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Evidence for the Dominican Republic using a Structural VAR approach*

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ABSTRACT

In this paper we provide new evidence of the transmission mechanism of monetary policy in Dominican Republic using a Structural Vector Autoregressive methodology where we incorporate carefully a set of constraints on contemporary relationships composed of domestic and external variables. Using the model, we estimate the responses of CPI inflation and GDP growth, as well as money demand and the real exchange rate, to exogenous movements in monetary policy. In quantitative terms, an innovation of monetary policy has an effect on growth from the second month and runs for one year. In the case of inflation, the effects begin to be observed from the fifth month after the monetary shock occurred, with an average duration of two years. These responses are in line with economic theory in qualitative terms, and we do not observe the existence of any of the economic puzzles.

Keywords: Structural VAR, Monetary policy shock, liquidity puzzle, price puzzle, exchange rate puzzle.

JEL Classification: E50 E52 F41

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I. Introduction

In January 1st 2012, the Central Bank of the Dominican Republic (CBDR) formally started to operate under an Inflation Targeting Regime (IT). The operation framework of IT is based on inflation expectations; therefore one of the prime criteria is the understanding of transmission mechanism of monetary policy. Particularly, the quantification of the effects the monetary policy has over output and prices related to magnitudes and duration of shocks.

Monetary transmission mechanism in the Dominican Republic have been analyzed through different perspectives, taking into account the monetary policy regime currently working by the time of the analysis. The results of all previous studies show a high dispersion and heterogeneity in concluding how the monetary policy works (Fuentes 2006). All these heterogeneity in the results, gives a light to researchers about the problem of identifying nonsystematic exogenous movements of the monetary policy instruments, in order to formulate a solid conclusion. For the Dominican case, this identification problem lies not only in the high debated aspects in economic literature, but due to empirical problems related to short samples and structural changes of macroeconomic time's series, making harder the replications and comparability of results from different studies.

In these sense, the goal of this paper is to empirically study the effects of monetary policy over output, prices, real exchange rate and money aggregates of Dominican Republic in order to summarize the timing and magnitude of transmission of policy shocks to economic variables.

We identify monetary policy shocks measured as deviations of the interbank rate taking into account the information the Central Bank has contemporaneously by using a Structural Vector

Autoregressive (S-VAR), composed with domestic variables (output, prices, monetary aggregates, interest rate and real exchange rate) and external variables (average commodities prices and an indicator of sovereign risk). The identification approach is realized through the imposition of restrictions over the variables that monetary policy cannot observe and react contemporaneously. With the specification and estimation of the model, we evaluate the quantitative effects a monetary policy shock has on inflation, GDP growth, money demand and real exchange rate.

Results suggest that monetary innovations influence output growth from the fourth month with an average length of one year and a half. Inflation responds in the second month, with a length of two years on average. Finally, monetary policy shocks explain around 10 percent of output variance of forecast error in a two years horizon.

The paper is organized as follows: section II summarize the literature review and a revision of the empirical papers in the Dominican Republic dealing with the monetary policy transmission mechanism. Section III explains how the monetary policy works in the Dominican Republic and its evolution in the last two decades. Section IV elaborates the empirical methodology used in the identification of the monetary shocks, section V a description of the data used; section VI the results, and by last, section VII summarizes the concluding remarks.

II. The effects of monetary policy on output and prices

Monetary effects over real activity and prices are one of the most debated topics in macroeconomic empirical literature. Sims (1992) explains that the size and nature of the effects of monetary policy on aggregate activity are not clear and quantifying these effects could be hard and fuzzy. Bernanke and Blinder (1992) also address the same question: Can monetary policy affect the real economic activity in the economy? And if so, which are the transmission mechanism in which monetary policy operates?

In general, theory says that in short run there are restrictions and distortions that inhibit the price system to adjust to shocks that impact the economy, in particular, monetary policy innovations. The Persistence of these rigidities results in adjustments in the real dimension of the economy to nominal shocks. These mechanisms depend in the structure of the economy, expectations formation and the currently monetary policy regime.

2.a) Transmission mechanisms of monetary policy

There are several transmission mechanisms documented in literature through which monetary policy operates and influence the economy. Mishkin (1995) identifies at least 4 mechanisms[1]:

I. Interest Rate Channel:

$$\mathbf{M} \downarrow \Rightarrow \boldsymbol{i} \uparrow \Rightarrow \boldsymbol{I} \downarrow \Rightarrow \boldsymbol{Y} \downarrow$$

[1] Additionally, economic literature recognizes the existence of a fifth channel: the expectations channel in which monetary policy actions affect the expectations of economic agents related to inflation and output.

A contraction in monetary policy (M ↓) given the rigidity in inflation response, leads to an increase of the real interest rates (*i* ↑), resulting in an increase in the cost of capital, causing a decrease in investment (*I* ↓), decreasing the aggregate demand and leading to a fall in output (*Y*↓).

2. Exchange Rate Channel:

M ↓ ⇒ *i* ↑ ⇒ *E* ↓ ⇒ NX ↓⇒ *Y* ↓

A contraction in monetary policy (M ↓) leads to an increase of the real interest rates (*i* ↑), resulting in an appreciation of the exchange rate (*E* ↓), causing a decrease of net exports (*NX* ↓) due to an increase of the relative prices of the domestics goods, decreasing the output (*Y*↓).

3. Asset Prices Channel

M ↓ ⇒ P_e ↓ ⇒ *q* ↓ ⇒ *I* ↓⇒ *Y* ↓

An increase of the interests rates associated with a money contraction, makes the bonds more attractive compared to stocks, therefore the price of stocks fall (P_e↓), causing Tobin's *q*[2] to decrease and at the same time causing investment to fall (*I*↓), leading to a fall in output (*Y*↓). Another mechanism, in relationship to the asset price channel is explained by the life-cycle hypothesis of Modigliani (1971). In this theory, consumption is determined by the life recourses of consumers, explained by human capital, real capital and financial wealth, where the mayor

[2] Tobin (1969): Tobin's *q* theory established how monetary policy affects the economy through of effects of stock valuation where q is defines as a ratio of total market value of the firm divided by the replacement value of firm's asset.

component of financial wealth is determined by stocks; therefore, when the price of stocks fall (P_e↓), there is a decrease in consumer's wealth (*w*↓), causing a decrease in consumption (*c*↓) and therefore producing a fall in output (*Y* ↓).

4. Credit Channel

This channel has two ways of operating. Firstly, it operates through bank lending channel and in secondly by the balance sheet channel. In relation with bank lending channel, a monetary contraction increases the marginal cost of offering loans, therefore reducing reserves and bank deposits, that is, the quantity of available recourses to lend to the public, causing in a decrease of investment in durable goods and consumption, decreasing output by last.

M ↓ ⇒ reserves and bank deposits ↓ ⇒ bank loans ↓ ⇒ *I* ↓ ⇒ *Y* ↓

In the other hand, the balance sheet channel emphasizes the effect of monetary policy on the price of financial assets and in consequence, the value of net wealth of firms, therefore, a contractive monetary policy increases financial vulnerability of firms and economic agents, reducing investment, consumption in durable goods and house expenditures.

M ↓ ⇒ P_e ↓ ⇒ Financial Assets ↓ ⇒ Financial Vulnerability ↑⇒ c ↓ ⇒ *Y* ↓

2. b) Empirical Evidence of Monetary Policy Transmission Mechanism

Quantifying Monetary Policy Transmission Mechanism is a hard subject. In the economic literature results may contradict the conventional economic theory. Researchers have identified three recurrent empirical puzzles at the time of studying monetary transmission mechanism: the liquidity puzzle, the price puzzle and by last, the exchange rate puzzle. The *liquidity puzzle*: positives innovations in the money aggregates lead to an increase in the domestic interest rates, instead of a decrease as economic theory establishes (we would expect interest rates to decrease when the stance of monetary policy is loose). The *price puzzle:* an increase in the interest rate is associated with an increase in the price level (instead of a decrease of price level) and by last, the *exchange rate puzzle:* an increase of the interest rate causes an exchange rate depreciation (rather than an exchange rate appreciation that would be expected as a result of increasing the interest rate). As noticed, all the puzzles mentioned above contradict conventional economic theory.

In this regard, Kim (1999) explains that when monetary policy shocks are identified using a measure of monetary aggregates a liquidity puzzle arises, a phenomenon related to a monetary contraction.

Also, much of the research suffers from the liquidity puzzle. Sims (1992) explains that interest rates innovations are systematic responses to structural shocks leading to a price increase. To solve this issue, Christiano et Al (1996) and Sims (1992) utilizes the short run interest rates or a measure of a narrow monetary aggregate[3] after including a variable that represents future inflationary pressures, as a commodity price index in the monetary reaction function. Gordon and Leeper (1994), suggests a detailed specification of the money market in the S-VAR as the puzzle solution.

Kim (1999) uses a Structural VAR model in order to separate supply and demand of money shocks in G-7 countries. Results suggest that an S-VAR approach solves liquidity and prices

[3] Traditionally empirical literature use M1 which includes physical cash and coins plus demand deposits and travelers checks.

puzzles for the majority of G-7 economies. Similarly, monetary shocks have significant effects in output in the short run. However, relative contribution of monetary shocks towards output fluctuations is low.

III. Empirical evidence on the effects of monetary policy supply shocks in the Dominican Republic.

Analyzing the empirical evidence for the Dominican Republic, Fuentes (2006) noticed that the empirical evidence about monetary transmission mechanism is varied and inconclusive. The author explains that in the majority of papers predominates the use of an autoregressive vector (VAR) approach and cointegration analysis, being the exchange rate transmission mechanism the most studied channel[4], in particular the coefficient estimation of the pass-through of exchange rate to prices. Fuentes (2006) explains that until 2006, none of the empirical papers explained the asset price channel and the expectations channel.

According to Williams (2001), Williams and Adedeji (2004), and Medina (2006) monetary policy has a significant influence over inflation through the exchange rate channel, (when monetary aggregates are an intermediate objective). However, monetary policy does not have significant influence over output. This ultimate result contradicts the findings of Gratereaux and Ruiz (2007), who identified that monetary policy, has the power to influence output. Similarly Gonzalez (2010) with a semi-structural methodology documents persistent effects in the active rates over aggregate demand of up to six quarters of duration.

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[4] Gonzalez y Lora (1999), Diaz (1999), Vázquez (2003), William y Adedeji (2004), Medina (2006), Hernandez (2006), Gratereaux y Ruiz (2007) and Fuentes and Mendoza (2007).

More recent studies, explore the functioning of alternatives channels but without extending the analysis of the effects of monetary policy to output and prices. For example, Andujar (2012) estimates the pass-through of monetary policy rate to the long run interest rates of the financial system. The author shows the existence of an interest rate channel noticing that the pass-thorough is complete in the long run for the active interest rates and incomplete for the passive interest rates.

Also, Santana (2004) and Bencosme (2007) suggest the existence of a transmission mechanism through the credit channel. Santana (2004) concludes that monetary policy has effects on the amount of loans of financial institutions depending on how big they are. Similarly, Bencosme (2007) concludes that monetary policy has redistributive effects depending on the size and banks liquidity.

As noticed, this dispersion of results among the empirical studies analyzing the transmission mechanisms of monetary policy in Dominican Republic could be attributed both to identification problems of exogenous innovations of interest and the difficulties of treatment of data.

Monetary Policy Implementation in the Dominican Republic

Monetary Policy in the Dominican Republic has gone through several different stages since the exchange rate market reform in the 90s (IMF staff reports). Three key stages can be identified in the understanding how the monetary policy operates:[5]

1. (1990-2001): The consolidation of the monetary policy with monetary aggregates, but with sterilized recurrent intervention in the exchange rate market in order to alleviate nominal exchange rate volatility. In this period, the Central Bank of the Dominican Republic started to publish the monetary program where established a schedule of contraction/expansion of the monetary emission, based on forecasting the growth of money demand and core inflation.

2. (2002-2003) Payment System Crisis that reached its peak with the bankruptcy and the bailout of three important commercial banks. This period was characterized by the instability of monetary indicators and nominal exchange rate depreciation, caused by pressure on the foreign exchange market due to capital outflows.

3. (2004-2012) Monetary Policy based in monetary targeting through explicit instruments and intervention in the exchange rate markets. In 2004, the Central Bank of the Dominican Republic introduced the interest rate corridor. This corridor was integrated by the overnight rate that served as the monetary policy rate (TPM by its acronym in Spanish) and the Lombard rate window. The interest rate corridor worked under monetary targeting, being the rate paid on deposits in the short term (overnight) the lower limit and the Lombard rate at the upper limit.

[5] More information regarding the history of monetary policy in the Dominican Republic could be found in the book "60 años de política monetaria en República Dominicana 1947-2007" published by the Central Bank of the Dominican Republic.

In this framework, the interbank interest rate was to fluctuate between the two rates. Under monetary targeting, the nominal anchor of monetary policy was the monetary aggregate.

Since 2012, the CBDR publicly announced the implementation of an inflation targeting regime, announcing a target were inflation expectations remain well anchored. From February 2013 to present, the instrument of monetary policy is the monetary policy rate (TPM) that serves as a rate of reference or benchmark of the expansions/contractions of monetary operations run by the CBDR within a day. The operative mechanism for setting the reference rate consists in conducting daily auctions operations to influence money market liquidity with expansions/contractions and by this way affecting the interbank interest rate.

Through this mechanism, the CBDR adjusts the interest rate in respond to deviations of projected inflation expectations, consistent misalignments of some output gap measure and of the real exchange rate. The adjustment of the monetary policy rate spread throughout the structure of market rates, affecting the targets via the different transmission mechanism of monetary policy described in section II.

IV. Empirical framework and model identification

In order to quantify the effects of monetary policy on prices and output we need the implementation of an empirical methodology in which data “speak by itself”, trying not to impose a structure or restriction suggested by an a *priori* economic theory.

In the empirical literature related to this topic the dominant strategy consists in estimating a Structural Vector Autoregressive (S-VAR) model, were researches estimate the joint distribution of the data, in order to get the residuals in a reduced form, which contents the contemporaneous relationships of interests. This paper uses this methodology.

Variables selection depends of the objectives of the analysis. In this case, our interest is monetary policy and its relationship with prices and real economic activity; therefore we incorporate output (Y), prices (P) and the monetary policy instrument (R). Similarly, as the Dominican Republic is an open economy, we incorporate the real exchange rate (TCR).

As mentioned in section II, empirical literature identifies incongruences (puzzles) among the quantitative response according to economic theory and the observed responses. The solution to these puzzles requires the incorporation of other variables to the system as controls. The liquidity puzzle requires the incorporation of a short run interest rate and some monetary aggregate to identify the money market. According to Sims (1992), the price puzzles arises as a respond of monetary policy to future price pressures, which inferred from information available at high frequency. Thus, information about imported inflation pressures and external economic conditions is incorporated.

Considering the information above, our VAR is composed of three blocks: domestic variables, (Y, P, M and TCR), external variables (P*, ρ*) and by last, the policy block (R). Therefore:

$$X_t = [\pi_t^*, \Delta y_t, \pi_t, r_t^*, r_t, \Delta\, m_t q_t]$$

Where X represents the VAR endogenous variable vector, Δy_t is the output growth, π_t is the domestic inflation rate, Δm_tM is the growth of some money aggregate, q_t is the real exchange rate, π_t^* is the commodities inflation rate, r_t^* is the foreign inflation rate and r_t is the monetary policy interest rate.

The structural model consistent with a given structural specification given by the theory that defines the relationships between the variables is given by:

$$\Gamma_0 X_t = \mathrm{B}(L) X_{t-1} + \epsilon_t$$

Γ_0 represents the matrix of contemporaneous relations between the variables according to a specification given by the theory. On the other hand, B is the matrix of coefficients of the lags (where L is the lag operator) and ϵ_t structural error vector of interest. For estimation purposes, the model is rewritten in its reduced form:

$$X_t = A(L) X_{t-1} + u_t$$

Being $u_t = \Gamma_0^{-1} \epsilon_t$ the vector of reduced form errors. The objective is to obtain structural errors from the reduced form errors. This requires identifying the primitive system, i.e., to obtain estimates of the Γ_0 matrix. For identification of the structural parameters from the reduced form, are required for a model of n variables, n (n-1) / 2 identifications constrains in relationship with reduced form errors and structural.

The system consists of seven variables $X_t = [\pi_t^*, \Delta y_t, \pi_t, r_t^*, r_t, \Delta\, m_t q_t]$ so in principle we need to identify 49 parameters, including standard structural deviations. The variance-covariance matrix of the estimated reduced form, 28 independent moments are obtained, therefore there are 7 (7-1) / 2 = 21 unidentified parameters. The imposition of these restrictions yields accurate identification system.

Following Parrado (2001) six constraints of over identification are imposed, which are associated with the set of information available contemporaneously for the central bank and additionally, we make some assumptions about the behavior of the external variables:

$$\begin{bmatrix} e_{com} \\ e_y \\ e_p \\ e_{risk} \\ e_r \\ e_m \\ e_{tcr} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 & 0 \\ a_{41} & 0 & 0 & 1 & 0 & 0 & 0 \\ a_{51} & 0 & 0 & a_{54} & 1 & 0 & 0 \\ 0 & a_{62} & a_{63} & 0 & a_{65} & 1 & 0 \\ a_{71} & a_{72} & a_{73} & a_{74} & a_{75} & a_{76} & 1 \end{bmatrix} \begin{bmatrix} u_{com} \\ u_y \\ u_p \\ u_{risk} \\ u_r \\ u_m \\ u_{tcr} \end{bmatrix}$$

Where e_{com}, e_y, ep, e_{risk}, e_r, e_m and e_{tcr} are the structural shocks which match the different variables, i.e., a shock of external supply shock, a domestic supply shock, a price shock, a country risk shock, a shock in the demand of money and by last, a shock in the real exchange rate, while u_{com}, u_y, u_p, u_{risk}, u_r, u_m u_{tcr} are the residual innovations.

With respect to the order of identification of the variables, the price of commodities is the most exogenous variable, since the variables of the Dominican economy have no influence on it. Parrado (2001) uses the world oil prices and explains that including this variable price puzzle can be avoided, where a shock or a positive innovation of interbank interest rate does imply an increase in the price level, rather than a decrease as economic theory suggest.

Output only reacts contemporaneously to oil prices (supply shocks) and innovations of itself. Other variables are zero because we assume that inflation, country risk, monetary aggregates, the interbank interest rate and the real exchange rate does not contemporaneously affect real economic activity.

Similarly, inflation is affected only by the commodity prices and the output level. That is, a rise in commodity prices puts pressure in the tradable component of inflation, leading to an increase of domestic inflation. Also, increases in aggregate demand generate inflationary pressures. It is assumed that the pass-through of real exchange rate has no contemporaneous effect on inflation. In the case of country risk, it is assumed that it only reacts to the world price of oil and innovations in itself.

An important key fact is the contemporary information available to the central bank when setting the policy rate. According to the model, the variables that the central bank can observe simultaneously are the price of commodities and country risk, given that both variables are calculated daily on the international market. Other variables (economic activity, inflation, monetary aggregates and real exchange rate) are not available at one time, due to the lag of information[6]; therefore they take the value of zero. Also, the demand for money depends on real income, inflation and interest rates. Finally, this specification assumes that the real exchange rate reacts contemporaneously to all variables.

V. Data

In order to estimate the structural VAR, we use monthly data from January 2006 to August 2013. The variables included are the growth rate of the Commodity Price Index, the country's sovereign risk[7], the growth rate of Monthly Index of Economic Activity (IMAE by its acronym in Spanish)[8], the year over year inflation rate measured by the Consumer Price Index (CPI), the Interbank interest rate as a proxy for the stance of monetary policy, the growth rate of a

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[6] Generally speaking, information related to these variables is available after one month.

[7] As a proxy for country risk the we use the Emerging Bond Market Index, (EMBI) defined as the difference (spread) between the interest rate paid by bonds denominated in dollars that developing countries issued and U.S. treasury bonds issued considered free from risk. The higher the EMBI, the greater the likelihood that the country in concerned, fails to fulfill its debt obligations.

[8] , The IMAE (by its acronym in Spanish), is used as a proxy for real economic activity in the economy. It is computed monthly by the Central Bank of Dominican Republic.

monetary Aggregate (M1) and by last, the logarithm of Real Exchange Rate between Dominican Republic and the United States (bilateral), (as USA is Dominican Republic's main trading partner in international commerce).

Regarding the sources of data, the commodity price index is obtained from the database of the Commodities Price Index of the International Monetary Fund (IMF). Also, the Monthly Index of Economic Activity (IMAE), Consumer Price Index (CPI), the interbank interest rate and the harmonized monetary aggregate M1 is obtained from the database of the Central Bank of the Dominican Republic (CBDR). The bilateral real exchange rate of DR-USA Is obtained from the database of Consejo Monetario Centro Americano (CMCA). The periodicity of the data is monthly and the sample covers the period from February 2006 to August 2013 for a total of 91 observations.

Also, the commodity prices, IMAE, consumer price index, monetary aggregate M1, and the real exchange rate, have a seasonal component, so these were seasonally adjusted using the methodology of X12002E CENSUS. During the estimation period the interbank interest rate, through which monetary shocks are identified, shows a negative trend. This deterministic trend is removed prior to estimating the vector autoregressive.

In the appendix we present the unit root tests Dickey-Fuller (ADF), together with Phillips-Perron (PP), all of them with constant (A), with constant and trend (B), and finally, without constant and trend (C) for all variables in levels and first differences. According to the results of the PP test, we can infer that all variables have a stationary behavior. This behavior is similar when comparing the results of the PP test with those found in the ADF test, where we can conclude that all variables are I = 0.

Analyzing the lag length criteria tests, the Schwartz criterion suggests the VAR should be estimated with one lag. The autocorrelation test indicates that residuals have a spherical structure until the eighth lag at a 5% level. Finally, four dummy variables are included in late 2008 and early 2009 to control movements of the interbank interest rate related to the uncertainty induced by the international monetary conditions during the first months of the financial crisis in advanced economies.

VI. Results

Once the VAR is estimated, we proceed to estimate the structural VAR, considering the identified restrictions proposed in section IV. The results are presented in the form of impulse-response functions of output growth, inflation, growth of the monetary aggregate M1, the interbank interest rate and the bilateral real exchange rate between the U.S. and Dominican Republic. Similarly, we present the variance decomposition error to analyze the importance of monetary policy on economic fluctuations and inflation. We also, calculate the confidence intervals computed with bootstrapping.

Figure 1 shows impulse response functions. According to these, we do not evidence the liquidity puzzle, exchange rate puzzle and price puzzle discussed in literature. In terms of the effects of monetary policy, when there is a contractive monetary shock expressed as an increase of 100 basis points (b.p) of interest rate, output growth respond negatively from the fourth month falling about half percentage point. The biggest fall is observed in the eighth month since the monetary shock was given, with a contraction of 64 basis points (b.p). The average span of a negative monetary shock over output extends until one year and a half.

Inflation start to decrease from the fourth month, but this fall is statistically significant from first year, with a maximum decrease of 44 basis points in the thirteenth month, with a persistence of one year and a half.

Real exchange rate responds with a negative impact until the third month (appreciation). After this, it starts to depreciate until it comes back to its equilibrium path. However, it is worth mentioning that this result is not statistically significant. By last, the monetary aggregate M1 responds negatively to a negative monetary shock where its biggest fall is presented in the sixth month with lasting effects of almost two years after the monetary shock. We can see that in general, the variable responses is in consonance with economic theory when there is an exogenous movement of monetary policy, that is, positive innovations on the interest rates produces a contraction on output, inflation and monetary aggregates.

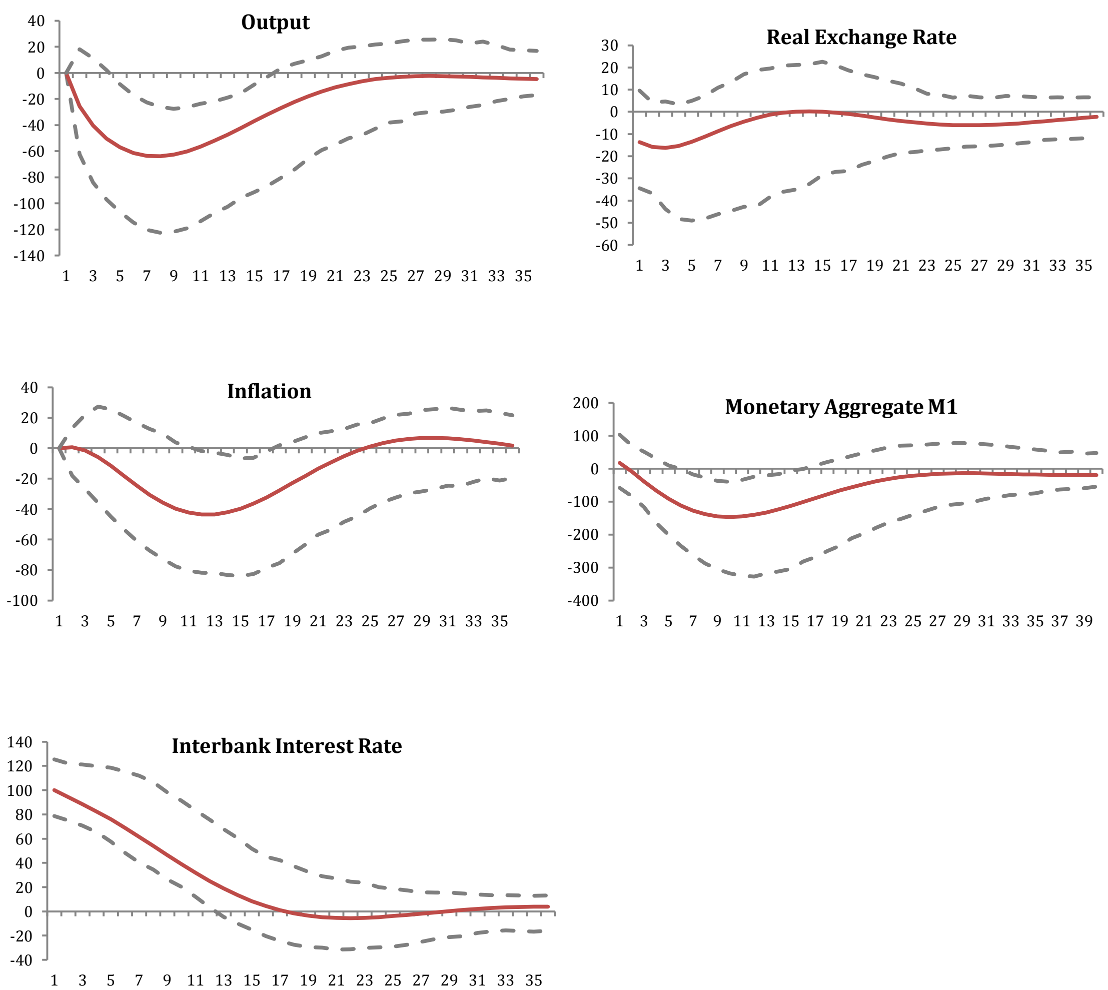
In quantitative terms, the effects of monetary policy are consistent with the international evidence in open economies (advanced and emerging). In particular, related to output growth, Cushman and Zha (1995) identify the maximum effect for Canada in 6 months, and Kim (1999) between 6 and 24 months for the G7 economies; Gonzalez, Hamman and Vargas (2010), 8 months in Colombia and Valdés (1998) and Parrado (2001) between 7 and 10 months respectively in Chile.

Regarding the role of monetary policy in explaining the cycles of GDP growth and CPI inflation, we show in table II the variance decomposition from the structural shocks of the estimated SVAR model. Monetary shocks explain at most 10% of the forecast error variance of GDP growth, were the greatest influence is observed in two years. In the case of inflation, monetary innovations explain about 5% of inflation fluctuations.

Figure 1

Impulse Response Functions

(100 bp increase in Interbank Interest Rate)



VII. Concluding remarks

This paper aims to quantify and identify the transmission mechanism of monetary policy in the Dominican Republic. We estimated the responses of GDP growth, inflation, money demand and the real exchange rate to exogenous movements in monetary policy using a Structural Vector Autoregressive approach (S-VAR) where we incorporate a set of constraints on contemporary relationships composed of domestic and external variables.

Responses of GDP growth, inflation, money demand and the real exchange rate, are in line with economic theory in qualitative terms, and we do not observe the existence of any of the economic puzzles mentioned before. In quantitative terms, an innovation of monetary policy has an effect on growth from the second month and runs for one year. In the case of inflation, the effects begin to be observed from the fifth month after the monetary shock occurred, with an average span of two years.

In terms of the relevance of these results, comparison with observations both in open economies (advanced and emerging) is consistent in terms of the response of inflation. However, the maximum effect of the monetary shock on GDP growth occurs in the eighth month, when the average of maximum effects in other studies reported maximum effects from six to eighteen months.

By last, more research is needed on the quantification of the transmission mechanism of monetary policy in the Dominican Republic. Future agenda includes: (1) refining the documented results and investigating discrepancies in the effects of monetary policy. (2) Exploration of credit channels and expectations, and (3) contrasting these results with those that could be obtained with other empirical methods such as Factor Vector Autoregressive model.

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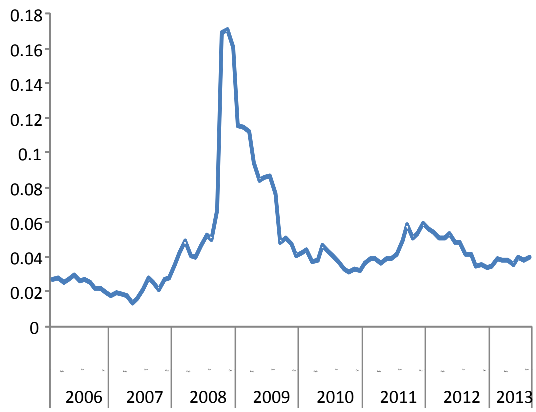
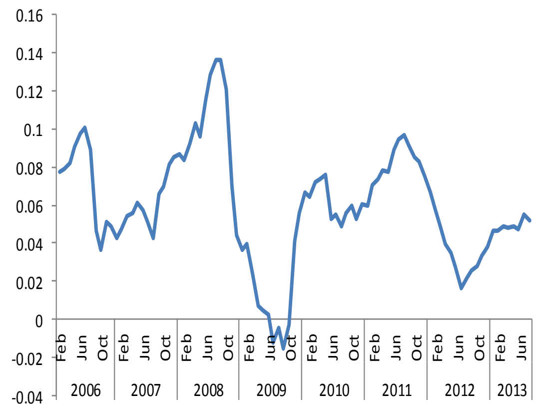
Appendix

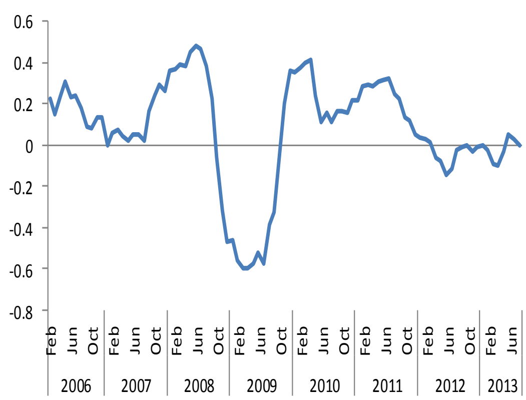
EMBI



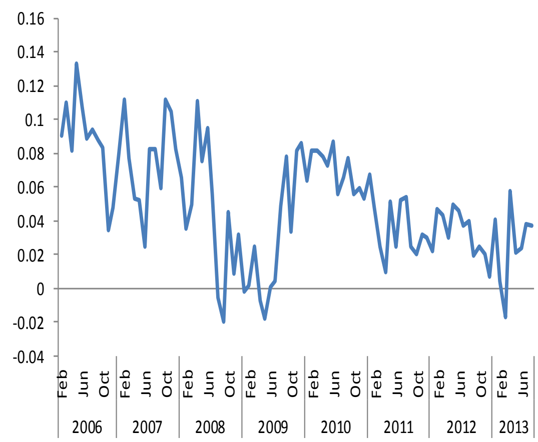
Inflation Rate (Year over Year)



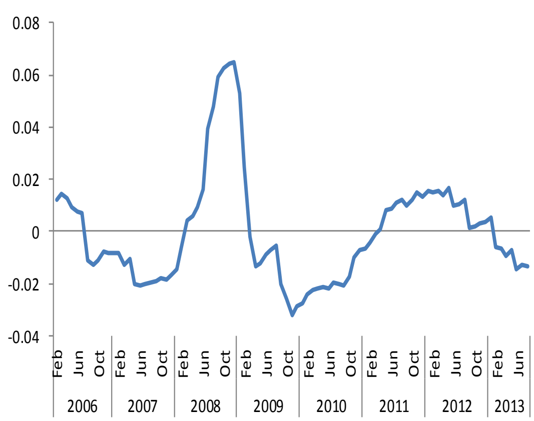
Commodity Prices (year over year)



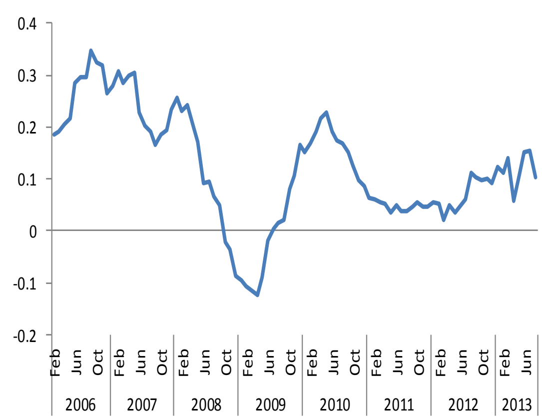
IMAE



Interbank Interest Rate (No trend)



M1



Real Exchange Rate DR-USA (logs)

Table I
Unit Root Tests

Variables	Augmented Dickey-Fuller *			Phillips-Perron		
	A	B	C	A	B	C
Levels						
Commodities Prices	**0.00**	**0.01**	**0.00**	0.11	0.30	**0.01**
Risk Premium (EMBI)	**0.09**	0.28	0.18	0.17	0.44	0.23
IMAE	**0.02**	**0.00**	**0.07**	**0.00**	**0.00**	**0.02**
Inflation CPI	**0.04**	0.13	0.13	0.10	0.27	0.18
Interbank Interest Rate	**0.07**	0.22	**0.01**	0.18	0.44	**0.02**
M1	0.11	0.20	0.12	0.40	0.63	0.17
Real Exchange Rate (logs)	**0.08**	0.95	0.43	**0.01**	0.21	0.42
First Differeces						
Commodities Prices	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Risk Premium (EMBI)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
IMAE	**0.04**	0.13	**0.00**	**0.00**	**0.00**	**0.00**
Inflation CPI	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Interbank Interest Rate	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
M1	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**
Real Exchange Rate (logs)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

A= Constant, B=Constant and Trend, C=No constant, no trend

*values in bold represent rejection of null unit root hypothesis

Table II
Variance Decomposition

Period	Output	Inflation CPI	M1	Real Exchange Rate
1	0	0	0.13	0.89
6	4.16	0.4	2.74	1.81
12	9.36	4.71	7.79	1.52
24	9.49	7.09	7.53	1.53
36	9.36	6.92	7.24	1.77