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OCENA TRANSMISIONOG MEHANIZMA MONETARNE POLITIKE U ZEMLJAMA NOVIM ČLANICAMA EVROPSKE UNIJE

Rezime

Kako bi se transmisioni mehanizam potpuno razumeo i analizirao, neophodno je sagledati sve faktore koji uslovljavaju njegovu efikasnost kao celinu i efikasnost pojedinih kanala. U fokusu rada su zemlje koje se uspešno prošle period tranzicije i koje imaju iskustvo sa primenom različitih režima monetarne politike. Kroz proces evolucije monetarne politike razvili su se i instrumenti kojima centralna banka deluje na realni sektor putem transmisionog mehanizma. Empirijskom analizom pomoću ekonometrijskih alata ispituje se efikasnost kanala transmisionog mehanizma, odnosno jačina njihovog delovanja u režimu ciljanja inflacije. Kako bi se došlo do zaključka u kom pravcu je neophodno razvijati strukturu realnog i finansijskog sektora, u cilju boljeg delovanja instrumenata monetarne politike, teorijski se analiziraju karakteristike monetarne politike razvijenih ekonomija, kao i strukturne karakteristike privrede.

Ključne reči: transmisioni mehanizam, inflacija, referentna kamatna stopa, devizni kurs, vektorska autoregresija

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ASSESSMENT OF THE MONETARY POLICY TRANSMISSION MECHANISM IN THE NEW EU MEMBER STATES

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Summary

In order to completely understand and analyse the transmission mechanism, it is necessary to observe all factors conditioning its overall efficiency as well as the efficiency of individual transmission channels. This paper focuses on countries that have successfully passed the transition period and have experience with implementing different monetary policy regimes. The evolution of monetary policy resulted in the development of instruments through which central banks influence the real sector activity by means of a transmission mechanism. The empirical analysis based on econometric tools investigates the efficiency of transmission mechanism channels, or more precisely, their significance in the monetary targeting regime. With a view to reaching the conclusion about the direction in which it is necessary to develop the structure of the real and financial sector, aimed at a better functioning of monetary policy instruments, the paper features a theoretical analysis of the characteristics of the monetary policy in the developed economies, as well as the structural characteristics of these economies.

Key words: transmission mechanism, inflation, key interest rate, exchange rate, vector autoregression

JEL: E52; E58; E44; F31

Uvod

U ovom radu testirana je efikasnost transmisionog mehanizma tri nove članice Evropske unije koje su uspešno prošle period tranzicije, odnosno Republika Češka, Mađarska i Poljska. Analiza evolucije monetarne politike u ovim zemljama značajna je sa stanovišta sagledavanja optimalnog režima monetarne politike, uzimajući u obzir okolnosti pri kojima se režim primenjuje. Na samom početku tranzicionog perioda sve tri zemlje primenile su režim fiksnog deviznog kursa. Međutim, režim fiksnog deviznog kursa nosi sa sobom negativne efekte. Sa razvojem uslova za primenu tržišnih instrumenata monetarne politike centralnim bankama su se otvorile nove mogućnosti za primenu i drugih monetarnih režima. Sa primenom ciljanja inflacije, evoluirao je i transmisioni mehanizam gde devizni kurs treba da ima znatno manju ulogu nego što je to bile ranije. Takođe, uslovi koji su neophodni za primenu ciljanja inflacije predstavljaju i uslove pod kojima transmisioni mehanizam može neometano da funkcioniše, naročito kanal kamatne stope. U tom smislu neophodno je sagledati i strukturne karakteristike finansijskog sektora kao spona između monetarne politike i realnog sektora. Ono što je karakteristično za sve zemlje Evropske unije, pa tako i nove članice, jeste da je finansijski sistem prvenstveno baziran na bankarskom sektoru te da je to glavni provodnik odluka monetarnih vlasti.

Bankarski sektor kao i slučaju ostalih tranzicionih zemalja tokom posmatranog perioda u analizi odlikuje višak likvidnosti. Usled toga sektor je otporniji na iznenadne šokove manjka likvidnosti kao što je to bio slučaj tokom globalne finansijske krize, ali u isto vreme ugrožava efikasnost transmisionog mehanizma monetarne politike. Sledeći faktor koji bankarski sektor čini više nezavisnim od promena u monetarnoj politici jeste to što su banke u većinskom stranom vlasništvu. Iako ne postoji visoka koncentrisanost bankarskog sektora, konkuretnost je ograničena upravo postojanjem banaka u vlasništvu stranih investitora. Naime, učešće depozita u ukupnoj aktivni stranih banaka je niže u odnosu na domaće banke, dok je veći udeo kredita iz inostranstva. Ove banke imaju lakši pristup na međunarodnom tržištu novca usled boljeg

rejtinga od banaka u domaćem vlasništvu. Njihovi izvori finansiranja su van dometa domaće centralne banke i pre svega su uslovljeni kretanjima kratkoročnih kamatnih stopa na evro i švajcarski franak. Sa većim učešćem banaka u stranom vlasništvu umanjuje se značaj kamatnog i kreditnog kanala.

Jačina transmisionog mehanizma u zemljama iz posmatrane grupe ograničena je učešćem kredita sa valutnom klauzulom. Naime, kako su ovi krediti vezani za kretanje strane valute, najčešće evra ili švajcarskog franka, referentna kamatna stopa nema odlučujući značaj na formiranje kamatne stope. Odlučujući značaj ima referentna kamatna stopa centralne banke, valute za koju se ovaj kredit vezuje. U tom smislu efikasnost kanala kamatne stope se smanjuje sa rastom učešća kredita sa valutnom klauzulom u ukupno izdatim kreditima komercijalnih banaka. Takođe se povećava i kreditni rizik klijenata u slučaju pada vrednosti domaće valute, jer prihodi klijenata u najvećem delu nisu vezani za kretanje valute u kojoj su zaduženi.

Empirijska analiza je fokusirana na istraživanje efikasnosti kamatnog kanala i kanala deviznog kursa, kako bi se ustanovilo da li je u režimu ciljanja inflacije ovih zemalja dominantan instrument referentne kamatne stope ili deviznog kursa.

Empirijska analiza transmisionog procesa u Republici Češkoj, Poljskoj i Mađarskoj

Rezultati empirijske analize

U empirijskoj analizi transmisionog mehanizma analiziraće se kanal kamatne stope i deviznog kursa. Pored analiza šoka rasta kamatne stope u modelu će se analizirati i uticaj ekspanzivne monetarne politike na realne varijable putem rasta monetarnog agregata M2. Primeniće se dve specifikacije VAR modela u cilju što bolje identifikacije modela.

U *prvom modelu* koristiće se model sa endogenim i egzogenim varijablama koji je predstavljen sledećom jednačinom:

$$Y_t = A(L)Y_{t-1} + B(L)X_t + \mu_t$$

gde je Y_t vektor endogenih varijabli dok je X_t vektor egzogenih varijabli. U prvoj postavci modela vektor endogenih varijabli sadrži realni bruto domaći proizvod y_t , indeks potrošačkih

Introduction

This paper analyses the efficiency of the transmission mechanism of the three new EU member states which have successfully passed the transition period i.e. the Czech Republic, Hungary and Poland. The analysis of monetary policy evolution in these countries is important from the point of reviewing the optimal monetary policy regime, taking into account the circumstances in which the regime is applied. At the very beginning of the transition period, all three countries implemented the fixed exchange rate regime. However, the fixed exchange rate regime entails some negative effects. With the development of the conditions for application of market-based instruments of monetary policy, central banks got new opportunities for the implementation of other monetary regimes. With the implementation of inflation targeting the transmission mechanism also evolved in which exchange rate should have a much smaller role than it had before. Moreover, the conditions necessary for successful inflation targeting are the conditions under which the monetary transmission mechanism can function smoothly, particularly the interest rate channel. Therefore, we need to consider the structural characteristics of the financial sector as the links between monetary policy and real economy. What is characteristic for all EU countries, including the new member states, is that the financial system is primarily based on the banking sector which represents the main channel for the monetary authorities' decisions.

The banking sector, as in the case of other transition countries during the analysed period, is characterized by excess liquidity. As a result, the sector is more resilient to sudden shocks of liquidity shortage as was the case during the global financial crisis, but at the same time it jeopardizes the efficiency of the monetary policy transmission mechanism. Another factor that makes the banking sector more independent of changes in monetary policy is that the banks are majority foreign-owned. Although the concentration of the banking sector is not high, competitiveness is limited by the existence of banks owned by foreign investors. Namely, the share of deposits in the total assets of foreign banks is lower compared to domestic banks, while there is a higher share of credits from abroad. These banks have easier

access to international money markets due to their better ratings than domestic banks. Their sources of funding are beyond the scope of domestic central bank and are primarily conditioned by developments in short-term interest rates on the Euro and the Swiss franc. Greater participation of foreign-owned banks reduces the importance of the interest rate and credit channels.

The strength of the transmission mechanism in the observed countries is limited by loans indexed in foreign currency. Namely, as these loans are tied to the movement of foreign currencies, mainly the Euro or the Swiss franc, the reference interest rate does not have a decisive impact on the interest rate formation. The main influence comes from the central bank's benchmark interest rate in respect of the foreign currency in which loans are indexed. Therefore, the efficiency of the interest rate channel reduces as the share of indexed loans in total granted commercial bank loans increases. Also, there is a growing credit risk in case of the local currency depreciation, since the incomes of bank clients usually are not linked to the movements of the currency in which they were indebted.

The empirical analysis in this paper is focused on examining the effectiveness of the interest rate and exchange rate channels in order to determine whether the benchmark interest rate or the exchange rate is the dominant instrument in the inflation targeting regime in these countries.

Empirical analysis of the transmission process in the Czech Republic, Poland and Hungary

Empirical analysis results

The empirical analysis of the transmission mechanism is focused on the interest rate and exchange rate channels. In addition to the analysis of the initial interest rate shocks, the model will also analyse the influence of the expansive monetary policy on real variables by including the monetary aggregate M2. Two VAR model specifications are implemented in order to better identify the model.

The *first model* will be using the endogenous and exogenous variables, presented by the following equation:

$$Y_t = A(L)Y_{t-1} + B(L)X_t + \mu_t$$

where Y_t is the vector of endogenous variables,

cena p_t , referentnu kamatnu stopu s_t , monetarni agregat $M2 m_t$ i nominalni efektivni devizni kurs $neer_t$. Redosled varijabli monetarnog agregata i deviznog kursa određen je pretpostavkom da je devizni kurs momententalno pod uticajem raznih šokova, dok je novčana masa isključivo pod uticajem monetarnih varijabli. Podupiruća pretpostavka je da u kratkom roku, šokovi na varijable monetarne politike nemaju istovremen uticaj na realni BDP i cene, usled spore reakcije realnog sektora na monetarne i šokove deviznog kursa.

$$Y_t = [y_t, p_t, s_t, m_t, neer_t]$$

Vektor egzogenih varijabli sadrži tromesečnu Euribor kamatnu stopu $euribor_t$ i svetsku cenu nafte $nafta_t$.

$$X_t = [euribor_t, nafta_t]$$

U posmatranim zemljama karakteristično je da se većina komercijalnih banaka finansira na međunarodnom tržištu kapitala, većim delom evropskom. Domaća depozitna baza ne obezbeđuje dovoljno izvora za rastuću tražnju za kreditima. Kamatna stopa na evro, kao jednoj od glavnih valuta finansiranja predstavlja faktor koji u znatnoj meri određuje nivo kamatne stope na kredite, a tako i na agregatnu tražnju u privredi. Zbog toga, u drugom modelu tromesečna Euribor kamatna stopa može biti posmatrana kao endogena varijabla te će u drugoj specifikaciji modela vektor endogenih varijabli biti:

$$Y_t = [y_t, p_t, s_t, euribor_t, m_t, neer_t]$$

dok će vektor egzogenih varijabli sadržati samo cenu nafte.

U analizi transmisijonog mehanizma za Republiku Češku, Poljsku i Mađarsku korišćeni su mesečni podaci za period od januara 2002. godine do decembra 2012. godine. Period je referentan za analizu efikasnosti transmisijonog mehanizma nakon uvođenja režima ciljanja inflacije. S obzirom da se BDP obračunava kvartalno, korišćen je Ekotrim (Ecotrim) program Kancelarije za statistiku Evropske komisije kako bi se kvartalni BDP dekomponovao na mesečne podatke. U tu svrhu korišćen je But, Fibes i Lisman-ov (BFL) metod vremenske dezagregacije.

Republika Češka

S obzirom da 3 od mogućih 5 kriterijuma ukazuje na broj docnji 4, koristiće se VAR reda docnji 4 za prvi model. Nijedan inverzni koren nije veći od jedinice, te model zadovoljava uslov stabilnosti sistema. Pored toga, model ne podleže problemu serijske korelacije reziduala. Rezultati Grejndžerove uzročnosti ukazuju da repo stopa ima statitički značajnu Grejndžerovu uzročnost na BDP, dok jedina varijabla koja ima značajan uticaj na inflaciju jeste devizni kurs. To ukazuje prvenstveno na značaj kanala deviznog kursa u transmisijonom mehanizmu.

Dalja analiza transmisijonog mehanizma nadomešćuje važan nedostatak Grejndžerove uzročnosti, a to je nedostatak informacija o predznaku veze između dve varijable. Slika 1. prikazuje odgovor na impulse BDP-a i inflacije na šokove monetarne politike, tj. promene referentne kamatne stope, deviznog kursa i monetarnog agregata.

Slika 1. Funkcija odgovora na impulse

Izvor: sopstvena kalkulacija autora

while X_t is the vector of exogenous variables. In the first model, the vector of endogenous variables contains real gross domestic product y_t , consumer price index p_t , key interest rate s_t , monetary aggregate M2 m_t and nominal effective exchange rate $neer_t$. The order of monetary aggregate and exchange rate variables is determined by the assumption that the exchange rate is promptly influenced by various shocks, whereas money supply is exclusively under the influence of monetary variables. The underlying assumption is that, in a short-term period, the shocks on the monetary policy variables do not have a simultaneous effect on the real GDP and CPI due to a slow reaction of the real sector on the monetary and exchange rate shocks.

$$Y_t=[y_t, p_t, s_t, m_t, neer_t]$$

The vector of exogenous variables contains the three-month Euribor interest rate $euribor_t$ and the world oil price $nafta_t$.

$$X_t=[euribor_t, nafta_t]$$

What is characteristic for the analysed countries is that most commercial banks are financed by foreign capital, mostly from the European capital market. The domestic deposit base does not provide enough resources for the increasing loan demand. Interest rates on the Euro, as one of the main financing currencies, have major impact on loan interest rates as well as on the aggregate demand in the economy. Therefore, in the *second model* specification, the three month Euribor interest rate can be considered as an endogenous variable. The vector of endogenous variables in the second model is, therefore, as follows:

$$Y_t=[y_t, p_t, s_t, euribor_t, m_t, neer_t]$$

while the vector of exogenous variables contains only the world oil price.

In the analysis of the transmission mechanism in the Czech Republic, Poland and Hungary, the monthly data from January 2002 to December 2012 are used. This is the reference period for analysing the efficiency of transmission channels during the inflation targeting regime. Since the GDP is calculated quarterly, ECOTRIM software of the Statistical Office of the European Commission is used to break down the quarterly GDP to monthly data. For that purpose, Boot, Feibes, and Lisman (BFL) method of time series disaggregation is used.

Czech Republic

Data series are obtained on the basis of statistical data of the Czech National Bank and the Czech Statistical Office.

Considering that three out of the five possible criteria indicate four lags, VAR of order 4 is used in the first model. The model satisfies the system's stability conditions since none of the inverse roots is higher than one. Apart from that, the model is not subject to the residual serial correlation problem. The results of the Granger causality test indicate that the key interest rate has a statistically substantial Granger causality on GDP, while the only variable substantially affecting inflation is the foreign exchange rate. This suggests primarily the importance of the exchange rate channel in the transmission mechanism.

Further analysis of the transmission mechanism compensates an important disadvantage of the Granger causality test i.e. the lack of information about the relationship sign between the two variables. Figure 1 below illustrates the response function of GDP and inflation impulses to the unexpected monetary policy shocks, i.e. the changes in interest rate, exchange rate and monetary aggregate.

U tumačenju funkcije odgovora na impulse neophodno je naglasiti da je u analizi korišćen indeks nominalnog efektivnog deviznog kursa koji pokazuje apresijaciju valute za indeks iznad 100 ili depresijaciju valute za indeks ispod 100 u nacionalnoj valuti u odnosu na korpu odabranih valuta za određeni period u odnosu na bazni period. Usled toga, šok monetarne politike predstavlja apresijaciju deviznog kursa u funkciji odgovora na impulse. Ovakva specifikacija modela ne ukazuje na statistički značajan uticaj referentne kamatne stope i deviznog kursa. Iako rezultati ukazuju na rast BDP-a i pada inflacije nakon rasta referentne kamatne stope, uticaj nije statistički značajan. Isto važi i za devizni kurs, gde apresijacija ne uzrokuje statistički značajnu promenu ni BDP-a ni inflacije. U ovoj postavci modela gde su sve endogene varijable vezane za kretanja na domaćem tržištu, jedino monetarni agregat ima statistički značajan uticaj na kretanje realnih varijabli. Šok monetarnog agregata M2 ima negativan uticaj na realni BDP, što je u suprotnosti sa ekonomskom teorijom, te se može zaključiti da je tokom posmatranog perioda veza između monetarnog agregata i BDP-a slaba. Nasuprot tome, reakcija inflacije na rast monetarnog agregata je veoma brza. Naime, inflacija ima najveću vrednost tri meseca nakon rasta monetarnog agregata, a uticaj slabi posle petog meseca.

Analiza dekompozicije varijanse u periodu od dve godine ukazuje da je fluktuacija BDP-a na monetarne šokove relativno slaba. Šok referentne kamatne stope utiče na oko samo 3% fluktuacije u BDP-u, monetarnog agregata oko 12% dok apresijacija deviznog kursa utiče na promenu BDP-a za oko 0,7%. Pored toga, uticaj monetarnih šokova na inflaciju pokazuje da nakon dvanaest meseci, promena referentne kamatne stope utiče na promenu inflacije za 2,3% promena monetarnog agregata rezultuje sa oko 12% promene stope inflacije, dok uticaj

deviznog kursa utiče na 2,2% promene inflacije.

Uzimajući u obzir drugi model sa endogeneom varijablom Euribor, na osnovu predloženih kriterijuma za izbor optimalnog broja doznji odabrana je nerestrikovana vektorska autoregresija sa dve doznje. Specifikacija modela ispunjava uslov stabilnosti sistema i nepostojanja serijske korelacije reziduala.

Rezultati Grejndžerove uzročnosti ukazuju da postoji veza između BDP-a i deviznog kursa, dok BDP nije uzrokovan ostalim endogenim varijablama. Inflacija je uzrokovana promenama u deviznom kursu i monetarnom agregatu, s tim što Grejndžerova uzročnost ne ukazuje na vezu između inflacije i Euribora kao endogene varijable.

Funkcija odgovora na impulse navodi na različite zaključke. Euribor kao endogena varijabla utiče na pad realnog BDP-a, ali pad nije statistički značajan. Sa druge strane, Euribor utiče na rast inflacije deset meseci nakon šoka dok efekat iščezava nakon četrnaest meseci. Ovo navodi na zaključak da je elastičnost tražnje za indeksiranim kreditima u ovom periodu mala, te da se kao što je to slučaj u Bart i Ramej (2000), troškovi finansiranja prelivaju na krajnje cene. Uključivanjem Euribora donekle se menja i ponašanje ostalih varijabli u modelu. Naime, u ovom slučaju se gubi efekat monetarnog agregata te ne postoji statistički značajan uticaj na BDP što bi bio slučaj u prvoj specifikaciji modela. Sa druge strane, uticaj šoka rasta novčane mase na inflaciju je momentalan, duži i znatno jači u odnosu na prvi model. Vek trajanja ovog efekta iznosi oko osam meseci. Takođe, odgovor inflacije na apresijaciju deviznog kursa je pozitivan. Pad inflacije se dešava u periodu između 2. i 4. meseca nakon čega se efekat gubi. Reakcija inflacije na repo stopu u ovoj specifikaciji modela je blizu statistički značajnog rezultata u periodu između šestog i desetog meseca.

When interpreting the impulse response function, it is necessary to emphasize that the analysis uses the nominal effective exchange rate index, which shows the appreciation of the currency for the index above 100 or depreciation of the currency for an index below 100 in the national currency against a basket of selected currencies for a given period in relation to the base period. Consequently, the monetary policy shock represents the appreciation of exchange rate as a function of the impulse response. The first model specification does not indicate a statistically significant impact of the key interest rate and exchange rate. Although the results suggest that there is GDP increase and inflation decrease after the interest rate shock, the influence is not statistically significant. The appreciation also does not have a significant effect on GDP and inflation. In this specification where all endogenous variables are related to the local market trends, only monetary aggregate has

a significant impact on the real variables. The shock of M2 monetary aggregate has a negative influence on the real GDP, which is contrary to the economic theory. Therefore, it can be concluded that there is a weak relationship between M2 and GDP in the observed period. On the contrary, the inflation reaction to M2 shock is almost immediate. Namely, inflation reaches its highest value three months after the monetary aggregate increases, while the effect weakens after the fifth month.

The decomposition variance analysis in the two-year period indicates that GDP fluctuations due to monetary shocks are relatively weak. The key interest rate shock accounts for only 3% of GDP variations; the monetary aggregate shock accounts for 12%, while the exchange rate shock accounts for 0.7% of GDP fluctuation. Moreover, the influence of monetary shocks on inflation shows that after twelve months, the change of the key interest rate causes inflation fluctuation by 2.3%, monetary aggregate accounts for 12%, while the exchange rate accounts for 2.2% of inflation fluctuations.

Considering the second model where Euribor interest rate is an endogenous variable, based on the proposed criteria for choosing the optimal number of lags, the unrestricted vector autoregression (VAR) with lag order 2 has been chosen. The model specification meets the system's stability condition and there is no evidence of the residual serial correlation problem.

The Granger causality test indicates the causality relationship between GDP and exchange rate while GDP is not conditioned by other endogenous variables. Inflation is caused by changes in the exchange rate and monetary aggregate, while the Granger causality does not indicate the relationship between inflation and the Euribor as an endogenous variable.

The impulse response function drives to different conclusions. Euribor as an endogenous variable causes a decrease in the real GDP, but the decrease is not statistically significant. On the other hand, Euribor influences the inflation increase ten months after the initial shock while

Slika 2. Funkcija odgovora na impulse

Izvor: sopstvena kalkulacija autora

Rezultati dekompozicije varijanse za drugu specifikaciju modela ukazuju na relativno mali uticaj endogenih varijabli na kretanje BDP-a. Inflacija je objašnjena promenom monetarnog agregata u periodu nakon dvanaest meseci za 14%, uticaj deviznog kursa 4, 7% dok uticaj tromesečnog Euribora iznosi oko 10, 3%. Inflacija je objašnjena promenom referentne kamatne stope u dvanaestom mesecu za 1,3%.

Poljska

U slučaju Poljske, nerestrikovani VAR Model 1. je određen sa tri docnje. Iako kriterijumi za odabir optimalnog broja docnji ukazuju na VAR sa dve docnje, ovakva specifikacija modela ne zadovoljava uslov stabilnosti sistema. Sa VAR modelom od tri docnje zadovoljen je uslov stabilnosti sistema i model ne podleže problemu serijske korelacije reziduala.

Na osnovu rezultata Grejndžerove uzročnosti zaključuje se da je realni BDP uzrokovan kratkoročnim kamatnim stopama i deviznim kursom, dok je inflacija uzrokovana jedino deviznim kursom.

Slika 3. Funkcija odgovora na impulse

Izvor: sopstvena kalkulacija autora

the effect disappears after fourteen months. This drives to the conclusion that indexed loans demand elasticity is quite low in this period and that the financing costs are included in the prices of final products (Barth and Ramey, 2000). Inclusion of the Euribor interest rate somewhat changes the behaviour of other variables in the model.

Specifically, in this case the effect of monetary aggregate diminishes and there is no statistically significant impact on GDP which would be the case in the first model specification. On the other hand, the impact of the monetary aggregate shock on inflation is immediate, longer and much stronger than in the first model. The duration of this effect is about eight months. Also, the response of inflation to the appreciation of exchange rate is positive. Inflation decrease is statistically significant in the period between the 2nd and 4th month, after which the effect disappears. Reaction of inflation to the interest rate shock in this model specification is close to a statistically significant result in the period between the 6th and 10th month.

Decomposition variance results for the second model specification indicate a relatively slight influence of endogenous variables on GDP fluctuations. The change of the monetary aggregate M2 by 14% accounts for the inflation movements in the period of 12 months, the exchange rate accounts for 4.7%, while the three month Euribor interest rate accounts for about 10% of inflation variations. The change of the key interest rates by 1.3% accounts for inflation movements in the twelfth month.

Poland

Data series are obtained on the basis of statistical data of the National Bank of Poland and the Central Statistical Office of Poland.

In case of Poland, the first specification of unrestricted VAR model is chosen with lag order 3. Although the criteria of optimal lags order suggest two lags, such specification does not satisfy the system’s stability condition. Therefore, VAR of order 3 satisfies the stability condition and residuals have no sign of serial correlation. Granger causality results indicate

the causality relationship between real GDP, key interest rate and exchange rate. Inflation is Granger caused only by the exchange rate.

Rezultati funkcije odgovora na impulse, kao i u slučaju Češke, ukazuju da uticaj referentne kamatne stope na BDP i inflaciju nije statistički značajan. BDP reaguje na promenu monetarnog agregata kao i apresijaciju deviznog kursa. Šok monetarnog agregata utiče na rast BDP-a u periodu nakon godinu dana i efekat traje do kraja druge godine, dok apresijacija deviznog kursa utiče na rast BDP-a sa efektom od četiri do deset meseci nakon nastalog šoka. Inflacija u Poljskoj u prvoj specifikaciji modela reaguje na apresijaciju deviznog kursa relativno brzo, i to nakon tri meseca nakon šoka. Statistički značajan efekat traje do kraja 10. meseca. Takođe, uticaj rasta monetarnog agregata na rast inflacije je momentalan sa efektom od deset meseci.

Rezultati dekompozicije varijanse pokazuju da referentna kamatna stopa ima najsnažniji uticaj na BDP dvadeset i četiri meseca nakon šoka sa efektom od 12%. Isto važi i za uticaj monetarnog agregata gde uticaj u 24. mesecu iznosi 12,5%. Devizni kurs ima najsnažnije dejstvo na BDP u 12. mesecu sa iznosom od 33,6% i nakon ovog perioda efekat postepeno slabi. Uticaj referentne kamatne stope nema značajan uticaj na inflaciju. Promena deviznog kursa u vremenskom periodu 12 od meseci nakon opisuju oko 40% fluktuacije cena. Približno visoke vrednosti ostaju do kraja druge godine. Promene monetarnog agregata ima najizrazitije dejstvo na inflaciju u 24. mesecu sa iznosom od 19,5%, mada je sličan uticaj i 12. meseci nakon promene sa iznosom od 18,4% što ukazuje na postojanost šoka. Visoka vrednost uticaja deviznog kursa na inflaciju može se objasniti i visokom volatilnošću deviznog kursa tokom posmatranog perioda, a naročito je to bilo izraženo u periodu 2007-2010. godine. Nizak uticaj referentne kamatne stope uzrokovan je prvenstveno malim promenama referentne kamatne stope tokom posmatranog perioda te su šokovi deviznog kursa znatno umanjili reakciju inflacije na kamatnu stopu. Usled toga je i uticaj monetarnog agregata značajniji jer period obuhvata i period finansijske krize kada su centralne banke obezbeđivale likvidnost putem instrumenata monetarne politike.

U drugoj specifikaciji modela za Poljsku izabran je VAR sa brojem docnji 2. Ovakva specifikacija predstavlja stabilan sistem bez problema serijske korelacije rezidula.

Test Grejndžerove uzročnosti ukazuje na uzročno-posledičnu vezu između BDP-a i deviznog kursa. Sa druge strane, inflacija je uzrokovana deviznim kursom i Euribor kamatnom stopom.

Analiza funkcije odgovora na impulse ne ukazuje na značajne razlike u odnosu na prvu specifikaciju modela. Uticaj Euribora kao endogene varijable nema statistički značajan efekat ni na BDP ni na inflaciju. Apresijacija deviznog kursa utiče na rast BDP-a četiri meseca nakon inicijalnog šoka i efekat iščezava nakon osmog meseca. Reakcija inflacije na promenu monetarnog agregata i deviznog kursa je momentalna. Efekat monetarnog agregata traje oko dvanaest meseci sa vrhom oko desetog meseca, dok efekat deviznog kursa traje oko deset meseci sa vrhom oko osmog meseca. Pokazatelji su prikazani na sledećoj slici.

Slika 4. Funkcija odgovora na impulse

Izvor: sopstvena kalkulacija autora

Rezultati dekompozicije varijanse ukazuju da deset meseci nakon promene, devizni kurs opisuje fluktuacije BDP-a sa 12,3%. Nakon toga efekat se značajno smanjuje, te na kraju druge godine promena deviznog kursa opisuje 7,3% promene BDP-a. Nasuprot tome, efekat ostalih

The impulse response function, as in case of the Czech Republic, indicates that the influence of the key interest rate on GDP and inflation is not statistically significant. Real GDP reacts to the changes in the monetary aggregate and the exchange rate appreciation. The rise of M2 triggers an increase of GDP after the 12th month, its effects lasting till the end of the second year. GDP response to the exchange rate appreciation is statistically significant in the period from the 4th to 10th month after the incurred shock. Inflation in Poland, according to the first model specification, reacts to the exchange rate appreciation relatively fast, just after the 3rd month of the initial shock. The statistically significant effect lasts until the end of the 10th month. Moreover, the response of inflation to the monetary aggregate shock is immediate, its effect lasting ten months.

Variance decomposition results show that the key interest rate has the most powerful

effect on GDP fluctuation throughout the two-year period with an effect of 12%. The same applies to the impact of the monetary aggregate, with the impact in the 24th month amounting to 12.5%. The strongest effect of the exchange rate on GDP, amounting to 33.6 %, is in the 12th month and after this period the effect gradually weakens. The impact of the key interest rate has no significant impact on inflation. Changes in the exchange rate during the period of 12 months account for about 40% of price fluctuations. The values remain approximately high until the end of the second year. The monetary aggregate shock has the most expressive effect on inflation in the 24th month in the amount of 19.5%, although a similar effect exists 12 months after the shock in the amount of 18.4%, which indicates the persistence of the shock. The high impact of the exchange rate on inflation can be explained by the high volatility of the exchange rate during the observed period, which was particularly prominent in the period 2007-2010. The low impact of the key interest rate is primarily caused by small changes in the key interest rate

during the observed period hence the exchange rate shocks significantly reduced the response of inflation to the interest rate. As a result, the effect of the monetary aggregate is more significant because the period includes the financial crisis when central banks provided liquidity through monetary policy instruments.

In the second specification model, VAR with lag order 2 is chosen for Poland. The model satisfies the system's stability condition and there is no serial correlation problem with the residuals. The Granger causality test indicates the causality between GDP and the exchange rate. On the other hand, inflation is caused by the exchange rate and Euribor interest rate.

Analysis of the impulse response function does not indicate significant differences compared to the first model specification. The impact of Euribor as an endogenous variable does not have a statistically significant effect on GDP or on inflation. The exchange rate

varijabli raste tokom vremena. Do kraja druge godine promena referentne kamatne stope objašnjava 5,1% promene BDP-a, promena tromesečnog Euribora može da objasni 4,5% promene BDP-a, dok M2 ima nešto značajniji uticaj sa oko 5,9% uzrokovane promene. Kao i u prvoj specifikaciji modela, uticaj deviznog kursa na inflaciju je dominantan. Najjači efekat je u 12. mesecu kada promene deviznog kursa objašnjava čak 38,9% promene inflacije, kada ovaj efekat postepeno iščezava. Efekat monetarnog agregata je najintezivniji u 17. mesecu i objašnjava 17,2% fluktuacije inflacije. Promene domaćih i stranih kamatnih stopa nemaju značajniji efekat na cene. Promena referentne kamatne stope objašnjava svega 2% promene inflacije u vremenskom horizontu od dve godine, dok Euribor objašnjava 4,1% promene inflacije u istom vremenskom horizontu.

Mađarska

Specifikacija VAR Modela 1. za Mađarsku određena je sa jednom docnjom. Iako kriterijumi FPI i AIC ukazuju na odabir dve docnje, odabrana je jedna docnja u skladu sa SC i HQ testovima jer pri ovoj specifikaciji postoji i određena kauzalnost između varijabli na osnovu Grejndžerovog testa. Rezultati testa Grejndžerove uzročnosti ukazuju na uzročno-posledičnu vezu između inflacije, repo stope i deviznog kursa.

Rezultati funkcije odgovora na impulse ukazuju na statistički značajan uticaj deviznog kursa na kretanje BDP-a. Apresijacija domaće valute utiče na pad BDP-a u periodu nakon šest meseci. Efekat traje do dvadeset meseci od inicijalnog šoka nakon čega gubi značaj. Šok referentne kamatne stope je momentalan i prvobitno utiče na povećanje inflacije. Ovaj efekat je vrlo kratkotrajan i gubi se nakon 4. meseca nakon čega se dešava pad inflacije, iako ovaj pad nije statistički značajan. Nasuprot tome, uticaj deviznog kursa ima duže statistički značajno dejstvo. Apresijacija deviznog kursa utiče na momentalni pad inflacije i dužina efekta iznosi oko šesnaest meseci. Uticaj monetarnog

agregata ne pokazuje statistički značajan uticaj, ni na BDP, ni na inflaciju.

Slika 5. Funkcija odgovora na impulse

Analizom dekompozicije varijanse dolazi se do sledećih zaključaka. Najizrazitije promene BDP-a uzrokovane referentnom kamatnom stopom su oko dvanaestog meseca sa vrednošću od 4,74%. Uticaj deviznog kursa je veoma izražajan i ima rastući trend, te u vremenskom horizontu od dve godine promena nominalnog efektivnog deviznog kursa utiče na promenu BDP-a sa 26,25%. Uticaj monetarnog agregata je izrazito slab. Uticaj referentne kamatne stope na inflaciju ima najznačajniju vrednost deset meseci nakon šoka, kada promene kamatne stope izazivaju promenu inflacije za 4,85%. Posle toga uticaj postepeno slabi. U periodu od dvadeset i dva meseca devizni kurs uzrokuje fluktuacije inflacije za 32,9%, nakon čega efekat slabi. Monetarni agregat u vremenskom horizontu od dve godinu uzrokuje promenu inflacije za 9,37%.

Specifikacija Modela 2. sa endogenom

appreciation causes a growth of GDP 4 months after the initial shock, its effect disappearing after the 8th month. The response of inflation to the exchange rate and monetary aggregate shock is immediate. The effect of monetary aggregate lasts about twelve months with a peak around the tenth month, while the effect of the exchange rate lasts about ten months with a peak around the eighth month. The relevant indicators are shown on the figure below.

Variance decomposition results indicate that exchange rate innovation accounts for 12.3% GDP fluctuation in the 10th month. After that, the effect reduces significantly and at the end of the second year the exchange rate changes account for 7.3% of the GDP fluctuation. As opposed to that, the effect of other endogenous variables increases over time. By the end of the second year, the change in the key interest rate accounts for 5.1% of GDP variation, while the three month Euribor accounts for 4.5% and M2 for 5.9%, exerting a somewhat more powerful impact. As well as in the first model specification, the impact of

the exchange rate on inflation is dominant. The strongest effect is in the 12th month, when the exchange rate change accounts for as much as 38.9% of the inflation variation, after which this effect gradually disappears. The effect of the monetary aggregate has the greatest explanatory value of inflation fluctuation in the 17th month, accounting for 17.2%. The changes in domestic and foreign interest rates have no significant effect on prices. The key interest rate variation explains only 2% of inflation changes, while Euribor explains 4.1% of inflation changes within the two-year time horizon.

Hungary

The first VAR specification for Hungary is determined by one lag. Although FPI and AIC criteria suggest choosing two lags, the specification of one lag is chosen according to the SC and HQ tests since specification with one lag indicates the causality relationship among the variables based on the Granger test. The Granger causality test shows that there is causality relationship between inflation, key interest rate and exchange rate.

The impulse response function indicates the statistically significant impact of the exchange rate on GDP.

The exchange rate appreciation reduces GDP after six months. The effect lasts until the 20th month, after which it loses significance. The interest rate shock immediately influences the inflation movements, initially causing inflation to grow. This effect is very brief and lasts for only four months, after which inflation drops, although this drop is not statistically significant. As opposed to that, the exchange rate appreciation has a longer effect with duration of around sixteen months. The shock of the monetary aggregate does not exhibit a statistically significant impact either on inflation or on GDP.

Euribor varijablom određena je brojem docnji jedan na bazi istih kriterijuma kao i u slučaju Modela 1. Dijagnostički testovi pokazuju da Model 2. ispunjava uslov stabilnosti sistema. Reziduali ne podležu problemu serijske korelacije.

Uključivanjem endogene varijable, rezultati Grejndžerove uzročnosti ne odstupaju od Modela 1. Ovde je relevantna veza između Euribor kamatne stope i BDP-a. Kao u slučaju Modela 1, inflacija je uzrokovana referentnom kamatnom stopom i deviznim kursom.

Rezultati funkcije odgovora na impulse takođe ne pokazuju značajnija odstupanja u odnosu na Model 1. Euribor utiče na rast BDP-a od trenutka nastalog šoka do šestog meseca. Ovakvo kretanje nije u skladu sa klasičnom ekonomskom intuicijom, te se ovo može objasniti kao deo ciklusa kada dolazi do pregrevanja privrede. Apresijacija deviznog kursa utiče na smanjenje BDP-a u periodu između šestog i osamnaestog meseca nakon čega efekat iščezava. Kao i u Modelu 1., monetarni šok kao rast referentne kamatne stope inicijalno utiče na rast inflacije, ali je efekat veoma kratak i iznosi oko pet meseci posle čega inflacija postepeno pada. Reakcija inflacije na apresijaciju je momentalna, kada se dešava pad inflacije najniža vrednost se dostiže oko osmog meseca. Uticaj monetarnog agregata i Euribor kamatne stope ne pokazuje statistički značajan uticaj na inflaciju. Ovako dugačak uticaj deviznog kursa može da se objasni i relativno visokim učešćem indeksiranih kredita u Mađarskoj.

Slika 6. Funkcija odgovora na impulse

Izvor: sopstvena kalkulacija autora

Dekompozicijom varijanse dolazi se do zaključka da referentna kamatna stopa ima najjači uticaj na BDP dvanaest meseci sa efektom od 5,13% nakon čega uticaj postepeno slabi. Promena deviznog kursa izaziva fluktuaciju BDP-a u vremenskom periodu od dvanaest meseci za 13%, međutim efekat značajno raste u drugoj godini i čini 24% fluktuacije BDP-a. Učešće monetarnog agregata i Euribor kamatne stope je izrazito mali. Najveći deo predviđajuće komponente inflacije u Mađarskoj objašnjen je deviznim kursom gde efekat raste do dvadeset i drugog meseca, a zatim gubi na značaju. U periodu od dvanaest meseci promena deviznog kursa objašnjava 25,5% promene inflacije sa rastućom vrednošću do dvadeset i drugog meseca kada efekat iznosi 30,65%. Referentna

The analysis of variance decomposition leads to the following conclusions. The most prominent changes of GDP caused by the key interest rate are recorded around the 12th month with a value of 4.74%. The exchange rate impact is rather prominent and has a growing trend, hence in the two-year time horizon the change in the nominal effective exchange rate affects the GDP fluctuations in the amount of 26.25%. The effect of the monetary aggregate is extremely weak. The effect of the key interest rate on inflation is most powerful ten months after the shock, when the interest rate changes cause the inflation to change by 4.85%. After that, the effect is gradually lost. In the period of twenty two months the exchange rate causes

the inflation to fluctuate by 32.9%, after which the effect weakens. The monetary aggregate causes the change in inflation by 9.37% in the two-year period.

The second model specification with Euribor as the endogenous variable is chosen with one lag based on the same criteria as in the case of the first model. Diagnostic tests show that the model satisfies the system's stability condition. Residuals are not subject to the problem of serial correlation.

After including the endogenous variable, Granger causality results do not deviate much from the first model specification. There is a casual relationship between Euribor and GDP. Also, as in the first model, inflation is Granger caused by the interest rate and the exchange rate.

The impulse response function does not record any substantial deviation from the results of the first model specification. The Euribor shock causes the immediate increase of GDP which lasts until the sixth month. Such a trend is not in line with the classic economic intuition, but can be explained as part of the economic cycle in which the economy is overheating. The exchange rate appreciation decreases GDP from the 6th to 18th month, after which the effect disappears. As in the first model, the monetary shock as a sudden increase of the key interest rate initially affects the growth of inflation but the effect is very brief and lasts for about five months after which inflation gradually diminishes. The exchange rate appreciation causes immediate inflation decrease with the lowest value reached around the 8th month. Euribor and monetary aggregate have no statistically significant impact on inflation. Such a long-lasting influence of the exchange rate can be explained by a relatively high share of indexed loans in Hungary.

kamatna stopa u periodu od godinu dana objašnjava 4,5% promene inflacije nakon čega uticaj gubi značaj. Promena monetarnog agregata u vremenskom horizontu od dve godine doprinosi varijaciji inflacije za 11,4%. Pri datoj specifikaciji modela može se zaključiti da se inflatorna očekivanja u Mađarskoj u najvećoj meri mogu kontrolisati kroz devizni kurs.

Zaključak

Monetarnu politiku novih zemalja članica EU odlikuje sličan način razvitka kao i relativno slične karakteristike uslova pod kojima monetarna politika funkcioniše. Za sve zemlje je karakterističan snažan uticaj deviznog kursa u formiranju inflatornih očekivanja, čak i nakon odbacivanja režima fiksnog pariteta deviznog kursa. Same strukturne karakteristike privrede i finansijskog sektora ukazuju da je uticaj kamatnog kanala u priličnoj meri ograničen zbog postojanja banaka u stranom vlasništvu i zbog eurizovanog bilansa stanja bankarskog sektora. Empirijska analiza fokusirana je na analizu uticaja referentne kamatne stope, monetarnog agregata i deviznog kursa na realne varijable, i to inflaciju i BDP. Kanal kamatne stope ispitan je kroz uticaj referentne kamatne stope na privrednu aktivnost i inflaciju. Kanal deviznog kursa analiziran je kroz ocenu uticaja nominalnog efektivnog deviznog kursa na BDP i inflaciju, dok je efekat novca u opticaju analiziran kroz uticaj novčanog agregata M2 na BDP i inflaciju. Empirijska analiza testirana je kroz dve specifikacije VAR modela. U jednom modelu tromesečna Euribor kamatna stopa je imala egzogeni karakter, dok je u drugom modelu uključena kao endogena varijabla.

Empirijskom analizom dolazi se do zaključka da ni u jednoj od zemalja referentna kamatna stopa nema značajniji uticaj ni na inflaciju ni BDP, jedino u slučaju Modela 2. za Poljsku gde BDP pokazuje kratak pad nakon šoka kamatne stope. Inflacija u Češkoj, iako u skladu sa analizom funkcije odgovora na impulse nije statistički značajna, pokazuje najsnažniju reakciju na šok kamatne stope u odnosu na ostale zemlje. Inflacija se sagledava iz ugla dekompozicije varijanse.

Za sve zemlje devizni kurs pokazuje jak uticaj na realne varijable, a to se naročito odnosi

na inflaciju. Češka privreda, a Češka je zemlja sa najnižom stopom eurizacije, pokazuje i najslabije reagovanje na iznenadnu promenu deviznog kursa. Realne varijable u Mađarskoj pokazuju najizrazitije reagovanje na promenu deviznog kursa, s obzirom da je većim delom posmatranog perioda ova zemlja sprovodila režim fiksnog pariteta deviznog kursa. Uticaj deviznog kursa na inflaciju u Mađarskoj je momentalan, dok za Poljsku deluje sa određenom docnjom i ima kraći vek trajanja, ali i izrazitije dejstvo. Ovo se može objasniti nešto većom volatilnošću deviznog kursa u Poljskoj tokom perioda finansijske krize, nego što je to slučaj u Mađarskoj. U Češkoj je prisutan uticaj deviznog kursa u Modelu 2, iako je znatno slabiji i kraći u odnosu na ostale dve zemlje.

Uticaj monetarnog agregata na inflaciju za sve zemlje osim Mađarske je značajan, što ukazuje da je količina novca u opticaju važna determinanta inflacije. Iako referentna kamatna stopa nema toliki značaj, ovi podaci ukazuju da je „novčano gledište“ transmisionog mehanizma za Češku i Poljsku opravdano te da rast novčane mase vodi rastu inflacije. I pored relativne neefikasnosti kanala kamatne stope kroz transmisiju referentne kamatne stope na konačne varijable, postoji naznaka postojanja kamatnog kanala u drugoj fazi transmisije kamatnih stopa banaka na realne varijable.

U skladu sa dobijenim rezultatima može se zaključiti da Republika Češka ima najbolje predispozicije za uspešnu primenu ciljanja inflacije sa režimom fluktuirajućeg deviznog kursa. Poljska ima nešto snažniji uticaj deviznog kursa, mada je i uticaj monetarnog agregata takođe značajan, te postoje indicije da se kontrolisanjem ponude novca putem kamatnih stopa može uticati na kretanje inflacije i BDP-a. Sa druge strane, Mađarska pokazuje izrazito jako dejstvo deviznog kursa na inflaciju, dok ostale endogene varijable ne pokazuju statistički značajan uticaj. Ovo navodi na zaključak da je devizni kurs dominantan instrument monetarne politike u Mađarskoj, što se kosi sa principima režima ciljanja inflacije.

Uvođenjem tromesečne Euribor kamatne stope ne utiče se bitno na odstupanje od rezultata u odnosu na Model 1. Euribor ima statistički značajan uticaj na rast inflacije u Češkoj i na rast BDP-a u Mađarskoj. Rezultati ipak nisu

Figure 6 Impulse response function

Source: Author's own calculation

Variance decomposition results lead to the conclusion that the key interest rate exerts its strongest impact on GDP during a twelve-month period, in the amount of 5.13% after which the effect gradually diminishes. Exchange rate fluctuations cause GDP fluctuations by 13% in the period of twelve months but the effect significantly increases in the second year and accounts for 24% of GDP fluctuation. The share of the monetary aggregate and the Euribor interest rate is very small. The largest portion of the predictable component of inflation fluctuation in Hungary is explained by the exchange rate whose peak is reached in the 22nd month after which it starts diminishing. In the twelve-month period the changes in the exchange rate account for 25.5% of the inflation change with the values rising up until the 22nd month to reach 30.65%. The key interest rate changes account for inflation fluctuations by 4.5% in the period of twelve months, after which the impact becomes insignificant. Changes in the monetary aggregate in the two-year period contribute to the variation of inflation by 11.4%. According to the second VAR model specification for Hungary, inflation expectations are largely to be controlled through the exchange rate movements.

Conclusion

Monetary policy of the new EU members states is characterised by similar development as well as by relatively similar characteristics of the environment in which monetary policy operates. In all these countries there is a distinctive role of the exchange rate in creating inflation expectations, even after abandoning the fixed exchange rate parity regime. The structural characteristics of the real economy and the financial system indicate quite a limited role of the key interest rate due to the high share of banks with foreign ownership and euroised balance sheet of the banking sector. The empirical analysis is focused on analysing the impact of the key interest rate, monetary aggregate and exchange rate on the real variables, GDP and inflation movements. The interest rate channel is examined through the impact of the key interest rate on economic activity and inflation. The exchange rate channel is analysed through the impact of the nominal effective exchange rate on GDP and inflation, while the effect of money in circulation is analysed through the influence of monetary aggregate M2 on GDP and inflation. Empirical analysis was tested by means of two specifications of the VAR model. Euribor was used as an exogenous variable in the first model and as an endogenous variable in the second model.

The empirical analysis leads to the conclusion that the key interest rate does not have a significant impact on inflation or on GDP in any of the countries, except in the case of Model 2 for Poland GDP shows a brief decline after the interest rate shock. Inflation in the Czech Republic, although statistically insignificant according to the analysis of the impulse response function, demonstrate the most powerful reaction to the interest rate shock compared to other countries. Inflation is thereby viewed from the perspective of variance decomposition.

On the other hand, in all countries there is a strong influence of the exchange rate on real variables, especially inflation. Due to its

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u skladu sa ekonomskom intuicijom koja ukazuje da rast kamatne stope uzrokuje pad inflacije i BDP-a. U slučaju Češke efekat se može objasniti prelivanjem troškova finansiranja na krajnje cene. Rast BDP-a u Mađarskoj može biti uzrokovan pregrevanjem ekonomske aktivnosti kada usled visokog rasta u ovom periodu ne postoji elastičnost tražnje za sredstvima, u odnosu na troškove finansiranja.

lowest level of euroisation, the Czech Republic has shown the weakest reaction to the sudden changes in the exchange rate. However, real variables in Hungary strongly react to the exchange rate shocks considering that for most of the observed period this country implemented the fixed exchange rate parity regime. The effect of the exchange rate on inflation in Hungary is immediate, while in Poland it works with a certain delay and has a shorter life span but a more pronounced effect. This can be explained by higher volatility of exchange rate in Poland during the financial crisis than it was the case in Hungary. In the Czech Republic there is a present influence of the exchange rate in the second model specification, though weaker and shorter than in the other two countries.

Influence of the monetary aggregate M2 is statistically significant for all countries except Hungary, which suggests that the amount of money in circulation is an important determinant of inflation. Although the key interest rate has no significant role, we can conclude that the “money view” of the transmission mechanism in the Czech Republic and Poland can be proved, with the rise of M2 leading to inflation growth. Despite the relative inefficiency of the interest rate channel in terms of the key interest rate effect on end variables, there are some indications of the interest rate channel in the second stage of transmission of the banks’ interest rates on the real variables.

On the basis of the obtained results it can be concluded that the Czech Republic has the

most favourable environment for a successful implementation of inflation targeting with the fluctuating exchange rate regime. Poland has a somewhat stronger impact of the exchange rate although the impact of the monetary aggregate is also significant and there are indications that inflation and GDP movements can be influenced by controlling the money supply through interest rates. On the other hand, Hungary exhibits a distinctive influence of the exchange rate on inflation, while the impact of other endogenous variables is not statistically significant. This leads to the conclusion that exchange rate is a dominant instrument of monetary policy in Hungary, which is not in line with inflation targeting recommendations.

Inclusion of the three-month Euribor interest rate does not cause important deviations from the first model specification results. Euribor has a statistically significant influence on inflation growth in the Czech Republic and on GDP increase in Hungary. The results are not in accordance with economic intuition indicating that the interest rate growth causes a drop of inflation and GDP. In the case of the Czech Republic the effect can be explained by the existence of the “interest rate puzzle”, when the costs of finance spill over to the end prices. The increase of GDP in Hungary may be caused by the economy’s overheating, when, due to the prominent growth in this period, there is not elasticity of demand for funds in relation to the costs of finance.