Monetary aspects of short-term capital inflows in the Central European Countries

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Abstract:

 International capital flows represents one of the key aspect of the globalisation process and refers to the continuous relieving the cross-border capital allocation barriers reflecting in huge increase in the common financial connections among the countries during the last decades. Flows of the capital among the countries stimulated by increased investment opportunities, expected profits and better risk diversification generated many positive, symmetric and multiplicative effects. On the other hand it also increases the exposure of the countries to many negative and asynchronous defects that led economists to revaluate the overall effects of financial liberalization and dynamic increase in the international capital flows. Rigorous assessment of general effects related to short-term capital inflows requires a consideration of a wide variety of country specific assumptions and determinants. Real conditions affecting overall effects of short-term capital inflows have to be also considered in the view of (dis)equilibrium trends in the balance of payments.

 In the paper we analyze selected monetary aspects of short-term capital inflows in the Central European countries (Czech republic, Hungary, Poland, Slovak republic) in the period 1999-2010 using VAR (vector autoregression) approach. In order to meet this objective we estimate a vector VAR model identified by the Cholesky decomposition of innovations that allows us to identify structural shocks hitting the model. Impulse-response functions are computed in order to estimate the impact of short-term capital inflows on exchange rate, money stock, price level and current account. Ordering of the endogenous variables in the model is also considered allowing us to check the robustness of the empirical results.

Keywords: capital inflows, exchange rate, balance of payments, money stock, VAR, Cholesky decomposition, impulse-response function

JEL Classification: C32, F15

1. Introduction

 Flows of a short-term capital among countries represent a kind of quite unstable and risky form of international capital flows. As their most the specific features we emphasize speculative intentions of investors and short-term maturity that distinguish them from other forms of international capital flows such as (1) long-term capital flows - foreign direct investments and long-term loans and (2) sophisticated capital flows - portfolio investments and financial derivatives. On the other hand as the main incentives for short-term capital flows we accept widely accepted assumption based on existence of interest rates margins on short-term deposits denominated in different currencies considering risk premium, inflation premium and exchange rate uncertainty. On the other hand the overall effects of the short-term capital inflows in the reporting country are not clear.

 To assess the contribution of the short-term capital inflows to the macroeconomic development in the target economy it is necessary to take into attention lot of country specific assumptions and considerations relating to the macroeconomic (macroeconomic policies, business cycle phase, size, trade and financial openness, productivity, regional disparities, labour market conditions, financial sector development and deepening, exchange rate regime, etc.) and microeconomic (institutional quality and governance, corporate governance, private sector profitability, standard of living, etc.) performance of the country as well as global conditions (financial markets conditions, expectations of investors, exchange rates volatility, etc.). Specific determinants affecting short-term capital inflows should be also evaluated in the view of (dis)equilibrium trends in the balance payments as a whole.

 In the paper we analyze selected monetary aspects of short-term capital inflows in the Central European countries (Czech republic, Hungary, Poland, Slovak republic) in the period 1999-2010 using VAR (vector autoregression) approach. In order to meet this objective we estimate a recursive VAR model identified by the Cholesky decomposition of innovations that allows us to identify structural shocks hitting the model. We compute impulse-response functions in order to estimate the impact of short-term capital inflows on exchange rate, money stock, price level and current account. Ordering of

the endogenous variables in the model is also considered. This approach helps us to check the robustness of the empirical results of the econometric model.

2. Overview of the literature

International financial integration of the European transition economies (ETE) that reflects their ability to participate in the process of the international capital flows is closely related to the process of economic integration and convergence, while it is also conditional to the qualitative changes of main macro and microeconomic indicators. International capital flows determine economic development of countries while they also reflect the ability of countries to actively participate in the process of international division of labour. In the chapter we analyze main features and trends in the international financial integration of ETE in the process of economic convergence toward old EU member countries. To fully explore main, side and specific effects related to ETE participation in the process of international capital flows we consider impact of the changes in main macro and microeconomic proportions in each of the selected group of countries.

International capital flows represents one of the key aspect of the globalisation process and refers to the continuous relieving the cross-border capital allocation barriers reflecting in huge increase in the common financial connections among the countries during the last decades (Kose, Prasad). International financial integration of the countries as a vehicle for participation of the countries in the process of the international division of the labour helped to reduce the restrictions that limited the investors' decision making on the national level. Flows of the capital among the countries stimulated by increased investment opportunities, expected profits and better risk diversification generated many positive, symmetric and multiplicative affects. On the other hand it also increased the exposure of the countries to many negative and asynchronous defects that led economists to revaluate the overall effects of financial liberalization and dynamic increase in the international capital flows (Blanchard, 1984; Obstfeld, 1998). Following the analysis of the overall effects of the international financial integration (Baldwin, 2004; Bussiere, 2004; Eichengreen, 2001) we consider not only macroeconomic but also microeconomic effects of the international financial integration. The overall outcome of these effects is significantly determined by the general parameters of the economy. On the other the similar economic environment in certain countries doesn't necessarily guarantee the similarity of the effects resulting from the participation of the countries in the process of international capital flows (Fisher, 1998; Stulz, 2006).

Specific attention should be taken into the evaluation of the overall effects and outcomes of the international capital flows in the ETE. International financial integration of the ETE became the most significant outcome of capital flows liberalization process that past central planning economies have started since the second half of the 1990s. At the beginning of the transition process these countries were in the specific situation and in the relative short period they passed the complicated, capital demanding process of the transition toward the market economies. The decision to allow the cross-border allocation of capital assets and liabilities resulted from the ability of the transition countries to sustain negative balance of payments and exchange rate pressures. Initial low domestic capital base together with usually higher domestic interest rates stimulated significant foreign capital inflows to such a degree that many ETE rapidly became net international capital debtors (Lane - Milesi-Ferretti, 2006).

Macroeconomic stabilisation and expectations of the fast economic convergence of the ETE toward the old EU member countries increased an attractiveness of the countries for the foreign investors that resulted in increased foreign direct investments inflows to the ETE (Stiglitz, 2000; Rose, 2005). While the effects of the foreign direct investments are well described in the present literature, the role of the portfolio investments is typically underestimated. It is typically the result of the low developed domestic financial markets in the ETE (Buiter-Taci, 2002; Blanchard, 1984). In addition to this obvious trend, changes in the external capital portfolio structure reflected the progress in the domestic economic and institutional reforms, increasing the reliance of foreign investors to allocate more direct and portfolio equity investments in those countries. In comparison with the old EU member countries the effects of the international capital flows in the ETE doesn't necessarily reach the generally expected intensity, while the overall outcome can be distorted or even opposite (Edwards, 2001; Edison - Ross - Luca - Torsten, 2002; Bekaert, 2005).

Individual national conditions significantly determine not only height, but also structure of the international capital flows in which the country participate. Another specific determinant of the international capital flows effects in the ETE is the length of the period during which we evaluate these effects reflecting the qualitative changes of the main parameters of the economies (Buiter - Taci, 2002; Blanchard - Giavazzi - Sa, 2005). This key factor significantly determined the character (increased share of the equity forms of the capital flows through the time), intensity (increased dynamics of the capital flows on the annual base) as well as the overall effects of the international financial integration of the ETE.

Among the other significant aspects that became at least as important as continuously increasing international financial integration we emphasize the progress in the financial sector development and the financial deepening in the European transition countries (Buiter-Taci, 2003). Of course, institutional aspects, heritage from the central planning period and transitional rigidities has fundamentally affected the overall progress as well as durability of partial steps shaping the individual features of the financial sector development and the financial deepening in each particular country. Hence we assume the financial sector development in the European transition countries became even more complicated and country specific when comparing with the financial integration process.

Considering the empirical knowledge from the old EU member countries an economic development of the ETE that remains the traditional target of the foreign capital inflows should stimulate the key change in the height, structure, as well as the direction of the capital flows in the later periods (Kraay, 1998; Hasan - Watchel - Zhou, 2006; Goldberg, 2004). These changes should affect the balance of payments development in the ETE. An increase in the export efficiency, an increase in the foreign direct investments exports, a decrease in the foreign indebtedness are only few examples of effects resulting from the expected change in the role of the more developed ETE in the process of the international capital flows (Lane - Milesi-Ferretti, 2006; Obstfeld, 1998; Blanchard, 1984).

Another important impact on the height and structure of the international capital flows that still remains difficult to estimate in the ETE results from the world financial crisis. An increased uncertainty, higher risk margins, clever credit policy of the commercial banks, decreased domestic and foreign demand, a pressure on the price decrease, a discriminating state assistance to the selected branches, together with other effects of the world financial crisis become specific determinants of the common parameters of the international capital flows (not only) in the ETE.

3. Econometric model

In regard of a monetary model of the balance of payments balance of payments equilibrium is considered to be a monetary phenomenon. Balance of payments surpluses and deficits then results from stock disequilibrium in the money market. On the other hand it doesn't mean this approach underestimates other non-monetary determinants (i.e. government expenditures, taxes, tariffs, productivity changes, etc.) of the balance of payments equilibrium[1].

Excessive demand in the domestic money market leads to the balance of payments surplus while an excessive supply in the domestic money market leads to the balance of payments deficit. We also suppose there is an equilibrium auto-corrective mechanism presented here as an integral part of the model. This mechanism enables country to maintain money market equilibrium through the balance of payments adjustments.

To analyze the effects of the short-term capital inflows to the Central European countries we consider two following statements as crucial assumptions a relevance of which we have to test. (1) If the short-term capital inflows[2] are determined by the domestic money market disequilibrium (demand for money exceeds money supply) the balance of payments as a whole of the country should tend to be in surplus. It also means that the short-term capital inflows shouldn't stimulate the current account to tend to the deficit as it then may offset a surplus in the capital account. If our analysis confirms a

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[1] While a monetary approach views the balance of payments disequilibrium as a result of monetary flows due to stock disequilibrium in the money market (Pilbeam, 2006), it is not considered to be a purely monetary phenomenon.
[2] Other things being equal, short-term capital inflows lead to the capital account surplus in the balance of payment of the country.

relevance of this statement then we may claim the short-term capital inflows in the individual country from the group of the Central European countries have been stimulated by the money market disequilibrium in the selected period. (2) On the other hand the situation seems to be different if the short-term capital inflows are largely determined by a motive of speculation focusing on short-term yields resulting from interest rates margins on short-term deposits denominated in national currencies among countries. It also means that the short-term capital inflows should stimulate the current account to tend to the deficit so that the overall balance of payments may tend to the equilibrium state. If our analysis confirms a relevance of this statement then we may claim the short-term capital inflows in the individual country from the group of the Central European countries have been stimulated by the speculative purposes of foreign investors in the selected period.

In order to estimate the monetary aspects of short-term capital inflows in the Central European countries we estimate a vector autoregression model (VAR) that can be written by the following moving average representation

$$CY_t = A(L)Y_{t-1} + u_t \qquad (1)$$

where $Y_t = [d_t, m_t, e_t, i_t, tb_t]$ is a N x 1 vector of the contemporaneous endogenous variables (d - short-term capital inflows, m - money supply, e - exchange rate, p - domestic price index, tb - trade balance), C is an N x N matrix with ones on the main diagonal and possibly non-zero off-diagonal elements representing the contemporaneous relationship among the endogenous variables of the model, $A(L)$ is a polynomial variance-covariance matrix in the lag operator L representing the relationship among variables on the lagged values and u_t is a N x 1 normalized vector of shocks to the model (short-term capital inflows shock, nominal shock, exchange rate shock, inflation shock, trade balance shock).

By multiplying equation (1) by an inverse matrix C^{-1} we obtain the reduced-form of the VAR model (this adjustment is necessary because the model represented by the equation (1) is not directly observable and structural shocks cannot by correctly identified):

$$Y_t = C^{-1}A(L)Y_{t-1} + C^{-1}u_t = B(L)Y_{t-1} + e_t \qquad (2)$$

Equation (2) reveals the relationship between u_t and e_t, that is given by

$$C^{-1}u_t = e_t \text{ or } u_t = Ce_t \qquad (3)$$

where $B(L)$ is again a matrix representing the relationship among variables on the lagged values and e_t is a N x 1 vector of serially uncorrelated structural disturbance (errors) of the model.

In order to identify our model there must be exactly $n^2 - \left[\left(n^2 - n\right)/2\right]$ relationships among the endogenous variables of the model, where n represents a number of variables. We have to impose $\left(n^2 - n\right)/2$ restrictions on the matrix C based on the Cholesky decomposition of the residual variance-covariance matrix that define matrix C as a lower triangular matrix. The lower triangularity of C implies a recursive scheme among variables (the Wald chain scheme) that has clear economic implications and has to be empirically tested as any other relationship. Identification scheme of the matrix C implies that some structural shocks have no contemporaneous effects on some endogenous variables given the ordering of the endogenous variables. It is clear that the convenient causal ordering of variables is necessary to identify structural shocks and reflects the distribution chain of the impulse hitting the model.

More explicitly written equation (3) following our identification scheme is given by

$$
\begin{bmatrix} u_{d,t} \\ u_{m,t} \\ u_{e,t} \\ u_{p,t} \\ u_{tb,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ c_{21} & 1 & 0 & 0 & 0 \\ c_{31} & c_{32} & 1 & 0 & 0 \\ c_{41} & c_{42} & c_{43} & 1 & 0 \\ c_{51} & c_{52} & c_{53} & c_{54} & 1 \end{bmatrix} \begin{bmatrix} e_{d,t} \\ e_{m,t} \\ e_{e,t} \\ e_{p,t} \\ e_{tb,t} \end{bmatrix} \qquad (4)
$$

To check the robustness of our empirical results we estimate two VAR models identified through the restrictions resulting from the recursive Cholesky decomposition of the residuals for each country from the Central European region - model A ($Y_t = [d_t, m_t, e_t, p_t, tb_t]$), model B ($Y_t = [d_t, e_t, m_t, p_t, tb_t]$).

In each model we assume different ordering of the variables that reflects the different distribution chain of the impulse initiated by the short-term capital inflows shock. It is also possible to analyze the responses of the endogenous variables to different types of capital inflows (foreign direct investments, portfolio investments, long-term capital).

Additionally, if the estimated results from the impulse-response analysis confirm the model is not very sensitive to the endogenous variables ordering, the Cholesky decomposition method can be interpreted as providing robust results.

In order to meet the objective of the article to estimate the monetary aspects of short-term capital inflows in the Central European countries in the period 1999-2010 we focus our attention to interpret the responses of the endogenous variables of the model to the short-term capital inflows one standard deviation innovation.

4. Data and results

We use monthly data ranging from 1999M1 to 2010M7 (127 observations) for the short-term capital inflows, money supply represented by the monetary aggregate M3, nominal effective exchange rate (NEER), inflation represented by the adjusted domestic consumer price index (indicator of core inflation) and trade balance. Time series for short-term capital inflows, monetary aggregate M3 and trade balance are seasonally adjusted and together with NEER are expressed as indexes with base line year 2005. Core inflation is calculated as an annual percentage change of adjusted consumers' price index expressed on the monthly base.

Before estimating the model we test the time series for stationarity and cointegration. The augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests were computed to test the endogenous variables for the existence of the unit roots. Both ADF and PP tests indicate the variables are non-stationary on the values so that the null hypothesis of a unit root cannot be rejected for any of the series. Testing variables on the first differences indicates the time series are stationary so that we conclude that the variables are I(1).

Because the endogenous variables have a unit root on the values it is necessary to the test the time series for cointegration using the Johansen cointegration test. The test for the cointegration was computed using two lags as recommended by the AIC (Akaike Information Criterion) and SIC (Schwarz Information Criterion). The results of the Johansen cointegration tests seem to be clear. Both trace statistics and maximum eigenvalue statistics (both at 0.05 level) indicate there is no cointegration among the endogenous variables of the model. The results of the Johansen cointegration tests correspond with the results of the unit root tests because it implies that there is no long-run equilibrium relationship among the variables of the model (they follow the different stochastic trend in the long run).

The results of unit root and cointegration tests are not reported here to save space. Like any other results, they are available upon request from the author.
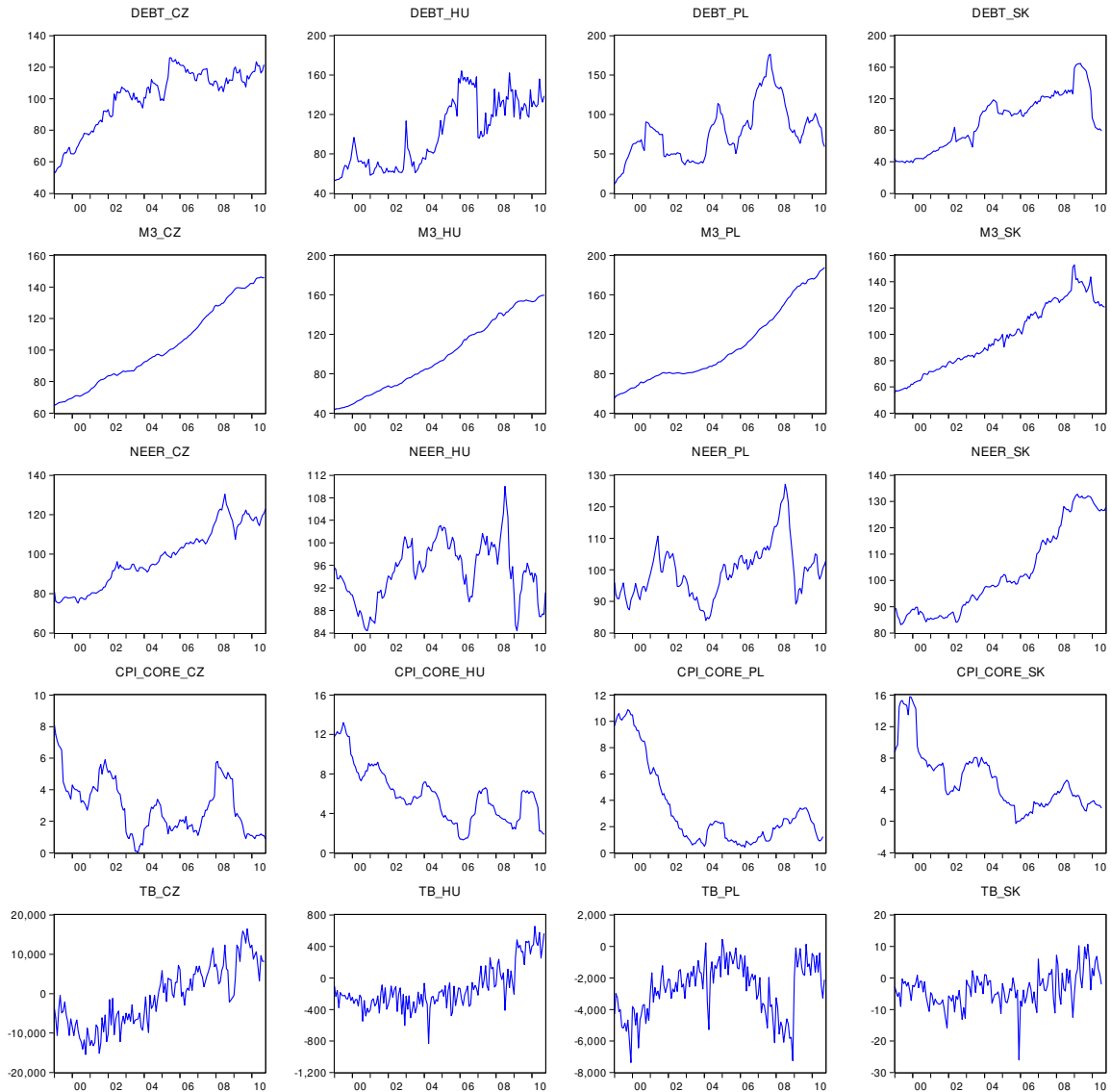
Figure 1. Variables

Source: Bank for international settlements, national central banks, OECD.

To test the stability of the VAR model we also applied a number of diagnostic tests. We found no evidence of serial correlation, heteroskedasticity and autoregressive conditional heteroskedasticity effect in the disturbances. The model also passes the Jarque-Bera normality test, so that errors seem to be normally distributed. The VAR models seem to be stable also because the inverted roots of the models for each country lie inside the unit circle, although several roots are near unity in absolute value (figure 2).
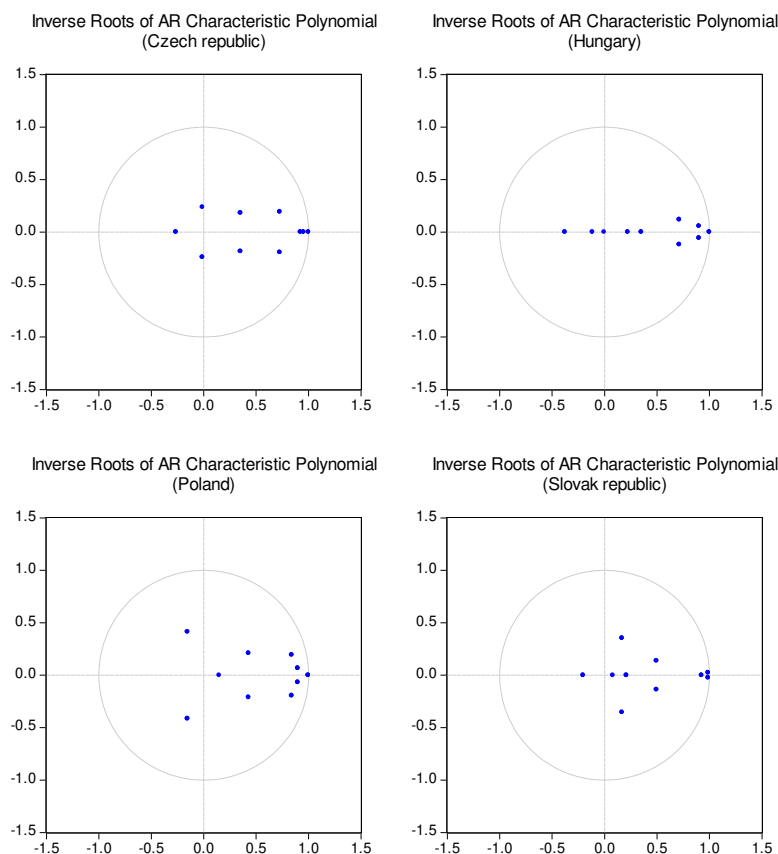
Figure 2. *VAR stability condition check (Central European countries)[3]*

Source: Author's calculations.

Following the results of the unit root tests and cointegration tests we estimate the model using the variables in the first differences so that we can calculate impulse-response functions (we focus on the responses of endogenous variables to the short-term capital inflows one standard deviation in each country from the Central Europe region. In the figure 3 - 6 we summarize the impulse-response functions for the model A ($Y_t = [d_t, m_t, e_t, p_t, tb_t]$) and model B ($Y_t = [d_t, e_t, m_t, p_t, tb_t]$) for each of the individual country from the Central European region.

4.1 Czech republic

In the model A we consider the exchange rate shocks are determined by the nominal shocks. At the same time the exchange rate shocks affects the price level contemporaneously, but not vice versa (assumption is given by the Cholesky structure that allows us to identify the model).

In the model B we consider the nominal shocks are determined by the exchange rate shocks. At the same time the nominal shocks affects the price level contemporaneously, but not vice versa (assumption is given by the Cholesky structure that allows us to identify the model).

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[3] The results of the VAR stability condition check are reported for the model A only. Like any other results, VAR stability condition check for model B is available upon request from the author.
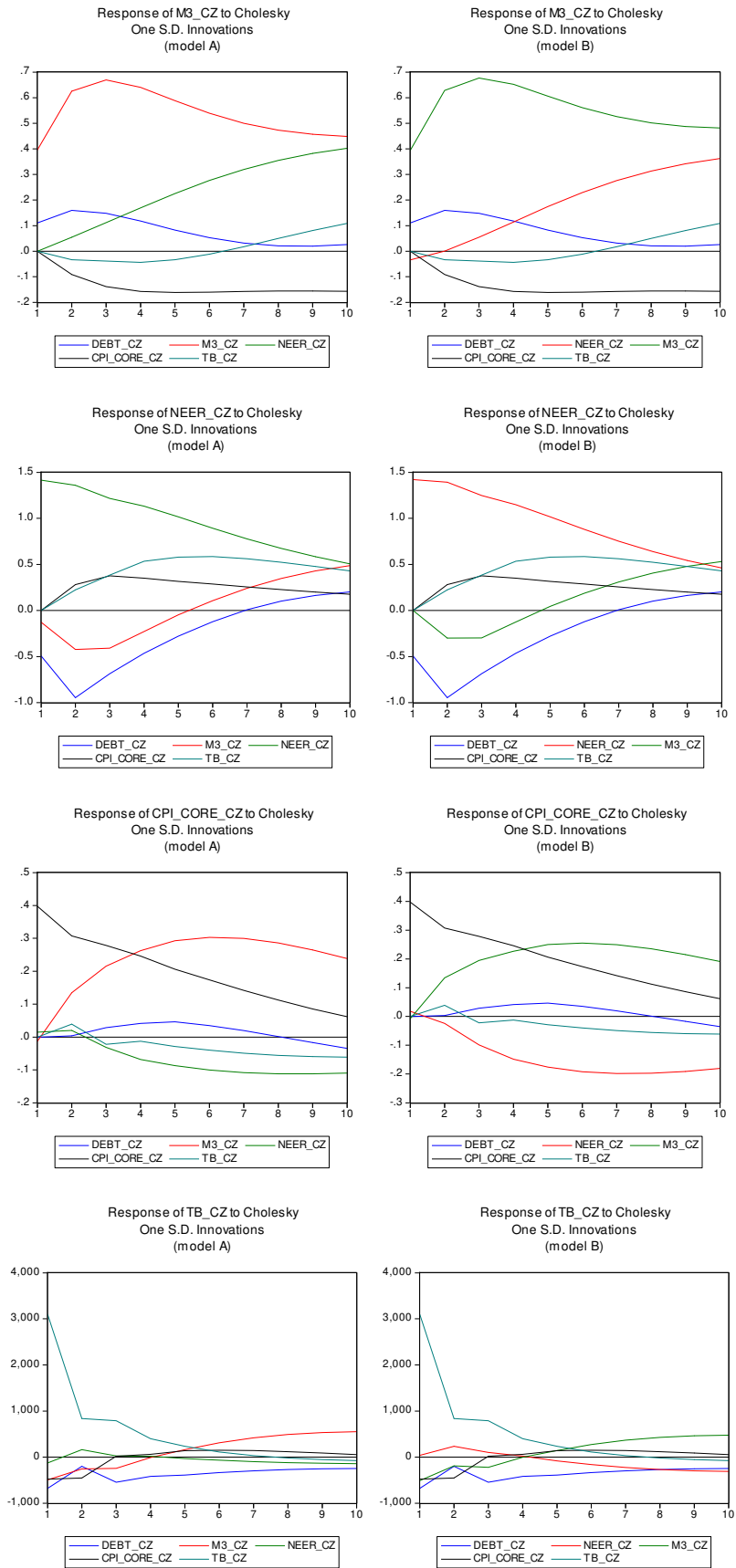
Response of M3_CZ to Cholesky
One S.D. Innovations
(model A)

Response of M3_CZ to Cholesky
One S.D. Innovations
(model B)

Response of NEER_CZ to Cholesky
One S.D. Innovations
(model A)

Response of NEER_CZ to Cholesky
One S.D. Innovations
(model B)

Response of CPI_CORE_CZ to Cholesky
One S.D. Innovations
(model A)

Response of CPI_CORE_CZ to Cholesky
One S.D. Innovations
(model B)

Response of TB_CZ to Cholesky
One S.D. Innovations
(model A)

Response of TB_CZ to Cholesky
One S.D. Innovations
(model B)

Figure 3. Impulse-response function, Czech republic (models A and B)

Source: Author's calculations.

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The figure 3 reflects the estimated impulse-response functions that reveal the responses of endogenous variables of the model to the Cholesky one standard deviation shocks in the Czech republic. As we expected the short-term capital inflows immediately raised the domestic stock of money in the short period and after 8 months the effect of this shock died out. As a result the stock of money remained unchanged in the long-run after one standard deviation short-term capital shock. As we can see the results are almost identical for both models A and B so that the changes in ordering of the variables don't play any significant role.

After initial short-term capital shock NEER slightly depreciated. After 1 month after the shock NEER followed the path on the way back to its initial level and after 7 months the negative impact of the short-term capital shock to the NEER development completely disappeared. Similarly the change in ordering of the variables confirmed the results presented here.

Core inflation slightly increased after one standard deviation short-term capital shock with lag of 2 months after the shock. The effect of this shock was only temporary and lasted only 6 months so that core inflation returned back to its initial level after this period. The change in ordering of the variables doesn't revealed results significantly different if we compare models A and B.

Finally, the current account turned into deficit after one standard deviation short-term capital shock and while the overall effect of the shock on the current account development slightly decreased after 10 months, the current account remained in deficit and it didn't return back to the initial equilibrium state. The change in ordering of the variables doesn't revealed results significantly different if we compare models A and B.

Considering our assumptions from the beginning of the section 3, the overall surplus in the capital account caused by the short-term capital inflows (leaving other accounts of the capital account unchanged), together with the negative trend in the current account development (reflects the negative trend in the current account development caused by the short-term capital inflows shock) caused the balance of payments in the Czech republic followed the path to the overall equilibrium. Considering this we expect, the main motive for the short-term capital inflows in the Czech republic was mainly determined by the motive of speculation.

4.2 Hungary

The figure 4 depicts the estimated impulse-response functions showing the responses of endogenous variables of the model to the Cholesky one standard deviation shocks in Hungary. In comparison with the Figure 3 we found rather similar response of the domestic stock of money to the one standard deviation short-term capital inflows shock. While the stock of money increased after this shock, the power of the stock rose steadily and reached its peak after 8 months. Contrary to its long-run neutral impact in the Czech republic, in Hungary it seems its effect on the stock of money seems to be permanent. The change in ordering of the variables (models A and B) doesn't seem have any significant impact on the response of domestic stock of money to short-term capital shock presented here.

Quite different, in comparison with the Czech republic, seems to be the response of NEER to the initial one standard deviation short-term capital shock in Hungary. The shock affected negatively the development of NEER with 1 month lag. NEER depreciated steadily after this shock with the peak after 10 months after the shock. Similarly, just like in case of the stock of money, the negative effect of the short-term capital shock to the NEER development seems to be permanent. Similarly the change in ordering of the variables (models A and B) doesn't seem have any significant impact on the response of NEER to the short-term capital shock presented here.
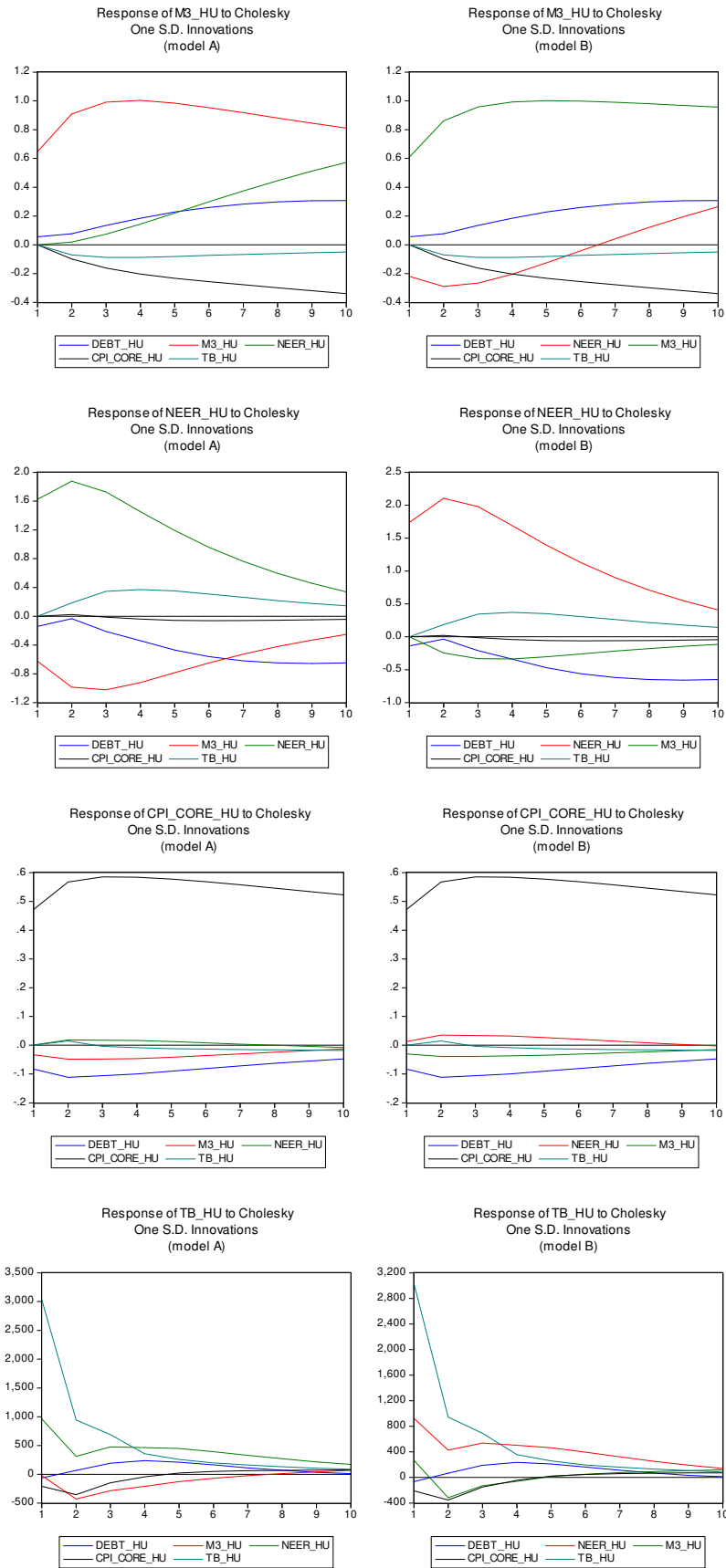
Absolutely different results, in comparison with the Czech republic, we found in the analysis of the response of the core inflation to the one standard deviation short-term capital inflows shock. Surprisingly the price level decreased after this shock while this effect steadily fades out in the long-run. We may expect it is due to non-speculative character of the short-term capital inflows in Hungary. Our consideration is supported by the response of current account to the initial short-term capital inflows shock. Contrary to our findings in the Czech republic, the current account in Hungary turned into surplus after this shock. Similarly the change in ordering of the variables (models A and B) doesn't seem have any significant impact on the response of NEER to the short-term capital shock presented here.

Figure 4. Impulse-response function, Hungary (models A and B)

Source: Author's calculations.

Absolutely different results, in comparison with the Czech republic, we found in analysing the response of the core inflation to the ode standard deviation short-term capital shock. Surprisingly the price level decreased after this shock while this effect steadily fades out in the long-run. We may expect it is due to non-speculative character of the short-term capital inflows in Hungary. Our consideration is supported by the response of current account to the initial short-term capital inflows shock. Contrary to our findings in the Czech republic, the current account in Hungary turned into surplus after this shock.

Finally, considering our assumptions from the beginning of the section 3, the overall surplus in the capital account caused by the short-term capital inflows (leaving other accounts of the capital account unchanged), together with the positive trend in the current account development (reflects the positive trend in the current account development caused by the short-term capital inflows shock) caused the balance of payments in the Hungary followed the path to the overall surplus. Considering this we expect, the main motive for the short-term capital inflows in the Czech republic was mainly determined by the stock disequilibrium in the money market.
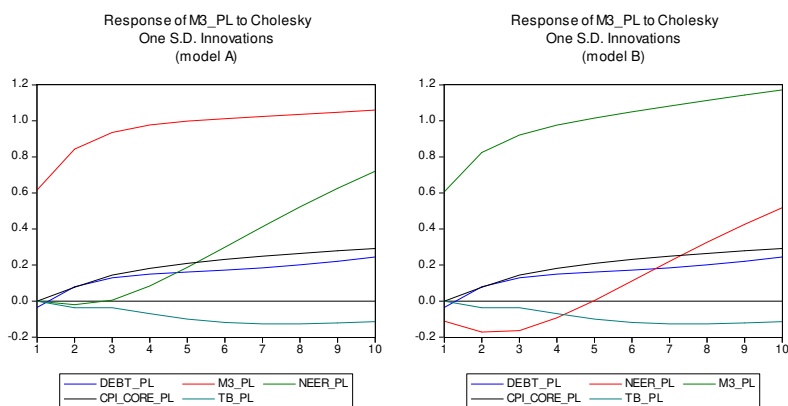
4.3 Poland

The figure 5 reflects the estimated impulse-response functions that reflect the responses of endogenous variables of the model to the Cholesky one standard deviation shocks in Poland. Similarly to the result for the Czech republic, the short-term capital inflows gradually increased the domestic stock of money in the short period with the slightly lower positive trend after 3 months after the shock. Contrary to its long-run neutral impact in the Czech republic, in Poland it seems its effect on the domestic stock of money seems to be permanent. The change in ordering of the variables (models A and B) doesn't seem have any significant impact on the response of domestic stock of money to short-term capital shock presented here.

After initial short-term capital shock NEER slightly depreciated. After 1 month after the shock NEER followed the path on the way back to its initial level and after 8 months the negative impact of the short-term capital shock to the NEER development completely disappeared. Similarly the change in ordering of the variables confirmed the results presented here.

Core inflation slightly increased after one standard deviation short-term capital shock with lag of 2.5 months after the shock. The effect of this shock seems to be also permanent so that the core inflation remained increased after initial short-term capital inflows shock. The change in ordering of the variables doesn't revealed results significantly different if we compare models A and B.

Finally, the current account didn't turn into deficit immediately after one standard deviation short-term capital shock, but only after 3 months. Here again the current account remained in deficit and it didn't return back to the initial equilibrium state. The change in ordering of the variables doesn't revealed results significantly different if we compare models A and B.
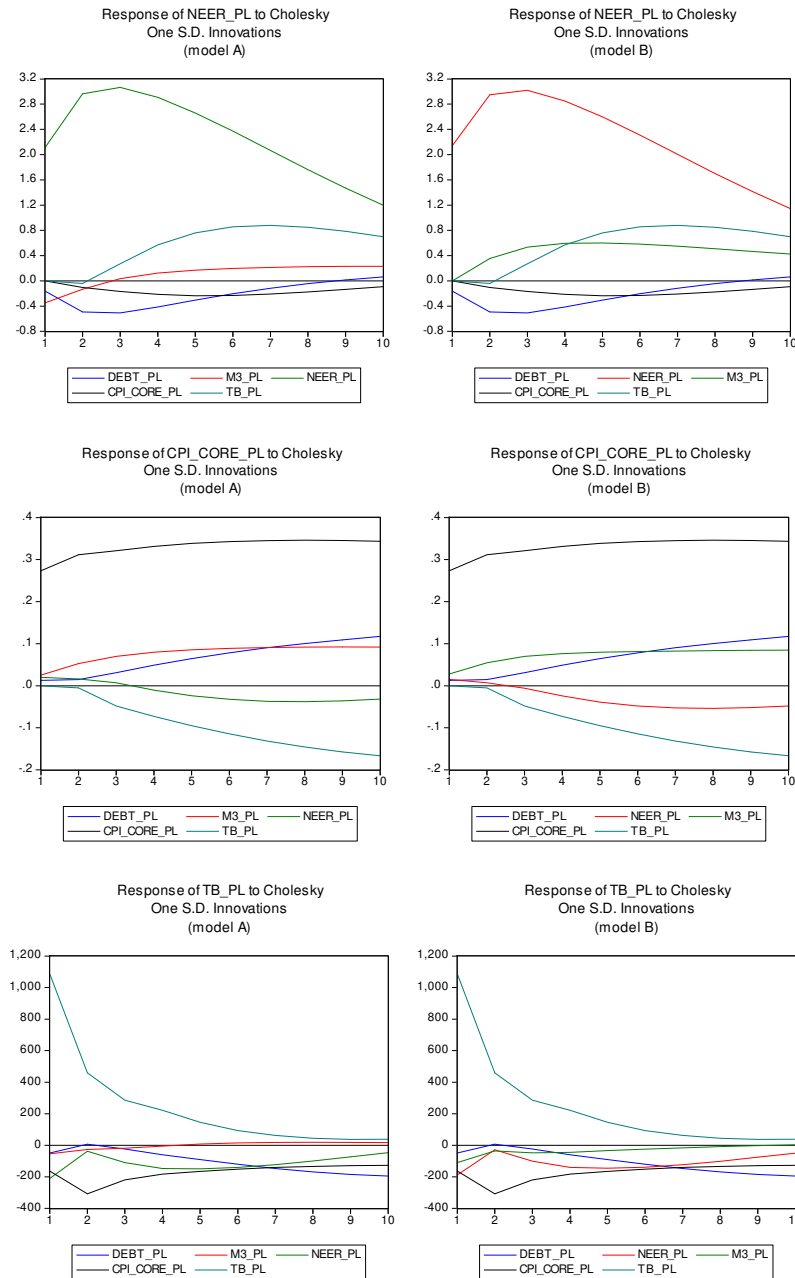
Figure 5. Impulse-response function, Poland (models A and B)

Final comments related the motives of the short-term capital inflows in Poland are similar to our findings for the Czech republic. The overall surplus in the capital account caused by the short-term capital inflows, together with the negative trend in the current account development caused the balance of payments in Poland followed the path to the overall equilibrium. Considering this we expect, the main motive for the short-term capital inflows in Poland was mainly determined by the motive of speculation.
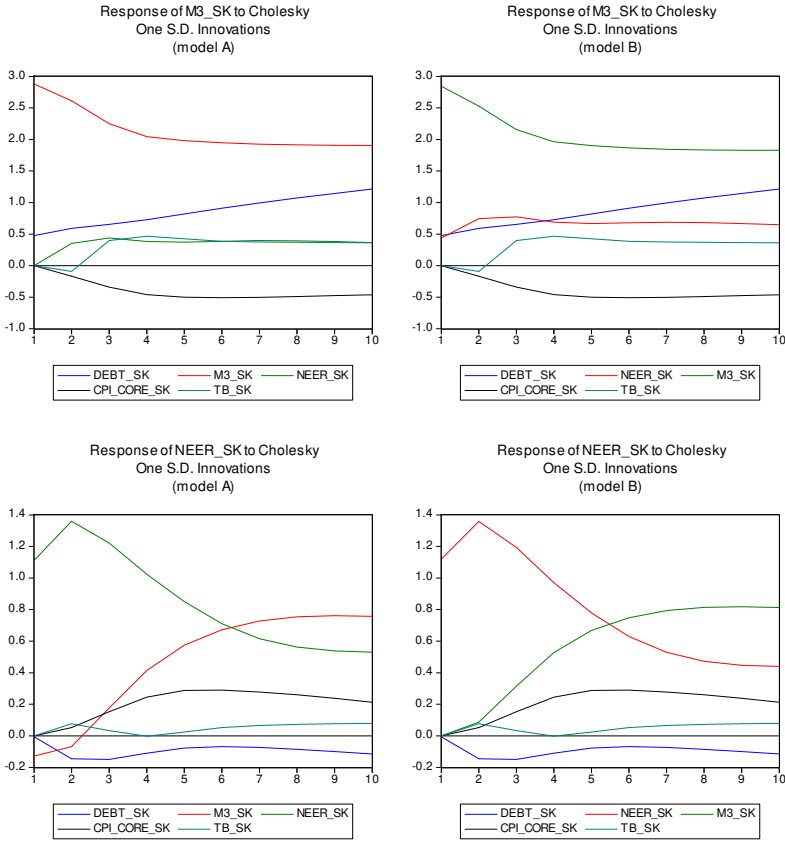
4.4 Slovak republic
The figure 6 reflects the estimated impulse-response functions that reveal responses of endogenous variables of the model to the Cholesky one standard deviation shocks in the Slovak republic. As we expected the short-term capital inflows immediately raised the domestic stock of money in the short

period. While in the Czech republic the positive effect of the short-term capital inflows shock to the stock of money development was only temporary and in Hungary and Poland permanent and stable, in the Slovak republic we observed a steadily rising trend even in the long-run. As we can see the results are almost identical for both models A and B so that the changes in ordering of the variables don't play any significant role.

After initial short-term capital shock NEER slightly depreciated. 2.5 months after the shock NEER followed the path on the way back to its initial level but contrary to the results for three remaining countries, in the Slovak republic NEER remained depreciated even in the long-run. Similarly the change in ordering of the variables confirmed the results presented here.

Core inflation slightly increased immediately after one standard deviation short-term capital shock while its effect was only temporary and lasted only 7 months so that core inflation returned back to its initial level after this period. The change in ordering of the variables doesn't revealed results significantly different if we compare models A and B.

The current account turned into deficit after one standard deviation short-term capital shock and it didn't return back to the initial equilibrium state. The results depict the impulse-response function of the short-term capital shock in the model B.
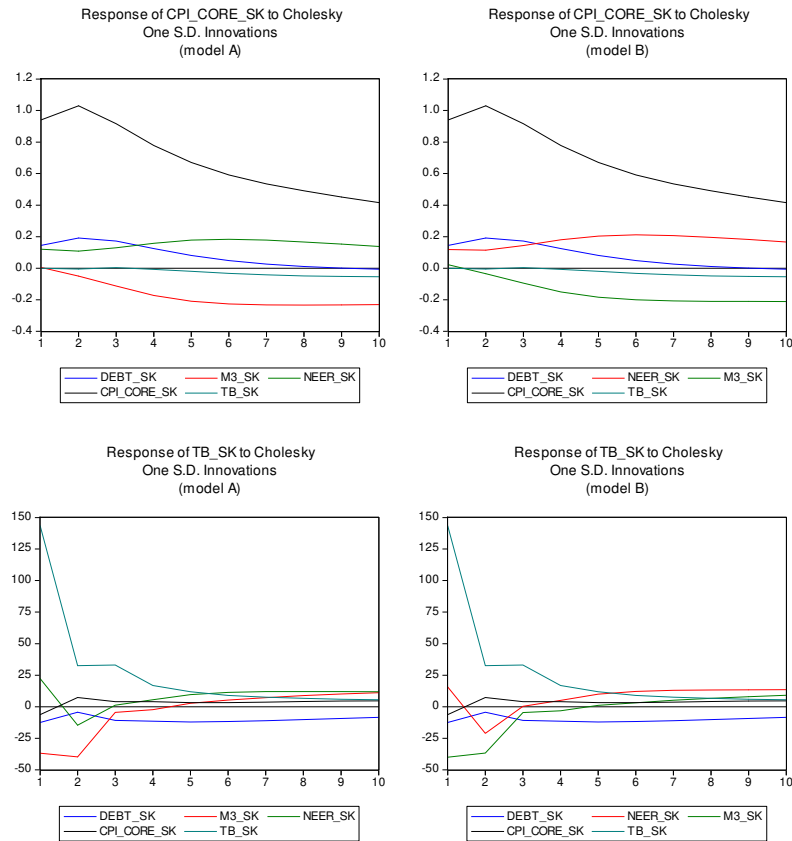
Figure 6. Impulse-response function, Slovak republic (models A and B)

Source: Author's calculations.

The overall surplus in the capital account caused by the short-term capital inflows, together with the negative trend in the current account development caused the balance of payments in the Slovak republic followed the path to the overall equilibrium. Considering this we expect, the main motive for the short-term capital inflows in the Slovak republic was, similarly to what we observed in the Czech republic and Poland, mainly determined by the motive of speculation.

5. Conclusion

In the paper we have analyzed selected monetary aspects of short-term capital inflows in the Central European countries (Czech republic, Hungary, Poland, the Slovak republic) in the period 1999-2010 using VAR (vector autoregression) approach. In order to meet this objective we have estimated a recursive VAR model identified by the Cholesky decomposition of innovations that allowed us to identify structural shocks hitting the model. We have computed impulse-response functions in order to estimate the impact of short-term capital inflows on exchange rate, money stock, price level and current account in the Central European countries. Ordering of the endogenous variables in the model was also considered.

To analyze the effects of the short-term capital inflows to the Central European countries we have considered two following statements as crucial assumptions a relevance of which we have tested. (1) If the short-term capital inflows[4] are determined by the domestic money market disequilibrium (demand for money exceeds money supply) the balance of payments as a whole of the country should tend to be in surplus. It also means that the short-term capital inflows shouldn't stimulate the current account to tend to the deficit as it then may offset a surplus in the capital account. If our analysis confirms a relevance of this statement then we may claim the short-term capital inflows in the individual country

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[4] Other things being equal, short-term capital inflows lead to the capital account surplus in the balance of payment of the country.

from the group of the Central European countries have been stimulated by the money market disequilibrium in the selected period. (2) On the other hand the situation seems to be different if the short-term capital inflows are largely determined by a motive of speculation focusing on short-term yields resulting from interest rates margins on short-term deposits denominated in national currencies among countries. It also means that the short-term capital inflows should stimulate the current account to tend to the deficit so that the overall balance of payments may tend to the equilibrium state. If our analysis confirms a relevance of this statement then we may claim the short-term capital inflows in the individual country from the group of the Central European countries have been stimulated by the speculative purposes of foreign investors in the selected period.

Comparing the result for each country from the Central European region we may summarize our findings:

- The one deviation short-term capital inflows shock raised the domestic stock of money in all countries with different intensity and durability. While in the Czech republic the effect of the short-term capital inflows shock was only temporary, in Hungary, Poland and the Slovak republic it seemed to be permanent.
- After the initial one deviation short-term capital inflows shock NEER temporarily depreciated in the Czech republic and Poland. On the hand in Hungary and the Slovak republic the negative impact of the short-term capital inflows shock seemed to be permanent.
- In the Czech republic and the Slovak republic the short-term capital inflows shock seemed to have only temporary negative impact on the core inflation development while in Poland the overall effect of the short-term capital inflows shock seemed to be permanent. Surprisingly the short-term capital inflows shock seemed to have a positive impact on the core inflation development in Hungary while this effect steadily fades out in the long-run.
- The overall surplus in the capital account caused by the short-term capital inflows (leaving other accounts of the capital account unchanged), together with the negative trend in the current account development (reflects the negative trend in the current account development caused by the short-term capital inflows shock) caused the balance of payments in the Czech republic, Poland and the Slovak republic followed the path to the overall equilibrium. Considering this we expect, the main motive for the short-term capital inflows in the Czech republic, Poland and the Slovak republic was mainly determined by the motive of speculation.
- The overall surplus in the capital account caused by the short-term capital inflows, together with the positive trend in the current account development caused the balance of payments in the Hungary followed the path to the overall surplus. Considering this we expect, the main motive for the short-term capital inflows in the Czech republic was mainly determined by the stock disequilibrium in the money market.

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7. References

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