Determinants of private sector credit extension in South Africa: the role of house and equity prices

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Abstract

The paper investigates the determinants of growth in credit extension in South Africa in particular, the role of real house and equity prices. The research paper uses a cointegarated VAR approach. The results of the four models estimated, suggest the existence of a long run relationship linking real credit to economic growth, real interest rates, real house and equity prices. This implies that, developments in credit extension cannot be explained by standard credit demand factors alone. In fact the role of GDP is reduced when asset prices are included, in particular house prices.

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Keywords: credit extension, house prices, equity prices, cointegrated VAR.

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1. INTRODUCTION

The demand for credit and asset price dynamics have been at the centre of policy debates, particularly given the recent financial crisis showing that periods of prolonged lending and asset price booms have serious macroeconomic and financial stability consequences. Research has since been pre-occupied by the estimation of the determinants of the demand for credit and the role of asset prices.

Unlike money demand, credit demand in South Africa has not been studied extensively. This paper contributes to research on the determinants of credit extension in South Africa by including real house and equity prices in the credit demand function, thereby, assessing the relationship between credit demand, economic activity, real house and equity prices in a formal way.

The paper finds that long-run developments in the demand for real credit in South Africa can be explained by developments in real house and equity prices, over and above those in GDP and real interest rates.

The paper is structured as follows: section two looks at the empirical studies, section three briefly reviews some stylized facts, section four and five outline the econometric methodology and the theoretical specification, section six presents the data and the results, and lastly section seven concludes.

2. Empirical Studies

Vera, (2002) identifies four categories under which empirical studies on the determinants of credit fall:

Studies that estimate credit demand as system due to the endogeneity coming from the interest rate. This leads to the estimation of a system using two reduced equations i.e. one for credit demand and the other for the interest rate. In this regard studies by Melitz and Pardue, (1973); Heremas, et al. (1976), Catoa, (1997); Friedman and Knutter (1993); and Fase, (1995) are cited.

The equilibrium approach: those studies that assume from the onset that, the stock of loans is equivalent to the point of intersection of supply and demand and therefore estimate the determinants of credit under equilibrium conditions as opposed to a credit demand equation per se. As a result a single equation model (hence the simultaneous solution of credit supply and demand equations) is generated and supply and demand factors appear as explanatory variables. In this instance examples of work by Hendershott, (1968); Hicks, (1980); and Panagopoulos and Spiliotis, (1998) are mentioned.

The dis-equilibrium approach – where studies estimate the independent function of credit supply and demand using the maximum likelihood methodology. Thereafter, the estimated values are compared with actual data in trying to determine whether supply of demand constraints exist. Under this approach studies by Maddala and Nelson, (1974); Laffont and Garcia, (1977); Sealy, (1979); Blundell-Wingnal and Gizycki, (1992); Pazarbasioglu, (1997); Ghosh and Ghosh, (1999); Literas and Legnini, (2000); Barajas, Lopez and Oliveros, (2001); Barajas and Steiner, (2001).

Studies that estimate a demand curve via identification by parameter restriction (i.e. the separation of variables that affect the demand and supply sides of the market). The supporting assumption for this methodology is based on the fact that banks operate under imperfect market conditions and that credit to economic agents is given by the demand side of the market and the level of interest rates charged by banks. In this regard, studies by Goldfeld, (1969); Harris, (1976); Moore and Theadgold, (1985); Chuthbertson, (1985); Arestis, (1987); Arestis and

Biefang-Frisancho, (1995); Howell and Hussein, (1992); and Calza, Gartner and Souza, (2001) are mentioned.

On an aggregate level (i.e. aggregate credit extension), studies in the Euro Area by Vega, (1998); De Nederlandsche, (2000); Hoffman, (2001); Calza, Gartner and Souza (2001); Nicoletti-Altimari (2001), Calza, et al. (2003); show that there is a stable long-run relationship between the stock of credit to the private sector and macro-economic variables. Calza, et al., (2003) goes further to show that dis-equilibria in nominal loans has information about and can help to predict the medium-term outlook for inflation.

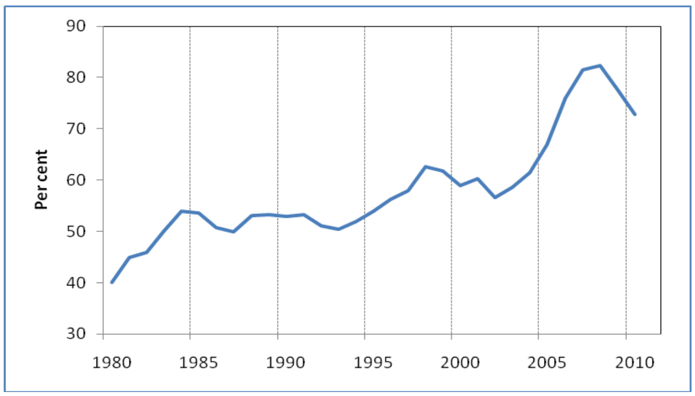
On a sectoral or disaggregated basis (by institutional sectors i.e. household and companies, in some instances a distinction is made between financial and non-financial companies), studies by De Brandt and Jacquinot, (1992); Odonnat, Grunspan and Verdelhan, (1997); Focarelli and Rossi, (1998); Panagopoulos and Spiliotis, (1998); Vega, (1989); Manrique and Saez, (1998); Hofmann, (2001); Jeanfils (2000); De Bandt et al. (2002); Fase et.al (1992), Van Els and Vlaar, (1996), have been conducted. Thomas, (1996) found that for the United Kingdom, the econometric analysis of money and credit at a sectoral level makes the interaction of these variables with interest rates and nominal economic activity much clearer as the determinants for these variables differ across sectors. Chrystal and Mizen, (2005) also find a stable credit equation using the household sector data.

This study draws on Hofmann (2001), in estimating all the models by means of a VECM technique in estimating the determinants of credit to the private sector as a function of real economic activity, real interest rates, real house and equity prices.

3. Credit extension, economic activity, property and equity prices

Figure 1 presents the credit-to-GDP ratio and shows that it has increased considerably over the years, particularly since 2003. The credit-to-GDP ratio roughly averaged 50 per cent in the period 1980 to 1989, 55 per cent between 1990 and 1999; and 69 per cent between 2000 and 2010.

Figure 1. Credit to GDP ratio



The main contributors to the substantial increase in the credit-to-GDP ratio over the years have notably been the liberalization of the financial sector, gradual exchange control relaxation, changes in the financial regulatory environment, changes in the corporate tax structure, innovation and technological advancement, the implementation of the Financial Sector Charter[1] and Black Economic Empowerment policies.

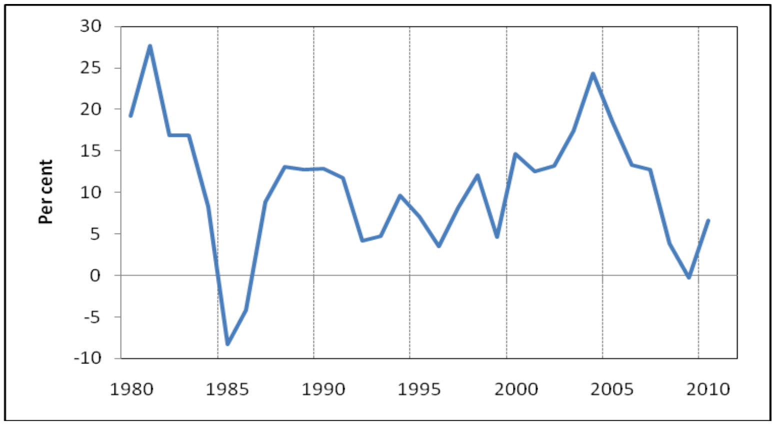
The trend displayed by the credit-to-GDP ratio coincided with substantial rise in house price growth as shown in figure 2, partly contributing to the significantly

[1] The implementation of the Charter has allowed greater access to financial markets, for the previously un-banked masses and has allowed for greater opportunities for borrowing and saving as well.

raised responsiveness of household consumption to housing wealth and collateral effects.

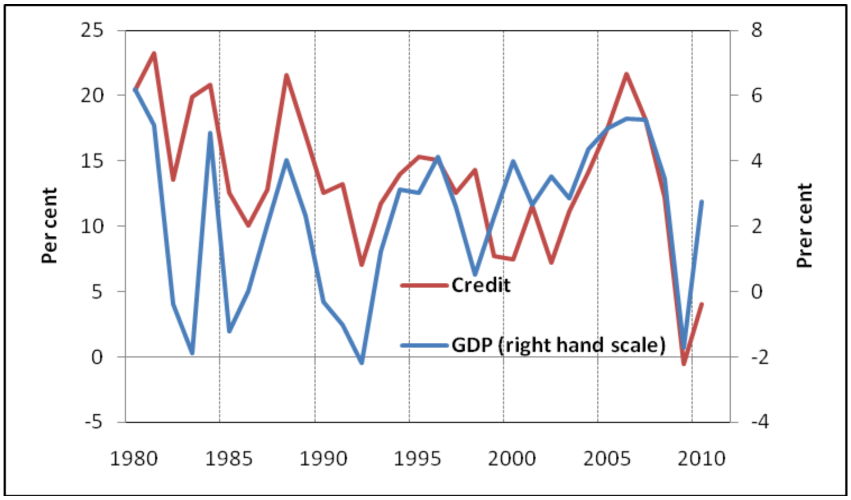
As shown in figure 2, nominal house price growth reached a recent peak in 2004 and has since decelerated. Nonetheless, the negative growth rates recorded recently are mild in comparison to rates experienced in the mid-1980s.

Figure 2. House price growth



It is generally accepted that financial conditions and developments have a significant impact on the economy; this is also evident on the trends displayed in figure 3. Endogenous growth models consider the interaction between economic agents and the output growth rate through their financial savings which can be intermediated towards investment in the form of both physical and human capital. Within growth models, financial intermediation and economic growth are not only linked with each other through costs of re-channelling savings but through the benefits of an effectively working financial sector.

Figure 3. Credit extension and GDP growth



The link between financial development and economic growth is mainly through the role the financial sector plays in the allocation of savings to productive enterprises, favouring economic efficiency and capital accumulation. It is in this context that credit growth can result in financial deepening and eventually economic growth (i.e. by easing financing constraints, increased bank lending can contribute to higher investment and consumption and ultimately a higher economic growth).

4. Econometric methodology

The estimation in the paper uses the Johansen-type vector error-correction model (VECM). The VECM methodology offers an essential testing tool to estimate time series models.

The motivation behind using a VECM approach is its ability to link cointegration provided by VARs and error-correction models (ECMs), thereby allowing for the investigation of both long-run and short-run dynamic relationships. Moreover, these models have capabilities to incorporate endogeneity i.e. the capability of handling a system where variables affect each other, therefore, capturing feedback effects within the transmission mechanism scenario.

The Johansen, (1988) cointegration procedure also allows the estimation of multiple long-run relationships between a set of non-stationary variables. Cointegration implies that certain linear combinations of the variables of the vector process are integrated of lower order than the process itself. Normally cointegrated variables are driven by the same persistent shocks such that when variables have common stochastic and deterministic trends, they show a tendency to move together in the long-run – hence these cointegrated relations are often interpreted as long-run economic steady state relations (Juselius, 2003).

With no weakly exongenous variables, a *k*-dimensional vector of *I(1)* variables cointegrated, y_t = [$y_{1t, \ldots,}$ y_{kt}]' system can be written in VAR (n) model form represented as:

$$Y_t = \sum_{i=l}^{n} A_i Y_{t-i} + v_t \qquad (1)$$

v_t= [v_{1t}, …, v_{kt}]' is a Gaussian white noise process. The A_i are (k x k) coefficient matrices and estimation is based on t =1, …, T from a set of t = 1-n, …, T. In equation (1) the I *(1)* variables are cointegrated of rank *(r)* if

$$A = l_k - A_1 - \ldots - A_n \qquad (2)$$

has rank *r* and all other roots are outside the unit circle. A VAR *(n-1)* process can be used where $r = 0$, Δy_t is *I(0)* but if $r = k$ then y_t is *I(0)*. A VAR represented in equation (1) can be transformed into error-correction form by subtracting y_{t-1} from both sides of the equation and further re-arranging the terms

$$\Delta y_t = \sum_{i=1}^{n-l} \Gamma_i \Delta y_{t-i} - \Pi y_{t-1} + v_t \qquad (3)$$

where, $\Pi = -(Ik - A_1 - \ldots - A_n)$, and $\Gamma_{i} = -(A_{1+1} + \ldots + A_n)$ for i = 1, …, *n-1*. All terms in this VECM are stationary by assumption hence, Δy_t, v_t and Πy_{t-1} must be *I(0)*. It also possible to recover the A_i parameter matrices in the VAR from the VECM by setting $A_1 = \Gamma_1 - \Pi + I_k$, $A_i = \Gamma_i - \Gamma_{i-1}$ *(i = 2, …, n-1), and* $A_n = -\Gamma_{n-1}$.

By assumption Π is a matix of rank (0 < r < k) and can be written as αβ', where α and β are *(k x r)* matrices of rank *r*. The matrix β is the cointegrating matrix and the columns of β provide the r cointegrating vectors, whereas the matrix α is the loading matrix and its coefficients provide the error-correction parameters.

By substituting for Π in equation 2, it is transformed to

$$\Delta y_t = \sum_{i=1}^{n-1} \Gamma_i \Delta y_{t-i} - \alpha\beta' y_{t-1} + v_t \qquad (4)$$

Because α and β are not unique they therefore require identifying restrictions for the interpretation of cointegrating relations $\beta' y_{t-1}$.

A full information maximum likelihood (ML) approach to estimating a system with exactly *r* cointegrating relation is used. In the Johansen approach, selecting the *r* largest eigenvalues corresponds to imposing a cointegrating rank of *r* on the system. The trace statistic and the maximum eigenvalue statistic tests are used to assist in choosing *r*.

The trace test statistic is based on the basis that the *r* largest eigenvalues (λ_1 , … , λ_r) give the cointegrating vectors and the λ_{1+1} , … , λ_k eigenvalues should be zero for the unit roots. The null hypothesis that there are *r* cointegrating vectors (0 r < k) is tested against the alternative hypothesis of k cointegration vectors using

$$\eta(r) = -T \sum_{i=r+1}^{k} \log(1-\lambda_i) \qquad (5)$$

where r = 0, 1, …., k-1.

The trace test statistic proceeds η (0), η (1), …, η(k-1), and *r* is chosen as the last significant statistic.

The maximum eigenvalue test statistic is a test of r cointegrating vectors against an alternative of r+1, using

$$\zeta(r) = -T\log(1-\lambda_i) \qquad (6)$$

Where, again r = 0, 1, …., k-1. Both η (1) and $\zeta(r)$ have non-standard distributions. The critical values are tabled in Johansen (1988); Johansen and Juselius, (1990) and Osterwald-Lenum, (1992).

5. Theoretical specification of a credit demand model

Based on the classical determinants, Bernanke and Blinder (1988) and the Bernanke and Gertler, (1992), Financial Accelerator model, when bonds and bank loans are not perfect substitutes, monetary policy actions affect the real economy not only through the money market but also through the credit markets. Policy changes influence lending rates and therefore shift the loans and supply scheduled for credit. These changes will ultimately influence production and the real economy. The aggregate loan demand by the private sector is specified as:

CREDIT = f (real gdp, real rate) ***Model1***

Expected results from equation 1 are that, there is a positive relationship between real GDP and the demand for credit based on the fact that economic agents demand credit for liquidity and financing working capital. There is also the impact of expectations of future economic activity and profitability which can also lead to higher demand for credit. As well, the fact that the demand for credit might include some counter-cyclical component in line with the smoothing of the impact of the business cycles on consumption expenditure and investment spending.

A negative relationship is expected between the demand for credit and nominal interest rates. It is also worth noting that nominal lending rates are the observable component of the true cost of loans, there are additional charges, other terms and conditions.

Implicit in the equation as well is the assumption that the data used in the estimation is a reflection of both demand and supply factors, and therefore equilibrium loans as well as interest rate. It is also acknowledged that there are causal relationships in the variables, where economic upward cycles are normally characterized by acceleration in credit and GDP and low interest rates and inflation. The reverse applies in cases of downward cycles.

Nevertheless, Kasyap et.al.,(1993) indicate that, this is an identification problem which does not prove the existence of causality and the direction thereof, hence favorable growth stimulates consumption and investment demand and therefore the demand for credit. In fact, research has established that credit and growth are mutually reinforcing.

The paper augments the standard credit demand function in model 1 by including real house and equity prices as shown in below:

CREDIT = f (real gdp, real rate, real house prices) ***Model 2***

CREDIT = f (real gdp, real rate, real equity prices) ***Model 3***

CREDIT = f (real gdp, real rate, real house prices, real equity prices) ***Model 4***

In establishing the role of real house and equity prices, the paper estimates four different models namely (i) Baseline model as per the specification in equation 1 (ii) Model two includes real house prices to the specification in equation 1 (iii) Model three includes real equity prices to the specification in equation 1, and lastly (iv) Model four is includes both real house prices and equity prices.

6. Data and empirical results

The sample size for the data used in the paper spans 1980Q1 to 2011Q1. The variables used in the paper are real credit extension, real GDP, real interest rate, real house prices and the all share price index (see data appendix for more detail).

6.1 Unit root tests

Table 1 reports the results of the Augmented Dickey-Fuller. The tests show that the null hypothesis of a unit root (non-stationarity) in levels for all the variables could not be rejected. This means that the tests must be conducted on the first differences.

Table 1. Unit root tests: Augmented Dickey Fuller

Variables	Level Form (Intercept and Trend)	First difference (Intercept and Trend)	Order of integration
CREDIT	-0,52 [0,98]	-3,41 [0,05]***	I(1)
GDP	-0,08 [0,99]	-5,67 [0,00]***	I(1)
RIR	-1,86 [0,67]	-9,02 [0,00]***	I(1)
HOUSEPRICES	-0,33 [0,99]	-3,51 [0,00]***	I(1)
ALLSHARE	-1,60 [0,79]	-7,89 [0,00]***	I(1)

***/**/* indicate rejection of the hypothesis at the 1/5/10 per cent level of significance.

As reported in table 1, the null hypothesis of a unit root is rejected for all the variables meaning that they are all integrated of order one i.e. I(1). This can also be interpreted as meaning that there is an existence of one or more cointegrating relationships in the data.

6.2 Lag Order Selection for the VAR

The Unrestricted Vector Auto Regression models (VAR) for all the four models were estimated and the results in all cases show that the optimal lag length suggested by the Akaike information criterion, Schwarz information criterion and the Hannan-Quinn information criterion is 2 lags.

6.3 Cointegration Rank

The cointegration properties of the data were conducted using the Johansen procedure. VARs for all four equations were estimated. The model used to test for cointegration is that which allows for a linear deterministic trend in the data with the intercept and no trend in the CE and test VAR. The results for all four equations find one cointegrating rank.

6.4 Long-run determinants of credit extension

Table 2 reports the results of the baseline model estimated as per the specification in equation 1.

Table 2. Cointegrating vector Baseline model

CREDIT	=	2,19 ***GDP***	-0,01 ***RIR***	+ 2,91
		(3.30)**	(2,61)**	
		ECT	**-0,09 ΔCREDIT**	
			(-3,47)**	

The results show that credit in the long-run is positively related to GDP and negatively related to the real interest rate (RIR). The long-run income elasticity of credit is significantly larger than one and significant, partly on account of the process of financial deepening and the impact of omitted variables. The elasticity of credit demand with respect to the real rate is negative and significant.

The adjustment coefficient in the credit equation is negative and significant suggesting that credit adjusts to the identified long-run relationship. The coefficient of 0,09 implies that the adjustment of real credit from dis-equilibrium is sluggish, adjusting at a rate of 9 per cent per quarter. This is comparable with results found in studies such as Calza, et.al., (2001 and 2003); Hofman, (2001) Hulsewig, et.al., (2001); Brozoza-Brzezina, (2005); Saase, et.al., (2007), where the slow adjustment of real credit relative to money demand is attributed to the existence of stronger frictions and transactions costs in credit markets.

Table 3 reports the results of Model 2 (a cointegration analysis for the extended system that includes house prices).

Table 3. Cointegrating vector Model 2

CREDIT = 2,03 ***GDP*** -0,02 ***RIR*** + 0.16 ***HOUSEPRICES*** + 2,13
(3.30)** (2,61)** (2.66)**
ECT -0,04 ΔCREDIT
(-2,04)**

The results indicate the existence of one long-run relationship and plausible estimates for the coefficients. The results also indicate that with the inclusion of real house prices in the system, the long-run income elasticity of demand, although still significantly larger than one, is slightly below the estimates presented in table 2. The coefficient for the real interest rate is marginally higher – indicating that the real interest rate effects are small but statistically significant. The elasticity of credit with respect to house prices is positive and significant, implying that house prices significantly affect credit in the long-run.

The coefficient for error-correction term (ECT) is negative and significant. This indicates the existence of a long-run loan demand relationship of the variables with real loans. The coefficient of 0,04 implies that the adjustment of real credit from dis-equilibrium is sluggish, adjusting at a rate of 4 per cent per quarter – which far more sluggish when compared to the results in table 2.

The results of Model 3 are presented in table 4, they are consistent with economic theory and a long-run relationship between credit and equity prices is established.

Table 4. Cointegrating vector Model 3

CREDIT = 1,79 ***GDP*** -0,02 ***RIR*** + 0.04 ***ALLSHARE*** + 6,13
(2.25)** (3,58)** (2.98)**
ECT -0,04 ΔCREDIT
(-2,68)**

The results also indicate that with the inclusion of real equity prices in the system, the long-run income elasticity of demand, although still significantly larger than one, is slightly below the estimates presented in tables 2 and 3. The coefficient for the real interest rate is unchanged when compared to the results in table 3 – indicating that the real interest rate effects are small but statistically significant. The elasticity of credit with respect to real equity prices is positive and significant, implying that real equity prices significantly affect credit in the long-run.

The coefficient for error-correction term (ECT) is negative and significant. This indicates the existence of a long-run loan demand relationship of the variables with real loans. The coefficient of 0,04 implies that the adjustment of real credit from dis-equilibrium is sluggish, adjusting at a rate of 4 per cent per quarter – which is the same with results presented in table 3.

Table 5 reports the results of Model 4 (a cointegration analysis for the extended system that includes both real house and equity prices).

Table 5. Cointegrating vector Model 4

CREDIT = 1,43 ***GDP*** -0,03 ***RIR*** + 0.12 ***HOUSEPRICES*** + 0.01 ***ALLSHARE*** + 2,58
(3.68)** (2,68)** (2.04)** (3.84)**
ECT -0,02 ΔCREDIT
(-1,98)**

The results also indicate that with the inclusion of both real house and equity prices in the system, the long-run income elasticity of demand, although still significantly larger than one, is slightly below the estimates presented with all the previous estimated models. The coefficient for the real interest rate is slightly improved but still indicates that the real interest rate effects are small but statistically significant. The elasticity of credit with respect to real house and equity prices is positive and significant but the magnitudes are slightly lower, implying that real equity prices significantly affect credit in the long-run.

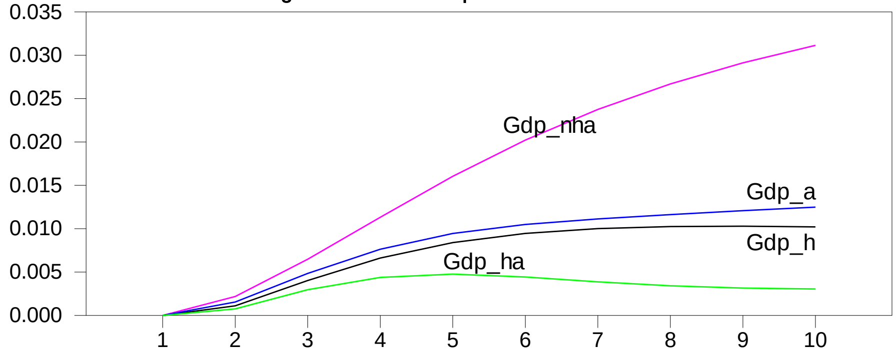
The coefficient for error-correction term (ECT) is negative and significant. This indicates the existence of a long-run loan demand relationship of the variables with real loans. The coefficient of 0,02 implies that the adjustment of real credit from dis-equilibrium is sluggish, adjusting at a rate of 2 per cent per quarter – which is mush lower than the results of all estimated models.

6.5 Dynamic Interaction

This section presents and analyses the dynamic interaction (presented through impulse responses) of real credit, real GDP, real interest rates, real house prices and real equity prices.

Figure 4, shows that the impact of GDP on real credit extension is significant across horizons when both asset prices are not included (baseline model), whereas, based on the results of models 2 and 3, the impact of the GDP is relatively large when equity prices as opposed to house price are included.

Figure 4. Credit response to GDP shock

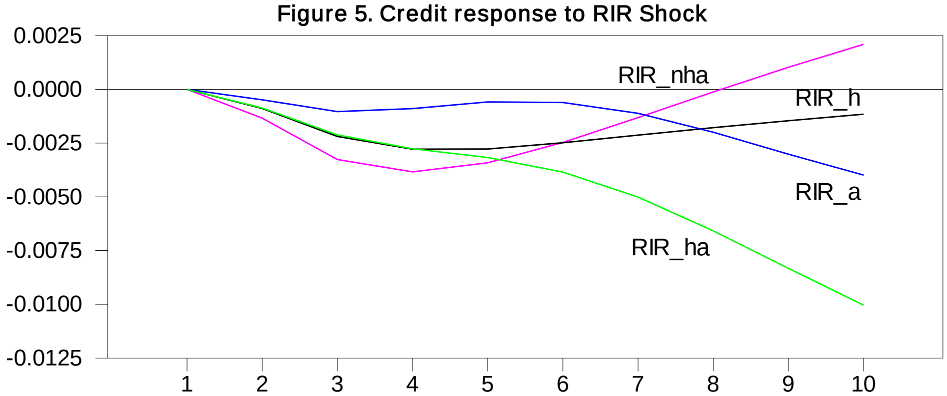


Note: GDP_nha = model with no house and equity prices; GDP_ha = model including house and equity prices; GDP_h = model including house prices only; GDP_a = model including equity prices only.

The impact of a shock to GDP on credit is much muted when both asset prices are included, the significance of the inclusion of asset prices as explanatory variables to developments in the demand for credit extension.

With respect to the impact of the real interest rate on real credit extension based on the results of the baseline model, as shown on figure 5, the impact of the real interest rate is more pronounced but reverses faster – it reaches its peak impact after 4 quarters.

Figure 5. Credit response to RIR Shock

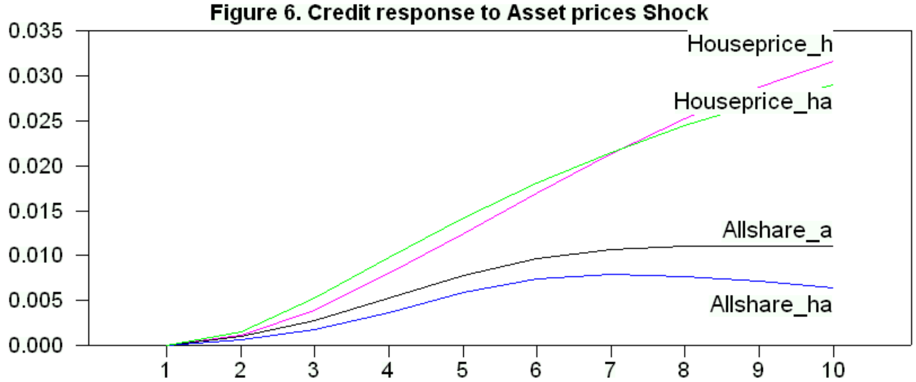


Note: RIR_nha = model with no house and equity prices; RIR_ha = model including house and equity prices; RIR_h = model including house prices only; RIR_a = model including equity prices only.

The inclusion of the asset prices, in particular real equity prices, shows that the impact of the real interest rate accentuates the response of credit extension to the real interest rate. When both assets prices are included (model 4) the impact of the real interest rate is more pronounced.

The results presented in figure 6, show that house price shocks on their own have a much more pronounced impact on developments in real credit demand in comparison to the impact of equity prices.

Figure 6. Credit response to Asset prices Shock



Note: Houseprice_h = model with house prices only; Houseprice_ha = model including house and equity prices; Allshare_a = model including equity prices only; Allshare_ha = model including house and equity prices.

When both asset prices are included, the shock to house prices has a bigger impact on real credit extension in comparison to equity prices.

6.6 Variance Decomposition

A summary of the variance decompositions of the four estimated models after 10 periods is presented in table 6. Based on the results, GDP explains a bigger share of the variation in real credit but this diminishes with the inclusion of asset prices, to a mere 1 per cent when both equity and house prices are included.

Table 6. Variance Decomposition

Model	Period	SE	Credit	GDP	RIR	Allshare	Houseprices
Base line	10	0.105	66.75	32.84	0.41		
Model 2	10	0.106	68.46	7.25	0.13		24.16
Model 3	10	0.123	89.28	5.75	0.99	3.99	
Mode l4	10	0.113	74.34	1.05	2.87	2.07	19.08

Nonetheless, the performance of the GDP is enhanced by the inclusion of house prices. With respect to the real interest rates, they explain a larger portion of the variation in credit when both asset prices are included.

7. Conclusion

The paper set out to determine the role of real house and equity prices as significant variables that have an impact on the demand for credit extension, over and above GDP and real interest rates. The results of the four VECM models estimated confirm the existence of a long-run positive relationship that links developments in real credit demand to asset prices, in particular house prices.

The impulse responses show the diminishing role of GDP when asset prices are included and the fact that house prices have a pronounced impact on developments in credit demand. The variance decomposition show that real house prices explain the bulk of the variation in credit demand.

References

Arnold J M I, Kool C J M and Raabe K. 2006, Industries and the bank lending effects of bank credit demand and monetary policy in Germany. Deutsche Bundesbank, Eurosystem.

Bernanke B S and Blinder A S. 1988, Is it money or credit, or both, or neither? Credit, money and aggregate demand.

Bernanke B S. 1983. Non monetary effects of the financial crisis in the propagation of the great depression. NBER working paper series.

Bernanke B S. 1993, Credit in the Macroeconomy. Federal Reserve Bank of New York. Quarterly Review.

Borio C and Lowe P. 2004, Securing sustainable price stability: should credit come back from the wilderness? BIS working papers No. 157.

Blundell-Wignall A and Gizycki M. 1992, Credit supply and demand and the Australian economy. Reserve Bank of Australia.

Calza, A., Gartner, C. and Sousa J. 2001, Modelling the demand for loans to the private sector in the Euro Area. European Central Bank.

Calza A, Manrique M and Sousa J. 2003, Aggregate loans to the Euro Area private sector. European Central Bank.

Cecchetti S. April 2008, Monetary policy and the financial crisis of 2007-2008. Centre for Economic Policy Research. Policy insight No.21.

Cottarelli, C, Giavanni, 2005, “Early birds, Late risers, and sleeping beauties: Bank credit growth to the private sector in Central and Eastern Europe and in the

Chrystal A K and Mizen P. 2005, A dynamic model of money, credit and consumption: A joint model for the UK household sector. Journal of Money, Credit and Banking, Vol. 37, No.1.

Davis E P and Zhu H. 2004, Bank lending and commercial property cycles: some cross country evidence. BIS working papers No150.

Gattin-Turkalj K, Ljubaj I, Martinis A and Mrkalj M. 2008, Estimating credit demand in Croatia. Croatian National Bank.

Gertler M and Gilchrist S. 1993, The role of credit market imperfections in the monetary transmission mechanism: Arguments and evidence. Board of Governors of the Federal Reserve System.

Henry F and Juselius K. Explaining cointegration analysis: Part II. 2000, Discussion papers. Department of Economics, University of Copenhagen.

Hofmann B. 2001, The determinants of bank credit to the private sector in industrialized countries: Do property prices matter?. Monetary and Economic Department. BIS working papers.

Juselius K. 2003, The cointegrated VAR model: Econometric methodology and macroeconomic applications.

Kiss G, Nagy M and Vonnak B. 2006, Credit growth in Central and Eastern Europe: Trend, Cycle or Boom?

Khan M. 2002. Inflation, Financial Deepening and Economic Growth. International Monetary Fund.

Lown C and Morgan D. 2002, Credit effects in the monetary mechanism. Federal Reserve Bank of New York. Economic Policy Review.

Ludi K L, Ground M, Joubert S J and Chen P P. 2006, Investigating the bank-lending channel in South Africa: A VAR approach. Department of economics, University of Pretoria, South Africa.

Sorensen K C, Ibanez M D and Rossi C. 2009, Modelling loans to non-financial corporations in the Euro Area. European Central Bank.

Vera V L. 2002, The demand for bank loans in Venezuela: A multivariate cointegration analysis. University of Oxford Latin American Centre and Universidad Central de Venezuela School of Economics.

South African Reserve Bank. Bank Supervision annual reports: various editions.Pretoria. South Africa.

Various editions of the Quarterly Bulletin.

Data Appendix

Data Description and Sources

1. ***Credit*** = Real credit extension to the private sector deflated with the CPI
2. ***GDP*** = Real GDP
3. ***RIR*** = Real Interest Rate (nominal weighted average of short-term lending rates and long-term nominal government bond yield deflated with the CPI)
4. ***House prices*** = Real house prices (ABSA nominal house prices deflated by the CPI index)
5. ***All share*** = Real all share index (nominal all share index deflated by CPI index)