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Monetary Transmission in a Crawling Peg Regime: Evidence from Costa Rica[¶]

by:

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(First draft, 6/19/00,
This draft 8/18/00)

Abstract

This paper discusses monetary transmission in Costa Rica that has successfully maintained a crawling peg regime for fifteen years. This exchange rate regime coupled with capital mobility hinders the central bank's ability to conduct monetary policy. Abstracting from perfect capital mobility, however, the central bank has some room to set interest rates in the short-run. The evidence suggests that interest rate shocks have fairly standard effects on the economy, that vanish when external shocks are accounted for. In short, Costa Rica's ability to conduct monetary policy is limited and in large part "imports" its monetary policy its trading partners.

JEL Classification: a, b, and c.

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1. Introduction

Monetary policy and its transmission have been the subject of considerable attention in the past decade. A fairly detailed account of the effects and channels through which monetary policy exerts is effect on the economy has been provided by among others Bernanke, Clarida, Christiano, Eichenbaum, Evans, Gali, Gertler, Sims, and their co-authors (see Bernanke and Gertler, 1995 and references therein). And while there is a broad consensus that monetary policy is neutral in the long-run, there is considerable evidence that monetary policy has substantial effects on economic activity that last up to two years.

With few exceptions, notably Mishkin and Savastano (2000), the literature has focused primarily on developed countries with flexible exchange rates. There is considerable less understanding and empirical evidence of the workings of monetary policy in developing countries. Aside for the wider diversity of economic structures and institutional frameworks, monetary authorities in developing countries tend to be more concerned with nominal exchange rate fluctuations than their developed country counterparts. This concern for the nominal exchange rate conditions the central bank's ability to conduct independent monetary policies, and the transmission of monetary policy. Abstracting from perfect capital mobility, the lower degree of flexibility in the exchange rate reduces the scope of independent monetary policy, but does not entirely eliminate it in the short-run.

This paper examines monetary transmission in Costa Rica where the exchange rate has followed successfully a crawling peg for fifteen years. Not surprisingly, interest rate movements are conditioned by international conditions and the defense of the exchange rate crawling peg. For instance, interest rates and the rate of the exchange rate crawl were adjusted to restore the uncovered parity condition, when international reserves fell significantly in 1990-91 (Figure 1).[1] The surge in international reserve that followed was

[1] The parity condition is obtained using the six month US dollar libor rate, the actual exchange rate depreciation for the corresponding six month period, and a constant three percentage point country risk.

associated with a decline in domestic interest rates and of crawl of the exchange rate. A similar pattern is observed throughout the 1990's, the last episode when interest rates and the rate of crawl were adjusted to arrest the declines in international reserves was in 1998. These stylized facts makes Costa Rica a particularly interesting case to examine how the exchange regime in developing countries impinges upon the central bank’s ability to conduct independent monetary. Moreover, Costa Rica provides a relatively clean data set for econometric analysis as it has not been subjected to a major macroeconomic or exchange rate crisis since the Latin American debt crisis in the early 1980’s.

To this effect this paper estimates a series of VAR models to examine the effect of interest rate shocks on economy, especially on economic activity and prices. The evidence suggests that the effects of interest rate shocks are fairly standard, although these effects contrast starkly with the effects when world inflation controls for external shocks. In particular, the impact of interest rate shocks on the economy virtually disappears. This paper continues by examining the importance of the credit channel that could play an important role in the transmission of monetary given underdeveloped capital markets. Also, evidence is provided to document the response of banks’ loan and deposit rates when monetary policy is tightened, and verifies the differences in the responses of state-owned versus private banks.

The rest of the paper consists of three sections. Section 2 provides a brief description of the VAR techniques used. Specifically, generalized VAR techniques are used to document the historical correlation in the data. Section 3 contains the bulk of the empirical evidence for the series of models examined. The discussion centers on the responses to interest rate shock, although a full set of impulse responses are provided. Section 4 summarizes the main results.

2. Measuring the effects of interest rate shocks

VAR framework. The models used to study the macroeconomic effects of interest rate shocks can be expressed by the following reduced-form VAR model:

$$i = d_{11}(L) \times i_{t-1} + d_{12}(L) \times \Delta x_{t-1} + m_i$$
$$\Delta x = d_{21}(L) \times i_{t-1} + d_{22}(L) \times \Delta x_{t-1} + m_x$$

where *i*, and *x* correspond respectively to the interest rate (BEM, six months), and a vector of *k*-1 domestic variables (in logs) that are specified below. The lag polynomials of p^{th} order are denoted by $d_{sj}(L)$, the shocks to each equation are denoted by μ_s, and the vector of shocks of the system μ is such that E[μ]=0 and E[μμ']=Ω.

Generalized impulse responses. Following Koop et al. (1996) and Pesaran and Shin (1998) this paper calculates generalized impulse responses (GIR) that account for all of the historical correlation in the data. These responses are not obtained by imposing (zero) restrictions on the contemporaneous correlation as in standard VAR analysis, and they are unique since they are not subject to the "composition" effect are unique. Their disadvantage is that they cannot be interpreted as reflecting the effect of "pure" (orthogonal) shock, rather they fully reflect the historical correlation in the data.

The GIR are defined as the difference between the expected value of a variable conditioned on a particular shock and its expected value in the absence of that particular shock. The expected values are obtained assuming that μ is distributed as a multivariate normal, with zero mean, and covariance matrix Ω. Assuming that the shock to the interest rate equals one standard error, $\mu_{i,0}=\sigma_{i,i}^{1/2}$, the GIR of y_t =[i, Δx]' can be expressed as:

$$GIR(y_t, m_{i,0} = s_{i,i}^{1/2}) = D(L)^{-1} \times \Omega_i \times s_{i,i}$$

where D(L), Ω_i, $\sigma_{i,i}$ are respectively the lag polynomial matrix with typical element $d_{sj}(L)$, the column of Ω that corresponds to the interest rate, and the variance of the interest rate (see Pesaran and Shin, 1998).

The functional form of the GIR are related to standard impulse responses but are conceptually different constructs. Contrary to standard impulse responses, GIR do not assume that the shocks of interest are orthogonal. Thus, GIR are not designed to "identify" pure shocks rather they are designed to capture all the historical correlation in the data. Note that GIR are not obtained using timing restrictions that typically lead to assume a recursive system. Thus, GIR are not subject to the composition making them unique.

Specific models. The GIR are calculated for two models, each comprised of three variants that successively add variables of interest. Model 1 focuses on macroeconomic responses, and the first variant defines *x*=[*p*, *y*]' thereby examining the basic macroeconomic effects on prices and output. The second variant adds the nominal exchange rate, *e*, so that *x*=[e, *p*, *y*]'. This variant accounts for the movements in the exchange rate that have accompanied shocks to the interest rate (see Figure 2). The third variant adds world prices, as proxied by the PPI in the US, *p**, so that *x*=[*p**, *e*, *p*, *y*]'. This variant completes the exchange rate determination, as the crawling peg has been roughly determined as the difference between world (US) inflation and programmed domestic inflation. For this variant the GIR to shock in p* are of particular interest. These shocks are identified using the assumption of a small open economy, so that domestic shocks do not affect *p** (see Hoffmaister y Roldós, 2001).

Model 2 focuses on the role of credit in the transmission of the interest rate shock. The first variant defines *x*=[*cr*, *p*, *y*]' where *cr* is private sector credit. As in the first model, the second and third variants of the second model are obtained by successively adding the exchange rate and world prices, so that *x* is defined respectively as *x*=[*cr*, *e*, *p*, *y*]' and *x*=[*p**, *cr*, *p*, *e*, *y*]'. To quantify the importance of the credit channel, the impulse responses in Model 2 are also computed assuming that credit is an exogenous variables, i.e., the level of credit does not vary following an interest rate shock. Using the notation above, the GIR assuming credit is exogenous can be expressed as:

$$GIR(y_t, m_{i,0} = s_{i,i}^{1/2}, cr_t = cr_0, s_{i,cr} = 0) = \tilde{D}(L)^{-1} \times \tilde{\Omega}_i \times s_{i,i}$$

where "~" denotes the system where the private sector credit is exogenous, i.e., $cr_t=cr_0$, and the correlation between the interest rate and credit is set to zero. Comparing these responses to the standard GIR, provides a fairly straightforward way to quantify the role of the credit channel. As above responses to *p** are of interest in the third variant.

In addition, this paper considers a third model that focus on the banking sector, so that $\Delta x=[r, r\_dep, r\_loan, cr]'$, where r_dep and r_loan are respectively the interest rates on deposits and loans. This model is estimated thrice, using interest rate and credit data for the banking sector, stated-owned banks, and private banks. These results are particularly useful to examine the delays that may exist between changes in the interest rate and movements in banks' loan and deposit rates. Moreover, potential differences in the behavior of public and private banks--given the structure of the banking sector, consisting of a few large state-owned banks and several smaller private banks--can be examined.

3. Impulse responses to interest rate shocks.[2]

The impulse responses of the models discussed above are contained in a series of figures. The figures are arranged so that columns correspond to specific shocks and rows correspond to specific variables in the models. Figures numbered 2.1-2.3 (3.1-3.3) contain the impulse responses of the three variants of Model 1 (Model 2). For instance, following a shock to the interest rate (e_r) the response of inflation (Dlp) in Model 1 variant 1 are contained in the first column and second row of Figure 2.1. The impulse responses to a shock in the interest rate for the banking sector model are presented in Figure 4, where columns contain the responses respectively of the banking sector, state-owned, and private banks. As noted before the discussion of the impulse responses centers on the shock to the interest rate.

[2] Details of the data definitions are contained in the appendix Table A1. The empirical evidence in this paper is based on VAR models using six lags. This evidence, however, is not unduly sensitive to the number of lags used. The impulse responses were also computed for VAR models nine lags, and where appropriate the main differences are note. Note that the model tend to exhibit unstable behavior with more lags.

3.1 Impulse responses for Model 1.[3]

Consider the *impulse responses for Model 1 variant 1 in Figure 2.1*. A shock to the interest rate is associated with an increase in inflation, and a decline in economic growth both persisting more than two years. These responses confirm the conventional wisdom for developed countries that output tends to respond more quickly than prices. Note that although the response of inflation is perverse, it has been documented in the early work on monetary policy for the US economy (Litterman and Weiss, 1985, and Sims, 1986). The positive correlation between interest rates and prices, known as "price puzzle," was solved by adding commodity prices to the model because those prices tend to forecast both inflation and the pre-emptive interest rate movements (for a critical review of the price puzzle, see Hanson, 1999). Pre-emptive interest rate movements have for the most part not characterized monetary policy here. A more likely explanation is associated with the exchange rate. Monetary authorities have tended to increase interest rate when the exchange rate tends to depreciate more than programmed (see Flores, et al., 2000). This coupled with some exchange rate pass-through to prices could explain the positive correlation of interest rates and prices. This is discussed below.

Consider the *impulse responses for Model 1 variant 2 in Figure 2.2*. A shock to the interest rate is associated with an exchange rate depreciation as posited above, and continues to be associated with an increase in inflation and with a decline in economic growth. The response of inflation and output growth are similar to those above, although they are somewhat smaller. Thus, the pass-through of the exchange rate to prices is partially associated with the

[3] The impulse responses for Model 1 using nine lags are qualitatively the same as those in Figures 2.1-2.3. In particular for variants 1 and 2, output tends to fall, and the price puzzle continues to be associated with the depreciation that accompanies an interest rate shock. Also, the impact of interest rates on the economy is drastically reduced when world conditions are accounted for in variant 3. The effect on the exchange rate depreciation, however, is a bit larger than in Figure 2.3 but still much less than in variants 1 and 2.

price-puzzle. Note that to a large extent the exchange rate peg has been set using a purchasing power parity (PPP) rule vis-à-vis the US, this is issue is considered below.

Before turning to the next set of responses, note that the smaller decline in output growth is associated with a depreciation of the exchange rate, that for most of the first six months is a real depreciation (nominal depreciation exceeding inflation). Considering the responses to a shock in nominal exchange rate (e_Dle, column two), the exchange rate depreciation leads to an initial increase in economic growth followed by a smaller expansion. These results are interesting because they seem to be associated with an increase in real interest rates and a real depreciation. The latter is at odds with the contractionary effects of devaluation in Latin America (Edwards, 1989).

Consider the *impulse responses for Model 1 variant 3 in Figure 2.3*. A shock to world inflation (e_Dlp*, column 1) is associated with qualitatively similar responses to those observed in the two previous variants of Model 1 for a shock in the interest rate. Namely, the interest rate, exchange rate depreciation and inflation increase, and output growth falls. The main difference, however, is in the time path of the nominal variables. The responses of interest rates and exchange rate depreciation are delayed respectively by about two and four months, and the increase in inflation materializes earlier.

Note that the responses to a shock in world inflation conform well to the view that the exchange rate essentially follows a PPP rule. An increase in the world inflation translates into domestic inflation via a (relative) PPP rule as the exchange rate remains essentially unchanged for about four months. The authorities seem to rise interest rate first before adjusting the exchange rate to offset the real appreciation. In this scenario, output growth declines are associated with a real appreciation.

Perhaps the most revealing impulse responses of the exchange rate regime are those associated with shocks to the interest rate (e_r, column 2). Although the shock and the dynamic path of the interest rate is essentially the same as in the two previous variants of Model 1, the effect on the economy as markedly reduced. The exchange rate response is virtually flat for up to six months, the inflation response is smaller and substantially less persistent, and the output response is small and undefined. These responses suggest that interest rate shocks have lost virtually all their impact on the economy when external shocks are explicitly accounted for in the model.

The path of real interest rates following a shock in inflation (e_Dlp) in Model 1 is worth noting. In general, during the first three months following the shock, real interest rates tend to fall as the response in interest rates is less than that of inflation. For a few months afterward, real interest rates tend to increase as the response in interest rates exceeds that of inflation. This path, when averaged over time, is consistent with Corbo (1999) who finds a small (long-run) response of interest rates to inflation in his estimated interest rate reaction functions. Moreover, the larger response of interest rates when inflation exceeds its targeted level (see Flores et al., 2000) seems to capture increases in real interest rates observed a few months following the inflation shock.

3.2 Impulse responses for Model 2.[4]

Consider the *responses for Model 2 variant 1 in Figure 3.1*. A shock to the interest rate is associated with a decline in credit growth that persists for about two years, and with an increase in inflation, and a decline in economic growth both persisting more than two years (solid lines, e_r, column 1). When credit is taken as an exogenous variable the interest rate shock and the associated inflation lasts longer.[5] The output growth response is essentially the

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[4] The impulse responses for Model 2 using nine lags are qualitatively the same as those in Figures 3.1-3.3. In particular for variants 1 and 2, output tends to fall, and the price puzzle continues to be associated with the depreciation that accompanies an interest rate shock, and the effect of credit is small. Also, the impact of interest rates on the economy is drastically reduced when world conditions are accounted for in variant 3. The effect of credit remains small.

[5] Note that there are two different ways to compute the GIR when credit is exogenous. The first is assuming a once and for all increase in credit, so that the GIR reflects the effect of a sustained increase in the growth of credit. These responses would assume that the growth of

(continued…)

same during the first twelve months, and its tends to last longer when credit is exogenous. The output growth responses are puzzling as they suggest a perverse effect of credit: higher credit is associated with lower output growth (broken line). This perverse output response, however, do no show up in the other variants of Model 2.

Consider the *responses for Model 2 variant 2 in Figure 3.2*. A shock to the interest rate is associated with a depreciation of the exchange rate, an increase in inflation, a decline in credit and output growth. These responses are comparable to those in Model 1, although the depreciation and inflation are less persistent, and the decline in output growth is a bit more persistent. When credit is taken as an exogenous variable the persistence of inflation and of the exchange rate depreciation is similar to that in Model 1. Perhaps a more interesting result is that decline in output growth is short-lived, and confined to the first two or three months following the interest rate shock. This response is suggestive of a credit channel operating on the real sector of the economy. However, this result is weaker in final variant of Model 2.

Consider the *responses for Model 2 variant 3 in Figure 3.3*. A shock to world inflation (e_Dlp*, column 1) is associated with qualitatively similar responses to those observed in the two previous variants of Model 2 for a shock to the interest rate. Namely, the interest rate, the exchange rate, and inflation increase, and output growth falls. As above, the main difference is in the time path, whereby the responses of interest rates and exchange rate depreciation are delayed, and the response of inflation manifests its self earlier. The responses when credit is taken as exogenous (broken lines) are similar to those in Model 1. In particular, they suggest that the output growth decline is less and the exchange rate depreciation is greater after about six months.

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credit is essentially a constant plus a shock. The second is to characterize credit as an AR process that does not depend on the rest of the variables in the system, as assumed here. Thus, following a one time shock to credit, credit is allowed to follow a dynamic path that depends only on itself. The main advantage of allowing credit to follow an AR process is that credit remains a stationary variable making these responses easier to compare to those when the credit equation reflects the lags of other variables.

As above, the impulse response to a shock to the interest rates (e_r, column 2) continue to be suggestive of how the exchange rate regime hinders the effect of independent monetary policy. To a large extent, the impact of the increase in the interest rate are diminished substantially, with the exception of the decline in credit. The decline in credit is smaller than those that follow a shock to world inflation (column 1) but that are similar to those observed in previous version of Model 2. It is possible that domestic banks increase loan rates when interest rates increase, even after controlling for the effect of external factors, the demand for domestic credit declines. In this case, the small decline in output growth could be interpreted as evidence of a limited credit channel or if the credit channel is important, then it would be consistent with a switch toward external credit sources.

Finally, consider briefly the impulse responses for shocks to inflation. In all variants, an increase in inflation is associated with increases in interest rates, and lagged declines in credit that vary from about two to four months. As before real interest rates tend to fall during the first few months following the shock and tend to increase for some months afterward. As before, the long-run response of real interest rates to shock to inflation will tend to be small as it will average this response. Also, the declines in credit seem to coincide with increases in *real* interest rates and declines in output growth. This suggests that the demand for credit could be driving the movements in credit following a shock to inflation.

3.3 Impulse responses for banking sector model.[6]

Consider the *responses for the banking sector* to a shock in domestic interest rates in Figure 4. It is interesting that both state-owned banks and private banks increase (on impact) loan and deposit rates by a smaller amount that the interest rate shock. In particular, an interest rate shock of roughly 130 bps leads (on impact) to increases that are roughly half as large. And although banks continue to increase rate gradually for the first three or four months, the

[6] The impulse responses for Model 3 using nine lags are not only qualitatively the same, they are virtually indistinguishable from Figure 4.

increase never match the increase in domestic interest rates. Nonetheless, private banks seem to increase deposit rates more and for a longer period than do state-owned banks. Note that the increases in loan rates, which are very similar across banks, are less than the increases in deposit rates. This suggests that spreads of loan over deposit rates fall in both types of banks, but the fall is greater in private banks. Note that to a large extent, the credit responses observed, confirm the lagged responses observed in Model 2, and suggest that they are roughly two and three months respectively for state-owned and private banks.

These responses appear to be consistent with the structure of the banking sector and the differences in the composition of banks' asset and liability positions (Table 1). In particular, note that state-owned banks dominate the banking system, with __ and __ percent respectively of total deposits and private sector loans. This suggests that private banks are likely to "follow the lead" of state-owned banks. This is particularly true for loan rates, because increases beyond those of state-owned banks will translate into decreased market shares. This could be behind the similar responses of loan rates. What is particularly intriguing is the magnitude of the responses, as one would expect that rates move in unison under normal circumstances. This could be associate to the fact that increases have significant effects on the assets side of banks balance sheets, particularly state-owned banks, as they the ratio of portfolio investments exceed in about 15 percent their private sector loans. That is, the impact of increases in the interest rate on the cost of the banks operations are partially offset by increases in the return of their portfolios. It is not clear, however, why private banks increase deposit rates more than state-owned banks. Perhaps this is a strategy to capture a larger share of deposits in the banking sector.

4. Concluding remarks.

Monetary policy and its transmission have been the subject of considerable attention in the past decade. Little attention, however, has been paid to examining these issues in developing countries, that are characterized by a more diverse set of economic structures and institutional frameworks, than developed countries. Moreover, monetary authorities in developing countries are typically more concerned with fluctuations in nominal exchange rates than their developed country counterparts. The role of these factors in monetary policy and its transmission, and how the exchange rate regime can effectively hinder the pursuit of independent monetary policy has not yet been subjected to exhaustive empirical examination.

This paper examines monetary transmission in Costa Rica where the exchange rate has followed successfully a crawling peg for fifteen years. This makes Costa Rica a particularly interesting case to examine how the exchange regime in developing countries impinges upon the central bank's ability to conduct independent monetary. Moreover, Costa Rica provides a relatively clean data set for econometric analysis as it has not been subjected to a major macroeconomic or exchange rate crisis since the Latin American debt crisis in the early 1980's.

In general, the empirical evidence can be summed up as follows. Interest rate shocks appear to be associated with a price-puzzle, whereby inflation increases following a shock to interest rates. The puzzle can be partially explained by the pass-through of nominal exchange rate depreciation that is associated with the interest rate shock. However, without identifying a "pure" monetary shock (using standard timing assumptions) it is cavalier to push this interpretation here. More importantly, the impact of interest rate shocks on the economy vanishes when external shocks are accounted for. This suggests that interest rates essentially follow world conditions and have very limited impact on the economy when they do not. This is quite revealing of how the exchange rate regime hinders the central bank's ability to pursue independent monetary policy.

Regarding the credit channel of monetary policy, some evidence is found that the decline in credit that follows a shock to interest rates is associated with a decline in output growth. In general the impact on output growth is concentrated in six to 24 months following the shock. Surprisingly, however, the credit channel effect appears to be relatively small. It is possible that the responses here underestimate credit channel effects because the decline in credit is likely to be less than that capture by the impulse responses. This is because facing the observed increases in loan rates, firms could substitute away from domestic credit to foreign credit. Unfortunately, the lack of data on foreign private credit is weak, making it difficult to construct the required time series to verify the extent to which firms switch to foreign sources of credit following an interest rate shock.

The response of the banking sector to an increase in domestic interest rates differs somewhat between state-owned and private banks. Although both loan and deposit rates increase following an increase in domestic rates, these increases are limited to about half of the increase in domestic rates. This could be associated to the structure of the banking sector, with private banks following the lead of state-owned banks, and the large share of portfolio investments in the banks asset position. Moreover, the increases in deposit rate exceed those of loan rates, suggesting that following an increase in interest rates the spread of loan over deposit rates fall for both types of banks.

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Table 1. Stylized Facts of the Banking System, 1995-99

	State-owned banks	Privately held banks
Share of total deposits in the banking system	0.82	0.18
Share of private sector loans	0.64	0.36
Ratio of total deposits to private sector loans	1.89	0.73
Ratio of portfolio investments to private sector loans	1.17	0.13
Ratio of demand to time deposits	0.38	0.07

Note: State owned banks are comprised of three state owned banks (Banco Nacional, Banco de Costa Rica, and Banco de Crédito Agrícola de Cartago) and Banco Popular. Privately held banks are the 20 banks recognized by the banking supervisory board (SUGEF). Total deposits are comprised of all banking sector liabilities (checking accounts plus time deposits). Private sector loans are defined as the stock of commercial and mortgage credit from banking system to private agents. Portfolio investments are comprised of dollar time deposits plus other investments in BCCR and banks' holdings of domestic public debt, wich is aproximatedly a half of total investments. The data for private banks demand deposits are net, i.e. banks' sight liabilities minus banks' sight assets. Also, the ratio of demand to time deposits of private banks has doubled when computed over the past three years. In part this reflects the growth in sight liabilities that now exceed sight assets.

Figure 1. Stylized Macroeconomic Fact

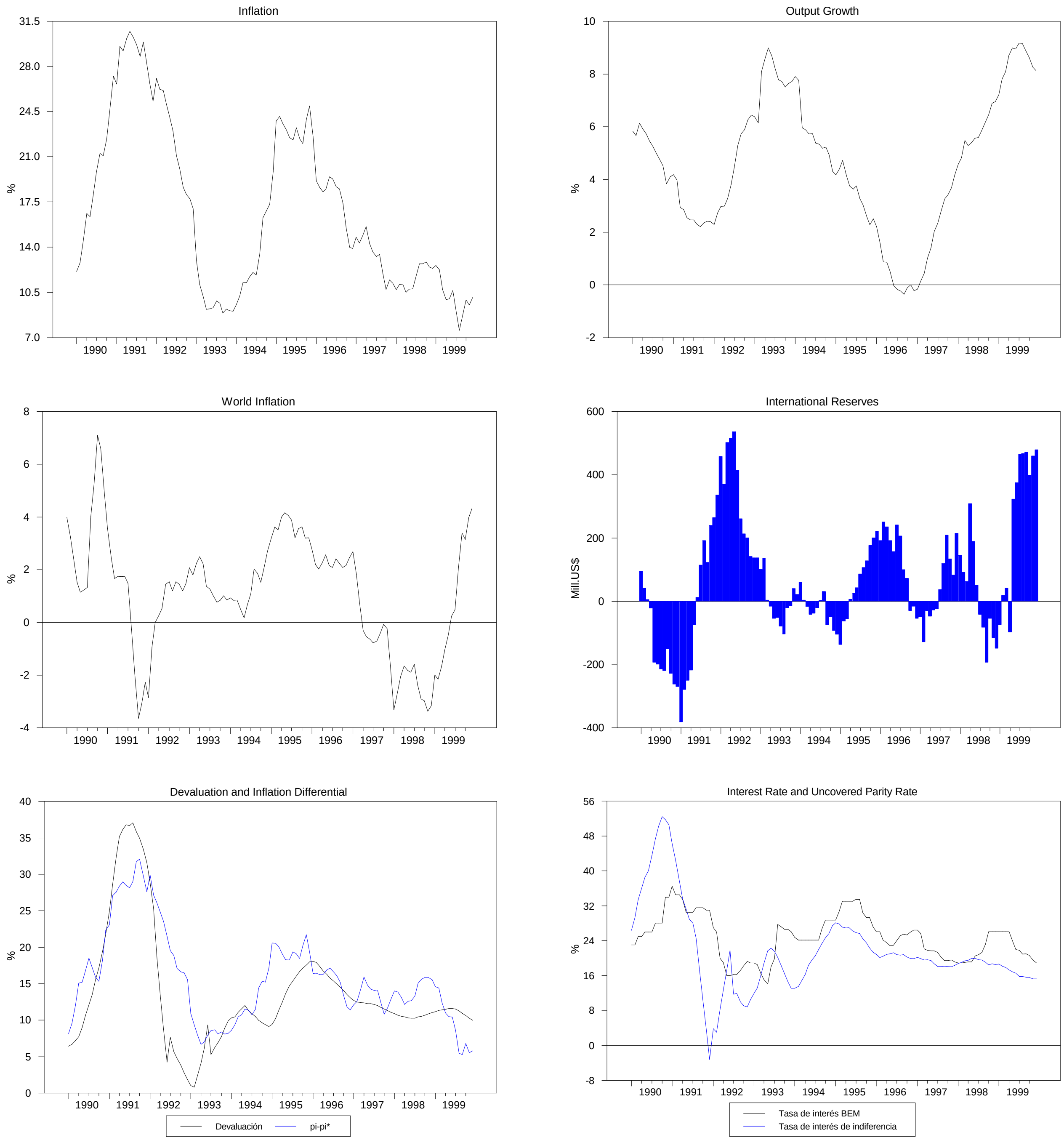

Figure 2.1. Impulse responses, model 1 variant 1

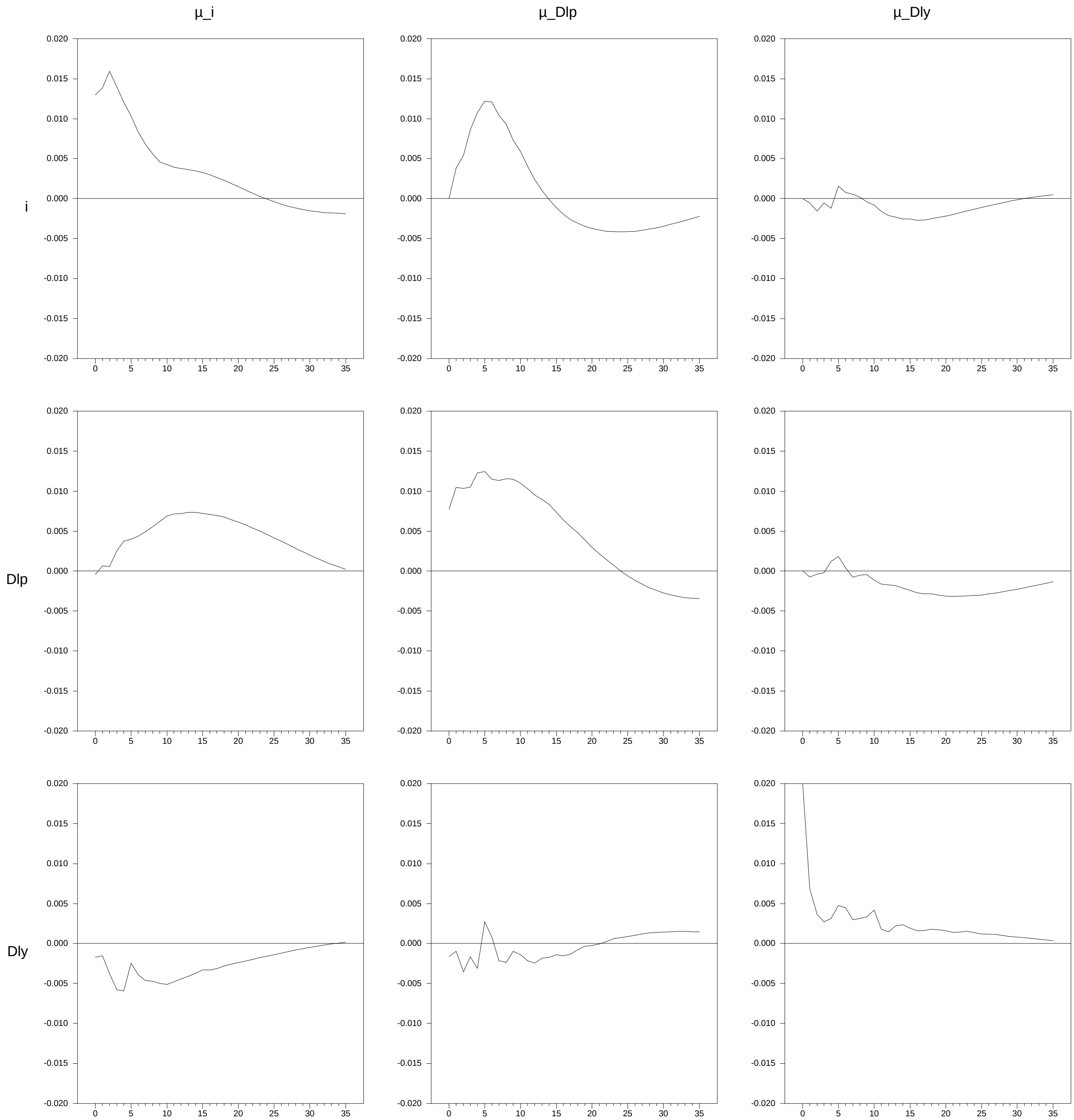

Figure 2.2. Impulse responses, model 1 variant 2

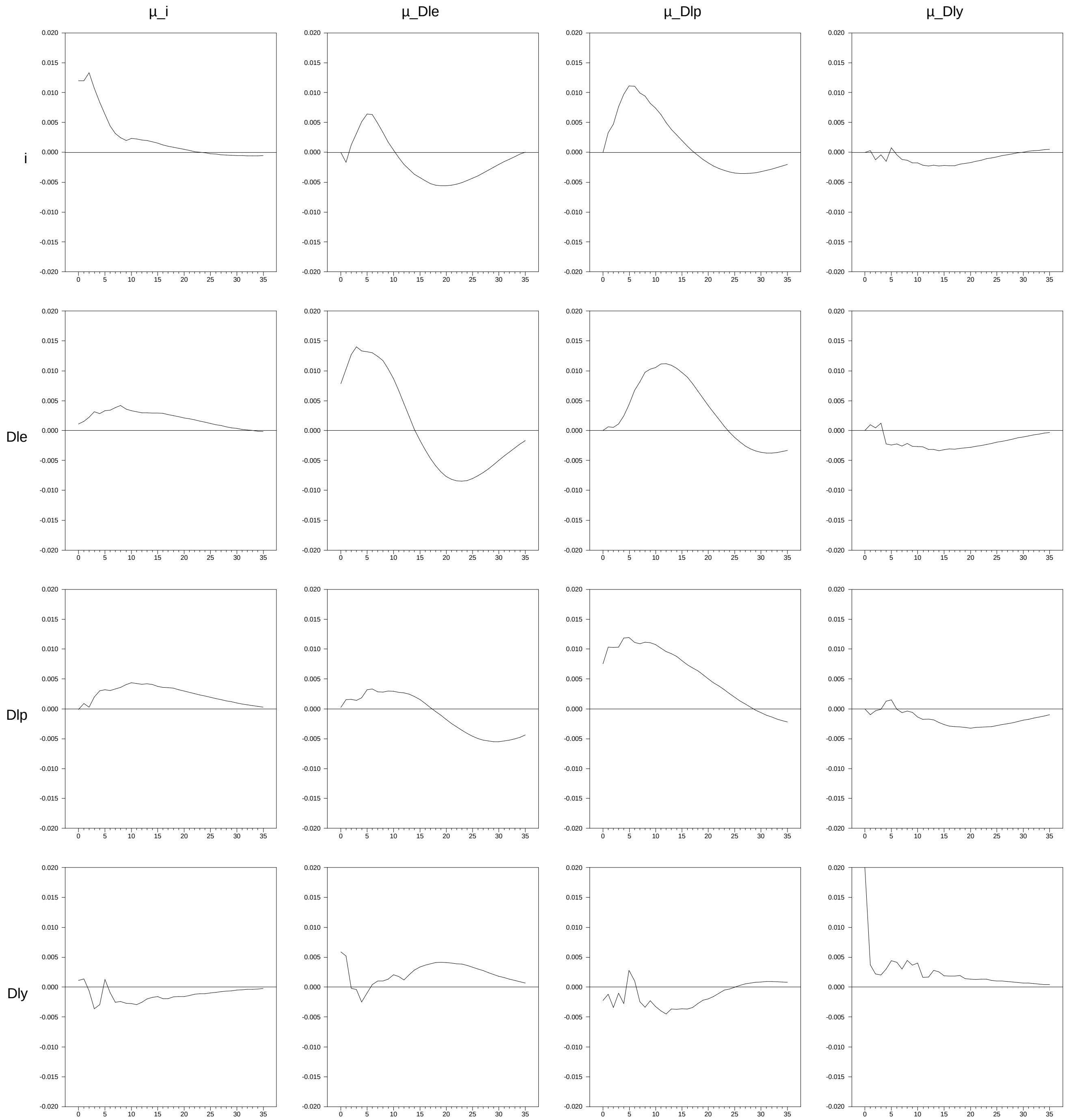

Figure 2.3. Impulse responses, model 1 variant 3

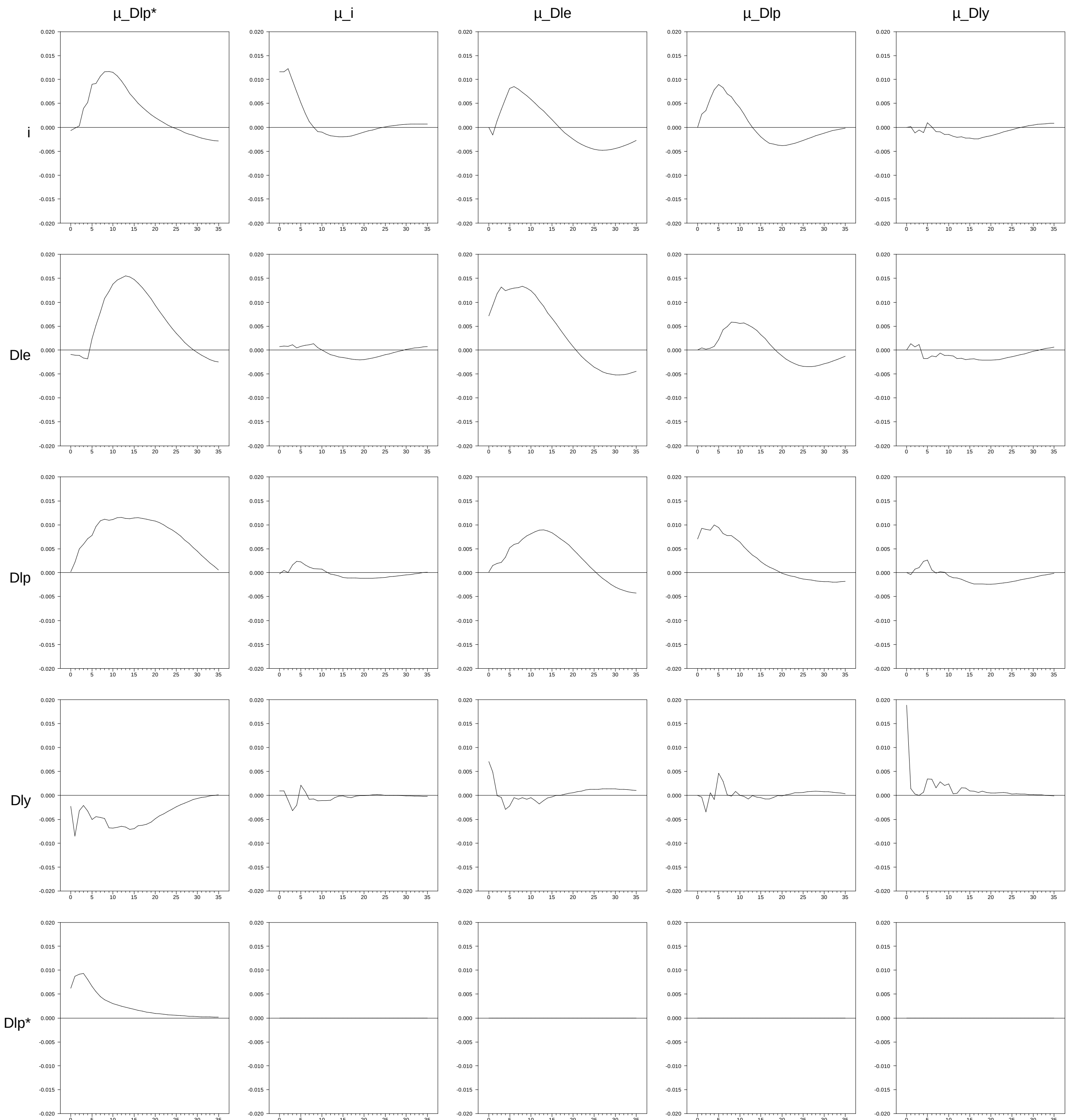

Figure 3.1. Impulse responses, model 2 variant 1

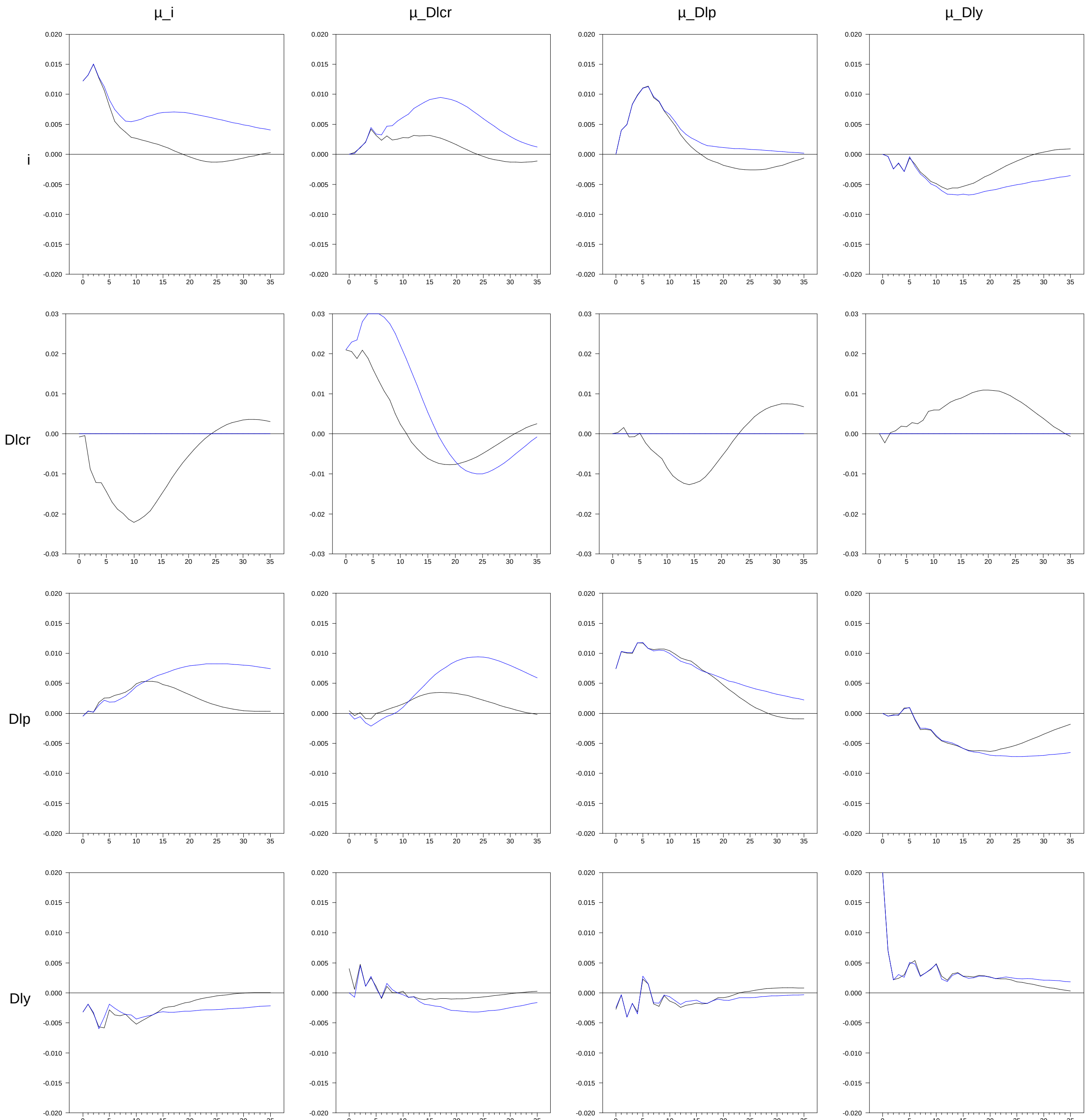

Figure 3.2. Impulse responses, model 2 variant 2

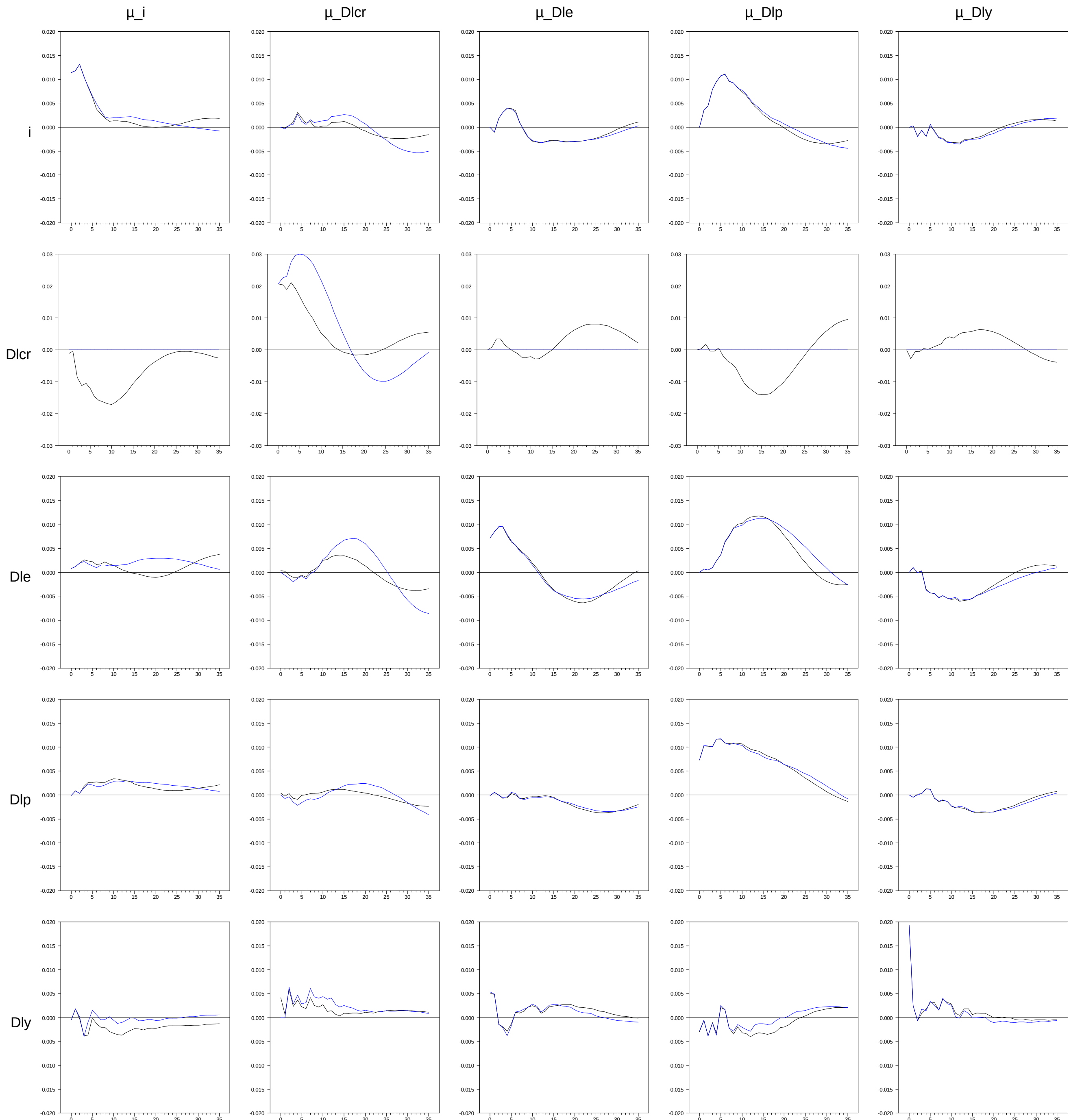

Figure 3.3. Impulse responses, model 2 variant 3

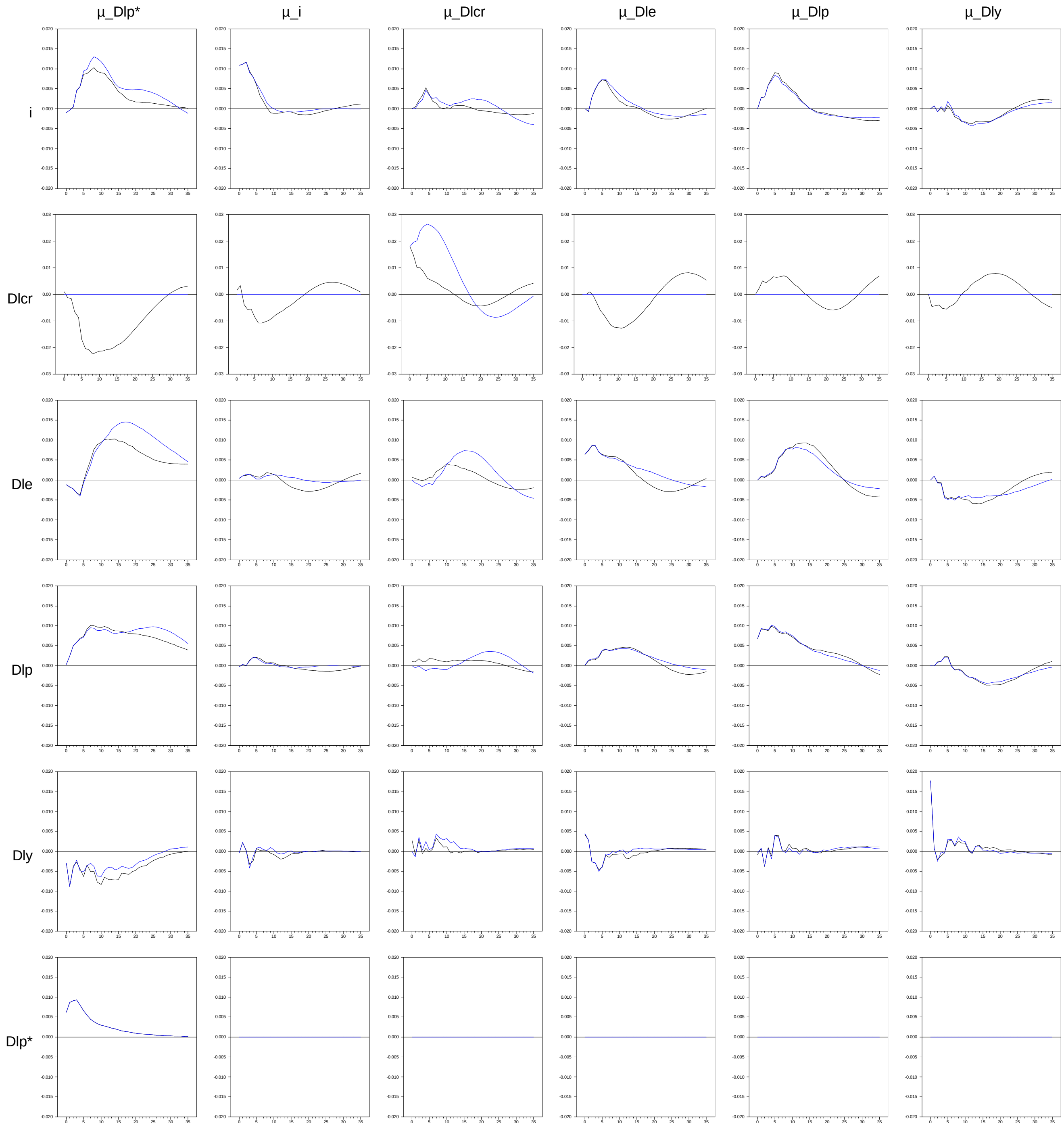

Figure 4. Impulse responses to an interest rate shock in:

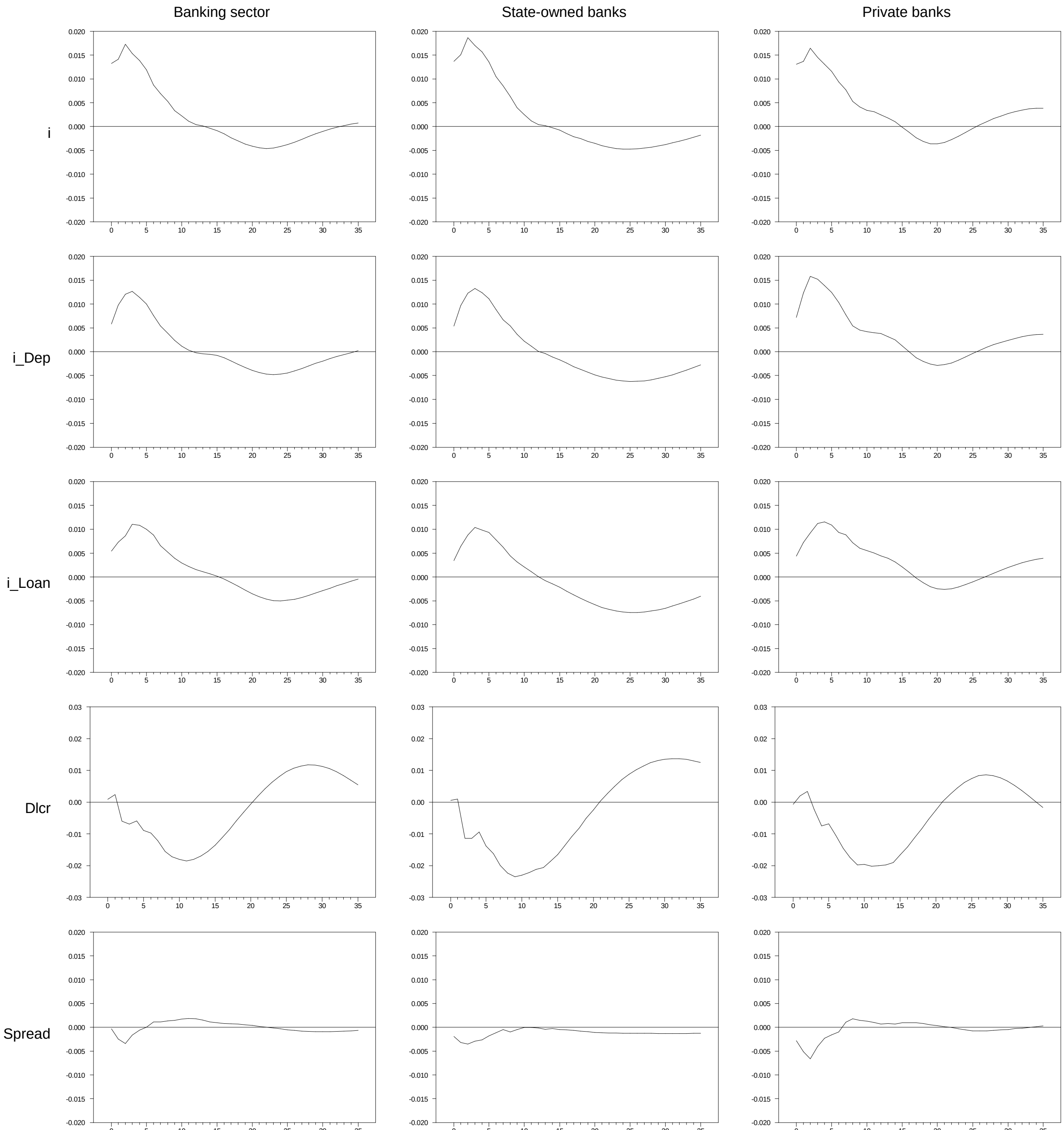

Table A1
Description of Variables

Variables	Description
i	Interest rate of BEM, six months.
Dlp	12-month rate of growth of consumer price index (CPI), 1995=100
Dly	12-month rate of growth of the monthly index of economic activity (IMAE), 1991=100
Dle	12-month rate of growth of nominal exchange rate (*e*).
Dlp*	12-month rate of growth of the US producer price index (PPI), 1995=100
Dlcpr	12-month rate of (end of period) growth of total private sector credit.
Dlcpr_e	12-month rate of (end of period) growth of private sector credit of state-owned banks.
Dlcpr_p	12-month rate of (end of period) growth of private sector of privately held banks.
i_dep	Monthly average of interest rates on six month deposits.
i_loan	Monthly average of loan interest rate, weighted by new credits of state-owned and private banks
*i**	US T bill rate, (six months).
Spread	difference of i_loan and i_dep
Parity interest rate	$\left[\left(\frac{1+i^*}{2}\right)\left(1+\frac{e_{t+6}}{e_t}\right)-1\right]*100*2+f$; f, country risk = 3
Inflation Differential	difference of Dlp and Dlp*