Asymmetric Effect of Monetary Policy Shocks on Output and Prices in Nigeria

Abiodun Sunday Olayiwola[*] and Ogun, T.P[**]

Abstract

This study investigated the asymmetric effect of positive and negative monetary policy shocks on output and prices in Nigeria using interest rate shocks. This was with the view to ascertaining the impact of monetary policy on sustainable output growth and price stability in Nigeria from 1986 to 2016. Quarterly secondary data from 1986: Q1 to 2016:Q4 on output (GDP), interest rate, money supply, inflation rate, investment and real effective exchange rate were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin, 2016 and World Development Indicator (WDI), 2018. Data collected were analyzed using Non-linear Autoregressive Distributive Lag (NARDL) econometric techniques. The results showed that in the short run, negative shocks have more significant effects (2.7%) on output than positive shocks (1.2%) but the effects of positive and negative monetary policy shocks do not have significant effects on price level; while in the long run, positive shocks have more significant effects than the negative shocks on both output (3.1% and 1.9%) and prices (-51.1% and 45.1%). The study concluded that monetary policy shocks have asymmetric effects on output and prices in Nigeria both in the short and long run period.

Keywords: Asymmetric, Policy Shocks, Positive, Negative, Output, Prices

[*] Department of Economics, Faculty of Social Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria, abiodunolayiwola37@gmail.com
[**] Department of Economics, Faculty of Social Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria

1. Introduction

Monetary Policy can be defined as a conscious or deliberate action taken by the monetary authority to regulate the value, supply and cost of money in the economy with a view to achieving certain macroeconomic objectives. The basic goals of monetary policy are the promotion of stable prices, sustainable output growth and employment. Monetary policy is one of the tools used by macroeconomic management to influence outcomes in the real sector of the economy to its desired goal. The goal of every macroeconomic management is to achieve price stability, economic (output) growth, full employment and balance of payment equilibrium which can be achieved through the use of stabilization policy. Stabilization policy refers to the use of fiscal and monetary policies in an economy for the purpose of achieving broad macroeconomic objectives and monetary policy has always been seen as a fundamental instrument over the years for the attainment of these macroeconomic objectives. Studies have shown that monetary policy exerts a great impact on economic activity in developing countries more than fiscal policy (Nigeria inclusive) and greater reliance should be placed on monetary policy actions (Ajayi, 1974, Ajisafe and Folorunso, 2002 and Ekpo, 2009).

The Central Bank of Nigeria (CBN) is the monetary authority in Nigeria with the mandate of manipulating monetary policy through policy instruments and also uses inflation rate to track the growth rate of the domestic prices. Thus, monetary authorities have often set targets on intermediate variables which include the short term interest rate, growth of money supply and exchange rate in the pursuit of macroeconomic objectives. Some empirical studies have suggested that monetary policy may have asymmetric effects on macroeconomic variables. Therefore, investigating the rate at which an economy responds to the asymmetric effects of monetary policy actions has important implications for macroeconomic management.

Some empirical studies have suggested that monetary policy may have asymmetric effects on macroeconomic variables and this idea of symmetric and asymmetric effects of monetary policy could be viewed as what happens when the monetary authority introduces a policy shock or innovation into the economy. Symmetric effect suggests that a 1% increase in the interest rate which is a contractionary monetary policy have the same magnitude effects on the economy as a 1% decrease in the interest rate which is an expansionary monetary policy and in this case monetary authority can use its policy measure in the same manner at any point in time while asymmetric effect occurs when contractionary and expansionary policy shocks do not have the same magnitude effects on the economy and monetary authorities will need to effectively manage these asymmetric effects so as to get the desired results (Hafstain, 2011).

Therefore, it is important to note that the level of changes in the output growth will affect prices. According to the Phillips curve analysis which represents a direct relationship between the growth rate of output and inflation (i.e., high output growth in the short-run gives rise to inflationary pressures) which implies a positive relationship between output growth and prices. As a result, there has been a wide consensus among economic scholars that monetary authorities should pursue the single objective of price stability, so that by anchoring inflation targeting approach in the desired way (say to achieve single digit inflation) using interest rate as policy instrument, monetary policy can create an environment conducive to output growth (CBN, 2000); Rajan and Prasad, 2008). Since monetary policy actions are based on different indicators that provide vital information on future prices and output growth, the important task for policymakers is to study the effect of monetary policy shocks

on output growth and prices, and thereby ensure the required changes in policy actions. Drawing from this, the pertinent question to ask is whether the effect of monetary policy on output and prices is symmetric or not in the short run and in the long run periods. Therefore, the objective of this study is to investigate whether the effect of positive and negative monetary policy shocks on output and prices is asymmetric or not in Nigeria between 1986 and 2016.

This study is organized into five sections: Section one is the Introduction, Section 2 focuses the literature review; section 3 deals with Methodology, variable measurement and sources of data. Section 4 discusses the results with their detailed analysis. Finally, Section 5 attempts to bring together the main findings for concluding remarks.

2.0 Literature Review

The issue of possible asymmetric effects of monetary policy shocks on output and prices empirically started with the seminal work of Cover in 1992. According to Cover, expansionary and contractionary monetary policy has different effects on macroeconomic variables (sign asymmetry). Some other researchers like Morgan, (1993); DeLong and Summers, (1998) conclude that positive and negative monetary shocks have asymmetric effects. On the contrary, Ravn and Sola, (1996) find that positive and negative monetary shocks have symmetric effects. This controversy has generated the issue of whether or not this symmetric effect of monetary policy shocks is with respect to the direction of policy action and size of policy shocks in the economy. Many studies havealso claimed that positive and negative monetary policy shocks have asymmetric effects by providing empirical evidences for asymmetry between positive and negative (tight and loose) monetary policy shocks (Parker and Rothman, 2004; Hayford, 2006; Crawford, 2007; Sznajderska, 2014;Ulkea and Berument, 2016). In the same vein, Komlan, (2013) argues that the effects of monetary policy in Canada show asymmetric preference and his result is in line with previous findings by Favero and Rovelli, (2003) for the case of USA and Rodriguez, (2008) for Canada.Likewise, a considerable amount of empirical research on this issue has emerged as case studies for different developing countries (Aye and Gupta, 2012; Nampewo *etal,* 2013; Zakir and Malik, 2013 just to mention a few).

The question that follows now is whether the agreed view on the asymmetric effects of monetary policy in the literature is applicable to the Nigeria economy or not. There are quite a number of studies from Nigeria that have investigated the effects of monetary policy and have largely focused on how aggregate output, as well as other microeconomic variables respond to monetary policy shocks. However, there is paucity of literature on the asymmetric effects of monetary policy in Nigeria and the available studies have produced mixed results especially due to sign asymmetric effects with little or no attention paid to the direct performance of monetary policy variables used. They also neglect the simultaneous effects of monetary policy shocks on output and prices; as well as the asymmetric effects of monetary policy shocks on the state of the economy (Olayiwola, 2018). For instance, Saibu and Oladeji, (2007) examine the asymmetric effects of monetary and fiscal policies on real output growth in Nigeria as a small open economy. The empirical results show that monetary policy in most of the output measures was negative and insignificant while fiscal policy had asymmetrical positive effect in most cases but attention was not paid on whether it is the positive or negative (tight or loose) monetary policy that was negative and insignificant in the study. Also, Akanbi, (2016) examines the relationship between monetary policy shocks and industrial output in Nigeria. Despite the fact that the study did not examine the asymmetric

effects of the policy shocks directly, the study concludes that both negative and positive monetary policy shocks have negative effects on industrial output in Nigeria using Autoregressive Distributed Lags (ARDL) procedure. Moreover, these investigations are only based on the effects of monetary policy shocks on industrial output without considering the effects of monetary policy shocks on prices and aggregate output (GDP). Apanisile, (2017) examines the long- run asymmetry effects of monetary policy shocks on output in Nigeria. The results show that both component of money supply have positive long-run effect on output in Nigeria and conclude that the long run effects of monetary policy on output are symmetric (not asymmetric) because their coefficients are the same but the study neglects the simultaneous effect of policy shocks on output and prices.Also, apart from annual data and money supply shocks used in the previous studies inNigeria, this study uses quarterly data and other measure of monetary policy shocks; like the interest rate, taking into cognizance the interest rate channel in transmission mechanism of monetary policy action.Hence, this study investigates the asymmetric effects of positive and negative monetary policy shocks on output and prices in Nigeria between 1986 and 2016.

Table1. Summary of Empirical Literature

AUTHOUR	OBJECTIVE	METHODOLOGY	FINDINGS
Akba *etal* (2012)	To examine whether the effects of monetary policy on real production and inflation in Iran is asymmetric or not.	A modification approach of Karras and Stokes (1996 and 1999)	Positive and negative shocks have Asymmetric effects on production and prices.
Barnichon and Matthes (2016)	To estimate whether monetary shocks generate asymmetric responses on prices	Gaussian Mixture Approximations and the Nonlinear Effects model.	Some albeit inconclusive result or evidence.
Cover (1992)	To examine whether unexpected positive and negative change in the money supply has different effect on output.	Uses a two-step procedure.	Negative money supply shocks have a significantly larger effect on output than positive shocks
Crawford (2007)	To examine the impact of monetary policy shocks on sectoral output in Australian	SVAR	Monetary policy shocks have uneven impact across thedifferent sectors.
Hayford (2006)	To determine if positive and negative funds rate shocks have an asymmetric effect on real GDP growth	Structural VAR and Taylor rule	Positive funds rate shocks have a larger absolute value impact on real GDP growth than negative funds rate shocks.
Karras (1996)	To estimate the	A modification of the	Money supply shocks do

	impact of positive and negative money supply shocks on real GDP growth and inflation.	approach of Cover (1992)	not have asymmetric effect on inflation but have asymmetric effects on real GDP growth.
Komlan (2013)	To estimate the asymmetric policy reaction of the Canadian monetary authorities	Threshold approach	Canadian monetary authorities showed asymmetric preferences
Morgan (1993)	To test for asymmetric effects of monetary policy using the Federal funds rate.	The federal funds rate is regressed on lags of itself and lagged real GDP growth and inflation	Funds rate shocks have asymmetric impact on real GDP growth.
Nampewo *etal* (2013)	To investigate the sectoral effects of monetary policy in Uganda	Pair wise granger causality test and recursive VAR	Positive shock in exchange rates result in increase in output of agriculture and service sectors, while the output in the manufacturing sector declined.
Ravn and Sola (1997)	To examine asymmetric effects of monetary policy	Threshold VAR-type model	Findings show evidences supporting menu cost model where large and small shocks have different effects.
Sznajderska (2014)	To investigates the asymmetric effects and reaction function of the National Bank of Poland (NBP) on inflation and output	Threshold models	Polish central bank responds more strongly to the level of inflation when the level of inflation is relatively high
Ülkea and Berument (2016)	Examine asymmetric effects of monetary policy shocks on exchange rate, output and inflation for Turkey.	Innovative nonlinear vector autoregressive (VAR) model	Effects of loose monetary policy are weaker than the effects of tight monetary policy shocks
Zakir and Malik (2013)	To investigate whether the response of output to monetary policy actions is symmetric or not in Pakistan	A methodology given by Cover (1992) with some variation and Hybrid modification	Results favor asymmetry in the effects of monetary policy actions on output

3.0 Methodology

3.1 Model Specification

Drawing from the need to investigate the asymmetry effects of positive and negative monetary policy shocks on output and prices in Nigeria, the empirical methodology that is employed by this study follows a modification approach to the two step procedure given by Cover, (1992), as used by Karras,(1996) and Akbar *etal*,(2012) by adding price equation to the system of equations to be estimated. To test whether monetary policy action affects output and prices differently in Nigeria, this study separates the monetary policy variable (interest rate) by decomposing it into positive and negative shocks. Where positive shock means contractionary direction/policy action and negative shock means expansionary direction/policy action.

Therefore, two additional series of monetary shocks were generated in this case

$$\varepsilon_t = [\varepsilon_t^+, \varepsilon_t^-] \tag{1}$$
$$\varepsilon_t^+ = \max(\varepsilon_t^+, 0] \tag{2}$$
$$\varepsilon_t^- = \max(\varepsilon_t^-, 0] \tag{3}$$

In order to estimate the effects of monetary policy shock on output and prices, these policy shocks $(\varepsilon_t^+, \varepsilon_t^-)$ are included in output and price equations as explanatory variables in addition to other macroeconomic variables. That is;

$$Y_t = f(Z_t, \varepsilon_t^+ ; \varepsilon_t^-) \tag{4}$$

Where Y_t stands for output growth, Z_t are other explanatory variables that affect output growth.

Also, $P_t = f(Q_t, \varepsilon_t^+ ; \varepsilon_t^-)$ (5)

Where P_t indicates growth rate of prices (Inflation rate), Q_t are other explanatory variables that affect price growth. By applying non-linear autoregressive distributive lag (NARDL), equations 4 and 5 can be written as equations 6 and 7 for Output and Prices respectively.

$$Y_t = \varphi_o + \sum_{l=i}^{L} \varphi_l Z_{t-l} + \sum_{j=0}^{m} \varphi_j \varepsilon^+_{t-j} + \sum_{k=0}^{n} \varphi_k \varepsilon^-_{t-k} + U_t \tag{6}$$

$$P_t = \beta_o + \sum_{l=i}^{p} \beta_l Q_{t-l} + \sum_{j=0}^{q} \beta_j \varepsilon^+_{t-j} + \sum_{k=0}^{r} \beta_k \varepsilon^-_{t-k} + U_t \tag{7}$$

Where Y_t and P_t are the output and price growth respectively, Z_{t-l} and Q_{t-l} stand for other explanatory variables as explained in equation (4 and 5). In addition to ε_t^+ and ε_t^-, φ_j, β_j φ_k and β_k are the coefficients to be estimated.

If the coefficients of ε_t^+ and ε_t^- are equal i.e $[\varphi_i^+ = \varphi_i^-]$ and $[\beta_i^+ = \beta_i^-]$, it means that the effects of monetary policy shocks are symmetric, otherwise, asymmetry effect requires that $\varphi_i^- > \varphi_i^+ \geq 0$ and $\beta_i^- > \beta_i^+ \geq 0$ for output and prices respectively.

The objective of this study is achieved by estimating equations (6) and (7) using Nonlinear Autoregressive Distributive lag (NARDL) approach developed by Shin, Yu, and Greenwood-

Nimmo, 2014 while Wald coefficient test is used to confirm the asymmetry effect. The Non-linear ARDL model are considered best methods because it uses positive and negative partial sum decompositions in detecting the asymmetric effects and hidden co integration in both long-run and the short-run periods and can be applied irrespective of whether the regressors are stationary at level I(0) or at the first difference I(1).

3.2 Data: Measurement of Variable and Sources

This study used quarterly data (measured in current local currency (Naira))on variables like: output (proxy by nominal GDP), money supply (M2), interest rate (proxy by Treasury bill rate), inflation rate as measured by the consumer price index and investment (proxy by Gross fixed capital formation) from 1986:1 to 2016: 4. Data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and World development indicators (WDI) online version.

4.0 Data Analysis and Discussion of Results

This study used Augmented Dickey- Fuller (ADF) unit root test with intercept and trend and the result is presented in Table 2. The result showed that only interest rate was stationary at levels I(0) while other variables(GDP, Investment, Money Supply, Exchange and Inflation rate) were stationary at first difference I(1) (that is, they were not integrated at order zero but they became stationary after first differencing). Therefore, the variables used are combination of I(0) and I(1) series and as a result, Nonlinear Autoregressive Distributive Lag (NARDL) was utilised for the purpose of investigating the asymmetric effects of positive and negative monetary policy shocks on output and prices in Nigeria over the period of the study.

The investigation analysis on the asymmetric effects of monetary policy shocks from Table 3; showed that in the short run; the estimated coefficients of positive and negative shocks have meaningful effects on output but negative shocks (2.7%) have more effects than positive shocks (1.2%) while the effects of positive and negative monetary policy shocks do not have meaningful or significant effects on price level. Also, the long run effects of positive and negative monetary policy shocks indicated that positive and negative policy shocks have meaningful effects on output and prices but positive shocks have more effects than the negative shocks (3.1% and 1.9% for output) and (-51.1% and 45.1% for prices). Therefore, since positive and negative monetary policy shocks have different but significant effects on output and prices in Nigeria, the theory of symmetric effects of monetary policy is rejected and the alternative hypothesis is accepted because the P-value is not significant at 5% significant level and this suggests that monetary policy shocks have asymmetric effects on output and prices in Nigeria both in the short and long run period using Wald coefficients test of 5% level of significant. It should be noted that this outcome of asymmetric effects of monetary policy on output especially is in contrast with the findings and conclusion of Apanisile, 2017 which states that the long run effects of monetary policy shocks on output in Nigeria are not asymmetric (symmetric) because the coefficients of positive and negative money supply are the same.

Table 2: Unit Root Test

Variables	M2	EXCH	INTR	INFL	GDP	INVESTMENT
ADF	-4.034997*	-4.037668*	-3.446765**	-4.047795*	-4.034997*	-3.150986**
Stationary Status	I(1)	I(1)	I(0)	I(1)	I(1)	I(1)

*/ **/ *** represent stationary at 1, 5 and 10 percent level respectively.

Table 3: Short and Long-run Effects of positive and negative monetary shocks

Coefficients of monetary shocks on output Equation 6			Coefficients of monetary shocks on prices Equation 7		
Coefficient	value	t-Statistic	variable Coefficient	value	t-Statistic
$D\varphi_0^{+}$	0.026654 (0.0000)	5.053822	$D\beta_i^{+}$	-	-
$D\varphi_4^{+}$	0.012417 (0.0111)	2.588534	$D\beta_i^{+}$	-	-
$D\varphi_3^{-}$	0.007676 (0.0980)	1.670909	$D\beta_j^{-}$	-	-
$D\varphi_4^{-}$	-0.03054 (0.0000)	-6.254779	$D\beta_j^{-}$	-	-
$\varphi_0 +$	0.031 (0.3265)	8.3784	$\beta_1 +$	-0.511 (0.19938)	-2.5629
$\varphi_0 -$	0.019 (0.3702)	7.6754	$\beta_1 -$	0.451 (0.17622)	2.5593
Wald Test	0.17 (0.68)			0.68 (0.41)	

Source: *Author's E-views computation results 2018.Note: figures in ( ) is* the P-value. φ_0 **and**$\beta_1$indicate long run coefficients while **$D\varphi_i$ and $D\beta_i$** represent short run coefficients.

5.0 Conclusion

The general conclusion that could be drawn from the analysis of the effects of positive and negative shocks on output and prices is that positive and negative monetary policy shocks have different but significant effects on output and prices in Nigeria. This suggested that the theory of symmetric effects of monetary policy is rejected and the alternative hypothesis of asymmetric effects is accepted and it can be said that in Nigeria, monetary policy shocks have asymmetric effects on output and prices both in the short and long run. However, given the significant effects of positive and negative monetary policy shocks on output and prices, there is need for the monetary authority in Nigeria to put in place the necessary policies with strict guidelines and monitoring in order to reduce the effects of any shocks that can impair the desired growth of output and prices in the economy.

References

Ajayi, S. I (1974): "An Econometrics Study of the relative importance of monetary and Fiscal policy in Nigeria" *Bangliadesh Economic review.* 1(2) 559-576.

Ajisafe, R.A. and Folorunso, B.A (2002): "The Relative Effectiveness of Fiscal and Monetary policy in Macro Economic Management in Nigerian". *The African Economic and Business Review,* 3 (1): 23-40.

Akanbi, M (2016): "Monetary policy shocks and Industrial output in Nigeria 1986-2013" Unpublished M.Sc. Thesis, Department of Economics Obafemi Awolowo, Ile-Ife, Nigeria.

Akanbi, M.O and Dada, J.T (2018): "Monetary policy shocks and Industrial output in Nigeria 1986-2013"*African Journal of Economic Review*, 6(1): 72-86.

Akbar K, Mostafa S, Marzieh A and Razieh A (2012): "Asymmetric Effects of Monetary Policy on Economic Growth and Inflation: Case Study of Iran". *International Journal of Business and Social Science.* 3 (9).

Apanisile, O.T. (2017): "Asymmetric Effects of Monetary policy Shocks on Output in Nigeria: A Non-Linear Autoregressive Distributed Lag(NARDL) Approach" *Economic Society of South Africa Biennial Conference Paper.* essa_3452

Aye, G.C. Gupta, R. (2012):"Are the Effects of Monetary Policy Asymmetric in India? Evidence from A Nonlinear Vector Auto Regression Approach. Working Papers 2012–02, Department of Economics, University of Pretoria.

CBN, (2010): Monetary Policy Transmission Mechanism in Nigeria, Research Department, Central Bank of Nigeria.

Cover, J. (1992): "Asymmetric Effects of Positive and Negative Money Supply Shocks" *Quarterly Journal of Economics*, 107(4), 1261-1282..

DeLong, B. and Summers, L (1988): "How Does Macroeconomic Policy Affect Output?" *Brookings Papers on Economic Activity*, 433-480

Ekpo, A.H (2009): "The global economic crisis and the crises in the Nigeria economy" Presidential Address to the 50th (Golden jubilee) Conference of the Nigeria Economic Society, Abuja.

Favero, C and Rovelli, R. (2003):"Macroeconomic stability and the preferences of the Fed: a formal analysis, 1961–98" *Journal of Money, Credit and Banking* 35 (4), 545–556.

Friedman, B.M and Kuttner, K.N (1993): "Another Look at the Evidence on Money-Income Causality", *Journal of Econometrics* 57, 189-203.

Hayford (2006): "Asymmetric effects of Monetary Policy" *Journal of Economic Asymmetric*. Volume 3

Hafstein, B.H (2011): "The Effects of Monetary Policy on the Real Economy": Evidence from United States, the United Kingdom and Japan.

Karras, G and Houston H. Stokes (1999): "Why are the effects of money-supply shocks asymmetric? Evidence from prices, consumption and investment" *Journal of Macroeconomics*, 21 (4), 713–727

Komlan (2013): "The asymmetric reaction of monetary policy to inflation and the output gap: Evidence from Canada" *Economic Modelling* 30 (2013) 911–923.

Kumar, Jeevan and Khundrakpam(2013): "Are There Asymmetric Effects of Monetary Policy in India?" MPRA Paper, Reserve Bank of India.

Morgan, Donald (1993): "Asymmetric effects of monetary policy*". Federal Reserve Bank of Kansas City Economic Review* 78(1):21–33

Notarpietro, Alessandro and Stefano Siviero (2015):"Optimal Monetary Policy Rules and House Prices: The Role of Financial Frictions," *Journal of Money, Credit and Banking*, 47(S1), 383–410.

Olayiwola, A.S (2018): "Asymmetric Effects of Monetary policy on Output and Prices in Nigeria 1986-2016" Unpublished M.Sc. Thesis, Department of Economics Obafemi Awolowo, Ile-Ife, Nigeria.

Olayiwola, Abiodun (2018): "Effects of Monetary policy Shocks on Output and Prices in Nigeria 1986-2016" *Journal of Economics and Sustainable Development* 9(21):117 - 123

Parker,R. and P. Rothman (2004):"An Examination Asymmetric Effects of money supply shock in the pre-world war I and inter war periods" Department of Economics, East Carolina university, Green ville. NC 2, 7858 USA.

Rajan, R. and Prasad, E (2008): "Monetary Policy Myths" An article in Business Standard (India), May 21.

Ravn, M. O. and Sola, M. (2004): Asymmetric effects of monetary policy in the United States. Federal Reserve Bank of St. Louis Review, 41–60.

Rodríguez, G (2008): "Stability of central bank preferences, macroeconomic shocks, and efficiency of the monetary policy: empirical evidence for Canada". *Applied Economics Letters* 15 (6), 437–441.

Saibu, M.O and Oladeji, S.I (2007): "Asymmetric Policy Shocks and Real Output Fluctuations in Nigeria (1960-2004)"*International Journal of Applied Economics and Finance*.

Shin, Y, Yu, B and Greenwood- Nimmo, M (2014): "Modeling Asymmetric cointegration and Dynamic Multiplier in a Nonlinear ARDL Framework.

Sznajderska, Anna (2014): "Asymmetric effects in the Polish monetary policy rule" Economic
Modelling36 (1): 547–556

Ülke, V &Berument, M.H (2016): "Asymmetric effects of Monetary Policy Shocks on Economic Performance" Empirical Evidence from Turkey, *Applied Economics Letters*, 23:5, 353-360

Weise, C., (1999): "The Asymmetric effects of monetary policy: A nonlinear vector auto regression approach*" Journal of Money, Credit and Banking February* 31(1) 85-108

Zakir, Nadia and Malik, WasimShahid (2013): "Are the effects of monetary policy on output asymmetric in Pakistan?" *Economic Modelling*,32 (1)