum squared resid	18580.16	Durbin-Watson stat	0.180196

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	21.265041	6	0.0016

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CAR	0.037523	-0.005092	0.000397	0.0324
DLR	0.003239	0.001990	0.000002	0.3798
NPLTL	0.093843	0.157863	0.000435	0.0021
LR	-0.081826	-0.050884	0.000161	0.0147
ROA	-0.287199	-0.044466	0.009115	0.0110
ROE	0.137510	0.125555	0.000074	0.1636

Cross-section random effects test equation:

Dependent Variable: INFLATION

Method: Panel Least Squares

Date: 03/03/22 Time: 14:37

Sample: 2009Q1 2018Q4

Periods included: 40

Cross-sections included: 15

Total panel (unbalanced) observations: 458

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	6.409141	1.955684	3.277186	0.0011
CAR	0.037523	0.076304	0.491760	0.6231
DLR	0.003239	0.004718	0.686600	0.4927
NPLTL	0.093843	0.071604	1.310587	0.1907
LR	-0.081826	0.020756	-3.942241	0.0001
ROA	-0.287199	0.362389	-0.792515	0.4285
ROE	0.137510	0.043048	3.194356	0.0015

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.523407	Mean dependent var	7.128205
Adjusted R-squared	0.501595	S.D. dependent var	6.714938
S.E. of regression	4.740598	Akaike info criterion	5.994971
Sum squared resid	9820.819	Schwarz criterion	6.184194
Log likelihood	-1351.848	Hannan-Quinn criter.	6.069496
F-statistic	23.99626	Durbin-Watson stat	0.340807
Prob(F-statistic)	0.000000		

JOHANSEN COINTEGRATION

Inflation Vs Capital Adequacy Ratio

Pedroni Residual Cointegration Test

Series: INFLATION CAR

Date: 03/03/22 Time: 14:41

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 14 (1 dropped)

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	10.21409	0.0000	3.807492	0.0001
Panel rho-Statistic	-5.162091	0.0000	-3.688704	0.0001
Panel PP-Statistic	-4.478758	0.0000	-3.620581	0.0001
Panel ADF-Statistic	-3.006123	0.0013	-3.315482	0.0005

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-3.073176	0.0011
Group PP-Statistic	-3.912292	0.0000
Group ADF-Statistic	-4.621725	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.920	12.08024	26.67265	3.00	39
2	0.640	17.54569	21.82543	1.00	25
3	0.649	1.241580	0.966886	1.00	29
4	0.048	30.30478	77.04304	3.00	25
5	0.671	0.843698	0.843698	0.00	39
6	Dropped from Test				
7	0.634	1.858974	2.270331	3.00	39
8	0.895	8.546303	15.25638	2.00	27
9	0.707	0.866872	1.065884	1.00	36
10	0.727	30.07339	33.46626	4.00	39
11	0.722	0.419904	0.708638	3.00	39
12	0.647	1.006217	1.995590	4.00	39
13	0.850	4.119113	5.997482	2.00	39
14	0.804	6.041320	8.445807	1.00	39

15	0.402	61.20951	61.20951	0.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.855	7.224329	1	--	38
2	0.480	12.42809	1	--	24
3	0.698	1.220976	1	--	26
4	0.856	3.112930	1	--	23
5	0.584	0.419756	1	--	38
6	Dropped from Test				
7	0.621	1.838396	1	--	38
8	0.863	5.373216	1	--	25
9	0.592	0.749967	1	--	35
10	0.539	18.76434	1	--	38
11	0.649	0.351858	1	--	38
12	0.705	0.848556	1	--	38
13	0.874	3.632697	1	--	38
14	0.715	4.669177	1	--	38
15	0.127	58.52151	1	--	20

Capital Adequacy Ratio Vs Inflation

Pedroni Residual Cointegration Test

Series: CAR INFLATION

Date: 03/03/22 Time: 14:44

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 14 (1 dropped)

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	1.682154	0.0463	0.625655	0.2658
Panel rho-Statistic	-3.880464	0.0001	-5.926111	0.0000
Panel PP-Statistic	-2.807585	0.0025	-5.232489	0.0000
Panel ADF-Statistic	-1.276420	0.1009	-2.139332	0.0162

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-3.467404	0.0003
Group PP-Statistic	-3.444699	0.0003
Group ADF-Statistic	-0.524788	0.2999

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.928	3.017804	3.462924	1.00	39
2	0.292	12.79471	12.42842	1.00	25
3	0.098	0.791021	0.625563	4.00	29
4	0.807	2.428173	2.821647	2.00	25
5	0.274	11.06155	11.06155	0.00	39
6	Dropped from Test				
7	0.812	0.412864	0.427971	9.00	39
8	0.720	11.80117	12.39907	2.00	27
9	0.603	0.375365	0.500765	3.00	36
10	0.689	1.971054	2.435995	2.00	39
11	0.852	0.193235	0.193235	0.00	39

12	0.287	5.535664	5.447406	1.00	39
13	0.327	0.779060	0.779060	0.00	39
14	0.825	2.553979	3.112158	2.00	39
15	0.842	7.485946	6.909818	1.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.836	2.634418	1	--	38
2	0.102	12.85789	1	--	24
3	0.174	0.864765	1	--	26
4	0.945	2.069040	1	--	23
5	0.160	11.05021	1	--	38
6	Dropped from Test				
7	0.808	0.374236	1	--	38
8	0.738	12.45067	1	--	25
9	0.845	0.294015	1	--	35
10	0.648	1.636976	1	--	38
11	0.883	0.192482	1	--	38
12	0.349	5.536664	1	--	38
13	0.591	0.700093	1	--	38
14	0.758	2.236609	1	--	38
15	0.855	7.743369	1	--	20

Inflation Vs Deposit to Loans Ratio

Pedroni Residual Cointegration Test

Series: INFLATION DLR

Date: 03/03/22 Time: 14:45

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 15

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	11.24583	0.0000	4.060954	0.0000
Panel rho-Statistic	-7.673142	0.0000	-3.509939	0.0002
Panel PP-Statistic	-6.536405	0.0000	-3.471428	0.0003
Panel ADF-Statistic	-2.493329	0.0063	-4.317112	0.0000

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-3.380262	0.0004
Group PP-Statistic	-4.266428	0.0000
Group ADF-Statistic	-5.540968	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.878	11.13121	19.99237	3.00	39
2	0.578	16.81135	21.70914	1.00	24
3	0.882	0.466636	0.549542	1.00	29
4	-0.020	38.07494	81.05197	3.00	25
5	0.696	0.897410	1.397019	1.00	39
6	0.794	0.932984	1.177255	2.00	39
7	0.649	1.785082	2.133723	3.00	39
8	0.888	8.399121	16.35995	2.00	24
9	0.724	0.780655	1.234747	2.00	36

10	0.788	1.481777	2.405404	3.00	32
11	0.733	0.446026	0.735826	3.00	39
12	0.616	1.085890	1.936751	3.00	36
13	0.774	2.906340	7.239145	3.00	32
14	0.794	6.587351	9.022075	1.00	39
15	0.307	41.30631	41.59877	1.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.810	9.414512	1	--	38
2	0.425	12.81783	1	--	23
3	0.858	0.407254	1	--	26
4	0.760	6.183711	1	--	23
5	0.590	0.427036	1	--	38
6	0.761	0.930973	1	--	38
7	0.648	1.810442	1	--	38
8	0.804	5.065517	1	--	23
9	0.627	0.613072	1	--	35
10	0.728	1.296991	1	--	30
11	0.654	0.374093	1	--	38
12	0.656	0.929900	1	--	35
13	0.735	0.817177	1	--	31
14	0.692	5.189354	1	--	38
15	0.110	39.83739	1	--	20

Deposit to Loans Ratio Vs Inflation

Pedroni Residual Cointegration Test

Series: DLR INFLATION

Date: 03/03/22 Time: 14:46

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 15

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	4.219579	0.0000	-1.077324	0.8593
Panel rho-Statistic	-2.905092	0.0018	-0.177222	0.4297
Panel PP-Statistic	-2.482667	0.0065	-0.688351	0.2456
Panel ADF-Statistic	-1.658553	0.0486	0.208693	0.5827

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	1.135264	0.8719
Group PP-Statistic	-0.144227	0.4427
Group ADF-Statistic	0.577731	0.7183

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.889	61.49432	64.58981	1.00	39
2	0.192	123.3267	94.52779	3.00	24
3	0.654	13947.81	16346.48	2.00	29
4	0.886	723.0159	703.1198	1.00	25
5	0.909	317.9101	367.0790	3.00	39
6	0.814	38.04984	38.07075	5.00	39
7	0.799	40.55077	37.92182	3.00	39

8	0.937	208.2283	198.4261	1.00	24
9	0.759	13.60136	8.772719	1.00	36
10	0.911	373.3089	470.8703	3.00	32
11	0.865	1.490549	1.270549	2.00	39
12	0.707	69.48125	60.41972	1.00	36
13	0.763	23.26824	47.19894	3.00	32
14	0.714	142.9630	153.6985	3.00	39
15	0.792	87.01089	81.53743	2.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.878	62.88431	1	--	38
2	-0.051	118.9131	1	--	23
3	0.600	15196.96	1	--	26
4	0.972	413.3801	1	--	23
5	0.921	318.3176	1	--	38
6	0.815	36.04385	1	--	38
7	0.824	40.88194	1	--	38
8	0.932	203.5308	1	--	23
9	0.824	9.730872	1	--	35
10	0.879	382.9757	1	--	30
11	0.904	1.343324	1	--	38
12	0.754	69.04465	1	--	35
13	0.765	13.78269	1	--	31
14	0.758	139.8042	1	--	38
15	0.751	88.05478	1	--	20

Inflation Vs NPLTL

Pedroni Residual Cointegration Test

Series: INFLATION NPLTL

Date: 03/03/22 Time: 14:47

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 15

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	10.15348	0.0000	4.900549	0.0000
Panel rho-Statistic	-6.373014	0.0000	-5.678005	0.0000
Panel PP-Statistic	-4.343347	0.0000	-5.660382	0.0000
Panel ADF-Statistic	-3.660210	0.0001	-4.399790	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-3.734489	0.0001
Group PP-Statistic	-4.573275	0.0000
Group ADF-Statistic	-4.862208	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.872	15.67569	28.41984	3.00	39
2	0.836	13.91697	23.73115	2.00	23
3	0.609	0.373202	0.566416	3.00	29
4	0.324	45.85774	106.0663	3.00	25
5	0.689	0.946725	1.349356	1.00	39

6	0.699	1.015624	1.218927	2.00	39
7	0.640	1.676160	2.020707	3.00	39
8	0.725	7.791450	12.49586	2.00	27
9	0.703	0.785194	1.213092	2.00	36
10	0.675	31.37889	38.01663	2.00	39
11	0.704	0.396650	0.639194	3.00	39
12	0.637	0.981418	1.909016	4.00	39
13	0.831	3.627433	5.836834	2.00	39
14	0.796	5.925089	8.376451	1.00	39
15	0.448	64.85154	64.85154	0.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.812	13.07554	1	--	38
2	0.815	8.494315	1	--	21
3	0.794	0.323515	1	--	26
4	0.838	4.465432	1	--	23
5	0.531	0.553248	1	--	38
6	0.659	1.015313	1	--	38
7	0.619	1.668449	1	--	38
8	0.754	6.572827	1	--	25
9	0.592	0.604030	1	--	35
10	0.510	21.66514	1	--	38
11	0.631	0.321346	1	--	38
12	0.678	0.837037	1	--	38
13	0.778	3.080507	1	--	38
14	0.706	4.465565	1	--	38
15	-0.431	52.09218	1	--	20

NPLTL Vs Inflation

Pedroni Residual Cointegration Test

Series: NPLTL INFLATION

Date: 03/03/22 Time: 14:47

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 15

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-0.067324	0.5268	-0.430983	0.6668
Panel rho-Statistic	-1.326063	0.0924	-0.521182	0.3011
Panel PP-Statistic	-1.176265	0.1197	-0.884239	0.1883
Panel ADF-Statistic	0.248703	0.5982	0.923638	0.8222

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-0.279895	0.3898
Group PP-Statistic	-0.959394	0.1687
Group ADF-Statistic	2.132063	0.9835

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.802	18.91340	19.06396	2.00	39
2	0.800	4.028994	4.885477	2.00	23
3	0.407	0.282338	0.621986	4.00	29
4	0.690	0.948462	1.416485	2.00	25
5	0.729	0.193566	0.221212	4.00	39

6	0.799	0.413123	0.415033	2.00	39
7	0.906	0.586028	0.524926	3.00	39
8	0.699	4.318679	4.318679	0.00	27
9	1.035	0.034938	0.076734	4.00	36
10	0.664	1.499789	1.450238	1.00	39
11	0.975	0.037464	0.074432	3.00	39
12	0.437	2.745733	2.745733	0.00	39
13	0.782	0.998388	1.012493	2.00	39
14	0.861	1.737283	1.737283	0.00	39
15	0.863	4.030021	4.121889	1.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.817	19.08214	1	--	38
2	0.775	3.753482	1	--	21
3	0.830	0.181691	1	--	26
4	0.959	0.264727	1	--	23
5	0.843	0.151564	1	--	38
6	0.853	0.405115	1	--	38
7	0.900	0.586570	1	--	38
8	0.721	4.585072	1	--	25
9	1.025	0.031991	1	--	35
10	0.709	1.491988	1	--	38
11	0.956	0.016353	1	--	38
12	0.517	2.749272	1	--	38
13	0.788	1.022377	1	--	38
14	0.836	1.483856	1	--	38
15	0.855	4.216526	1	--	20

Inflation Vs LR

Pedroni Residual Cointegration Test

Series: INFLATION LR

Date: 03/03/22 Time: 14:53

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 15

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	7.815221	0.0000	4.017942	0.0000
Panel rho-Statistic	-4.939620	0.0000	-3.864366	0.0001
Panel PP-Statistic	-4.197797	0.0000	-3.768934	0.0001
Panel ADF-Statistic	-3.293857	0.0005	-3.596038	0.0002

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-3.620929	0.0001
Group PP-Statistic	-4.061259	0.0000
Group ADF-Statistic	-5.021919	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.886	14.78055	22.77572	2.00	39
2	0.783	11.50345	20.00210	2.00	25
3	0.788	0.571116	0.514029	2.00	29
4	0.297	46.14065	108.9689	3.00	25
5	0.716	0.972386	1.447953	1.00	21

6	0.759	0.967984	1.221702	3.00	39
7	0.560	1.891793	2.287846	3.00	39
8	0.882	10.52004	21.90944	3.00	27
9	0.735	0.798604	1.165392	2.00	36
10	0.714	19.68503	19.68503	0.00	39
11	0.666	0.486668	0.652255	3.00	39
12	0.499	1.261509	1.926458	3.00	39
13	0.870	3.552199	7.771812	3.00	39
14	0.766	6.544079	8.942485	2.00	39
15	-0.123	60.80784	60.37696	1.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.838	12.57858	1	--	38
2	0.687	6.860899	1	--	24
3	0.841	0.508663	1	--	26
4	0.839	4.323928	1	--	23
5	0.492	0.510531	1	--	20
6	0.748	0.987685	1	--	38
7	0.550	1.918204	1	--	38
8	0.817	6.476334	1	--	25
9	0.611	0.639186	1	--	35
10	0.629	13.07989	1	--	38
11	0.551	0.434081	1	--	38
12	0.563	1.256108	1	--	38
13	0.816	2.248891	1	--	38
14	0.703	5.499706	1	--	38
15	-0.841	53.34444	1	--	20

LR Vs Inflation

Pedroni Residual Cointegration Test

Series: LR INFLATION

Date: 03/03/22 Time: 14:54

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 15

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	1.234269	0.1086	-0.934392	0.8249
Panel rho-Statistic	-3.348145	0.0004	-6.696660	0.0000
Panel PP-Statistic	-3.500584	0.0002	-6.254319	0.0000
Panel ADF-Statistic	1.242041	0.8929	-2.618148	0.0044

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-3.158507	0.0008
Group PP-Statistic	-4.497974	0.0000
Group ADF-Statistic	-0.534669	0.2964

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.692	58.72728	38.21356	7.00	39
2	0.807	16.05953	14.61793	2.00	25

3	0.602	34.36277	28.28061	2.00	29
4	0.644	976.1767	1210.621	2.00	25
5	0.555	57.73152	46.71487	1.00	21
6	0.610	10.28166	9.394071	1.00	39
7	0.584	6.033664	6.135384	3.00	39
8	0.716	28.57662	26.07302	1.00	27
9	0.735	4.150314	4.550318	3.00	36
10	0.618	11.05713	11.05713	0.00	39
11	0.484	1.841499	1.911831	3.00	39
12	-0.048	8.396981	11.79260	3.00	39
13	0.901	2.758320	3.772037	3.00	39
14	0.513	28.10258	23.25721	2.00	39
15	0.857	31.62732	29.73772	1.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.641	57.87259	1	--	38
2	0.752	15.22644	1	--	24
3	0.694	32.90232	1	--	26
4	0.909	314.3578	1	--	23
5	0.770	38.57534	1	--	20
6	0.717	9.638745	1	--	38
7	0.618	6.161342	1	--	38
8	0.762	30.13633	1	--	25
9	0.927	2.843001	1	--	35
10	0.666	11.16994	1	--	38
11	0.576	1.703612	1	--	38
12	0.335	7.634771	1	--	38
13	0.888	2.700120	1	--	38
14	0.413	17.23577	1	--	38
15	0.850	32.58260	1	--	20

Inflation Vs ROA

Pedroni Residual Cointegration Test

Series: INFLATION ROA

Date: 03/03/22 Time: 14:58

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 14 (1 dropped)

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	5.024605	0.0000	3.512828	0.0002
Panel rho-Statistic	-2.586554	0.0048	-2.111479	0.0174
Panel PP-Statistic	-3.021488	0.0013	-1.864531	0.0311
Panel ADF-Statistic	-5.462323	0.0000	-3.826705	0.0001

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-1.890258	0.0294
Group PP-Statistic	-2.764518	0.0029
Group ADF-Statistic	-5.848879	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.935	10.42086	26.04479	4.00	39
2	0.820	15.18683	21.97162	1.00	25

3	0.968	0.479661	0.464891	4.00	29
4	Dropped from Test				
5	0.718	0.930656	1.466494	3.00	39
6	0.792	0.942272	1.195577	2.00	39
7	0.683	1.730294	2.140271	3.00	39
8	0.865	11.09995	24.85823	3.00	27
9	0.719	0.793579	1.245342	2.00	36
10	0.697	23.07139	23.47001	4.00	39
11	0.710	0.417282	0.720867	3.00	39
12	0.653	0.991889	1.967441	4.00	39
13	0.889	3.693475	5.849359	2.00	39
14	0.776	5.976638	5.976638	0.00	39
15	0.039	32.45339	31.73304	1.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.896	6.528196	1	--	38
2	0.693	10.62227	1	--	24
3	0.860	0.313550	1	--	26
4	Dropped from Test				
5	0.544	0.487350	1	--	38
6	0.758	0.938849	1	--	38
7	0.678	1.731436	1	--	38
8	0.820	4.852022	1	--	25
9	0.610	0.613010	1	--	35
10	0.566	13.65990	1	--	38
11	0.647	0.329261	1	--	38
12	0.689	0.785208	1	--	38
13	0.846	3.079189	1	--	38
14	0.685	4.692120	1	--	38
15	-0.052	33.31547	1	--	20

ROA Vs Inflation

Pedroni Residual Cointegration Test

Series: ROA INFLATION

Date: 03/03/22 Time: 14:58

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 14 (1 dropped)

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	2.552203	0.0054	0.850480	0.1975
Panel rho-Statistic	-3.353589	0.0004	-3.139710	0.0008
Panel PP-Statistic	-2.899861	0.0019	-3.107864	0.0009
Panel ADF-Statistic	-2.755492	0.0029	-2.205560	0.0137

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-1.907285	0.0282
Group PP-Statistic	-2.648351	0.0040
Group ADF-Statistic	-2.446229	0.0072

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.720	0.856279	0.856279	0.00	39
2	0.487	0.947674	0.943649	2.00	25
3	0.758	0.615145	0.533916	5.00	29
4	Dropped from Test				
5	0.718	0.339878	0.413932	1.00	39
6	0.883	0.168486	0.162211	2.00	39
7	0.533	0.026538	0.031510	2.00	39
8	0.797	0.390228	0.493961	2.00	27
9	0.940	0.007959	0.014398	3.00	36
10	0.560	0.899021	0.998760	2.00	39
11	0.943	0.003600	0.004936	2.00	39
12	0.835	1.579035	2.134145	1.00	39
13	0.447	0.212728	0.212728	0.00	39
14	0.491	0.221725	0.221725	0.00	39
15	0.385	0.477076	0.408430	3.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.699	0.875866	1	--	38
2	0.366	0.936609	1	--	24
3	0.667	0.437081	1	--	26
4	Dropped from Test				
5	0.728	0.320681	1	--	38
6	0.905	0.166047	1	--	38
7	0.465	0.024629	1	--	38
8	0.832	0.330401	1	--	25
9	0.873	0.005454	1	--	35
10	0.607	0.866740	1	--	38
11	0.909	0.003047	1	--	38
12	0.760	1.325150	1	--	38
13	0.403	0.216843	1	--	38

14	0.388	0.215555	1	--	38
15	0.406	0.480979	1	--	20

Inflation Vs ROE

Pedroni Residual Cointegration Test

Series: INFLATION ROE

Date: 03/03/22 Time: 14:59

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 14 (1 dropped)

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	6.912042	0.0000	3.980239	0.0000
Panel rho-Statistic	-2.984098	0.0014	-3.021801	0.0013
Panel PP-Statistic	-2.707183	0.0034	-2.373625	0.0088
Panel ADF-Statistic	-4.077174	0.0000	-3.791350	0.0001

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-2.506502	0.0061
Group PP-Statistic	-2.912379	0.0018
Group ADF-Statistic	-5.367846	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.930	10.98039	25.78460	4.00	39
2	0.662	18.45172	21.12384	1.00	17
3	0.860	0.772362	0.717097	3.00	29
4	Dropped from Test				
5	0.741	0.887102	1.460073	2.00	39
6	0.795	0.928738	1.246616	3.00	39
7	0.588	1.891512	2.180046	2.00	39
8	0.838	10.84809	23.85702	3.00	27
9	0.722	0.877234	1.118276	1.00	36
10	0.694	23.83466	23.53824	4.00	39
11	0.715	0.438704	0.521630	1.00	39
12	0.654	0.996495	1.980107	4.00	39
13	0.851	4.193713	5.285962	1.00	39
14	0.755	6.391272	8.449564	1.00	39
15	-0.277	46.52161	44.53839	1.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.893	7.645847	1	--	38
2	0.560	15.94142	1	--	16
3	0.827	0.325849	1	--	26
4	Dropped from Test				
5	0.575	0.486674	1	--	38
6	0.764	0.930823	1	--	38
7	0.557	1.837906	1	--	38
8	0.811	5.142700	1	--	25
9	0.596	0.675325	1	--	35
10	0.566	15.39466	1	--	38
11	0.621	0.396585	1	--	38
12	0.694	0.807534	1	--	38
13	0.819	3.917093	1	--	38

14	0.642	5.111268	1	--	38
15	-0.562	46.49463	1	--	20

ROE Vs Inflation

Pedroni Residual Cointegration Test

Series: ROE INFLATION

Date: 03/03/22 Time: 14:59

Sample: 2009Q1 2018Q4

Included observations: 600

Cross-sections included: 14 (1 dropped)

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coeffs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	2.816036	0.0024	0.987011	0.1618
Panel rho-Statistic	-4.907210	0.0000	-4.731125	0.0000
Panel PP-Statistic	-4.903388	0.0000	-4.447301	0.0000
Panel ADF-Statistic	-2.233104	0.0128	-2.265932	0.0117

Alternative hypothesis: individual AR coeffs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-4.210838	0.0000
Group PP-Statistic	-5.448917	0.0000
Group ADF-Statistic	-1.677338	0.0467

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.667	76.27046	79.94603	1.00	39
2	0.034	29.53936	17.15545	5.00	17
3	0.372	69.83366	76.16827	1.00	29
4	Dropped from Test				
5	0.751	41.07979	51.68254	1.00	39
6	0.818	15.57786	15.17339	2.00	39
7	0.643	5.640817	5.640817	0.00	39
8	0.798	49.93523	62.52862	1.00	27
9	0.217	3.358088	9.016435	4.00	36
10	0.567	102.5260	111.1255	2.00	39
11	0.700	0.664998	0.801825	1.00	39
12	0.625	75.19209	79.25336	1.00	39
13	0.512	14.27011	14.27011	0.00	39
14	0.732	37.20970	37.20970	0.00	39
15	0.400	18.49488	18.29677	4.00	21

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.643	77.37699	1	--	38
2	-0.333	26.47857	1	--	16
3	0.584	33.86854	1	--	26
4	Dropped from Test				
5	0.820	36.42222	1	--	38
6	0.842	15.61127	1	--	38
7	0.627	5.231324	1	--	38
8	0.842	43.71455	1	--	25
9	0.970	0.731763	1	--	35
10	0.609	101.8502	1	--	38
11	0.670	0.601576	1	--	38

12	0.583	76.39902	1	--	38
13	0.515	14.63221	1	--	38
14	0.746	35.54753	1	--	38
15	0.363	17.79858	1	--	20

GRANGER CAUSALITY TESTS

Inflation vs CAR

Pairwise Granger Causality Tests

Date: 03/03/22 Time: 15:01

Sample: 2009Q1 2018Q4

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CAR does not Granger Cause INFLATION	457	2.03106	0.1324
INFLATION does not Granger Cause CAR		2.40104	0.0918

Inflation vs DLR

Pairwise Granger Causality Tests

Date: 03/03/22 Time: 15:04

Sample: 2009Q1 2018Q4

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DLR does not Granger Cause INFLATION	474	0.86629	0.4212
INFLATION does not Granger Cause DLR		0.33076	0.7185

Inflation vs NPLTL

Pairwise Granger Causality Tests

Date: 03/03/22 Time: 15:05

Sample: 2009Q1 2018Q4

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
NPLTL does not Granger Cause INFLATION	492	1.75074	0.1747
INFLATION does not Granger Cause NPLTL		9.25136	0.0001

Inflation vs LR

Pairwise Granger Causality Tests

Date: 03/03/22 Time: 15:05

Sample: 2009Q1 2018Q4

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LR does not Granger Cause INFLATION	477	0.57145	0.5651
INFLATION does not Granger Cause LR		0.69342	0.5004

Inflation vs ROA

Pairwise Granger Causality Tests

Date: 03/03/22 Time: 15:06

Sample: 2009Q1 2018Q4

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
ROA does not Granger Cause INFLATION	472	14.2678	1.E-06
INFLATION does not Granger Cause ROA		1.90314	0.1503

Inflation vs ROE

Pairwise Granger Causality Tests

Date: 03/03/22 Time: 15:07

Sample: 2009Q1 2018Q4

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
ROE does not Granger Cause INFLATION	464	13.1230	3.E-06
INFLATION does not Granger Cause ROE		1.55215	0.2129