THE ANATOMY OF FINANCIAL STABILITY IN LESOTHO: WHICH EXTERNAL SHOCKS MATTER?

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Abstract

FINANCIAL intermediaries enhance economic growth by reducing transaction costs and allocating credit to its most efficient use. Although credit expansion is good for private investment, rapid credit growth or abrupt slump in credit may have deleterious effects on financial stability. Credit growth in small open economies is influenced by factors emanating from their neighbours. Lesotho is fully surrounded by South Africa and its economy is shaped by developments in its giant neighbour. This study employs the seemingly unrelated regression (SUR) technique to test the hypothesis that financial stability in Lesotho is determined by external shocks, mainly emanating from South Africa. The findings validate this hypothesis and reveal that factors such as real effective exchange rate, foreign monetary policy decisions and the lending rate spread are important foreign determinants of financial instability.

Keywords: Financial Stability, Credit Growth, External Shocks, SUR

JEL Classification: C33, E31, O43, O47, O55

1. INTRODUCTION

Financial intermediaries are crucial for sustained economic growth. Even though the literature on the finance-growth nexus provides evidence for both the demand-leading (Boulila and Trabelsi, 2004; Ang and McKibbin, 2005) and supply-leading (Gelb, 1989; Fry, 1997; King and Levine, 1993; Levine and Zervos, 1998) hypotheses, there is also some evidence of feedback causality between financial development and economic growth (Demetriades and Hussein, 1996; Neusser and Kugler, 1996). According to the supply-leading hypothesis, financial intermediaries promote economic growth by serving as delegated monitors, reducing transaction costs and allocating resources to their most efficient use. In fact, in a recent study, Luca and Spatafora (2012:2) find evidence that domestic credit is a significant driver "of domestic private investment in developing countries." Thus, the role of credit extension in economic growth cannot be taken as a grain of salt.

It is, nevertheless, important to note that unbridled credit extension can threaten financial stability. Such a *credit-fragility* hypothesis is associated with two aspects of credit growth. First, a plethora of empirical studies provide evidence that rapid credit growth predicts financial crises (Mendoza and Terrones, 2008; Obstfeld and Rogoff, 2010, Jorda et al., 2011; Schularick and Taylor, 2012). For example, Mishkin (2010) argues that the great global recession mainly reflected what is called a "credit-driven bubble". Second, an acute slump in domestic credit is also bad for financial stability because it can abruptly suffocate investment and hurt economic activity (Gourinchas and Obstfeld, 2012). Therefore, the developments in the credit markets must be monitored closely to inform an appropriate response to avert a financial crisis. In this context, external factors that affect domestic credit should not be neglected. In the case of Lesotho, the external determinants of credit are even more important due to its relationship with its hegemonic neighbour - South Africa. Despite its benefits, the Lesotho-South Africa neighbourhood effect may pose a vulnerability threat for Lesotho. This study attempts to investigate the nature of financial stability in Lesotho and the role of external shocks in this regard. Financial stability is captured by volatility of credit. The study tests the hypothesis that the determinants of credit growth, especially foreign factors, are also determinants of credit volatility.

The rest of the paper is organised as follows: Section 2 provides an overview of the evolution of domestic credit growth in Lesotho relative to South Africa. Section 3

discusses the key issues as debated in the literature on the subject of determinants of domestic credit growth and section 4 describes the methodological approach. Analytical tools, namely the Kalman Filter, the second order autoregressive model and the seemingly unrelated regression (SUR) estimator are discussed this section. Section 5 presents the results and discusses the key findings of the study while section 6 concludes the paper.

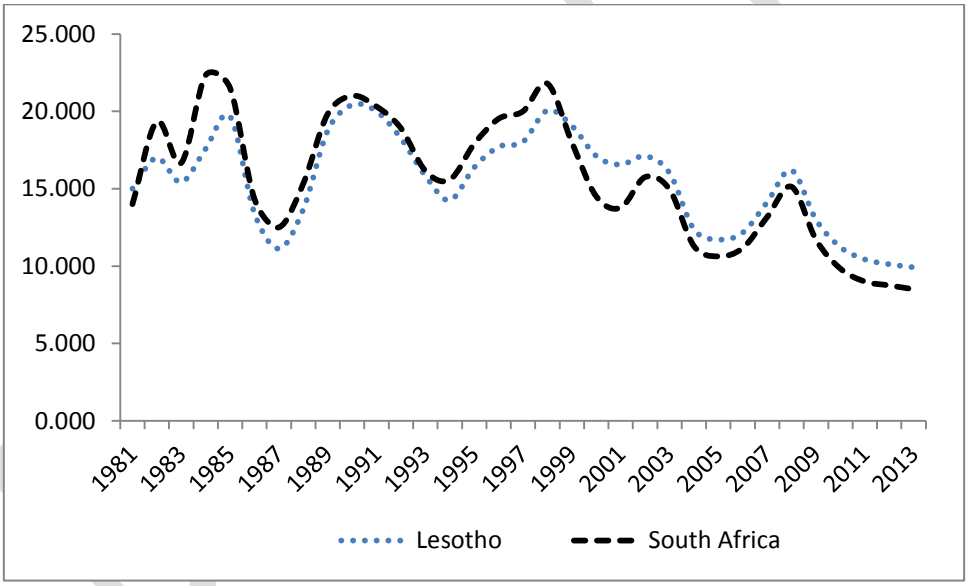
2. CREDIT GROWTH IN LESOTHO RELATIVE TO SOUTH AFRICA: AN OVERVEIW OF PRICE AND QUANTITY DEVELOPMENTS

The financial sector in Lesotho saw a number of reforms that have a bearing on the dynamics of credit growth. In this connection, Motelle and Masenyetse (2012) highlight four areas of reform. *First*, the Central Bank of Lesotho (CBL) eliminated interest rate controls and restrictions on credit allocation. *Second*, the CBL proceeded to relax controls on the current and capital accounts allowing residents to operate foreign currency accounts and hold some funds offshore. Of course, the offshore holdings of assets remain subject to stipulated limits. The *third* financial reform involved the restructuring of banks which culminated in the closure of the Lesotho Agricultural Development Bank and subsequent privatisation of Lesotho Bank. Consequently, state involvement in the banking system was reduced and a new entrant later came into the market. *Fourth*, the Central Bank implemented reforms associated with strengthening of prudential regulation and supervision. This entailed promulgation of specific statutes such as Financial Institutions Act and various regulations. This aspect of the reform process also involved tightening of bank regulations intended to combat money-laundering.

The reform process has resulted in a number of developments in the behaviour of credit extension in Lesotho. However, credit extension is also influenced by economic developments in South Africa. For example, monetary policy implementation in South Africa has also influenced the price of loanable funds in Lesotho. Consider the picture depicted in Figure 1. This Figure shows that since the adoption of inflation targeting framework in South Africa in 2000, the lending rate began to follow a downward trend. As the South African Reserve Bank (SARB) gained credibility, inflationary pressures were eased introducing an era of declining interest rates (Figure 1). During the era of inflation targeting, two humps in the trend of lending rates are observed as depicted in Figure 1.

The humps correspond to two episodes when the inflation rate target range in South Africa was breached. Even though the causes of the target misses were beyond the control of the (SARB) during the two episodes, Motelle and Sebutsoe (2009) propound that the SARB continued to hike interest rates in an attempt to deal with second-round effects and steer inflation back to within the target band. Consequently, lending rates in South Africa increased during those periods. Developments in Lesotho were similar as can be seen in Figure 1. Therefore, the observed co-movement in lending rates in the two countries is not surprising.[1] From 1998, the lending rate in Lesotho hovers above its South African counterpart rate reflecting the higher risk premium in Lesotho during the period (Appendix 3).

Figure 1: Lending market pricing



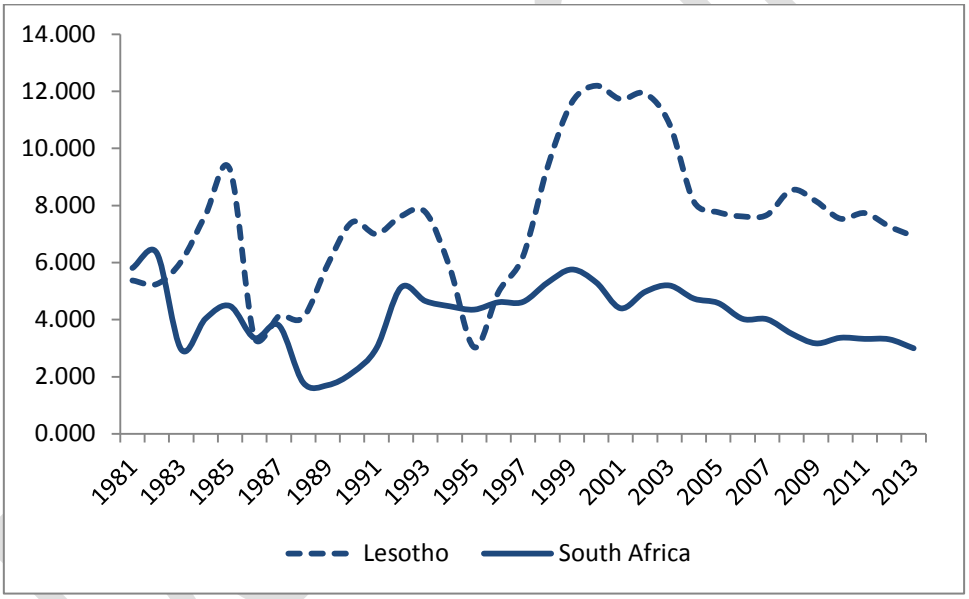
Source: World Development Indicators, 2014

The spread between deposit and lending rates is used as an indicator of the effectiveness of financial intermediation. According to Randall (1998), a financial intermediation spread that remains persistently wide may reflect a number of problems such as lack of competition, perceived market risk, bank unsoundness, scale

[1] Both Lesotho and South are members of the common monetary area (CMA) arrangement together with Namibia and Swaziland. Under the CMA, South Africa is the core and the other members are the periphery. The South African rand is pegged 1:1 with, and circulates alongside, national currencies of the periphery. As a result, the arrangement has enabled the inflation targeting framework in South Africa to be an anchor for monetary policy in the periphery.

diseconomies, distortionary regulatory constraints, and the underdevelopment of the financial sector. Figure 2 shows that the spread in Lesotho hovered above that of South Africa and the gap between the two became more pronounced in the late 1990s into the turn of the millennium. Prior to 1998, two state banks were still operational and were dominating the market thereby steering the rates in the line with social banking which aimed at making borrowing cheap. However, this wedge converges significantly in 2003 towards its South African counterpart. This convergence is consistent with the decline in the lending rates during the same period because deposit rates are generally rigid to monetary policy stimuli.

Figure 2: Financial intermediation spread

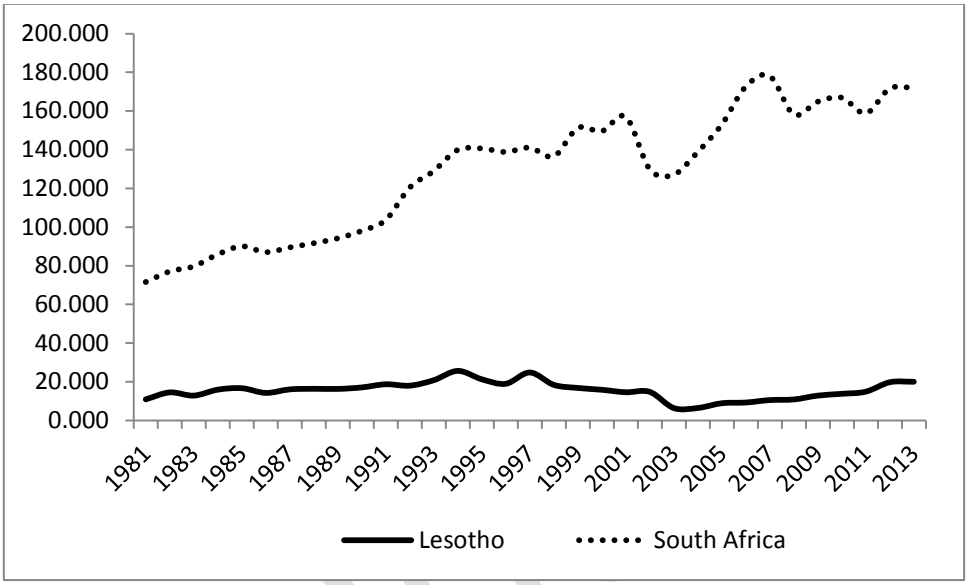


Source: World Development Indicators, 2014

Bank lending to the private sector is considered to be more effective for economic growth than credit to government due to the fact that governments are usually motivated by short-term spending intended to deepen political popularity often to the detriment of long-term economic goals. The ratio of credit granted to the private sector to GDP is used to measure the contribution of the banking sector to private sector-led economic growth. It can be seen from Figure 3 that this ratio is higher in South Africa. In addition, this ratio follows a conspicuous upward trend in South Africa while remaining relatively constant in Lesotho. Needless to say, the ratio

follows a steady increase in Lesotho since 2003, albeit at a sluggish pace. This rise in the ratio is consistent with the decline in the lending rate during the same period suggesting that as borrowing becomes cheaper, the demand for credit increases (Figure 1).

Figure 3: Credit to the private sector (% of GDP)



Source: World Development Indicators, 2014

3. DETERMINANTS OF CREDIT GROWTH IN THE LITERATURE

The growth in domestic credit provides several benefits to the economy. For example, efficient allocation of credit bolsters private investment and boosts economic activity (Luca and Spatafora, 2012). Furthermore, Fernandez-Villaverde et al. (2013) propound that, unlike funding from abroad, reliable supply of domestic credit relieves local firms from pressure coming from exchange rate risk especially during an economic downturn. However, unbridled credit growth can have deleterious effects on financial stability. It is no wonder that credit growth is used as one of the single-variable-based indicators of financial stability (Gadanecz and Jayaram, 2009). The literature on economics abounds with determinants of credit growth.

The determinants of credit growth can be dichotomised into domestic and foreign factors. The *domestic determinants* comprise real and monetary factors. The real factors are real GDP growth and the inflation rate. In their study on the causes of credit cycles in

new entrants into the European Union, Bakker and Gulde (2010) found that inflation is a significant cause of credit booms. They argue that as inflationary pressures subside, real interest rates decline and encourage private borrowing. In addition, Aisen and Franken (2010) examine the major drivers of domestic credit growth in a panel of eighty countries and discovered that the growth rate of the economy influences credit boom-bust cycles. This finding hinges on the validity of the finance-growth nexus as viewed through the lens of the demand-leading hypothesis. In this sense, as the economy grows, the demand for credit increases. Conversely, a deceleration in economic activity dampens the appetite for borrowing by undermining borrowers' repayment ability. Hence, as the findings of Guo and Stepanyan (2011) confirm, the volatility of domestic credit depends on both the rate of inflation and economic growth.

Credit boom-bust cycles also depend on local monetary factors. Under this class of factors, the literature identifies domestic monetary policy and liquidity conditions (Aisen and Franken, 2010), external liquidity conditions (Elekdag and Wu, 2011), and housing and equity prices (Mendoza and Terrones, 2012). In addition, Aisen and Franken (2010) find that performance of domestic bank credit growth depends on the momentum of credit accumulated in the past. In a study on Latin America, Kamil and Rai (2010) discover that domestic funding-bias is a safeguard against adverse external shocks. This means that as local banks depend on domestic deposits to fund credit, the threat of external shocks becomes superfluous. Furthermore, Gozgor (2014) identifies banking industry soundness, deposit and real interest rates as other important drivers of credit growth. Moreover, Rose and Spiegel (2011) find that the environment in which banks operate is also pivotal. For instance, countries with weak credit market regulations suffer more severely during capital haemorrhages than those with strong regulation. At the bank-level, Barajas et al. (2010) observe that both bank capitalisation and the quality of the loan book affect the speed of lending.

Domestic credit growth is also influenced by several foreign factors. For example, Mendoza and Terrones (2012) study the determinants of credit cycles in a panel of 61 countries and discover that capital flows, real exchange rates, burgeoning trade and current account balances play a prominent role. In fact, when the development of financial markets remains at low ebb and the financial system is fragile, net inflows of capital fuel credit booms. Mendoza and Terrones (2012) find a strong relationship between significant receipts of foreign capital and credit booms in emerging markets

economies. Furceri et al. (2012) provide some evidence that even though foreign direct investment and portfolio equity flows do not appear to have a statistically significant effect on domestic credit growth, it turns out that debt inflows are important determinants of domestic credit in emerging markets economies. Elekdag and Wu (2011) observed that global money supply expansion spills over into the domestic economy in the form of credit expansion. Another important factor is the domestic and external lending rates spread (Magud et al., 2014).

When credit markets are characterised by deeper financial integration in credit markets, trans-border borrowing intensifies. Consequently, as Obsfeld (2012) suggests, the ability to borrow abroad at lower rates of interest and allocate resources locally at higher rates has implications for domestic credit growth. It is therefore not surprising that Gozgor (2014) finds that global financial market conditions influence domestic credit fluctuations. Financial integration makes it possible for regional monetary policy decisions to transmit signals which affect patterns of domestic credit growth (Roman and Bilan, 2012). At the bank level, as much as the soundness of domestic banks is crucial for stability in lending, Avdjiev et al. (2012) shows that the soundness of foreign banks also has a bearing on credit growth. Otherwise, unsound foreign banks that have linkages with local banks may be a source of instability in domestic credit. Furthermore, Edwards (2012) indicates that both trade and current account balances are associated with domestic credit growth. For example, a developing country that has deep trade links with the rest of the world would see expansion in credit to support trade. Hence, domestic credit dynamics in open economies are susceptible to various shocks initiating with their trade partners. Therefore, both trade and financial integration have real implications for domestic credit growth.

4. METHODOLOGY

4.1 The data

Annual data from the World Bank's World Development Indicators (WDI) database were used. The time series dimension spans 1980 to 2013. *First*, the data collected on the lending rates in Lesotho, South Africa, China and the United States of America (US) were used to measure the lending rate spreads dictated by the international capital pricing model. This model is used to capture credit market integration between Lesotho and South Africa. The spreads are calculated as the difference between the lending rate in Lesotho and South Africa, lending rate in South Africa and China as well as the lending rate between South Africa and the US. *Second*, the data on the lending rates in Lesotho and South Africa are used to estimate stochastic volatility in the credit market pricing in the two countries. *Third*, data on the ratio of credit to the private sector to GDP is used to generate the volatility of credit in Lesotho and South Africa. *Fourth*, the volatility of private sector credit is then used as a dependent variable regressed on a number of other explanatory variables in order to identify the key determinants of credit volatility in Lesotho. In line with the literature, the following independent variables are included in the model: inflation rate, GDP per capita growth rate, deposit rates, real interest rates, lag of ratio of M2 to GDP, real exchange rates, openness to trade, ratio of FDI flows to GDP. In addition, the spread between lending rates in Lesotho and South Africa are included in the model to capture the effect of arbitrage opportunities created by differences in the cost of borrowing between the two countries. Moreover, foreign monetary policy decisions are important for credit growth dynamics (Roman and Bilan, 2012). In the context of the common monetary area, South Africa remains a dominant regional player, to account for this neighbourhood effect, the South African money supply is included in the model (Appendix 1).

4.2 Model specification and estimation techniques

4.2.1 Modelling credit market integration between Lesotho and South Africa

The paper adopts the Kalman Filter technique used by to measure financial integration between Lesotho and South Africa.[2] The approach is similar to that followed by Biekpe and Motelle (2013). Nevertheless, the current study is different in two ways. First, this study focuses on credit market integration, instead of treasury bill market

[2] See Haldane and Hall (1991)

integration. Second, unlike Biekpe and Motelle (2013) who only use the United States (US) of America to represent the rest of the world, this study includes China for a similar purpose. The model is specified in state-space form with the following signal equation:

$$lnr_{LES,t} - lnr_{SA,t} = \alpha_t + \beta_t\left(lnr_{SA,t} - lnr_{ROW,t}\right) + \varepsilon_t, \qquad \varepsilon_t \sim N(0, W) \tag{1}$$

The state equations are specified as follows:

$$\alpha_t = \alpha_{t-1} + \xi_t, \qquad \xi_t \sim N(0, Q)$$
$$\beta_t = \beta_{t-1} + \mu_t, \qquad \mu_t \sim N(0, V) \tag{2}$$

Where $r_{SA,t}$ represents the South African lending rate, while $r_{ROW,t}$ refers to the lending rate of the US and China. Equation 2 makes it possible to measure the degree of credit market integration between Lesotho and South Africa, as well as determine which anchor rate plays a major role at a given point in time. Equation (1) is transposed in $r_{LES,t}$ to get:

$$r_{LES,t} = (1 - \beta_t)lnr_{SA,t} + \beta_t lnr_{ROW,t} - \alpha_t - \varepsilon_t \tag{3}$$

It can be seen from Equation (3) that as β_t approaches zero, the Lesotho lending rate would be increasingly determined by its South African counterpart rate. This would imply a high degree of credit market integration between Lesotho and South Africa. Conversely, as $\beta_t$approaches unity, the rest of the world-effect becomes dominant.

4.2.2 Modelling instability of credit in Lesotho and South Africa

4.2.2.1 Volatility of credit market pricing

A different specification of the Kalman Filter model is used to measure stochastic volatility of the lending rate for Lesotho and South Africa over the sample period. In this case, stochastic volatility is estimated to measure the evolution of instability of credit market pricing using time-varying measure of volatility. Following Francois-Eric and Raymond (2010), the state-space model is specified as follows[3]:

$$\log(r_t^2) = -1.27 + \eta_0 + h_t + \zeta_t, \tag{4}$$
$$h_t = \lambda_0 + \lambda_1 h_{t-1} + \varepsilon_t \tag{5}$$

[3] See Biekpe and Motelle (2013) for further details on this model

Where $\log(r_t^2)$ is the log of the square of the lending rate at time t and h_t is the conditional volatility. Equation (4) is an observation (signal) equation and equation (5) is a measurement (state) equation. Biekpe and Motelle (2013) demonstrate that the Kalman filter estimation procedure follows three stages namely; forecasting, updating and estimation of parameters. The study estimates the state-space model given in equations (4) and (5).

4.2.2.2 Measuring credit market volatility

This study proceeds to use the second order autoregressive process augmented with the inclusion of a trend variable to estimate the volatility of credit. This technique is more appropriate for estimating volatility in cases of low-frequency time series data (Lensink and Morrissey, 2000). *First*, this study uses annual data from 1980 to 2013 to estimate the following second order autoregressive process with a time trend:

$$Cred_t = \alpha + \lambda Cred_{t-1} + \alpha Cred_{t-2} + \beta T + \xi_t \quad (6)$$

Where, $Cred$ represents private sector credit at time t and T is the time trend. ξ_t is the residual. *Second*, credit uncertainty is measured for each period t as the standard deviations of the residuals of equation 6. This volatility measure is able to separate simple variation from uncertainty and purely captures unanticipated changes in credit.

4.2.3 Seemingly unrelated regression (SUR) technique

4.2.3.1 Model specification

In order to estimate the determinants of credit growth and its volatility, the following model is specified:

$$fis_{it} = \omega_0 + \beta_{it} DF_{it} + \alpha_{it} X_{it} + \varepsilon_{it} \quad (7)$$

Where DF_{it} and X_{it} is a vector of domestic and foreign factors, respectively (See Appendix 1 for description of variables). Equation 7 is estimated using SUR. The SUR approach pioneered by Zellner (1962) is based on the generalised least squares (GLS) estimation technique. The choice of this technique is justified by three reasons. First, unlike other approaches, SUR does not assume homogeneity in the country-specific parameters. This makes it easy to extract coefficients that apply to individual countries in the sample instead of giving equal weighting to all countries regardless of their differences. In this way, the differing degrees of economic and financial development

across countries can easily be accounted for. Second, most panel data methods, especially non-stationary panel data methods, presume independence across equations. Baltagi (2001) indicates that this is a very restrictive assumption which holds only in extreme cases. The SUR approach is unique due to its assumption of contemporaneous correlation in the disturbances (Revankar, 1974)[4]. Hence, SUR estimator allows for robust analysis of inter-linkages inherent in the macroeconomic and financial data for both Lesotho and South Africa. Furthermore, the estimates from the joint estimation approach are asymptotically more efficient. Third, Westerlund (2007) indicates that this approach is appropriate when the cross-sectional dimension N is of a smaller order than the time series dimension T, i.e. $N < T$. This condition ensures that the covariance matrix of the regression errors is not rank deficient

4.2.3.2 Step-wise estimation procedure

The study adopts a three-step procedure in the estimation of equation 7. *First*, the panel unit root properties of the data are studied. In this step three first generation panel unit root tests such as Levin and Lin (1992), Levin and Lin and Chu (2002), Im, Pesaran and Shin (2003), and Maddala and Wu (1999) tests are used[5]. In instances where the three tests yield contradictory results, a simple majority rule is used to formulate the decision for individual series. *Second*, the Breusch and Pagan (1980) Lagrange multiplier test is performed to test for contemporaneous correlation. This test shows that SUR can be appropriately applied to estimate equation 7 because of the evidence of contemporaneous correlation between the residuals (see Appendix 4). *Third*, the SUR technique is applied to estimate equation 6.

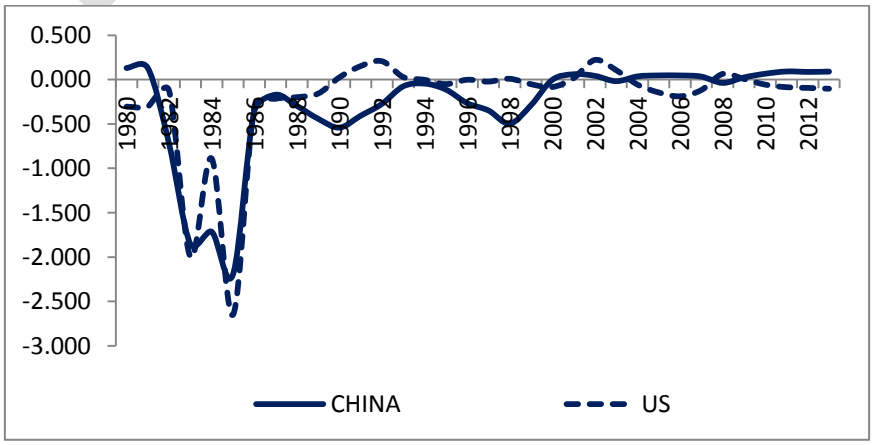
[4] Zellner (1962) demonstrated that if contemporaneous correlation is present, then estimating the whole system jointly yields more efficient parameters than applying Ordinary Least Squares to each equation.
[5] Refer to Appendix 3D for technical notes

5. DATA ANALYSIS AND DISCUSSION OF FINDINGS

5.1 Credit market integration between Lesotho and South Africa

Credit market integration between Lesotho and South Africa is measured using a time-varying measure of integration embedded in the international capital pricing model. The estimation technique used is the Kalman filter which requires that data should be stationary. The study employs the Augmented Dickey Fuller (ADF) test to study the unit root properties of the data. The results show that all the lending interest rate spreads, namely; the spread between the lending interest rate in Lesotho and South Africa, the spread between the South African and Chinese lending rates and the spread between the lending rate in South Africa and US, are integrated of order zero, that is, they are I(0) stationary (Appendix 4). Therefore, all variables are used in levels to compute the time-varying credit market integration. Figure 4 provides a graph of the time-varying measure of credit market integration between South Africa and Lesotho, that is, β_t in equation 3. The evidence shows that integration between the credit markets in the two countries is very deep. This is reflected by the fact that the value of β_t hovers very closely around zero. There is no evidence of credit market integration between 1982 and 1985 because $\beta_t < 0$. In addition, the results suggest no credit market integration between Lesotho, China and the US. This is reflected by the few instances where β_t is slightly greater than zero. The key message from Figure 1 is that developments in the pricing of loanable funds in South Africa would most likely influence pricing of credit in Lesotho. Evidently, changes in the South African monetary policy stance would affect the cost of borrowing in both countries.

Figure 4: Dynamics of credit market integration

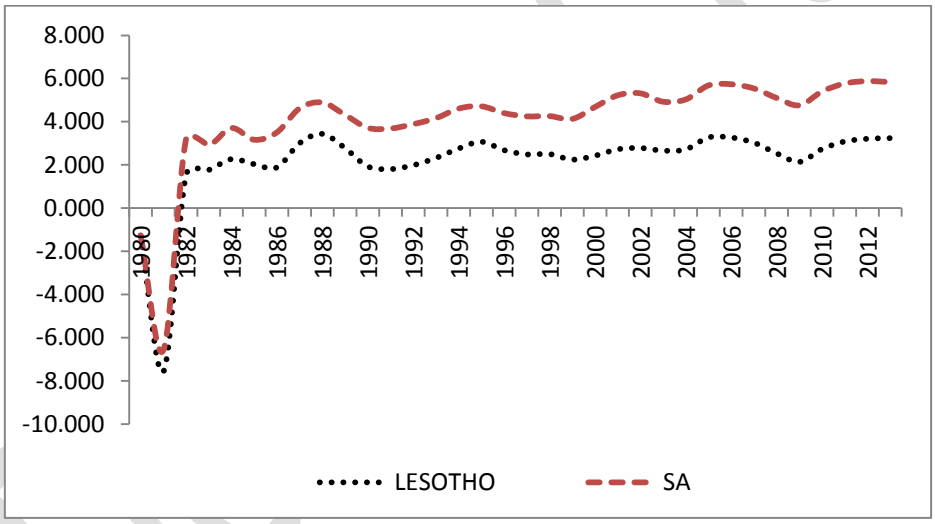


Source: Computed by the author using data from the WDI database

5.2 Stochastic volatility of credit in Lesotho and South Africa

The volatility of lending rates is not high for both Lesotho and South Africa. Figure 5 shows that the level of lending rates volatility is higher in South Africa than in Lesotho. This indicates that a shock to lending rates results in a higher volatility of lending rates in South Africa than Lesotho. Even though there is evidence of a sharp decline in volatility from 1980 to 1981 and a subsequent sharp increase from 1981 to 1982, the prime lending rates become rather stable from 1983. Over time, volatility in the two countries tends to follow an sluggish upward trend. In addition, the pattern of volatility in the two countries is fairly similar which suggests a high pass-through between the two rates.

Figure 5: Stochastic volatility of lending rates



Source: Computed by the author using data from the WDI database

5.3 Determinants of financial instability in Lesotho and South Africa

5.3.1 Unit root results

The results show that the dependent variable - credit volatility - is integrated of order zero, that is, I(0) stationary. Similarly, some independent variables such as the logarithm of the inflation rate, the deposit rate, real exchange rate and the ratio of FDI flows to GDP are I(0) stationary. However, the rest of the independent variables are integrated of the first order, i.e. I(1). Thus all I(0) variables are included in the

estimations at their levels while first differences of all I(1) variables are utilised (Appendix 5).

5.3.2 Discussion

The volatility of credit depends on a number of internal and external factors which may have either an accelerating-effect or moderating-effect. The results on the determinants of credit volatility are reported in Tables 1 and 2. This subsection discusses the findings and their implications for financial stability in Lesotho.

5.3.2.1 *Internal drivers of credit volatility*

There two categories of internal drivers of credit volatility considered in the study, namely; real and monetary factors. In the first category, the inflation rate and the growth rate of GDP per capita are considered. The growth rate in GDP per capita tends to fuel credit volatility in Lesotho and South Africa even though, in general, the effect is statistically insignificant in Lesotho. Sustained growth in GDP per capita improves borrowers' ability to service debt and reduces repayment risk. Low repayment risk encourages banks to intensify their lending efforts while a higher ability to service debt improves the willingness to borrow. Thus increasing per capita GDP may increase the demand for credit. The results show that rapid growth in per capita GDP is associated with higher volatility of credit even though this accelerating-effect is statistically significant in Lesotho when monetary variables are included in the model.[6] This finding implies that the cyclicality of real GDP influences financial stability through credit volatility. That is, economic buoyancy in Lesotho may foster a credit boom, while a recession may precipitate a credit bust.

Table 1 shows that the inflation rate has a significant negative impact on credit volatility, even though when monetary variables are included the effect becomes insignificant. The link between inflation and domestic credit works through real interest rates. That is, as inflationary pressures built up in the economy, they exert downward pressure on real interest rates. As a result, falling real interest rates improve the appetite

[6] In South Africa, the effect is also positive and consistently statistically significant.

to borrow and boost domestic credit (Bakker and Gulde, 2010). Nevertheless, to the extent that inflation remains low and stable, inflation tends to have a *moderating-effect* on credit volatility. This means that even though domestic credit may rise as inflation increases, a low and stable inflation environment enhances planning and eliminates uncertainty thereby moderating credit volatility. Since the adoption of inflation targeting regime in South Africa, inflation has remained subdued, generally in single-digit levels. As a result of the rand-loti parity, inflation targeting has been an effective nominal anchor for domestic monetary policy implementation which has nurtured a low and stable inflation environment in Lesotho with a moderating-effect on credit volatility.

The second category of internal drivers of credit volatility includes lagged ratio of credit to the private sector to GDP, real interest rates, lagged deposit rates and domestic money supply. The first two factors, that is, lagged ratio of credit to the private sector to GDP and real interest rates have an accelerating-effect on credit volatility. First, the findings reveal that the lag of private sector credit to GDP ratio has an accelerating effect on credit volatility even though the effect is not statistically significant in both Lesotho and South Africa. This shows that past volumes of credit extension influence current volatility of credit through momentum accumulated periodically in the process of lending. Second, the results tend to suggest that real interest rates have an accelerating-effect on credit volatility. Real interest rates affect credit volatility through their impact on monetary conditions in the economy. High real interest rates indicate a tight monetary policy stance and imply a credit-squeeze (Gozgor, 2014).

Local monetary conditions are also affected by deposit rates and domestic money supply. For example, deposit rates have a moderating-effect on credit volatility. A hike in deposit rates would increase the pool of loanable funds and accelerate domestic credit growth. However, the increase in deposit rates may be accompanied by an increase in lending rates which would dampen the demand for credit. As a result, a change in deposit rates may have offsetting effects on domestic credit. Therefore, the consequent change in credit would depend on a dominant effect. The results show that the increase in deposit rates in Lesotho and South Africa is usually too small to disrupt lending patterns. In fact, as the findings show an increase in deposit rates is good for financial stability because it reduces credit volatility.

Table 1: Determinants of Credit Volatility: Without monetary variables

	I		*II*		*III*		*IV*		*V*	
	Lesotho	*SA*	*Lesotho*	*SA*	*Lesotho*	*SA*	*Lesotho*	*SA*	*Lesotho*	*SA*
$Constant$	-4.771**	-7.355***	11.507***	14.706**	1.105	-0.073	1.399	0.818	1.019	0.146
	(0.011)	(0.063)	(0.053)	(0.010	(0.107)	(0.892)	(0.109)	(0.180)	(0.150)	(0.808)
inf_{t-1}	-0.937*	-0.482***	-0.946**	-0.213	-0.494***	0.035	-0.576***	-0.462	-0.458	-0.067
	(0.002)	(0.099)	(0.016)	(0.360)	(0.094)	(0.884)	(0.092)	(0.131)	(0.133)	(0.800)
$GDPKG_{t-1}$	0.104	0.208**	0.118	0.23**	0.15	0.265**	0.131	0.256**	0.165***	0.237**
	(0.203)	(0.038)	(0.202)	(0.022)	(0.101)	(0.010)	(0.182)	(0.016)	(0.090)	(0.032)
$Crisis$	0.678	0.336	0.817	0.526	0.041	0.354	0.146	0.351	0.086	0.121
	(0.159)	(0.500)	(0.197)	(0.282)	(0.932)	(0.463)	(0.773)	(0.486)	(0.862)	(0.823)
$REER$	1.392*	1.803***								
	(0.001)	(0.050)								
$FORM$			-2.306***	-3.329**						
			(0.078)	(0.011)						
$SPREAD$					0.458***	-0.937**				
					(0.062)	(0.029)				
FDI							-0.082	-0.202***		
							(0.507)	(0.069)		
$Open$									-3.101	1.472
									(0.298)	(0.599)
n	32	32	32	32	32	32	32	32	32	32
R^2	0.33	0.21	0.24	0.29	0.23	25	0.18	0.22	0.18	0.14
BP $X^2(1)$	3.288***	3.288***	0.208	0.208	0.739	0.739	0.159	0.159	0.495	0.495
	(0.070)	(0.070)	(0.649)	(0.649)	(0.390)	(0.390)	(0.690)	(0.690)	(0.482)	(0.482)

*All I(1) stationary variables have been used in their first differences. BP test indicates that models II to V can also be estimated using ordinary least squares (OLS) technique. (*), (**) and (***) denote 1, 5 and 10 percent level of statistical significance, respectively.

5.3.2.2 *External drivers of credit volatility*

Table 1 also shows that when monetary variables are excluded from the estimations, external factors such as real exchange rate, foreign money supply, lending rate spreads and foreign direct investment flows have a statistically significant effect on credit volatility[7]. The results for the real exchange rate remain robust even when monetary variables are included in the estimations. *First*, the magnitude of lending rates spread has an *accelerating-effect* on credit volatility. Financial integration facilitates borrowing from abroad. As a result, if foreign interest rates are lower than local rates, banks can borrow cheap from abroad and lend at higher domestic rates. Thus a rise in the spread in favour of local rates would boost the volume of domestic credit. The results show that the lending-rate-spread-credit relationship implies that expansion of the spread accelerates credit volatility in Lesotho. Since the lending rate in South Africa is lower than that in Lesotho, local commercial banks can boost their credit book by borrowing from abroad to fund domestic investment. When this happens, the volatility of credit in Lesotho would remain vulnerable to dynamics of the lending rate spread. *Second*, financial integration potentially exposes Lesotho to adverse shocks emanating from its main trade partners such as South Africa and the United States of America. Consequently, the domestic credit cycle remains vulnerable to external shocks (Aisen and Franken, 2010). This *accelerating-effect* on credit volatility is evident from the results because the 2007 global financial crisis bears a positive sign albeit statistically insignificant in most of the estimations.

Third, real effective exchange rate is statistically significant and bears a positive sign. Borio et al. (2011) show that an appreciation of local currency has a tendency to dampen domestic credit. In a similar vein, the results of the current study indicate that sharp exchange rate appreciations may bolster credit busts thereby magnifying credit volatility. This finding underscores the need for formulation and implementation of sound exchange rate policies to achieve stable exchange rates. In the context of Lesotho, this may warrant collaborative efforts with South Africa within the auspices of the common monetary area (CMA) agreement. *Fourth*, financial integration also allows for free flow of capital between Lesotho and other countries. Table 1 shows that foreign direct investment (FDI) flows moderate credit volatility even though the effect is insignificant

[7] However, when monetary variables are included in the model, all external factors with the exception of real exchange rates become insignificant (See Appendix 8).

in Lesotho. Lane and McQuade (2013) find that as FDI increases, domestic credit also improves. Since FDI-inflows are putty in nature, they do not harm financial stability because they are not subject to sudden stops and abrupt reversals.

The *fifth* factor is monetary policy conduct in neighbouring South Africa which has a bearing on credit extension in Lesotho. For example, Elekdag and Wu (2011) find that an increase in foreign money supply is associated with domestic credit expansion. Nevertheless, the results show that a rise in foreign money supply in South Africa would moderate credit volatility in Lesotho. This supports the fact that good foreign monetary policy implementation does not disrupt domestic lending mechanics and augurs well for financial stability. This moderating-effect is foregone if monetary policy is poor and disruptive. This emphasises the value of conducting effective monetary policy within a common framework when two countries are financially integrated.

Table 2: Determinants of Credit Volatility: Including monetary variables

	I		*II*	
	Lesotho	*SA*	*Lesotho*	*SA*
$Constant$	-3.856***	-8.784**	-7.579*	-5.415
	(0.065)	(0.011)	(0.003)	(0.160)
$Privcred_{t-1}$	0.75	1.339	0.357	2.614
	(0.317)	(0.461)	(0.606)	(0.206)
ri	0.211***	-0.026	0.202***	-0.019
	(0.068)	(0.763)	(0.060)	(0.852)
DOM	-1.095	0.108	-0.842	2.592
	(0.532)	(0.968)	(0.607)	(0.388)
Dr_{t-1}			-1.112**	-0.249
			(0.014)	(0.567)
inf_{t-1}	-0.290	-0.856*		
	(0.338)	(0.001)		
$GDPKG_{t-1}$	0.252**	0.237**	0.221**	0.236**
	(0.011)	(0.012)	(0.017)	(0.028)
$Crisis$	0.567	0.534	0.928***	0.224
	(0.285)	(0.232)	(0.078)	(0.658)
$REER$	0.907**	2.272*	1.974*	1.289
	(0.045)	(0.004)	(0.002)	(0.159)
n	32	32	32	32
R^2	0.19	0.37	0.30	0.16
BP $X^2(1)$	2.791***	2.791***	3.172***	3.172***
	(0.095)	(0.095)	(0.075)	(0.075)

**All I(1) stationary variables have been used in their first differences. Due to high correlation between inflation rate and deposit rates, model-I excludes the deposit rate while model-II excludes inflation rate. The BP test indicates that SUR is the right technique to estimate models I and II. (*), (**) and (***) denote 1, 5 and 10 percent level of statistical significance, respectively.*

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

The study set out to test the hypothesis that the determinants of credit growth especially foreign factors are also determinants of credit volatility. The results cannot reject this hypothesis and make several revelations. *First*, the results show that rapid growth in per capita GDP is associated with higher volatility of credit even though this accelerating-effect is statistically significant in Lesotho when monetary variables are included in the model. This finding implies that the cyclicality of real GDP influences financial stability through credit volatility. That is, economic buoyancy in Lesotho may foster a credit boom, while a recession may precipitate a credit bust. *Second*, inflationary pressures exert downward pressure on real interest rates boost domestic credit. Nevertheless, to the extent that inflation remains low and stable, inflation tends to have a *moderating-effect* on credit volatility. *Third*, the results tend to suggest that real interest rates have an accelerating-effect on credit volatility through their impact on monetary conditions in the economy. High real interest rates indicate a tight monetary policy stance and imply a credit-squeeze.

Moreover, three external factors are important for credit volatility. *First*, the expansion magnitude of lending rates spread has an *accelerating-effect* on credit volatility through its positive effect on the volume of domestic credit. *Second*, real effective exchange rate is statistically significant and bears a positive sign which imply that sharp exchange rate appreciations may bolster credit busts thereby magnifying credit volatility. *Third*, the results show that a rise in foreign money supply in South Africa would moderate credit volatility in Lesotho. This underscores the fact that good foreign monetary policy implementation does not disrupt domestic lending mechanics and augurs well for financial stability.

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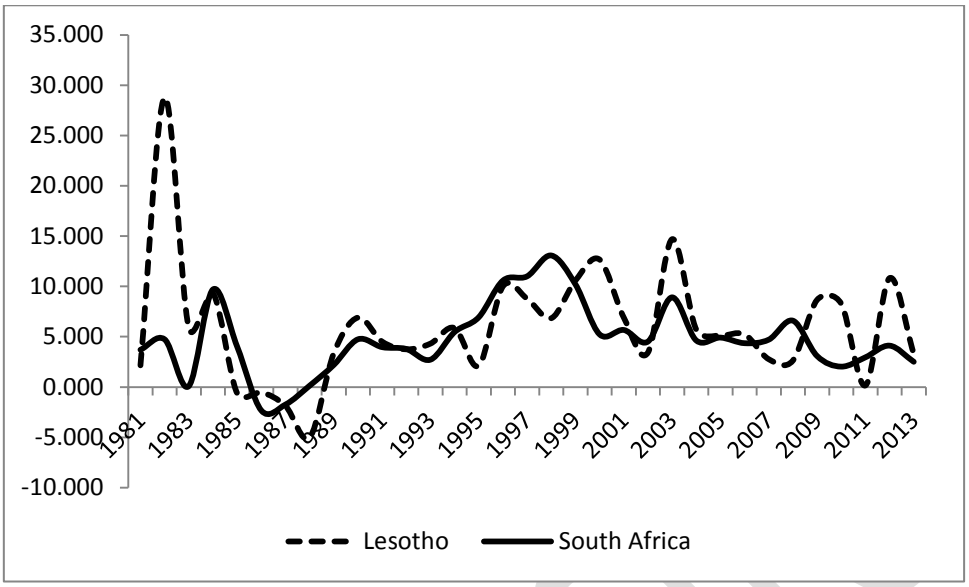
LIST OF APPENDICES

Appendix 1: Description of variables

Category	*Variable*	*Description*
Dependent variable	$Credvol_t$	Volatility of credit
Domestic Factors		
Real economy	$GDPKG_{t-1}$	GDP per capita
	inf_{t-1}	Inflation rate
Monetary policy	Dr_{t-1}	Deposit rates
	ri_{t-1}	Real interest rates
	DOM_{t-1}	Lag of M2 to GDP ratio
Foreign Factors		
External environment	$FORM_t$	Foreign money supply. In estimating the determinants of credit volatility in Lesotho, the South African money supply is used while the US money supply is used to study the determinants of credit volatility in South Africa.
	$REER_t$	Real exchange rate between loti/rand and US dollar
	$OPEN_t$	Ratio of the sum of real imports and exports to GDP
	$CRISIS_t$	Dummy variable for the 2007 global financial crisis
Financial integration	FDI_t	Ratio of net FDI flows to GDP
	$SPREAD_t$	Lending rate spread. In the case of Lesotho the spread is computed relative to South Africa while in the spread is computed relative to the US.

Appendix 2: Real interest rates



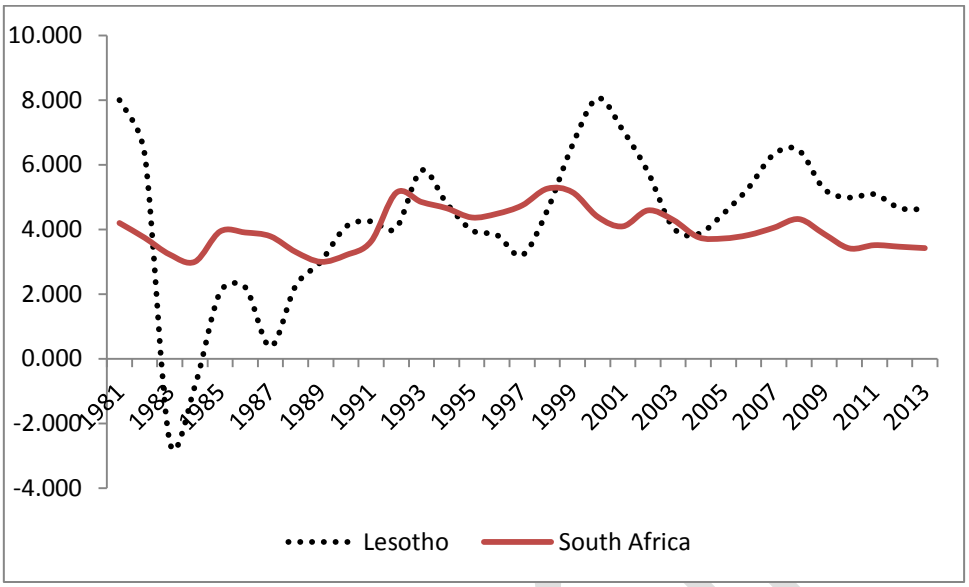
Source: World Development Indicators, 2014

Appendix 3: Time series unit root test results

Variable	***ADF-Stat***	***Decision***
Lesotho-South Africa Spread	-4.123** (0.014)	I(0)
China-South Africa Spread	-4.074** (0.016)	I(0)
US-South Africa Spread	-5.375* (0.001)	I(0)
Log of Lesotho prime lending rate	-3.323*** (0.081)	I(0)
Log of Lesotho prime lending rate	-3.583** (0.047)	I(0)

(*), (**) and (***) denote 1, 5 and 10 percent level of statistical significance. All variables are integrated of order zero.

Appendix 4: Risk premium



Source: World Development Indicators

Appendix 5: Panel data unit root test results

	Level			*First difference*			*Result*
	LLC	*IPS*	*ADF-F*	*LLC*	*IPS*	*ADF-F*	
Credvol	-4.411*	-5.090*	26.782*				I(0)
	(0.000)	(0.000)	(0.000)				
Inf	-4.223*	-3.547*	18.736*				I(0)
	(0.000)	(0.000)	(0.001)				
GDPKG	-0.244	-0.813	4.686	-11.957*	-13.251*	185.193*	I(1)
	(0.404)	(0.208)	(0.321)	(0.000)	(0.000)	(0.000)	
Dr	-4.891*	-2.953*	15.788*				I(0)
	(0.000)	(0.002)	(0.003)				
ri	0.356	0.010	3.858	0.986	-5.919*	34.676*	I(1)
	(0.639)	(0.504)	(0.426)	(0.838)	(0.000)	(0.000)	
DOM	-0.188	-0.113	3.271	-3.982*	-3.261*	16.587*	I(1)
	(0.426)	(0.455)	(0.514)	(0.000)	(0.001)	(0.002)	
FORM	0.209	1.013	1.294	-4.695*	-3.129*	15.873*	I(1)
	(0.583)	(0.845)	(0.862)	(0.000)	(0.001)	(0.003)	
REER	-2.045**	-1.355***	7.808***				I(0)
	(0.021)	(0.088)	(0.099)				
Open	-0.894	-0.520	4.398	-4.598*	-4.131*	21.540*	I(1)
	(0.186)	(0.301)	(0.355)	(0.000)	(0.000)	(0.000)	
FDI	-3.066*	-2.482*	12.802**				I(0)
	(0.001)	(0.007)	(0.012)				
Spread	-0.945	-0.455	5.714	-7.855*	-8.015*	48.680*	I(1)
	(0.172)	(0.325)	(0.222)	(0.000)	(0.000)	(0.000)	

(*), (**) and (***) denote 1, 5 and 10 percent level of statistical significance. The dependent variable – credit volatility – is I(0) stationary and the explanatory variables are a mixture of I(1) and I(0).

Appendix 6: Descriptive statistics

	DOM	*DR*	*FDI*	*FORM*	*GDPG*	*INF*	*OPEN*	*CREDVOL*	*REER*	*RIR*	*SPREAD*
Mean	3.89	2.17	0.18	4.19	0.55	2.19	-0.09	3.67	4.80	1.44	1.12
Median	3.946	2.262	0.246	4.231	0.862	2.221	-0.033	3.631	4.726	1.556	1.312
Maximum	4.441	2.937	3.562	4.504	1.924	3.521	0.723	5.121	5.291	3.360	2.598
Minimum	3.394	0.991	-5.963	3.847	-2.694	0.326	-1.102	1.855	3.991	-2.478	-1.163
Std. Dev.	0.274	0.477	1.943	0.174	1.082	0.533	0.717	1.061	0.325	1.045	1.008
Skewness	0.088	-0.576	-0.704	-0.099	-1.414	-0.546	-0.099	-0.036	0.075	-1.750	-0.217
Kurtosis	2.235	2.663	3.728	1.886	4.482	3.968	1.168	1.414	1.959	7.248	1.909
Jarque-Bera	1.745	4.083	7.122	3.629	28.881	6.032	9.616	7.145	3.132	85.810	3.909
Probability	0.418	0.130	0.028	0.163	0.000	0.049	0.008	0.028	0.209	0.000	0.142
Sum	264.430	147.329	12.066	284.778	37.731	148.999	-6.212	249.644	326.101	98.027	76.430
Sum Sq. Dev.	5.030	15.276	252.985	2.025	78.498	19.002	34.415	75.372	7.091	73.210	68.070
Observations	68	68	68	68	68	68	68	68	68	68	68

Appendix 7: Correlation Analysis

	Credvol	*inf*	*GDPKG*	*Dr*	*ri*	*DOM*	*FORM*	*REER*	*Open*	*FDI*	*Spread*	*Privcred*
Credvol	1.00											
inf	-0.167	1.00										
	(0.174)											
GDPKG	0.03	-0.143	1.00									
	(0.809)	(0.246)										
Dr	-0.002	0.505*	-0.216***	1.00								
	(0.991)	(0.000)	(0.076)									
ri	0.066	-0.149	-0.036	0.009	1.00							
	(0.593)	(0.225)	(0.770)	(0.939)								
DOM	0.058	-0.116	-0.108	0.317*	-0.133	1.00						
	(0.639)	(0.348)	(0.380)	(0.009)	(0.280)							
FORM	-0.087	-0.364*	0.143	-0.273**	-0.190	0.455*	1.00					
	(0.483)	(0.002)	(0.245)	(0.024)	(0.121)	(0.000)						
REER	0.156	0.437*	0.003	0.377*	-0.033	-0.162	-0.743*	1.00				
	(0.206)	(0.000)	(0.980)	(0.001)	(0.788)	(0.188)	(0.000)					
Open	0.010	0.015	0.062	-0.428*	0.145	-0.655*	-0.536*	0.327*	1.00			
	(0.937)	(0.904)	(0.617)	(0.000)	(0.238)	(0.000)	(0.000)	(0.007)				
FDI	-0.058	-0.310**	0.007	-0.388*	0.231***	-0.397*	-0.111	-0.110	0.643*	1.00		
	(0.64)	(0.010)	(0.954)	(0.001)	(0.058)	(0.001)	(0.366)	(0.373)	(0.000)			
Spread	0.013	-0.107	-0.134	0.423*	0.025	0.650*	0.459*	-0.361*	-0.875*	-0.521*	1.00	
	(0.916)	(0.385)	(0.278)	(0.000)	(0.838)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)		
Privcred	0.139	-0.202***	-0.113	0.368*	-0.068	0.809*	0.489*	-0.366*	-0.892*	-0.463*	0.845	1.00
	(0.26)	(0.099)	(0.361)	(0.002)	(0.581)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	

(*), (**) and (***) denote level of statistical significance at 1, 5, and 10 percent level

Appendix 8: Determinants of Credit Volatility: Including monetary variables

	I		*II*		*III*		*IV*		*V*	
	Lesotho	*SA*	*Lesotho*	*SA*	*Lesotho*	*SA*	*Lesotho*	*SA*	*Lesotho*	*SA*
$Constant$	-3.856***	-8.784**	0.109	1.066***	-0.367	0.672	-0.062	1.369*	-0.163	0.968***
	(0.065)	(0.011)	(0.875)	(0.053)	(0.592)	(0.223)	(0.943)	(0.007)	(0.807)	(0.077)
$Privcred_{t-1}$	0.75	1.339	0.710	0.65			0.683	-0.776		
	(0.317)	(0.461)	(0.357)	(0.755)			(0.382)	(0.684)		
ri	0.211***	-0.026	0.168	-0.031	0.099	0.002	0.160	-0.003	0.164	-0.039
	(0.068)	(0.763)	(0.167)	(0.752)	(0.390)	(0.982)	(0.196)	(0.974)	(0.141)	(0.701)
DOM	-1.095	0.108	-0.245	0.376			-0.578	3.820		
	(0.532)	(0.968)	(0.896)	(0.907)			(0.762)	(0.225)		
inf_{t-1}	-0.290	-0.856*	-0.045	-0.493**	0.157	-0.317	0.024	-0.795*	0.064	-0.456***
	(0.338)	(0.001)	(0.881)	(0.049)	(0.599)	(0.210)	(0.943)	(0.001)	(0.826)	(0.064)
$GDPKG_{t-1}$	0.252**	0.237**	0.262**	0.246**	0.226**	0.252**	0.256**	0.242**	0.268**	0.239**
	(0.011)	(0.012)	(0.013)	(0.023)	(0.026)	(0.014)	(0.016)	(0.013)	(0.011)	(0.024)
$Crisis$	0.567	0.534	0.152	0.27	0.109	0.284	0.153	0.591	0.115	0.100
	(0.285)	(0.232)	(0.761)	(0.622)	(0.826)	(0.546)	(0.768)	(0.195)	(0.817)	(0.842)
$REER$	0.907**	2.272*								
	(0.045)	(0.004)								
$FORM$			-2.434	-3.934						
			(0.458)	(0.420)						
$SPREAD$					0.401	-0.734				
					(0.143)	(0.110)				
FDI							-0.006	-0.289*		
							(0.962)	(0.005)		
$Open$									-3.85	0.977
									(0.203)	(0.711)
n	32	32	32	32	32	32	32	32	32	32
R^2	0.19	0.37	0.18	0.25	0.19	0.29	0.16	0.39	0.17	0.24

*All I(1) stationary variables have been used in their first differences. Due to high correlation between inflation rate and deposit rates, deposit rates have been excluding in the estimations. (*), (**) and (***) denote 1, 5 and 10 percent level of statistical significance, respectively.