

Financial liberalisation, financial development and financial crises in SADC countries

Financial
crises in SADC
countries

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Abstract

Purpose – The impact of financial reforms and financial development on an economy has received considerable attention over the recent past. This paper aims to investigate whether financial liberalisation and financial development increase the likelihood financial crises in Southern African development community (SADC) countries.

Design/methodology/approach – Due to the binary nature of the dependent variable, the logit model is used for the analysis using data for the period 1990 to 2015.

Findings – The results showed that financial liberalisation captured by real interest rates reduces the likelihood of financial crises. Furthermore, regulatory quality strengthens this reductive effect of financial liberalisation on the probability of financial crises. On the other hand, financial development represented by bank credit increases the incidence of financial crises. The results also suggest that financial liberalisation may increase the likelihood of financial crises indirectly through financial development.

Research limitations/implications – The study recommends that a sound regulatory and supervisory framework be established as well as institutional quality raised to curb the effect of financial development on the incidence of financial crises.

Originality/value – There is scant evidence on the role that financial liberalisation and financial development play in the incidence of financial crises in the SADC. This study incorporates the effect of institutional quality in the analysis which has been neglected by most studies on financial reforms in SADC countries. A number of recent studies in SADC countries conclude that financial development resulting from financial reforms, may hinder economic growth. Therefore, this study sheds light on this negative relationship.

Keywords Financial markets and the macroeconomy, Financial economics, Macroeconomic policy, Econometric modelling, Financial liberalization, Financial crises, Financial development, Logit model

Paper type Research paper

1. Introduction

The 2008-2009 global financial crisis has brought the issue of financial reforms and in particular, interest rates into the spotlight. According to the advocates of the Austrian school, such as [Kates \(2010\)](#) and [Templeman \(2010\)](#), the crisis was caused by a decrease in interest rates below equilibrium, which resulted in malinvestments, a situation where the



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activities of producers and consumers are not coordinated. On the other hand, the Keynesians argue that the financial crisis was caused by a drop in aggregate demand as well as the savings glut resulting from excess savings in Asian economies (Kotios and Galanos, 2012; Tridico, 2011).

According to McKinnon (1973) and Shaw (1973), financial liberalisation and, in particular, interest rate deregulation, is a means for achieving high economic growth by boosting savings and investments. Furthermore, financial reforms may promote financial development which further encourages savings, investments and economic growth (Shaw, 1973; Levine, 1997). Other proponents of financial liberalisation argue that financial repression policies such as low interest rates also encourage excessive risk-taking as banks attempt to earn higher returns, so causing financial crises (Bogutoglu and Ekinci, 2010). Also, interest rate liberalisation provides liquidity buffers which reduce the likelihood of financial crises (Barrell *et al.*, 2016). Therefore, financial repression policies that maintain low real interest rates may increase the likelihood of financial crises rather than prevent them.

Critics of financial liberalisation argue that it may increase the likelihood of financial crises by encouraging financial institutions to take risks in their lending practises to earn higher returns (Demirgüç-Kunt and Detragiache, 1998; Kaufmann, 2000). Furthermore, higher levels of financial development resulting from financial reforms may increase competition in the financial sector which in turn reduces profits and causes more risk taking (Ariss, 2010; Agoraki *et al.*, 2011; Hope *et al.*, 2013; Cubillas and González, 2014). Capital inflows in a country with an underdeveloped financial system can cause a rapid increase in bank lending, which can in turn result in a financial crisis if the lending is to unworthy candidates (McLean and Shrestha, 2002).

Most Southern African development community (SADC) countries introduced financial reforms in the late 1980s and 1990s (Mowatt, 2001). Prior to the reforms, the financial systems of most of these countries were largely controlled by the respective governments, real interest rates were negative and there was a lack of competition, especially in the banking sector. Financial liberalisation policies had a positive influence on the performance of the banking industries of most of the SADC countries as more banks entered the financial systems and increased the level of competition. Financial reforms also had a positive effect in turning real interest rates from negative to positive territory, despite the obstacles of high inflation and increasing savings and investments in a number of countries. Financial reforms were, to a large extent, successful in Botswana and Mauritius. Due to a market-oriented economy, savings and investments have been high in Botswana, which has had a positive effect in increasing economic growth and propelling the country into middle-income territory with a high standard of living. Financial reforms initiated in Mauritius had a positive effect on real interest rates, savings, investments and economic growth; therefore, the economy had the highest GDP per capita in the SADC region for the period 2000-2009 (Gorlach and Le Roux, 2015).

Financial reforms had a negative effect on some countries which experienced financial sector problems. For instance, Lesotho's banking sector performance worsened after financial reforms due to a series of bank failures (Mowatt, 2001; Mottelle and Masengetse, 2012). These failures were caused by weak regulatory and legal frameworks, which suggests that financial liberalisation policies should be accompanied by the strengthening of regulation and supervision in an economy.

In light of the above, this study examines the impact of financial reforms and financial development on the likelihood of financial crises in SADC countries using an approach similar to that of Demirgüç-Kunt and Detragiache (1998), Lee and Shin (2007) and Barrell *et al.* (2016). Due to the binary nature of the dependent variable (financial crisis), the logit model is used for the empirical analysis using data covering the period 1990 to 2015.

Recent studies conclude that financial development may negatively related to economic growth in SADC countries (Phakedi, 2014; Le Roux and Moyo, 2015; Bara *et al.*, 2016). Therefore, determining whether financial development impacts negatively on growth because of financial crises is crucial for future policy formulation. Furthermore, the study test whether regulatory quality reduces the likelihood of financial crises and whether financial development may increase the likelihood of financial crises indirectly through credit growth.

There is scant evidence on the impact of interest rate liberalisation on financial crises in Sub-Saharan African (SSA) countries despite the frequency of financial crises in the region over the years. Misati and Nyamongo (2011) use the Chinn-Ito-Index as a measure of financial liberalisation in examining the impact of reforms on financial fragility. However, most of the problems in the banking sector are caused by interest rates which impact on bank risk taking and competition. This study contributes to literature by investigating whether interest rates and financial development on financial crises. Higher levels of financial development in particular, bank credit and credit to the private sector in an environment of low institutional quality result in an increase in the number of non-performing loans which in turn increases the probability of financial crises. The study incorporates regulatory quality which has been neglected by most studies that examine the effect of financial reforms in SADC countries.

The study is structured as follows: Section 2 surveys the existing literature on the impact of interest rate liberalisation and financial crises. Section 3 describes the data and discusses the methodology. Section 4 presents the results of the empirical analysis, while Section 5 concludes the study.

2. Literature review

This section surveys the existing literature involving the relationship between financial liberalisation, financial development and financial crisis. Theoretical and empirical literature are discussed.

2.1 Theoretical literature

The major causes of banking crises are macroeconomic instability and structural weaknesses in an economy (Mezui *et al.*, 2012). Macroeconomic instability results from fiscal and current account deficits, currency devaluations, high inflation and high interest rates. Structural weaknesses emanate from weak regulatory and supervisory frameworks, a significant proportion of government or state ownership of banks, an increase in banking competition which reduces the franchise values of banks, and high non-performing loans (Mezui *et al.*, 2012). The other cause of banking crises is financial liberalisation, which is associated with moral hazard problems and a rise in capital inflows (Arestis and Demetriades, 1999). Financial liberalisation is also related to the major causes of both macroeconomic instability and structural weaknesses in the economy.

Financial liberalisation, and in particular interest rate liberalisation, encourages banks to take a more expansive approach in lending activities due to higher interest rates (Misati and Nyamongo, 2011). The number of risky and low return projects increases as the prospect of earning more returns entices banks to relax their monitoring or screening mechanisms (Angkinand *et al.*, 2010). The increase in interest rates resulting from interest rate liberalisation causes financial instability in an economy, as borrowers with higher credit risks would be willing to borrow, compared with those with lower credit risks (Mishkin, 1997). The possibility of financial institutions, like banks, lending to borrowers with high risks increases with higher interest rates. Therefore, banks become vulnerable to banking

crises due to adverse selection and the surge in non-performing loans (Misati and Nyamongo, 2011).

According to Daniel and Jones (2007), financial liberalisation encourages foreign banks to enter the market which leads to a reduction in interest rates. Lower interest rates encourage banks to undertake riskier projects so as to preserve their competitive advantage. Banks undertake riskier projects due to a reduction in franchise values caused by entry of new banks in the financial sector (Demetriades *et al.*, 2001). Furthermore, entry of new banks into the financial sector may increase the bidding for bank deposits, so causing a rise in interest rates (Chowdhury, 2010). Banks pass this rise in deposit rates to borrowers through higher lending rates, which attract borrowers with greater risks.

Interest rate liberalisation often increases the volatility of nominal interest rates, which may have a negative effect on the ability of banks to perform one of their functions, that of borrowing short and lending long, so deteriorating the bank's balance sheets (Demirgüç-Kunt and Detragiache, 1998). Banks borrow short and lend long so as to make profits and so have more long-term assets than short-term liabilities (Mishkin, 1997). A rise in interest rates reduces the value of long-term assets and increases the value of short-term liabilities. The drop in the value of longer-duration assets outweighs the increase in the value of short-term liabilities, so decreasing the net worth of those banks (Mishkin, 1997). The rise in bad debts resulting from non-performing loans also causes a deterioration of bank balance sheets.

Proponents of financial reforms argue that financial repression policies such as keeping very low interest rates increases the likelihood of financial crises. Controls on interest rates which result in low returns also encourage banks to undertake risky projects in an attempt to earn higher profits (Snowdon and Vane, 2005). According to Boyd and De Nicolò (2005), the increase in bank competition fosters financial stability if banks charge lower interest rates to borrowers, as risks would be reduced. This view assumes that the increase in the number of banks and other financial institutions prevents excessive lending rates, as borrowers have a wide range of lenders to choose from. A concentrated banking sector with a small number of banks could result in collusion, with borrowers forced to pay higher interest rates.

2.2 Empirical literature

2.2.1 Financial liberalisation and financial crises. There is contrasting empirical literature on the effect of financial liberalisation on financial crises. Some studies report that financial liberalisation is associated with increased incidence of financial crises. Using a sample of 53 countries, Demirgüç-Kunt and Detragiache (1998) found that banking crises are associated with higher interest rates and financial liberalisation increases the chances of banking crises through lowering of bank profits due to higher capitalisation and foreign entry. Ranciere *et al.* (2006) concluded that financial liberalisation increases the probability of financial crises in a sample of 60 countries. Furthermore, the authors found that the growth effects of financial liberalisation in terms of financial development and investments outweigh the negative effects of financial fragility. Lee and Shin (2007) also found that financial liberalisation increases the likelihood of banking crises in a sample of 58 countries.

Studies by Misati and Nyamongo (2011) and Enwobi *et al.* (2017) focused on African countries and both reached similar conclusions. According to Misati and Nyamongo (2011), financial liberalisation increases the likelihood of banking crises and the furthermore, the growth-retarding effects of financial liberalisation outweigh the growth enhancing effects. Enwobi *et al.* (2017) found that financial liberalisation is positively related to financial

instability in a sample of 41 countries. Furthermore, financial instability is linked to the development of the financial sector.

Some studies suggest that financial liberalisation reduces the likelihood of financial crises. Shehzad and De Haan (2009) concluded that financial reforms reduce the likelihood of systemic banking crises but increases the likelihood of non-systemic banking crises. Angkinand *et al.* (2010) found that financial liberalisation beyond a certain level reduces the likelihood of financial crises in sample of developed and developing countries. Altunbas *et al.* (2010) reported that lower short-run interest rates for an extended period encourage banks to take more risks. Therefore, the result suggests interest rate liberalisation reduces bank risk-taking, which in turn reduces the likelihood of financial crises.

Using a sample of 40 emerging and developed countries, Triki and Maktour (2012) provide evidence that financial liberalisation reduces the likelihood of financial crises in some of the countries. Barrell *et al.* (2016) found that interest rate liberalisation provides capital buffers that reduce the likelihood of financial crises. Furthermore, the deregulation of interest rates mitigates risky lending practises due to improvements in their balance sheets. Other studies argue that financial liberalisation should be accompanied by measures to strengthen institutional quality to reduce the likelihood of financial crises (Bonfiglioli and Mendicino, 2004; Angkinand *et al.*, 2010; Beju and Ciupac-Ulici, 2012).

2.2.2 Financial development and financial crises. The effect of financial development has also been placed in the spotlight over the past few years. As shown earlier, SADC countries such as Phakedi (2014), Le Roux and Moyo (2015) and Bara *et al.* (2016), concluded that credit to the private sector dampens economic growth. Credit growth may hinder economic growth through its impact on non-performing loans and banking crises. Perugini *et al.* (2013) found that credit expansion increases the likelihood of financial crises in a panel of 18 OECD countries for the period 1970 to 2007. Caldera-Sanchez *et al.* (2016) reported that domestic credit and international private debt flows were the main causes of crisis risk. Furthermore, institutional quality mitigates the effect of financial reforms on crisis. Davis *et al.* (2014) showed that rapid credit growth increases the likelihood of financial crises in a panel of 35 countries. The effect is enhanced when the current account is in deficit. Kiley (2018) reported that the effect of debt growth on financial crises in the USA is minimal. Rather, it is asset prices and current account deficits that are the main causes of financial crises.

3. Data and methodology

This section presents the data and the methodology used in the study.

A description of all the variables used in the study is provided in Table I. Most of the data on the variables are obtained from the World Bank's world development indicators.

Variable	Description
GDP	annual percentage growth rate of GDP at market prices
RINT	lending rate minus inflation
RDEP	deposit rate minus inflation
INF	annual percentages of consumer prices
CHINN	Chinn-Ito-index, a measure of a nation's financial openness
BC	private credit provided by the banking sector as a ratio of GDP
CA	current account balance as a percentage of GDP
REG	Regulatory quality

Sources: World Bank (2016); Kaufmann *et al.* (2010); Chinn and Ito (2013)

Table I.
Description of the
variables

The Chinn-Ito index is taken from [Chinn and Ito \(2013\)](#) and measures the degree of financial openness for a country at a particular period. The index is constructed using binary variables based upon the IMF's Report on Exchange Arrangements and Exchange Restrictions (AREAER). Furthermore, the index encompasses the period from 1970 to 2015 in 182 countries and has a range of scores from 2.44 which represents the most financially open score to -1.86 which is the least financially open score. The financial development indicators are compiled by [Beck *et al.* \(2000\)](#), [Beck *et al.* \(2009\)](#) and [Čihák *et al.* \(2012\)](#). The institutional quality (regulation) data is sourced from the World Bank's Worldwide governance indicators which is based on a methodology by [Kaufmann *et al.* \(2010\)](#). Due to the unavailability of regulation data for some the periods, the interpolation and extrapolation methods were used. The data covers the period 1990-2015, and 11[1] of the 15 SADC countries were selected due to the unavailability of data for Angola, DRC, Mozambique and Zimbabwe.

The financial crises variable is a binary variable taking the value of 1 if a financial crisis occurred and 0 otherwise. Literature suggests that banking crises usually precede currency crises ([Kaminsky and Reinhart, 1999](#); [Glick and Hutchison, 1999](#)). Both crises have common causes, like current account imbalances, high real interest rates, high inflation rates and financial liberalisation. Banking sector credit is sometimes financed by capital inflows in a liberal regime and as such, uncertainties in the domestic economy, like high inflation and low growth, may result in an attack against the domestic currency as capital outflows increase. Banking crises may occur as creditors have to be repaid in foreign currency, and because of the diminishing liquidity in the banking sector.

So as to increase the sample of crisis observations, the study combines data on banking and currency crises so that the binary variable 1 indicates the presence of a crisis, regardless of whether it involves banking or currency. Based on this strategy there are 44 total financial crises. [Tables II and III](#) present the banking and currency crises dates for the SADC countries. In [Table III](#), the crisis dates are those that are within the period of the study.

The crises dates are sourced from [Caprio and Klingebiel \(2003\)](#), [Reinhart and Rogoff \(2011\)](#) and [Laeven and Valencia \(2008, 2012\)](#). According to [Laeven and Valencia \(2008, 2012\)](#), a banking crisis is defined as a significant sign of financial distress in the banking system as shown by bank runs, losses in the banking system, a large number of defaults and liquidations. Also, any noteworthy banking policy intervention measures in response to

Country	Banking crisis	Currency crisis
Botswana	1994, 1995	1984-1986, 1996
Lesotho	1988, 1995-1996, 1998-1999	1981, 1984-1985, 1988, 1996, 1998, 2000-2001, 2008
Madagascar	1988	1984, 1994, 2004
Malawi	1994	1982, 1985-1987, 1992, 1994
Mauritius		
Namibia	1984	1981, 1984-1986, 1988, 1996, 1998, 2000-2001, 2008
Seychelles		2008
South Africa	1977-1978, 1984, 1989, 1990	1981, 1984-1986, 1988, 1996, 1998, 2000-2001, 2008
Swaziland	1995-1999	1981, 1984-1986, 1988, 1996, 1998, 2000-2001, 2008
Tanzania	1987, 1988	1985, 1990-1995
Zambia	1995-1998	1983, 1985, 1988-1996, 2000, 2008-2009

Table II.
Crises dates

Sources: [Caprio and Klingebiel \(2003\)](#); [Reinhart and Rogoff \(2011\)](#); [Laeven; Valencia \(2008, 2012\)](#)

significant losses in the banking system also indicate a banking crisis. [Caprio and Klingebiel \(2003\)](#) define a banking crisis as a situation of financial distress in which the banking system has a negative net worth. [Reinhart and Rogoff \(2011\)](#) state that banking crises are periods of bank runs that result in closure, mergers or takeovers by the public sector of one or more financial institutions. If there are no bank runs, the closure, takeover or large-scale government assistance of an important financial institution or a group of institutions can be classified as a banking crisis.

A currency crisis is defined as a nominal depreciation of the currency of at least 30 per cent that is also at least 10 per cent increase in the rate of depreciation compared with the previous year ([Laeven and Valencia, 2008, 2012](#)). The exchange rate depreciations are measured as a percentage change at the end-of-period official nominal bilateral dollar exchange rate from the World Economic Outlook (WEO) database of the IMF.

3.1 Methodology

In most empirical economic models, dependent variables are ratio scale variables. However, there are a number of econometric models where the dependent variable is a binary variable which takes the value of 1 or 0 ([Johnson and Wichern, 2007](#)). The values 1 and 0 indicate the presence or absence of a characteristic, respectively. This study examines whether financial liberalisation increases the likelihood of financial crises, using the logit model. The analysis is similar to that of [Demirgüç-Kunt and Detragiache \(1998\)](#), [Lee and Shin \(2007\)](#) and [Barrell et al. \(2016\)](#). The model is appropriate for the analysis as the dependent variable is a binary variable.

Financial crisis, the dependent variable, is a binary variable specified as follows:

$$y = \begin{cases} 1 & \text{if a financial crisis takes place} \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

Models with nominal scale dependent variables are referred to as qualitative response models. Such models can be estimated using a number of techniques one of which is OLS ([Gujarati and Porter, 2009](#)). The application of OLS to qualitative regression models produces a linear probability model (LPM) which is not the ideal method for estimating qualitative response models, for a number of reasons ([Nagler, 1994](#)). Firstly, the model is based on the assumption that the probability of an event taking place is linearly related to

Country	Banking crisis	Currency crisis
Botswana	1994, 1995	1996
Lesotho	1995-1996, 1998-1999	1996, 1998, 2000-2001, 2008
Madagascar		1994, 2004
Malawi	1994	1992, 1994
Mauritius		
Namibia		1996, 1998, 2000-2001, 2008
Seychelles		2008
South Africa	1990	1996, 1998, 2000-2001, 2008
Swaziland	1995-1999	1996, 1998, 2000-2001, 2008
Tanzania		1990-1995
Zambia	1995-1998	1990-1996, 2000, 2008-2009

Table III.
Crisis dates: 1990-
2015

Sources: [Caprio and Klingebiel \(2003\)](#); [Reinhart and Rogoff \(2011\)](#); [Laeven and Valencia \(2008, 2012\)](#)

the value of the independent variables regardless of the size of the variables. Secondly, due to the inability of the OLS method to restrict the values of the estimated probabilities, the probability values from the LPM may not lie between 0 and 1 (Gujarati and Porter, 2009). Thirdly, the due to the fact that the dependent variable is a nominal scale variable, the disturbances follow as a Bernoulli distribution, so violating the assumption that the disturbance term is normally distributed. Finally, the model is plagued by problems of heteroscedasticity which renders the significance tests invalid (Hill *et al.*, 2012).

Due to the aforementioned limitations of the LPM, qualitative response models are usually estimated using logit and probit models (Nagler, 1994). These models ensure that the probability values of an event taking place always lie between 0 and 1 as the value of the dependent variable(s) changes. The relationship between the explanatory variables and the probability of an event is non-linear under the logit and probit models, unlike with the LPM. These models produce roughly the same estimation results, and due to its mathematical simplicity, the logit model is preferred in this study.

The probability that an event takes place is dependent on the probability distribution of Y_i , which in turn depends on the probability distribution of the disturbance term (Cakmakyapan and Goktas, 2013). The disturbance term under the logit model is assumed to follow a logistic probability distribution which can be specified as follows:

$$P_i = \frac{1}{1 + e^{-Z_i}} \quad (2)$$

where P_i is the probability that an event takes place and:

$$Z_i = BX + u_i \quad (3)$$

The probability that an event does not take place can be specified as follows:

$$1 - P_i = \frac{1}{1 + e^{-Z_i}} \quad (4)$$

The ratio of the probability that an event takes against the probability that it does not take place produces the following equation:

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad (5)$$

where $P_i/1 - P_i$ is the odds ratio of an event taking place.

Taking the natural log of the equation above produces the following equation:

$$L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = Z_i = BX_i + u_i \quad (6)$$

where L_i is the log of odds ratio and is also referred to as the logit. A positive value of L_i implies that an increase in the value of the explanatory variables enhances the likelihood of an event taking place, while a negative L_i value means that the probability of an event taking place decreases with an increase in the value of the explanatory variables (Gujarati and Porter, 2009). The equation above shows that L_i is a linear function of the independent variables and the slope coefficients measure the change in L_i resulting from a unit change in the independent variables.

The empirical analysis of the study is twofold. Firstly, the effect of financial liberalisation on financial crises is examined using interest rates as the main proxy for financial liberalisation. Furthermore, the crises mitigating effect of institutional quality is also incorporated by including an interaction term between interest rates and institutional quality. As shown earlier, studies by [Bonfiglioli and Mendicino \(2004\)](#), [Angkinand *et al.* \(2010\)](#) and [Beju and Ciupac-Ulici \(2012\)](#) sound institutions may mitigate the incidence of financial crises. Secondly, the study determines whether financial liberalisation increases the likelihood of financial crises through financial development. An interaction term between interest rates and credit to the private sector is included in the second part of the analysis.

The empirical models of the study are specified as follows:

$$L_i = \beta_1 + \beta_2 INT_{it} + \beta_3 INST_{it} + \beta_4 INT_{it} REG_{it} + \beta_5 Z_{it} + \varepsilon_{it} \quad (7)$$

$$L_i = \beta_1 + \beta_2 INT_{it} + \beta_3 FD_{it} + \beta_4 INT_{it} FD_{it} + \beta_5 Z_{it} + \varepsilon_{it} \quad (8)$$

where

- L_i = dummy variable capturing financial crises,
- INT = interest rate,
- REG = is regulatory quality,
- $RINT\#REG$ = Interaction term between the real interest rate and regulatory quality,
- FD = represents financial development (credit to the private sector),
- $RINT\#FD$ = Interaction term between the real interest rates and financial development,
- Z = set of control variables which include GDP growth, Chinn-Ito index, the current account balance, inflation and lastly; and
- ε_{it} = the error term.

The financial crisis dummy variable takes the value of 1 in a crisis year and 0 if there is no crisis. The real interest rate captures the effect of interest rate liberalisation on the incidence of financial crises. The real deposit and real lending rates are used in separate regressions. The coefficient of the interaction term on [equation \(7\)](#) is expected to be negative. Institutional quality mitigates the effect of financial liberalisation on financial crises. The interaction term of [equation \(8\)](#) is expected to be positive as excessive credit growth may exacerbate the effect of financial liberalisation on financial crises. GDP growth captures the effect of higher economic growth on the likelihood of financial crises. The coefficient of GDP growth is expected to be negative ([Triki and Maktour, 2012](#)). Financial development is captured by bank sector credit as a percentage of GDP. A rise in credit growth is expected to have a positive impact on the number of non-performing loans and therefore is expected to increase the likelihood of banking crises ([Angkinand *et al.*, 2010](#)). Capital account liberalisation is represented by the Chinn-Ito index of capital account openness. Critics of financial openness argue that it increases a country's exposure to external shocks and the reversal of capital inflows. Also, lending booms initiated by capital inflows also increase the risk of banking crises by widening the maturity mismatch between banks' assets and liabilities, as well as increasing the risks associated with movements in exchange rates ([Demetriades *et al.*, 2001](#)). According to [Barrell *et al.* \(2016\)](#), current account imbalances usually precede financial crises and therefore the current account balance is included in the specification. Inflation is an indicator of macroeconomic instability, which enhances the likelihood of banking crises ([Bonfiglioli, 2005](#)).

4. Empirical results

The empirical strategy involves answering two questions. Firstly, does financial liberalisation increase or decrease the likelihood of financial crises? Secondly, what is the

role of financial development in causing financial crises? To ensure that the results are robust, the explanatory variables are lagged by one period, which provides a true early warning model (Barrell *et al.*, 2016) and to cater for potential endogeneity of the regressors (Demirgüç-Kunt and Detragiache, 1998).

The baseline regression model includes only four explanatory variables: GDP growth, financial openness, current account balance and the inflation rate. The results are presented in Tables IV and V. The probit model, and also the LPM, is estimated for robustness checks; however, the interpretations will centre on the logit model. The coefficient of inflation is positive and significant at 5 per cent level, indicating that financial crises are associated with higher levels of inflation. High inflation rates signify macroeconomic instability, which increases uncertainty in the economy, so the result is in line with a priori expectations. The result confirms the findings of Demirgüç-Kunt and Detragiache (1998), Ranciere *et al.* (2006), Angkinand *et al.* (2010) and Hamdi and Jlassi (2014).

Capital account liberalisation reduces the likelihood of financial crises, although the coefficient is weakly significant. One of the causes of banking crises is the diminishing of liquidity to meet depositors' needs. So capital inflows may mitigate liquidity problems faced by domestic financial institutions, thus reducing the possibility of banking crises. The result supports the findings of Beju and Ciupac-Ulici (2012), Hamdi and Jlassi (2014) and Barrell *et al.* (2016). As expected, GDP growth is negatively signed and significant at 5 per cent level, indicating that higher economic growth levels are associated with lower crisis probabilities. The result is in line with those of Demirgüç-Kunt and Detragiache (1998), Shehzad and De Haan (2008), Angkinand *et al.* (2010), Hamdi and Jlassi (2014), Barrell *et al.* (2016) and Enwobi *et al.* (2017). The current account balance has the expected negative sign; however, the

Variable	logit	probit	LPM
INF	0.04 (2.94)***	0.03 (3.06)***	0.01 (4.35)***
CHINN	-0.31 (-1.87)*	-0.17 (-1.96)**	-0.02 (-1.62)
GDP	-0.10 (-2.03)**	-0.06 (-2.01)**	-0.01 (-2.14)**
CA	-0.03 (-1.36)	-0.01 (-1.11)	-0.003 (-1.29)
C	-2.36 (-6.61)***	-1.36 (-6.98)***	0.09 (2.34)**
pseudo R-squared	0.13	0.13	
R-squared			0.13
chi-square	28.45***	28.79***	
F-statistic			9.42***

Table IV.
Baseline results

Note: (***), (**) and (*) indicate significance at 1%, 5% and 10% levels respectively
Source: Researcher's own computations

Variable	logit	probit	LPM
INF	0.005 (3.06)***	0.005 (3.19)***	0.007 (4.35)***
CHINN	-0.03 (-1.86)*	-0.03 (-1.97)**	-0.02 (-1.62)
GDP	-0.01 (-2.06)**	-0.01 (-2.04)**	-0.01 (-2.14)**
CA	-0.003 (-1.36)	-0.003 (-1.11)	-0.003 (-1.29)

Table V.
Marginal effects

Note: (***), (**) and (*) indicate significance at 1%, 5% and 10% levels respectively
Source: Researcher's own computations

coefficient is insignificant. According to the literature, current account imbalances are one of the precursors of financial crises, so positive current account balances are necessary to reduce the likelihood of financial crises (Barrell *et al.*, 2016). The results of the probit model and the LPM mirror those of the logit model to a large extent. However, the financial openness variable is negative and significant at 5 per cent in the probit model, but insignificant in the LPM.

Table V shows the marginal effects which measure the probability that each explanatory variable contributes to the likelihood of financial crises. Inflation increases the probability of financial crises by 0.5 per cent in both the logit and probit models. The probability is slightly higher in the LPM. Financial openness reduces the probability of financial crises by 3 per cent in both the logit and probit models, which makes it the most important explanatory variable. GDP growth reduces the probability of financial crises by 1 per cent.

The effect of interest rate liberalisation is introduced in different specifications and the results are presented in Table VI. Due to the strong links between the inflation rate and interest rate liberalisation measures (real deposit rate and real interest rate), the inflation rate is omitted from the specification. The two measures of interest rate liberalisation are used separately in regression models. The coefficient of the real deposit rate is negative but insignificant, while that of the real interest rate is negative and significant at 10 per cent level. The results imply that interest rate liberalisation do not directly increase the likelihood of financial crises in SADC countries. The result supports the findings of Barrell *et al.* (2013, 2016) who found that liberalisation of the deposit and lending rates adds to the strength of capital in protecting against banking crises. The results provide support to the view that higher interest rates do not necessarily result in bank risk-taking behaviour. Furthermore, financial repression policies that maintain low real interest rates may increase the likelihood of financial crises rather than prevent them. In most SADC countries real interest rates were low during the 1990s, the period in which most financial crises occurred.

In the third and fourth specifications, the interaction between financial liberalisation indicators and a measure of regulatory quality is included. The coefficients of financial liberalisation are negative and significant at the 10 per cent level without regulatory quality. The interaction of the real interest rate and regulatory quality is negative suggesting that the effect of financial liberalisation on the probability of financial crises declines further in the presence of stronger regulatory quality. The finding supports that of Bonfiglioli and Mendicino (2004), Angkinand *et al.* (2010), Beju and Ciupac-Ulici (2012) and Caldera-Sanchez *et al.* (2016) who reported that financial liberalisation should be accompanied by measures to

Variable	logit	logit2	logit3	logit4
CHINN	-0.30 (-1.78)*	-0.31 (-1.81)*	-0.37 (-2.07)**	-0.35 (-1.92)*
GDP	-0.10 (-2.22)**	-0.11 (-2.22)**	-0.10 (-1.93)*	-0.10 (-2.01)**
CA	-0.03 (-1.40)	-0.05 (-2.32)**	-0.04 (-1.67)*	-0.05 (-2.56)**
REG			0.69 (1.46)	0.55 (1.01)
RDEP	-0.03 (-1.54)		-0.04 (-1.77)*	
RINT		-0.04 (-1.90)*		-0.04 (-1.59)*
RDEP#REG			0.05 (0.75)	
RINT#REG				-0.01 (-0.01)
C	-1.90 (-6.09)***	-1.64 (-4.97)***	-2.10 (-5.98)***	-1.74 (-4.68)***
Pseudo R-squared	0.09	0.10	0.10	0.11
chi-square	16.64***	21.09***	19.08***	22.67***

Notes: (***), (**) and (*) indicate significance at 1%, 5% and 10% levels respectively

Source: Researcher's own computations

Table VI.
Interest rate
liberalisation and
financial crises

enhance institutional quality. Despite the insignificance of the interaction term, it should be noted that in such models the aim is to estimate the marginal effects (Brambor *et al.*, 2006). The coefficients of the other explanatory variables are similar to those of the baseline model. However, the coefficient of the capital account balance becomes significant in specifications with the real interest rate, which implies that after the adoption of financial liberalisation, the current account balance significantly reduces the likelihood of financial crises.

Table VII shows the marginal effects of the explanatory variables, including the financial liberalisation measures. Financial liberalisation reduces the likelihood of financial crises, as both the real interest rates and the real deposit rate are negative. The current account balance reduces the likelihood of financial crises by between 1 and 4 per cent. The coefficient of GDP growth suggests that higher economic growth reduces the probability of financial crises by 1 per cent when the real interest rate is introduced into the specification. Financial openness reduces the probability of financial crises by between 3 and 4 per cent. The marginal effect of regulatory quality is shown in Figure 1. The probability of financial crises declines with financial liberalisation in the presence of stronger regulatory quality which is in line with a priori expectations. Figure 1 also shows that the likelihood of financial crises taking place is higher when real interest rates are in negative territory. Therefore, financial repression policies that maintain very low interest rates should be avoided.

Variable	logit	logit2	logit3	logit4
CHINN	-0.03 (-1.77)*	-0.03 (-1.86)*	-0.04 (-2.05)**	-0.04 (-1.99)**
GDP	-0.01 (-2.24)**	-0.01 (-2.26)**	-0.01 (-1.94)*	-0.01 (-2.04)**
CA	-0.003 (-1.40)	-0.01 (-2.35)**	-0.04 (-1.67)*	-0.01 (-2.60)***
REG			0.06 (1.28)	0.06 (1.24)
RDEP	-0.003 (-1.56)		-0.03 (-1.63)	
RINT		-0.004 (-1.92)*		-0.04 (-1.52)

Table VII.
Marginal effects

Notes: (**) and (*) indicate significance at 5% and 10% levels respectively
Source: Researcher's own computations.

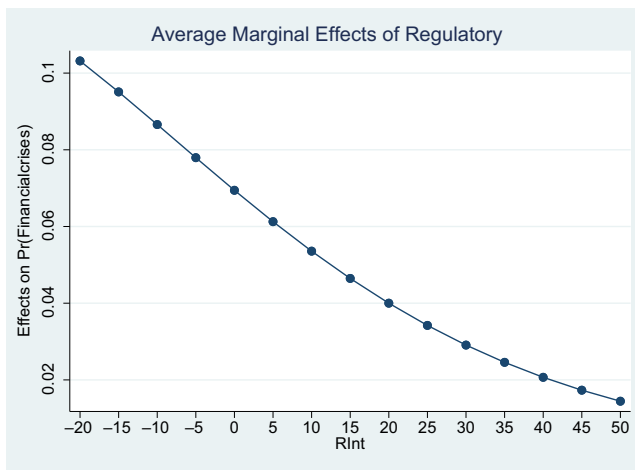


Figure 1.
Marginal effect of regulatory quality

The effect of financial development on the likelihood of financial crises is presented on [Table VIII](#). In the first specification, the bank credit to the financial sector is introduced in the baseline model, while in the second and third specifications, the measures of financial liberalisation are introduced. Bank credit to the private sector is positive and significant at 1 and 10 per cent levels in the baseline model and the third specification, respectively, meaning that it increases the likelihood of financial crises. The coefficient is in line with a priori expectations and confirms the findings of [Angkinand *et al.* \(2010\)](#), [Hamdi and Jlassi \(2014\)](#) and [Enwobi *et al.* \(2017\)](#). The interaction effects between financial liberalisation and bank credit are positive suggesting that the reductive effect of financial liberalisation on financial crises is lower in the presence of bank credit. Financial liberalisation may increase the likelihood of financial crises through financial development in SADC countries. This may explain the negative effect of credit to the private sector on economic growth that has been reported by [Phakedi \(2014\)](#), [Le Roux and Moyo \(2015\)](#) and [Bara *et al.* \(2016\)](#).

The marginal effects shown in [Table IX](#) suggest that bank credit increases the likelihood of financial crises by between 0.1 and 0.2 per cent. The marginal effect of the real interest rate on financial crises shown on [Figure 2](#), declines initially at lower levels of credit to the private sector. However, as bank credit growth grows the effect of the real interest rate on the probability of financial crises increases. This supports the notion that financial liberalisation may increase the likelihood of financial crises through financial development.

Variable	logit	logit2	logit3
INF	0.05 (3.29)***		
CHINN	-0.18 (-1.01)	-0.24 (-1.39)	-0.22 (-1.22)
GDP	-0.09 (-1.67)*	-0.10 (-1.97)**	-0.10 (-1.87)*
CA	-0.05 (-1.81)*	-0.06 (-2.88)***	-0.04 (-1.74)*
BC	0.02 (2.58)***	0.01 (1.13)	0.01 (1.79)*
RINT		-0.06 (-0.99)	
RDEP			-0.09 (-1.30)
RINT#BC		0.002 (0.33)	
RDEP#BC			0.001 (0.74)
constant	-3.96 (-5.15)***	-2.43 (-3.35)***	-3.06 (-4.20)***
pseudo R^2	0.17	0.12	0.11
chi-squared	35.88***	24.19***	22.03***

Notes: (***), (**) and (*) indicate significance at 1%, 5% and 10% levels respectively

Source: Researcher's own computations

Table VIII.

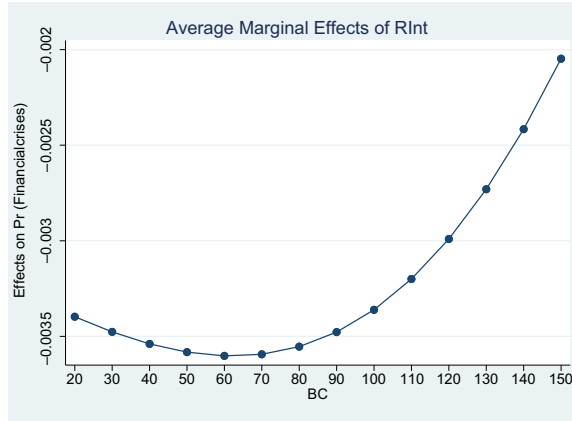
Financial
development and
financial crises

Variable	logit	logit2	logit3
INF	0.01 (3.46)***		
CHINN	-0.02 (-1.01)	-0.02 (-1.39)	-0.02 (-1.21)
GDP	-0.01 (-1.68)*	-0.01 (-2.00)**	-0.01 (-1.89)*
CA	-0.005 (-1.82)*	-0.01 (-2.61)***	-0.004 (-1.74)*
BC	0.002 (2.61)**	0.001 (1.64)*	0.01 (1.57)
RINT		-0.03 (-1.27)	
RDEP			-0.03 (0.89)

Table IX.

Marginal effects

Figure 2.
Marginal effects of
financial
liberalisation



Sensitivity analysis involving the use of lagged explanatory variables was conducted and due to the small sample size, only the first lags are considered. Lagging the regressors deals with issues of endogeneity (Demirgüç-Kunt and Detragiache, 1998; Barrell *et al.*, 2016). The results showing the baseline regression, the effect of interest rate liberalisation on financial crises and the role of financial development on financial crises are presented in Table X. In the baseline regression, inflation and financial openness retain their respective positive and negative signs, as well as their significance. GDP growth and the current account balance are insignificant. The introduction of interest rate liberalisation in the specification does not alter the result of financial openness which remains negative and significant. The other coefficients are similar to those in the baseline regression. The interest rate liberalisation variables are negative but insignificant. The coefficient of bank credit retains its positive and significant coefficient.

5. Conclusion

This study examined the effect of financial liberalisation and financial development on the likelihood of financial crises in SADC countries. Financial liberalisation considered for the analysis was interest rate reforms captured by the real deposit and lending rates, as well as the capital account liberalisation proxied by the Chinn-Ito index. The financial development

Variable	Baseline	Interest rate liberalisation	Financial development
INF	0.03 (2.58)***		0.04 (2.59)***
GDP	0.02 (0.37)	0.02 (0.39)	-0.0001 (-1.40)
CA	0.01 (0.22)	-0.01 (0.68)	-0.001 (-0.05)
CHINN	-0.40 (-2.25)**	-0.38 (-2.22)**	-0.14 (-0.68)
RINT		-0.02 (-0.92)	
BC			0.02 (2.76)***
constant	-2.57 (-6.90)***	-2.14 (-5.85)***	-3.67 (-5.56)***
pseudo R-squared	0.07	0.04	0.12
chi-squared	15.39***	7.57	24.03***

Table X.

Sensitivity analysis:
Logit model

Notes: (***) and (**) indicate significance at 1% and 5% levels respectively
Source: Researcher's own computations

measure chosen was banking sector credit. The analysis was conducted using the logit model due to the binary nature of the financial crises, the dependent variable.

The empirical results suggest that interest rate liberalisation reduces the likelihood of financial crises. This implies that higher real interest rates may reduce the risk-taking behaviour of banks and financial repression policies that maintain negative real interest rates might increase the likelihood of financial crises. Also, interest rate liberalisation may increase the strength of capital in mitigating financial crises as put forward by Barrell *et al.* (2016). There is evidence that capital account liberalisation reduces the likelihood of financial crises which may occur through the alleviation of liquidity problems in the banking sector as capital inflows increase (Beju and Ciupac-Ulici, 2012; Hamdi and Jlassi, 2014).

The results provide support for the hypothesis that financial development increases the likelihood of financial crises. This could be the result of low levels of institutional quality and a weak supervisory framework in the SADC region, which have played a minimal role in mitigating the effects of financial development on financial crises. As expected, inflation and current account imbalances increase the probability of financial crises, while GDP growth is associated with lower crises probabilities.

The results of the study have profound implications. It is recommended that policymakers establish sound supervisory and regulatory framework to accompany financial liberalisation policies to reduce the likelihood of financial crises in the SADC region. Financial liberalisation policies may reduce the incidence of financial crises directly; however, their indirect effects such as the growth of banking sector credit may increase the possibilities of banking crises occurring. The financial sectors in a number of SADC countries are still at low levels of development. Enhanced levels of financial development should thus be accompanied by stronger institutional quality. Financial repression policies that maintain low or negative interest rates should be avoided by policymakers as these increase the likelihood of financial crises possibly through excessive risk-taking on the part of banks and other financial institutions. Market forces should thus be allowed to determine interest rates. Economic growth rates should be enhanced as this reduces uncertainty in an economy, while inflation rates should be low so as to promote macroeconomic stability. Capital account liberalisation should be encouraged while maintaining a positive current account balance is important for SADC countries as these reduces the likelihood of financial crises.

Note

1. Botswana, Lesotho, Madagascar, Malawi, Mauritius, Namibia, Seychelles, South Africa, Swaziland, Tanzania and Zambia

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