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THE IMPACT OF MONETARY POLICY ON GOVERNMENT DEBT MARKET: THE CASE OF ALBANIA

Anisa Plepi
University of Tirana, Faculty of Economics, Albania
anisaplepi@feut.edu.al

Abstract

This paper attempts to evaluate the impact of monetary policy on Albanian debt market through a yield curve approach. Following the information extracted from the representative yield curve I determine how a change in the stance of monetary policy influences the behavior of interest rates of government bonds with different maturities (short, medium and long term). More specifically, by relying on a Vector Autoregressive Model, the focus is put two on key aspects. First, in identifying the set of variables that explain the interest rates movements. Second, in determining the time span throughout which the impact of an exogenous monetary policy shock results significant. Empirical evidence suggests that inflation plays a significant role in explaining the variations exhibited by interest rates movements, almost 50% of variations in medium-term rates and 70% of those in short-term rates. Furthermore, the slope and curvature factor of the yield curve result to be more sensitive to monetary policy shocks (up to 2 quarters) whereas the level factor is not subject to significant changes.

Keywords: Monetary Policy, Yield Curve, Slope, Level, Curvature, VAR, Debt Market

INTRODUCTION

Over the last three decades the theory of the term structure of interest rates has received particular attention as an instrument with the potential of revealing important information for the conduct of monetary policy. The term structure of interest rates widely known as the yield curve, plots interest rates of bonds with similar credit quality but different maturities and as such can provide useful insight on the financing conditions of the overall economy.

Existing literature regarding the term structure of interest rates has mainly developed in two fronts. On the first front, the focus has been mainly on extracting the information provided by the yield curve, in particular the information concerning the three latent factors (level, slope and curvature) which as shown by Litterman and Scheinkman (1991) can explain most of the movements of the yield curve. Two approaches stand out in the literature. First, the parametrically parsimonious model introduced by Nelson and Siegel (1987) that was able to capture yield curve dynamics and represent the different shapes it exhibits over time. Second, the Diebold et al. (2006) one-step procedure that builds on the Nelson-Siegel model and can be utilized to estimate the latent factors through the application of a Kalman Filter.

On the other front, the yield curve approach has been employed to study the relationship between the yield curve latent factors, monetary policy and macroeconomic variables such as inflation and real activity. Among those, Wu (2001) examines the relationship between monetary policy and the slope factor of the yield curve and finds that monetary policy shocks explain a large part of the variability of the slope factor. Brand et al. (2006) explore another dimension of the relation between monetary policy and the yield curve, that of central bank communications. More specifically, by constructing several multidimensional indicators that characterize monetary policy news regarding decisions and communications, they are able to analyze the impact of ECB communications on market expectations concerning the future path of monetary policy. Their results provide evidence that monetary policy communications significantly affect medium to long-term interest rates through their impact on market expectations regarding the course of monetary policy. In a more recent approach, Dalhaus et al. (2021) introduce a time-varying network model to evaluate among others a particular aspect of monetary policy communications, that of forward guidance. Their results suggest that forward guidance is associated with a strong time variation in the network intensity parameter.

Tillman (2019) on the other hand provides an attempt to study the response of bond yields to monetary policy shocks depending on the degree of monetary policy uncertainty. They find that a higher degree of uncertainty is associated with a smaller increase in long term yields in response to a shock.

Ang and Piazzesi (2001) further incorporate macroeconomic variables such as inflation and real activity and find evidence that macro factors explain up to 85% of the variation in bond yields. In a similar attempt, Coroneo et al. (2016) investigate the predictive power of macroeconomic factors on government bond yields and excess returns in the US and find that economic growth and real interest rates provide predictive information regarding their future developments.

In this paper, considering the significant weight of internal debt in the overall public debt, I employ a similar approach to examine the impact of monetary policy on Albanian bond market in terms of the borrowing costs (interest rates) and expectations. In this regard, the aim of this paper is two-fold: First, to represent the Albanian yield curve through its three latent factors: level, slope and curvature. Second, to quantify the impact of monetary policy on the Albanian yield curve and determine the implications it poses for policymaking.

The paper is structured as follows. Section 2 presents the features of the econometric approach employed, the dataset and the estimation methodology while Section 3 provides the empirical results. Section 4 finally concludes.

RESEARCH METHODOLOGY

Data Description

In order to conduct the empirical analysis, two groups of data are used: the first one characterizes the borrowing costs faced by the Albanian government in the domestic debt market and the other monetary policy and macroeconomic conditions.

More specifically, to characterize the borrowing costs in the domestic debt market, I use quarterly data on the yields of government bonds with a maturity period of 3,6,12, 24, 36 and 60 months that are derived from the database of the Bank of Albania and cover a time span[1] from 1996:Q1-2014:Q4 (3,6,12 months) 2002:Q4-2014:Q4 (24 months) 2005:Q2-2014:Q4(36 months) and 2006:Q4-2014:Q4 (60 months).

Considering that monetary policy in Albania is endogenous (responds to economic developments), it is necessary to include in the empirical analysis the main macroeconomic factors that determine the conditions of Albania's economy and as such determine the stance of monetary policy. In addition, seasonally adjusted quarterly data on inflation, real economic activity (real GDP) and the repo rate (as the main instrument used by the Bank of Albania to conduct its monetary policy) that cover a time period from 1996:Q1-2014:Q4[2], are used.

The Representation of the Albanian Yield Curve

In deriving the Albanian yield curve, I follow the same approach as Abazaj (2013) and rely on standard empirical approximations of the three latent factors that characterize the yield curve, the level, slope and curvature:

$$\text{Level} = [\, Y_t(3) + Y_t(6) + Y_t(12) + Y_t(24) + Y_t(36) + Y_t(60) \,] / 6 \qquad (1)$$

[1] Data on government yields are not published as a continuous time series.

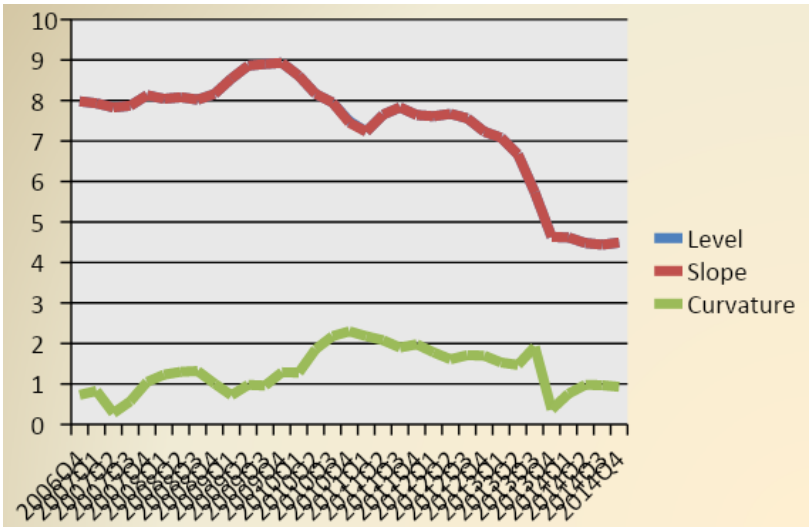
[2] Constrained by the time span of the data on the government bond yields.

$$\text{Slope} = [Y_t(60) - Y_t(3)] \quad (2)$$

$$\text{Curvature} = [\, Y_t(36) - \tfrac{1}{2} * [Y_t(3) + Y_t(60)] \,] \quad (3)$$

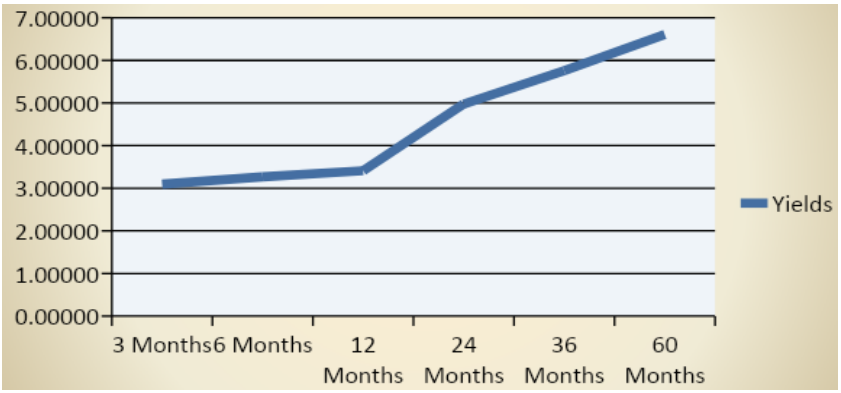
Several authors such as Alfonso (2010), Diebold et al. (2005) have compared these empirical approximations to the latent factors estimations derived through the application of a Nelson-Siegel model and found them to be highly correlated.

Figure 1 The Unobservable Factors of the Yield Curve in Albania



Following Figure 1, which represents the dynamics of the latent factors over time, it can be noticed that the level and slope factor of Albania's yield curve tend to move in a similar pattern, therefore the moves of short term rates can be used to forecast those of longer term rates, however further analysis is required.

Figure 2 The Dynamics of the Albanian Yield Curve



The plotted yield curve in Figure 2 provides some insights regarding the behavior that the Albanian yield curve has exhibited over time and as such can be utilized to better

understand the behavior of economic agents that invest in government bonds. More specifically, throughout 2014, the yield curve has displayed two different shapes: in the first part it is mostly flat which reflects investor's uncertainty concerning the future movements of interest rates; in the markets there may be some signals that short terms will rise and other signals that indicate that long-term rates will fall. In the second part, the yield curve displays its normal positively sloped shape, which suggests that investors expect the economy to grow in the future, followed by higher inflation rates. This is understandable considering the current expansive monetary policy followed by the Bank of Albania, which the investors expect to tighten at some point in the future by raising short term rates so it can slow economic growth and dampen inflationary pressures. Under these circumstances they require higher yields for bonds with longer maturities, as a compensation for the uncertainty they must face before being paid back the principal.

Model Specification

In order to quantify the impact of monetary policy on the Albanian debt market, following the approaches of the existing literature, i rely on a Vector Autoregressive framework whose mathematical representation is as follows:

$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (3)$

Where, y_t is a k vector of endogenous variables, x_t is a d vector of exogenous variables, $A_1, \ldots, A_p$ and B are matrices of coefficients to be estimated and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and all of the variables on the right side.

In addition, in order to specify a VAR model that best captures the characteristics that Albanian data display over time, i rely on a two-step procedure.

In the first step, i establish how the variables will be included in the VAR model, using the stationary and the degree of endogeneity they display, as a criterion.

Following the results of the Augmented Dickey Fuller Test shown in Table 1, all variables except for inflation that is stationary in level, enter the model in their first differences thus are integrated of first order I(1). As for the order, based on the Cholesky Decomposition, the selected variables are included in the model in an ascending order starting from the least endogenous:

-The level, slope and curvature are placed last for they are prone to be affected simultaneously from inflation, real activity and monetary policy shocks.

-Inflation is also influenced by monetary policy and real activity shocks and as such is placed third.

-The conduct of monetary policy in Albania is highly dependent on economic developments and as such it is likely to react to inflation and real activity shocks. Hence, the repo rate as the main instrument used by the Bank of Albania to conduct its monetary policy, is positioned second.
-Real activity is thus placed first.

In the second step the appropriate lag length is determined based on the information criterion AIC, SC, according to which a VAR(1) model seems to be more fitting.
In addition the final specified model would be :

$$Y_t = C + \sum_{1}^{p} AY_{t-1} + \varepsilon_t \qquad (4)$$

Where Y_t = (real activity, repo rate, inflation, level, curvature, slope).

RESULTS

Impulse Response Functions

Given the estimated VAR (1) model specified in the previous section, by relying on an impulse response function, the effect of a monetary policy shock (as represented by the key interest rate) on each of the yield curve latent factors, can be determined. More specifically, the information provided by Figure 3 (appendix) suggests that the slope factor significantly responds to monetary policy (represented by its key interest rate- repo rate), inflation and level shocks.

In addition, a positive shock in the repo rate causes the slope factor to decrease for a period of 3 quarters only to be dispersed soon afterwards.

An inflation shock on the other hand, induces a reduction in the slope factor for only two quarters, followed by an increase that is present until the seventh quarter.

The effect of a level shock is similar to that of repo, thus causes the slope factor to decrease for only 2 quarters.

From an economic perspective, a significant increase in the inflation rate in the present would trigger a reaction from the Bank of Albania in order to put inflationary pressures under control, the increase of its key interest rate (very short term rate). This would cause short-term interest rates (of government bonds) to increase by much larger amounts than the long-term ones (causing the slope to decrease). As a result investors would expect lower rates in the future that would reflect an expansive monetary policy, which explains the increase in the slope factor (thus short term rates raise by smaller amounts than long term rates) after 2 quarters, as a response to an inflation shock.

Monetary policy shocks result to also have a significant impact on the curvature factor of the yield curve. A positive repo shock is followed by an increase in the curvature factor for 2

quarters, thus the medium term rates increase by much larger amounts than those of shorter and larger terms. A positive inflation and real activity shock have an impact of the same nature on medium term rates.

Variance Decomposition Analysis

While impulse response functions help in tracing the effects of a shock to an endogenous variable on the other variables in the VAR model, variance decomposition provides information about the relative importance of each random innovation in affecting the other variables in the VAR. Given the current analysis, as shown by Figure 4 (appendix), most of the variations in the slope factor (almost 70%) are explained by inflation whereas the repo rate and the level factor hold a relatively equal share in explaining slope dynamics (almost 10%). As for the curvature factor, inflation keeps playing an important role in explaining its movements (almost 50%), the rest is explained by the level (almost 20%) and curvature factor (almost 30%). In this context inflation is a key element in explaining the fluctuations in the movements of short and medium term rates.

CONCLUSIONS

This paper provides the first attempt in literature to quantify the impact of a change in the stance of monetary policy to the borrowing costs faced by the government in the domestic debt market by relying on a yield curve approach. Under the current economic conditions in Albania: weak economic growth and weak inflationary pressures, following the consistent expansive monetary policy (as reflected by the decisions of the Bank of Albania to lower its key interest rate in accordance with its main objective of a stable inflation of 3% in the medium term), after a period of uncertainty (as reflected by the flatness of the Albanian yield curve), investors are more prone to expect positive economic developments in the future.

This is further sustained by the empirical results where a negative shock in inflation and the key interest rate (expansive monetary policy) caused the slope factor of the yield curve to increase for 2 quarters thus raised short term interest rates by smaller amounts than longer term rates. That being said, given the continuous expansive monetary policy, investors expect future inflation (which explains almost 70% of the fluctuations in the movement of short term rates) and as a result expect the Bank of Albania to tighten monetary policy by raising short term rates in the future so they can slow economic growth and dampen inflationary pressures. Under these circumstances investors require higher yields for bonds with longer maturities, as a compensation for the uncertainty they must face before being paid back the principal.

To conclude, in spite of the restrictions posed by the limited availability of data in the case of Albania, the yield curve can prove to be a useful instrument in understanding the behavior of the bond market in response to a change in the stance of monetary policy or overall economic conditions. Looking forward, in future research the specified model can be employed to study the conditions of the Albanian debt market in the light of the recent crisis with the monetary policy soon approaching the zero lower bound.

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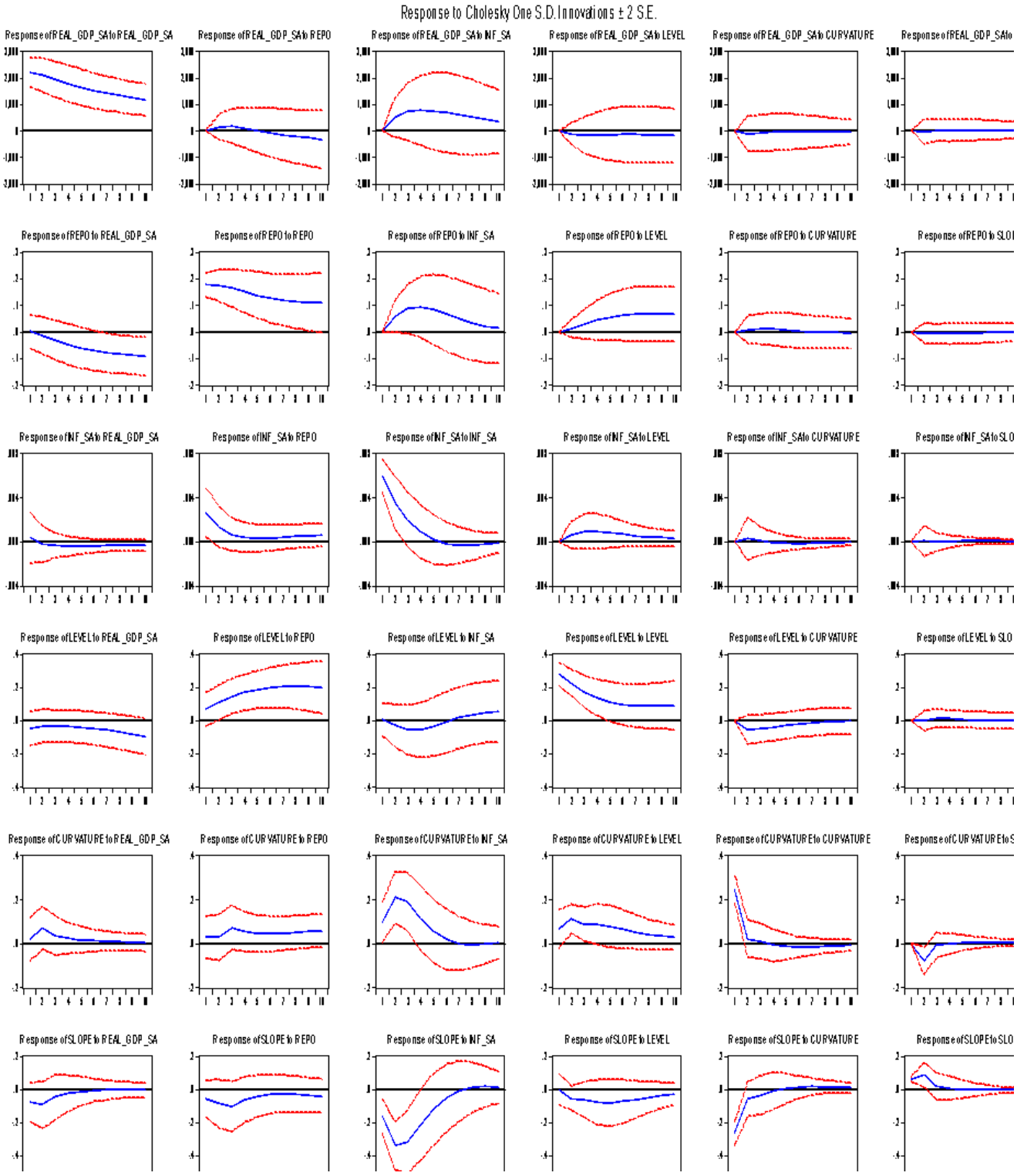
APPENDICES

Table 1 Augmented Dickey Fuller Test Results

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_t$$

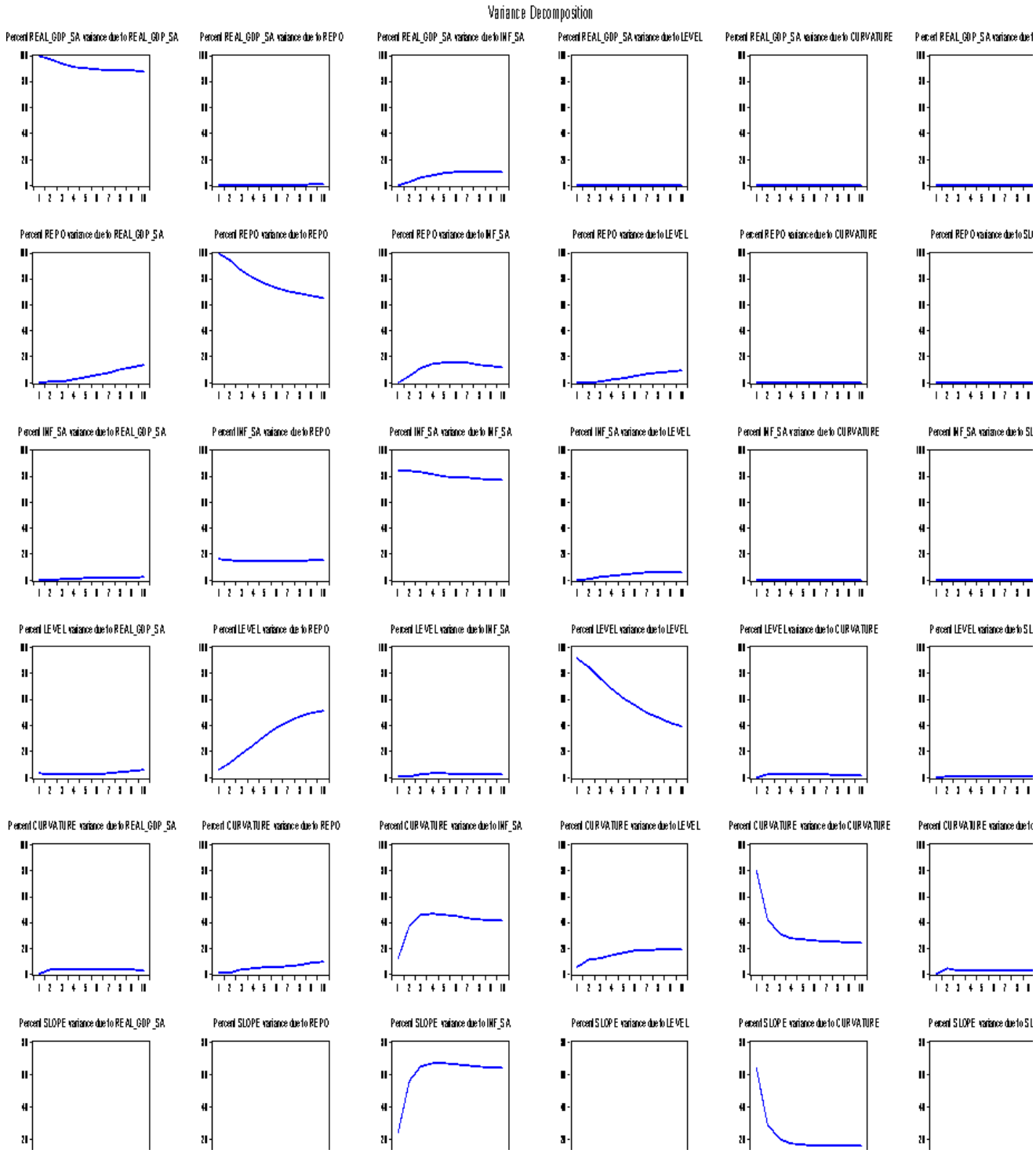
Variables	Level	First Difference
Repo Rate	**-1.89**	**-5.32**
Inflation	**-5.06**	**-4.96**
Real GDP	**-0.04**	**-12.31**
Level	**-0.50**	**-2.97**
Slope	**-1.90**	**-4.73**
Curvature	**-2.09**	**-6.76**

Figure 3 Impulse Response Functions 1996:Q4 -2014:Q4



Note: Estimations based on the VAR(1) model

Figure 4 Variance Decomposition Analysis



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