



TEST OF THE BANK LENDING CHANNEL FOR A BRICS COUNTRY

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ABSTRACT

Based on a simultaneous-equation model of loan demand and loan supply and applying the three-stage least squares method, this paper finds that loan demand is negatively affected by the lending rate and positively associated with manufacturing production and the inflation rate and that loan supply is positively influenced by the lending rate, bank deposits, and the nominal effective exchange rate and negatively affected by the government bond yield and the policy rate. The bank lending channel is confirmed for South Africa as expansionary monetary policy such as a lower policy rate or open market purchases of government bonds would reduce the cost of borrowing by banks and increase bank deposits/reserves.

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1. INTRODUCTION

During the 2008-2009 financial crisis, bank loans and advances in South Africa declined from 1,874,177 million rand in 2008.M11 to a low of 1,843,062 million rand in 2009.M9. The financial crisis hit mortgage loans hard. New residential mortgage loans declined from a high of 39,511 million rand in 2007.M5 to a low of R 9,227 million rand in 2009.M1 or 76.65% before it picked up again. The South African Reserve Bank (SARB) had engaged in monetary easing to stimulate the economy. The policy rate dropped from a high of 12.00% in 2008.M4 to a low of 5% in 2013.M8, and the money market rate declined from a high of 11.80% in 2008.M11 to a low of 4.82% in 2013.M8.

The bank lending channel suggests that monetary policy would affect bank loan supply. Monetary easing leading to a lower interest rate reduces the cost of borrowings by banks and increase banks' incentives to make loans. Open market purchases of government bonds increase

banks deposits/reserves, providing banks with more excess reserves to make loans. The validity of the bank lending channel remains inconclusive. [Bernanke and Blinder \(1988\)](#), [Bernanke and Blinder \(1992\)](#), [Gertler and Gilchrist \(1994\)](#), [Bernanke and Gertler \(1995\)](#), [Peek and Rosengren \(1995\)](#), [Kashyap *et al.* \(1993\)](#), [Kashyap and Stein \(1995; 2000\)](#), and [Suzuki \(2004\)](#) argue or find support for the bank lending channel. On the other hand, [Romer and Romer \(1989\)](#), [Ramsey \(1993\)](#), [Oliner and Rudebusch \(1995\)](#), and [Morris and Sellon \(1995\)](#) raised doubts about the concept. There are several recent studies examining the bank lending channel or related subjects for South Africa or selected countries. [Sichei \(2005\)](#) finds support for the bank lending channel in South Africa. When the policy rate rises, bank loan supply and deposits decline. Large banks attract more deposits. Large and well capitalized banks can cushion the impacts of monetary tightening. [Lungu \(2007\)](#) finds support for the bank lending channel for South Africa. Bank loans drop in response to an increase in the policy rate after 2 quarters. The lending rate adjusts immediately following an increase in the policy rate.

[Pandit and Vashisht \(2011\)](#) studies monetary policy transmission mechanism for five African countries including South Africa. They show that bank credit and the policy rate have a negative relationship and that the credit channel and the interest rate channel are effective.

[Walker \(2012\)](#) finds evidence of the bank lending channel for five African countries as a group. Bank loan supply declines after the policy rate is raised. Large and well capitalized banks can cushion the impacts of monetary tightening. [Kapan and Minoiu \(2013\)](#) indicate that banks with strong balance sheets were able to maintain lending during the recent global financial crisis and that banks with less liquidity and more dependent on market funding lower loan supply than other banks.

[Gumata *et al.* \(2013\)](#) test all five channels of monetary policy transmission mechanism for South Africa. The interest rate channel is the most important one, followed by the exchange rate, expectation and credit channels. The asset price channel is rather weak.

On the other hand, [Ground and Ludi \(2006\)](#) cannot find support for the bank lending channel. Bank loans are demand-driven instead of supply-driven. In other words, bank loans are determined by consumer demand and not by bank loan supply. [Walker \(2012\)](#) shows that if each of five African countries is tested, the bank lending channel is not statistically significant.

This paper tests the bank lending channel for South Africa and has several major features. To identify bank loan supply, a simultaneous-equation model is formulated. To determine whether currency depreciation or appreciation or interest rate differentials may affect the supply of loanable funds, the exchange rate and the foreign interest rate are incorporated into the model. To avoid simultaneity bias and to correct for potential correlation among error terms in the simultaneous-equation system, the three-stage least squares method is applied in estimating regression parameters.

2. THE MODEL

Extending [Bernanke and Blinder \(1988; 1992\)](#), [Kashyap and Stein \(2000\)](#), [Kishan and Opiela \(2000\)](#), [Sichei \(2005\)](#), [Ground and Ludi \(2006\)](#), [Lungu \(2007\)](#), [Pandit and Vashisht \(2011\)](#), [Walker](#)

(2012), Kapan and Minoiu (2013), Gumata *et al.* (2013) and other studies, we can express the demand for and supply of bank loans in South Africa as:

$$LD = X(LR, BR, OP, IF) \quad (1)$$

$$LS = Y(LR, BR, DE, PR, EX, IF) \quad (2)$$

where

LD = demand for bank loans,

LS = supply of bank loans,

LR = the lending rate,

BR = the interest rate on bonds,

OP = output,

IF = the inflation rate,

DE = bank deposits,

PR = the policy rate, and

EX = the nominal effective exchange rate (An increase means appreciation of the rand.).

More bank deposits result in more excess reserves that banks can consider to increase loan supply (Bernanke and Blinder, 1988). The policy rate has been used by the central bank as a major monetary policy instrument (Bernanke and Blinder, 1992; Kashyap and Stein, 2000; Kishan and Opiela, 2000; Vera, 2012).

The demand for bank loans is expected to have a negative relationship with the lending rate and a positive relationship with the interest rate on bonds, output, and the inflation rate. The supply of bank loans is expected to have a positive relationship with the lending rate and bank deposits and a negative relationship with the interest rate on bonds, the policy rate, and the inflation rate. When the central bank lowers the policy rate, the cost of borrowing by banks decreases, and banks would have more incentives to increase loan supply.

The exchange rate plays an important role in monetary policy transmission mechanism (Sims, 1992; Peersman, 2004; Suzuki, 2004; Zanforlin, 2011). As the South African rand appreciates, international lenders may reduce loan supply due to a higher cost of exchanging for the rand or a worse financial position caused by less revenue from exports or may increase loan supply because of increased relative collateral values of domestic firms. These impacts of currency appreciation on bank loan supply can be summarized as:

$$\partial LS / \partial EX = \left(\frac{\partial LS}{\partial PF} \times \frac{\partial PF}{\partial EX} \right) + \left(\frac{\partial LS}{\partial EP} \times \frac{\partial EP}{\partial EX} \right) + \left(\frac{\partial LS}{\partial CV} \times \frac{\partial CV}{\partial EX} \right) > or < 0, \quad (3)$$

where PF, EP and CV stand for the preference for exchanging for the rand, exports, and collateral values, respectively.

According to comparative static analysis, the impact of a change in one of the exogenous variables on the equilibrium bank loan can be expressed as:

$$\partial \bar{L} / \partial OP > 0, \partial \bar{L} / \partial IR < 0, \partial \bar{L} / \partial DE > 0, \quad (4)$$

$$\partial \bar{L} / \partial BR = (-X_{BR} Y_{LR} + X_{LR} Y_{BR}) / |J| > or < 0, \quad (5)$$

$$\partial \bar{L} / \partial IF = (-X_{IF} Y_{LR} + X_{LR} Y_{IF}) / |J| > or < 0 \quad (6)$$

$$\partial \bar{L} / \partial EX = X_{LR} Y_{EX} / |J| > or < 0, \quad (7)$$

where $|J|$ is the Jacobian for the endogenous variables and has a negative sign.

3. EMPIRICAL RESULTS

The data were collected from the South African Reserve Bank and the *International Financial Statistics* published by the International Monetary Fund. Bank loans and bank deposits are measured in millions of the rand. To reduce multicollinearity, manufacturing production index is selected to represent output and has a base year in 2005. The nominal effective exchange rate is a trade-weighted exchange rate index. An increase means appreciation of the rand. The interest rate on bonds is represented by the government bond yield. The lending rate, the government bond yield, the policy rate, and the inflation rate are expressed as a percent. Except for the inflation rate which may have negative values, a log-log form is chosen so that the estimated coefficient is the elasticity. The sample ranges from 2001.Q4 to 2013.Q1 and has a total of 46 observations.

The cointegration test on the residuals is applied to determine whether the variables in equation (1) or (2) have a long-term stable relationship. Because the value of the test statistic is greater than the critical value in absolute values at the 5% level, these variables in equation (1) or (2) are cointegrated.

The three-stage least squares method is employed to estimate regression parameters. Table 1 presents estimated parameters, z values and other statistics. Due to the wrong sign of the government bond yield in loan demand and the insignificance of the coefficient of the inflation rate in loan supply, these two variables are deleted from the regressions.

As shown, in the regression of the demand for bank loans, 78.04% of the variation in loan demand can be explained by the three right-hand side variables. The estimated coefficients are significant at the 1% level. Loan demand is negatively affected by the lending rate and positively associated with manufacturing production and the inflation rate. Specifically, a 1% increase in the lending rate leads to a 1.9331% decline in bank loan demand. If manufacturing production rises 1%, bank loan demand will increase by 2.1604%. The significant positive coefficient of the inflation rate suggests that a higher inflation rate reduces the real cost of borrowing and increases the demand for bank loans.

Table-1. 3SLS Estimation of the Demand for and Supply of Bank Loans in South Africa

Log(demand for loans):	Coefficient	z value
Log(lending rate)	-1.9331	-9.00
Log(manufacturing production)	2.1604	3.38
Inflation rate	0.0927	6.15
Intercept	8.3648	2.62
R-squared	0.7804	
χ^2	165.07	
Log(supply of loans):	Coefficient	z value
Log(lending rate)	0.7476	3.64
Log(government bond yield)	-0.0985	-1.83
Log(bank deposits)	1.1118	51.75
Log(policy rate)	-0.3773	-2.66
Log(nominal effective exchange rate)	0.1727	3.70
Intercept	-2.9390	-4.54
R-squared	0.9968	
χ^2	13945.45	
Sample period	2001.Q4-2013.Q1	
Sample size	46	

Notes: Except that the coefficient of the government bond yield is significant at the 10% level, other estimated coefficients are significant at the 1% level.

In the regression of the supply of bank loans, the right-hand side variables can explain approximately 99.68% of the change in bank loan supply. Bank loan supply is positively influenced by the lending rate, bank deposits and the nominal effective exchange rate and negatively impacted by the government bond yield and the policy rate. The estimated coefficient of 0.7476 for the lending rate is less than the coefficient of -1.9331 for the lending rate in absolute values in the loan demand regression. It suggests that bank loan supply is less sensitive to a change in the lending rate than bank loan demand. A 1 percent increase (decrease) in the policy rate is expected to reduce (increase) bank loan supply by 0.3773%. As the nominal effective exchange rate appreciates 1%, bank loan supply would increase by 1.7266%, implying that the positive impact of rand appreciation dominates the negative impacts. To test the robustness of the results, the ZAR/USD exchange rate is chosen to replace the nominal effective exchange rate in the bank loan supply equation. Its negative coefficient of -0.1136 is significant at the 1% level, and the estimated R-squared of 0.9967 is the almost the same as 0.9968 when the nominal effective exchange rate is

used in Table 1. The negative coefficient of the government bond yield is significant at the 2.5% level. The coefficient of the policy rate is estimated to be -0.3926, which is slightly higher than -0.3772 in absolute values reported in Table 1. To save the space, these results are not printed here and will be available upon request.

4. SUMMARY

This paper has examined the demand for and supply of bank loans and tested the bank lending channel for South Africa. A simultaneous-equation model is estimated by the three-stage least squares method. A lower lending rate, a higher manufacturing production, or a higher inflation rate would increase the demand for bank loans. A higher lending rate, a lower government bond yield, more bank deposits, a lower policy rate, or appreciation of the nominal effective exchange rate would increase the supply of bank loans. There is support for the bank lending channel in South Africa mainly because the coefficient of the policy rate has the negative sign and is significant at the 1% level. Monetary easing through open market purchases of government bonds by the central bank is expected to increase bank deposits/reserves and lead to more bank loan supply. There are several policy implications. If the South African Reserve Bank raises the policy rate in response to a stronger economy, bank loan supply will respond in the opposite direction. If the rand depreciates, negative impacts dominate positive impacts, and bank loan supply is expected to decline. In response to monetary tightening, banks may have other avenues to raise funds and maintain desired loan supply.

ENDNOTES

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