Asymmetric pass-through effects from monetary policy to housing prices in South Africa

Phiri, Andrew

Department of Economics, Finance and Business Studies, CTI Potchefstroom Campus, North West, South Africa

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ASYMMETRIC PASS-THROUGH EFFECTS FROM MONETARY POLICY TO HOUSING PRICES IN SOUTH AFRICA

A. Phiri
Department of Economics, Finance and Business Studies, CTI Potchefstroom Campus, North West, South Africa

ABSTRACT: Following the recent financial crisis, spurred by the crash of house prices in the US, there has been a renewed interest by academics in examining the pass-through effects of monetary policy instrument to house price inflation. This study examines the asymmetric pass through effects from monetary policy to house price inflation for the case of South Africa. Our study uses a momentum threshold autoregressive model and a corresponding threshold error correction model (MTAR-TECM). The empirical results reveal a negative and significant pass through from interest rates to house price inflation, even though such pass-through effects are relatively weak. Overall, these findings undermine the ability of the South African Reserve Bank (SARB) to control real house price inflation.

Keywords: asymmetric cointegration; monetary policy instrument; house price inflation; South Africa.

JEL Classification Code: C22, C52, E31, E52.

1 Introduction

In the aftermath of the global financial crisis, which was triggered by an asset bubble burst in the US housing market, there has been a surge of interest concerning the pass-through effects of monetary policy to housing prices. Given that housing prices are relevant to wealth accumulation, labour mobility, consumption, macroeconomic volatility and overall financial market stability, it is indeed surprising that most Central Banks objective function encompasses inflation and output stabilization directives yet ignores movements in asset prices (Naraidoo and Kasai, 2012). Mishkin (2007) identifies six transmission channels through which the effects of monetary policy can pass-through to housing prices. These are via i) user costs, ii) future expectations, iii) housing supply, iv) wealth effects, v) credit-channel effects, and vi) balance sheet effects. The first of the three channels are direct whereas the remainder are indirect channels. Therefore, given it's relative importance, the link between monetary policy and house prices has recently been the subject of a much heated debate amongst academics and financial policymakers alike. On the forefront of this debate, the role of housing prices in the transmission mechanism of monetary policy is argued to be crucial for the implementation of an efficient monetary policy and it is believed that Central Banks would be more successful in responding to asset prices such as housing prices in addition to deviations of inflation from it's predetermined target (Bjornland and Jacobsen, 2010).

Much empirical research has been devoted towards examining the link between housing prices and monetary policy instruments. A vast majority of the literature exists for industrialized economies such as the US (Del Negro and Otrok (2007), Vargas-Silva (2008), Gupta and Kabundi (2010)), the UK (Elbourne, 2008), Australia (Wadud et. al. (2012), Costello et. al. (2015)), China (Xu and Chen, 2012) and Japan (Iwata, 2007). Unfortunately very little empirical research has been conducted for developing countries and in particular for Sub-Saharan Africa (SSA) countries, of which the available literature is focused on the South African economy (Gupta and Kasai (2010), Gupta et. al (2010)). Notably, all of the aforementioned studies rely on linear econometric models and this may be oversimplifying the relationship given the complex interaction between monetary policy and housing prices. Of recent, there has been a methodological shift of focus towards the possibility of an asymmetric pass-through from monetary policy to other transmission mechanisms such as exchange rates (Sollis and Wohar, (2006) and Zhang (2014)), market rates (Payne and Waters (2008), Wang and Thi (2010), Fadiran and Ezeoha (2012), Becker et. al. (2012), Jin et. al. (2014) and

Matemilola et. al. (2015)), and expectations (Dimitris et. al. (2007), Phiri and Lusanga (2011), Guney et. al. (2015)). Nevertheless, the literature on the asymmetric relationship between monetary policy and housing prices remains quite limited on the subject and may be narrowed down to the studies of Simo-Kengne et. al. (2013) and Tsai (2013).

Our study aims to build upon the existing literature by examining asymmetric pass-through effects between monetary policy and housing prices in South Africa using the recently developed momentum threshold autoregressive (MTAR) model. The motivation behind the use of the MTAR lies in its ability to accommodate for the testing of unit roots within a time series, model asymmetric cointegration and error correction effects, between a pair of time series. The success of the MTAR model in modelling the pass-through effects of monetary policy to other transmission mechanisms has been documented in previous studies such as Payne and Waters (2008), Wang and Lee (2009), Becker et. al. (2012) and Matemilola et. al. (2015). What is most notable about the MTAR model is that it allows for different responses in equilibrium correction behaviour depending on whether deviations are negative or positive. This is a particularly valuable attribute when examining monetary policy transmission mechanisms in the presence of possible market rigidities.

Henceforth, the rest of the paper is structured as follows. The next section provides an overview of monetary policy in South Africa whereas the third section gives an overview of the housing market in South Africa. In the fourth section, the data and the empirical model are introduced whilst the fifth section present the empirical results of the study. The paper is then concluded in the sixth section.

2 Monetary policy conduct in South Africa

Over the last five decades or so, monetary policy conduct by the South African Reserve Bank (SARB) has been characterized by four major policy regimes. The first regime was the liquid asset ratio-based (LARB) system and was in effect from 1965 up until 1980. Under this regime, direct quantitative controls on interest rates and credit extension were the Reserve Bank's main policy strategies and these were executed in the form of ceilings placed on bank credit extended to the private sector, controls on the deposit rate, controls on foreign exchange as well as controls on hire-purchase and consumer credit (Mollentze, 2000). Notably, under this regime, very little importance was attached to interest rate as a policy instrument and the

Reserve Bank's main form of monetary control were minimum 'liquid' asset requirements imposed on commercial banks (Aron and Meullbauer, 2000). However, in the midst of a falling Bretton-Woods exchange rate system as well as the oil price shocks of 1973-1974 and 1979-1980, the direct controls system brought about disintermediation in the monetary market and thus resulted in a failure of monetary authorities to effectively control the domestic demand for credit. Consequentially, the Reserve Bank began to engage in a systematic shift away from the previous 'Keynesian' perspective of conducting monetary policy to a more market related approach. In particular, this policy shift came about in response to the recommendations of the De Kock Commission in 1979 and constituted of the phasing off certain direct controls and instituting changes in asset reserve requirements.

The SARB'S second regime of policy conduct was the Cash Reserves (CR) system which was a replacement of the previous direct controls system. In further adhering to recommendations of the De Kock Commission report in 1986, the SARB decided to switch to a monetarist approach to policy conduct in which M3 money supply targets become the anchor of monetary policy in South Africa (Phiri, 2016). The Reserve Bank's main policy instrument was it's discount rate and was used to influence the cost of overnight collateralised lending and ultimately affect market interest rates (Aron and Meullbauer, 2000). However, due to financial liberalization, a more open capital account as well as a deteriorated relationship between money supply, inflation and output growth, the money targeting framework was deemed as an ineffective monetary policy mandate and, accordingly, the SARB sought a more heterogeneous approach towards policy conduct. This involved replacing the accommodation system with the repo system in March 1998, which saw banks enter into repurchase agreements in respect of various securities sold by tender to the SARB on a daily or intra-day basis for the purpose of acquiring liquidity (Akinboade et. al., 2002). The 'repo system' was coupled with pre-announced money supply targets and informal inflation targets of core inflation and collectively this constituted of the third regime of policy practice by the Reserve Bank.

In February 2000, the then minister of Finance, Mr. Trevor Manuel, announced yet another shift in South Africa's monetary policy mandate, this time towards a formal inflation target framework. Domestic monetary authorities viewed this policy switch as necessary since the previous eclectic monetary framework created uncertainties and the Reserve Bank's decisions were seen to be in conflict with the stated guideline for growth in money supply and bank credit extension (Phiri, 2012). Under the inflation targeting regime, the SARB has been granted at it's disposal, the manipulation of the repo rate in order to maintain levels of inflation within a pre-determined set target. Initially, the SARB had put into place targets of 3 to 6 percent which were to be met in 2002. However, between 2004 and 2005 the target was momentarily changed to a range of between 3 and 5 percent but has since been re-specified back to its initial range of 3 to 6 percent. All-in-all, the ultimate objective of these inflation targets is to reduce the inflation bias of discretionary policy since increased credibility leads inflation anticipations to moderate more rapidly (Khamfula, 2004). Moreover, the inflation targeting framework is built upon other foundational pillars such as transparency, independence and accountability and these are attributes of monetary policy which ensure a 'sounder' financial environment. Up-to-date the inflation target regime continues to be the basis for monetary policy conduct by the Reserve Bank.

3 An overview of South Africa's housing market

South Africa is one of Africa's largest economies and is currently ranked in the top 5 of Africa's largest property market destinations. South Africa's domestic housing market is the largest component of the South African property market, consisting of a majority of property assets within the country, and is also an important component of household wealth (Rust, 2006). As of June 2015, the South African deeds register counted for 5.8 million registered residential properties whose total worth was approximately R4.6 billion and ranges from sectional title and freehold properties, to estate; including government-sponsored homes, homes occupied by their owners or rented to others, and holiday homes. The residential housing market in South Africa is categorized into four pricing groups namely; properties below R300 000, properties between R300 000 and R600 000, properties between R600 000 and R1.2 million as well as property over R1.2 million. Notably, about 45 percent of housing property in South Africa is listed under property valued below R300 000 and this reflects the impact of the National Housing Subsidy Scheme which provides subsidized housing units to low income households. This has resulted in a shift in the composition of South Africa's property market, with the proportion of lower value housing properties increasing relative to the rest of the market (Rust, 2006). Nevertheless, residential properties above the value of R1.2 million continues to account for more than 50 percent of the total value of the housing market in South Africa.

Historically, the South African residential property has been subject to wavering forms of growth patterns in response to exogenous events on the macroeconomy (Clark and Daniel, 2006). In this regard, developments in the domestic housing market has been dominated by monetary policy actions and in particular by interest rate and exchange rate movements. During the 1980's, the economy had relatively high growth rates in housing prices and this was mainly due to negative interest rate policy and a strong domestic currency spurred by escalating gold prices (Clark and Daniel, 2006). However, following the depreciation and subsequent crash of the Rand in the mid-1980's, the SARB began to implement aggressive interest rate hikes that resulted in a sharp plunge in the growth of housing prices which fell to negative rates between 1985 and 1986. Afterwards, the real housing market in South Africa experienced a downward correction up until 1998 and this created a very low real house price base off which saw the housing market enter into one of its biggest price growth booms which lasted from 1999 to 2007.

There are two structural changes which are responsible for the aggressive house price boom experienced between 1999 and 2007. Firstly, the political transition to a democratic state in 1994 brought about the abolishment of trade sanctions, increased financial liberalization, political stability and extensive trade reforms. This, in turn, contributed to the lowering of inflation levels to single digits at relatively low real rates of interest, which further resulted in improvements in investment, export growth, employment, economic growth and ultimately household income. Secondly, the South African Reserve Bank's (SARB) experienced a shift away from eclectic monetary supply targets towards a formal inflation targeting regime. This caused in a downward structural adjustment of interest rates from the year 2000 onwards. Notably, the South African housing market reached a record high in over 30 years with an average house price growth of 32 percent in 2004. However, this was short lived as a major financial crisis hit the US property market in 2007, which saw the growth in domestic housing prices take yet another plunge in 2008 and eventually this growth turned negative in 2009 as the SARB implemented a series of aggressive interest rate manipulations in fear of further aggravating the already depressed economy. It was only after the 2008 financial crisis that the Reserve Bank began paying more attention to the volatility of exchange rates and placing emphasis on the role of asset prices as a means of ensuring stability in the South African financial markets (Phiri, 2016). Since then, the growth in housing prices has slowly recuperated even though such growth is not nearly as high as that experienced in the mid-2000's.

4 Methodology

Engle and Granger (1987) developed a standard method for verifying cointegration between time series variables. According to the authors, cointegration within the system of equations exists when a pair of individual time series are first difference stationary and the cointegration residuals formed from their long-run equilibrium are levels stationary. This condition enables for the construction of a unique cointegration vector comprising of a linear combination of the time series. Thereafter, the residuals of the cointegration vector can be normalized for the time series through an error correction model (ECM) which measures the deviation of the series from its steady-state equilibrium. However, recent developments have suggested that the conventional linear cointegration framework is misspecified and therefore produces low testing power. One way of circumventing this issue, is to model the steady-state equilibrium residuals as a threshold autoregressive (TAR) process (Enders and Granger, 1998). Enders and Silkos (2001) suggest that the steady-state errors (ξ_t) can be modelled as the following variations of nonlinear cointegration regressions:

$$\xi_t = \rho_1 \xi_t (\xi_t < 0) + \rho_2 \xi_t (\xi_t \geq 0) + \nu_t \quad (1)$$
$$\xi_t = \rho_1 \xi_t (\xi_t < \tau) + \rho_2 \xi_t (\xi_t \geq \tau) + \nu_t \quad (2)$$
$$\xi_t = \rho_1 \xi_t (\Delta\xi_t < 0) + \rho_2 \xi_t (\Delta\xi_t \geq 0) + \nu_t \quad (3)$$
$$\xi_t = \rho_1 \xi_t (\Delta\xi_t < \tau) + \rho_2 \xi_t (\Delta\xi_t \geq \tau) + \nu_t \quad (4)$$

Where ρ_1 is a measure of asymmetric adjustment when the equilibrium error is below its threshold and ρ_2 is a measure of asymmetric adjustment above its threshold level. Regressions (1) and (2) are known as the TAR model with a zero threshold (TAR(0)) and the TAR model with a consistent threshold estimate (TAR(τ)), respectively. On the other hand regressions (3) and (4) are known as the MTAR model with a zero threshold (MTAR(0)) and the MTAR model with a consistent threshold estimate (MTAR(τ)). As noted by Enders and Silkos (2001), MTAR adjustment can be especially useful when describing how policymakers smooth out any large changes in a financial series such as interest rates. On the other hand, TAR regression are designed to capture a series characterized by deep and sharp movements in residual behaviour. Enders and Granger (1998) propose a three-step procedure for testing and estimating the TAR and MTAR cointegration models. Firstly, the unknown threshold variable (τ) in equations (2) and (4) must be determined. Since these thresholds are unknown a prior, we use Hansen's (2000) method to estimate the unknown threshold. This involves ordering the threshold value in ascending order such that $\tau_0 < \tau_1 < \ \ldots. < \tau_T$, where T is the number of observations after tranculating the lower and the upper 15 percent of the observations. Thereafter, a grid search is performed to estimate the true value of the threshold as the value which minimize the residual sum of squares (RSS). Secondly, we must test for i) normal cointegration effects (i.e. H_{00}: $\rho_1 = \rho_2 = 0$); and ii) threshold cointegration effects (i.e. H_{00}: $\rho_1 \neq \rho_2$). Both tests are performed with a standard F-test statistics denoted as Φ and Φ^*, respectively. Thirdly, if null hypotheses testing no cointegration and no threshold cointegration can both be rejected, then the final estimates of the parameters ρ_1 and ρ_2 are obtained using the previously determined threshold.

5 Data and Empirical Analysis

5.1 Data and unit root tests

The time series data used in our study consists of the average real house price growth ($house_t$) and government securities treasury bills (int_t), which are used as proxies for house price inflation and monetary policy instrument, respectively. The average nominal house price growth data has been collected from the Amalgamated Bank of South Africa (ABSA) whereas the treasury bills series has been collected from SARB online database. All data has been collected on monthly basis from 1967:01 to 2015:12. Before we can make any analytical use of the empirical data, it is important to test for unit roots in the time series. A classical method of testing for unit roots involves subjecting a univariate time series (y_t) to the following Dickey-Fuller type regression:

$$y_t = \phi y_{t-1} + \varepsilon_t \qquad (5)$$

And thereafter testing the null hypothesis of a unit root as H_0: $\phi = 1$. Enders and Granger (1998) modified this procedure by incorporating asymmetric behaviour in the unit root testing regression. This is important because recent literature has shown that linear unit root tests have low and are misspecified if the time series evolves as a nonlinear process. By defining $\Delta y_t = y_t - y_{t-1}$, the variations of the TAR and MTAR specifications (1) through (4), can be respecified and then applied to test for asymmetries and unit roots within the data. These asymmetric unit root testing regressions are given as:

$$\Delta y_t = \psi_1\ \varepsilon_t\ (\varepsilon_t < 0) + \rho_1\ \varepsilon_t\ (\varepsilon_t \geq 0) + \nu_t \quad (6)$$

$$\Delta y_t = \psi_1\ \varepsilon_t\ (\varepsilon_t < \tau) + \rho_1\ \varepsilon_t\ (\varepsilon_t \geq \tau) + \nu_t \quad (7)$$

$$\Delta y_t = \psi_1\ \varepsilon_t\ (\Delta\varepsilon_t < 0) + \rho_1\ \varepsilon_t\ (\Delta\varepsilon_t \geq 0) + \nu_t \quad (8)$$

$$\Delta y_t = \psi_1\ \varepsilon_t\ (\Delta\varepsilon_t < \tau) + \rho_1\ \varepsilon_t\ (\Delta\varepsilon_t \geq \tau) + \nu_t \quad (9)$$

Regressions (6) and (7) are the TAR(0) and TAR(τ) versions, whereas (8) and (9) are the MTAR(0) and MTAR(τ) versions, respectively. Based on these regressions two hypotheses are tested for. Firstly, we use a standard F-test (Φ) to test the null hypothesis of no asymmetries in the time series process (i.e. H_{00}: $\psi_1 = \psi_2$) against the alternative of asymmetries in the process (i.e. H_{01}: $\psi_1 \neq \psi_2$). Secondly, we use a modified F-test (Φ^*) in testing for the null of a unit root (i.e. H_{10}: $\psi_1 = \psi_2 = 0$) against the alternative of a stationary time series (i.e. H_{11}: $\psi_1 \neq \psi_2 \neq 0$). The aforementioned unit root testing procedures are performed on our empirical data with the lag length of the unit roots being determined by the AIC. The results of these tests are reported in Table 1.

Table 1: Enders and Granger (1998) nonlinear unit root tests

time series	model	Φ	Φ^*
	TAR(0)	23.02	0.06
		(0.00)***	(0.80)
int_t	TAR(τ)	23.02	0.06
		(0.00)***	(0.80)
	MTAR(0)	23.63	0.72
		(0.00)***	(0.40)
	MTAR(τ)	23.63	0.72
		(0.00)***	(0.40)
	TAR(0)	18.52	0.16
		(0.00)***	(0.69)
$house_t$	TAR(τ)	19.33	1.05
		(0.00)***	(0.31)
	MTAR(0)	19.09	0.01
		(0.00)***	(0.95)
	MTAR(τ)	21.98	2.10
		(0.00)***	(0.08)*

Notes: Significance codes: '***', '**', '*' denote 1 percent, 5percent and 10 percent significance levels, respectively.

From Table 1, it can be observed that the null hypothesis of no asymmetries in both interest rates and house price inflation is rejected at all significance levels for estimated threshold models. However, when testing for unit roots, we find that our test statistics cannot reject the null hypothesis of a unit root process for both time series variables. An exception is warranted for house prince inflation, whereby we find that the Φ* statistic rejects the null hypothesis in favour of stationarity at a 10 percent level of significance. Thus, given the overriding evidence of nonlinearity and unit root behaviour within the times series, we conclude that both interest rates and house price inflation are nonlinear I(1) processes. Notably, Clark and Daniel (2006) and Matemilola et. al. (2015) find similar findings of a unit root in house price inflation and interest rates for South African data. In light of this, we proceed to our cointegration analysis and error correction modelling of the variables.

5.2 Cointegration analysis and error correction modelling

Having verified that both interest rates and growth in housing prices are asymmetric I(1) variables, we proceed to our cointegration analysis. Since theory depicts that interest rates are endogenously related to housing price inflation (Tsai, 2013), our long run cointegration regression is specified as:

$$house_t = \beta_0 + \beta_1\, int_t + \xi_t \qquad (10)$$

Where $house_t$ is the growth in housing prices, int_t is the interest rate variable and ξ_t is the equilibrium error. We use Enders and Granger's (1998) three-step procedure for estimation of the cointegration models and record the empirical results in Table 2. To recall, we first have to estimate the unknown threshold value for the TAR(τ) and MTAR(τ) specifications. As reported in Table 3, we obtain threshold estimate values of -6.76 and -0.81 for the TAR(τ) and MTAR(τ) models, respectively. We then perform the tests for cointegration and threshold effects for the TAR(0), TAR(τ), MTAR(0) and TAR(τ) specifications using the Φ and Φ* statistics. In testing the null hypotheses of no cointegration, we obtain Φ statistics of 24.76, 25.79, 25.52 and 28.68, respectively. Note that all of these statistics manage to reject the notion of cointegration between interest rates and growth in housing prices at all significance levels thus implying cointegration amongst the time series. However, the Φ* statistics obtained in testing for threshold cointegration effects are less optimistic, with only the test statistics from the MTAR(τ) specification managing to reject the null hypothesis of no threshold cointegration effects at a 5 percent level of significance. This find is in alignment with Tsai (2013) who also finds that asymmetric pass-through effects between interest rates and house price inflation is best capture as a MTAR process. Given our evidence of the MTAR(τ) model being the best mode for capturing asymmetric cointegration among the variables, we therefore estimate this model for the time series using standard OLS method. As is reported in Table 2, we obtain a significant slope coefficient estimate (β_1) of -0.02 which indicates a low degree of pass-through effects amongst the time series. We are particularly encouraged by this result since it adheres to conventional monetary theory which postulates a negative relationship between interest rates and housing prices. Also estimates of -0.38 and -0.58 are obtained for the equilibrium threshold error terms ρ_1 and ρ_2, respectively. Note that this implies that positive deviations from the steady state are eliminated at a quicker rate than that of negative deviations which is an indication of downward rigidity of house price inflation equilibrium adjustments. Similarly, Gao et. al. (2009) also find that a monetary policy shock induced to house price appreciation during declining periods will have less 'momentum' to be transferred to the later periods.

Table 2: Threshold cointegration estimates

model type	TAR(0)	TAR(τ)	MTAR(0)	MTAR(τ)
τ	0	-6.761	0	-0.811
Φ	24.76	25.79	25.52	28.68
	(0.00)***	(0.00)***	(0.00)***	(0.00)***
Φ*	0.05	1.03	0.80	3.77
	(0.82)	(0.32)	(0.38)	(0.05)*
β_0				11.23
				(0.00)***
β_1				-0.02
				(0.04)*
$\rho_1\ \xi_{t-1}$				-0.38
				(0.02)*
$\rho_2\ \xi_{t-1}$				-0.58
				(0.01)**
R^2				0.57

Notes: Significance codes: '***', '**', '*' denote 1 percent, 5percent and 10 percent significance levels, respectively. t-statistics are reported in parentheses.

In view of the verifying asymmetric cointegration existing between interest rates and housing price inflation in South Africa, we proceed to introduce an associated threshold error correction model (TECM) for our estimated MTAR(τ) specification. The resulting MTAR(τ)-TEC model is specified as follows:

$$\Delta house_t = \alpha_{01} + \sum_{i=1}^{n} \phi_{i1}\, \Delta house_{t-i} + \sum_{i=1}^{n} \delta_{i1}\, \Delta int_{t-i} + \gamma_{11}\xi_{t-1}(\Delta\xi_t < \tau) + \gamma_{21}\xi_{t-1}(\Delta\xi_t \geq \tau) + \mu_{t1} \quad (11)$$

$$\Delta int_t = \alpha_{02} + \sum_{i=1}^{n} \phi_{i2}\, \Delta house_{t-i} + \sum_{i=1}^{n} \delta_{i2}\, \Delta int_{t-i} + \gamma_{12}\xi_{t-1}(\Delta\xi_t < \tau) + \gamma_{22}\xi_{t-1}(\Delta\xi_t \geq \tau) + \mu_{t2} \qquad (12)$$

Based on these threshold error correction (TEC) regressions (11) and (12), two main sets of hypothesis are tested for. Firstly, the null hypothesis of no asymmetric error correction model (i.e. H_{30}: $\gamma_1=\gamma_2$) can be tested against the alternative of an otherwise threshold error correction model. Secondly, we test for the direction of causality amongst the time series. The null hypothesis that $house_t$ does not granger cause int_t is tested as H_{40}: $\phi_i = 0$ whereas the null hypothesis that int_t does not granger cause $house_t$ is tested as H_{50}: $\gamma_i = 0$. The empirical results for the estimated MTAR(τ)-TEC model are provided in Table 3.

Table 3: MTAR(τ)-TEC model estimates

	equation (11) $\Delta house_t$	equation (12) Δint_{t-i}
γ_{1i}	-0.37	-2.73
	(0.54)	(0.00)***
γ_{21}	-0.15	-0.13
	(0.68)	(0.79)
H_{30}: $\gamma_1=\gamma_2$	0.10	9.77
	(0.75)	(0.00)***
H_{40}: $\phi_i = 0$	1.89	0.08
	(0.16)	(0.92)
H_{50}: $\gamma_i = 0$	1.75	12.85
	(0.19)	(0.00)***
R^2	0.02	0.65
DW	1.856	1.865
LB(4)	0.27	0.01

Notes: Significance codes: '***', '**', '*' denote 1 percent, 5percent and 10 percent significance levels, respectively. t-statistics are reported in parentheses.

As can be observed in Table 3, the null hypothesis of no threshold error correction effects can only be rejected for the interest rate equation (11). Furthermore, the speed of adjustment is found to be significant for the Δint_t equation in the lower regime (γ_{1i}) but not for the $\Delta house_t$ equation in both upper and lower regimes. This suggests that house price inflation is weakly exogenous in equilibrium correcting behaviour. Notably, this result is in coherence with that obtained in Gupta and Kasai (2011) who also find that house price inflation is a weakly exogenous variable for South African data. Moreover, the causality tests performed on the time series further verify this assumption of a weakly exogenous house price inflation. As can be further observed in Table 4, the null hypothesis of int_t not leading $house_t$ is rejected at a 1 percent significance level whereas the null of $house_t$ not leading int_t cannot be rejected at all. This result concurs with finance theory which suggest that interest rates are endogenous whilst house price inflation is weakly exogenous. However, our earlier empirical results have also shown that the pass-through effect from monetary policy instrument to house price inflation in South Africa is rather weak. Collectively, these results undermines the Reserve Bank's ability to control real house price inflation which is most likely being explained by itself (Gupta and Kasai, 2011).

6 Conclusions

Of recent, it has been argued that the pass through effects from monetary policy instruments to house price inflation would best be captured as a nonlinear relationship (Tsai, 2013). In this paper we sought to examine asymmetric pass through effects from prime interest rates to house price inflation in South Africa, hence adding to the limited available literature on the subject matter for Sub-Saharan African (SSA) economies. Our choice of empirical model is the moment regressive model coupled with a corresponding threshold vector error model (MTAR-TECM). The empirical results reveal a negative and significant relationship between the prime interest rates and real house price inflation even though the degree of pass-through is found to be quite low. In particular, our empirical result indicate the an interest rate change of 1 percent will results in an opposite movement of house price inflation of 0.02 percent. Furthermore, our findings reveal downward rigidity in the equilibrium adjustment of house price inflation which is most like a result of the downward correction that the South African housing market has been experiencing over the couple of years. In this regard, our results show that disequilibrium caused by positive shock to house price inflation, as induced by a decrease in interest rates, would revert back to equilibrium at a faster rate than for the case of a negative shock to house prices as induced by an interest rate hike.

Our overall empirical analysis bears a number of important policy implications for the South African economy. For one, our study implies that whilst there are significant asymmetric pass-through effects from monetary policy instrument to real house price inflation, these pass-through effects are quite small. This, in turn, undermines the Reserve Bank's ability to effectively influence house price inflation through the sole manipulation of interest rates. Given the recent US hikes in the fed rates, the SARB will most likely react by hiking future domestic interest rates. However, due to the low pass through effects, this increase in domestic interest rates will have very little effect on house price inflation. Another implication which can be drawn from our study is that monetary policy should consider the low asymmetric pass-through effects to house price inflation in the design of their policies. This important because current monetary policy conduct will not be able to stabilize house price inflation in the event of a housing market bubble or a market crash. Therefore, as a proposition, future research can focus on identifying other intermediate channels through which the effects of monetary policy asymmetrically influence house price inflation. Future research could also expand the available literature towards other SSA countries such Nigeria, Angola, Mozambique and Kenya whose residential property markets are quite developed.

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