Real Exchange Rates, Current Accounts and Competitiveness Issues in the Euro Area

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Abstract

The lack of nominal exchange rate flexibility in the monetary union induced the growing divergence of trade performance among the member countries. Intra-Eurozone current account imbalances among countries with different income levels per capita fuel discussions on competitiveness channels under common currency. Asynchronous current account trends between North and South of the Euro Area were accompanied by significant appreciations of real exchange rate in the periphery economies originating in the strong shifts in consumer prices and unit labor costs in these countries relative to the countries of the Euro Area core. The issue is whether the real exchange rate is a significant driver of persisting current account imbalances in the Euro Area considering than, according to some authors, differences in domestic demand are more important than is often realized. In the paper we analyze main aspects of current account adjustments in the Euro Area member countries. From estimated VAR model we calculate impulse-response function of the current account to the real exchange rate (REER calculated on CPI and ULC base) and domestic demand shocks and variance decomposition to examine the relative importance of both shocks. Our results indicate that while the prices and costs related determinants of external competitiveness affected imports more significantly than exports, demand drivers shaped current account balances mainly during the crisis period.

Keywords: current account, real exchange rate, economic crisis, vector autoregression, impulse-response function, variance decomposition

JEL Classification: C32, F32, F41

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1. Introduction

Euro Area member countries are still suffering from negative effects of the crisis period. Increasing economic imbalances have become obvious in the Euro Area since the start of the monetary union. Differentials in productivity, inflation and unit labor costs were indeed very persistent (Comunale and Hessel, 2014). Economic and debt crisis highlighted their existence and impropriate economic policy mix has even intensified their negative implications. Economic imbalances are obvious not only among different countries (e.g. rising disparities between core and periphery) but also within particular member countries of the Euro Area (Gruber and Kamin, 2005). In addition, we can observe clear contagion effect among the European Union member countries. Disturbances and distortions are fairly transmitted on both intra-country and cross-country levels (Berger and Nitsch, 2010).

Exposure of countries to negative implications of exchange rate volatility (Stavárek, 2011) represents one of areas of empirical investigations related to the fixed versus flexible exchange rate dilemma (Calvo and Reinhart, 2002). Analysis of various aspects of exchange rate shift and its influence on macroeconomic performance provides information on cross-country expenditure shifting/switching effects. The lack of nominal exchange rate flexibility in the monetary union induces the growing divergence of trade performance among the member countries with different income levels per capita (Chen, Milesi-Ferretti and Tressel, 2012). Fixed nominal exchange rate triggers real exchange rate adjustments through relative price and unit labor costs levels alone, which can be difficult in the presence of rigidities in national goods and services markets (Berger and Nitsch, 2010).

Investigation of relative changes in real exchange rates and associated adjustments in current accounts reveals causal relationship between real exchange rate and international competitiveness (Rusek, 2013). Shifts in competitiveness associated with real exchange rate movements correspond to changes in relative prices and unit labor costs. Real exchange rate appreciation makes domestic goods less competitive because their prices increase more than foreign prices. As a result, real exchange rate appreciation and subsequent decrease in foreign competitiveness of domestic goods on foreign as well as domestic markets shifts expenditures from domestic goods to goods produced abroad (Mirdala, 2013a). Negative effect of the real exchange rate appreciation on the current account is significantly determined not only by a shift in demand preferences but also by the ability of domestic economy to shift unused production capacities to more perspective areas with high growth perspectives (Chinn, 2005).

The establishment of the Euro Area and introduction of the euro represent a crucial milestone in the ongoing discussions highlighting positive and negative implications of the nominal exchange rate inflexibility (Bayoumi, Harmsen and Turunen, 2011). Although the contemporary evidence on empirical validity of causal relationship between the real exchange rate and the current account seems to be limited (Arghyrou and Chortareas, 2008), we emphasize challenges addressed to the phenomenon of internal devaluation (Armingeon and Baccaro, 2012) and wide range of its direct and indirect effects in the Euro Area member countries.

While internal devaluation in countries with nominal exchange rate anchor may improve price competitiveness and boost both internal and external demand, risk of deflationary pressures substantially reduce vital growth incentives (Hetzel, 2015). Moreover, ECB (European Central Bank) by inflating its monetary base fueled by another wave of quantitative easing does not primarily follow idea of economic recovery (Christensen and Gillan, 2015). Low interest rate environment may be followed by euro depreciation improving competitiveness of European producers on the foreign markets. However, as the most of transactions on the EU single market are conducted in euro among its member countries, Euro Area seeks common reasonable automatic mechanisms that would help to improve its internal competitiveness (Peersman, 2011).

Economic crisis intensified demand driven redistributive effects that induced diverse and spurious effects on current account adjustments. While current accounts temporary deteriorated (with quite different intensity in each particular economy) at the beginning of the crisis period (Kang and Shambaugh, 2013), at the later stages we have observed a positive trend (either improvement or stable outlook) in almost all Euro area member countries reflecting intensified redistributive effects of the crisis on the cross-country expenditure shifting (Gaulier and Vicard, 2012). However, existing nexus between surpluses in the core with deficits in the periphery addresses issues in both trade and financial linkages (Hobza and Zeugner, 2014). While current accounts between North and South of the Euro Area do not necessarily have to be balanced, existence of large and persisting bilateral current account imbalances may induce policy tensions or rigidities (Berger and Nitsch, 2012). Euro area is in a vicious circle and economic policy of European Union faces a real challenge.

Intra-Eurozone current account imbalances among countries with different income levels per capita fuel discussions on competitiveness channels under common currency (Belke and Dreger, 2011). Disinflation followed by deflationary pressures induced shifts in

competitiveness associated with real exchange rate adjustments through relative price levels. While external imbalances in countries on the periphery of the Euro Area were mainly driven by domestic demand boom fueled by increasing financial integration (Chen, Milesi-Ferretti and Tressel, 2012), the role of changes in the competitiveness of the Euro Area core countries may be disputable. As a result, limited effectiveness of internal devaluation in reducing current account imbalances in the Euro Area could be expected (Sanchez and Varoudakis, 2013). However, asynchronous current account trends between North and South of the Euro Area were accompanied by significant appreciations of real exchange rate in the periphery economies originating in the strong shifts in consumer prices and unit labor costs in these countries relative to the countries of the Euro Area core (Holinski, Kool and Muysken, 2012). As a result, the issue is whether the real exchange rate is a significant driver of persisting current account imbalances in the Euro Area (Lane and Milesi-Ferretti, 2002).

In the paper we examine competitiveness issues associated with current account development in the Euro Area member countries. Our main objective is to examine effects of the unexpected shifts in real effective exchange rates (REER) and overall demand and associated current account adjustments in the core and periphery of the Euro Area. We employ VAR methodology to analyze responsiveness of current account to the real exchange rate (REER calculated on CPI and ULC base) and demand shocks as well as the relative contribution of both shocks in explaining adjustments in current accounts. Possible implications of the crisis period will be considered by the comparison of estimated results for two models estimated for each individual country for two subsequent periods 2000-2007 (pre-crisis period) and 2000-2014 (extended period). In both models for each country we alternate both CPI and ULC based REER. We suggest that a comparison of the results for models with different time period is crucial to understand redistributive effects and competitiveness issues associated with real exchange rates shifts (induced by different dynamics in the consumer prices and unit labor costs movements between the core and periphery of the Euro Area) and overall demand shifts.

Following the introduction, we provide brief overview of theoretical concepts referring to the relationship between the real exchange rate dynamics and current account adjustments in Section 2. In Section 3 we provide an overview of the empirical evidence about current account imbalances in the Euro area member countries. While the recent empirical literature provides lot of evidence about the effects of real exchange rates shifts on current accounts, conclusion are quite different according to the relative importance of

changes in competitiveness and its role in triggering intra-Eurozone current account imbalances. In Section 4 we observe main trends in the current account development in the Euro area member countries and highlight some stylized facts about common implications resulted from its determination. In Section 5 we provide a brief overview of the VAR model (recursive Cholesky decomposition is employed to identify structural shocks) that was employed to examine responsiveness of current accounts to the positive one standard deviation real exchange rate and demand shocks in the Euro Area member countries as well as the relative importance of both shocks in explaining adjustments in current accounts. In Section 6 we discuss the main results.

2. Overview of the Literature

Bussiere, Fratzscher and Muller (2004) analyzed the current account determination in 33 countries employing an intertemporal approach via regression analysis considering effects of fiscal stance of government as well as real exchange rate deviations. Authors suggest that current account balances of countries included in the model are close to their structural current account positions confirming a validity of the intertemporal approach. Arghyrou and Chortareas (2008) investigated dynamics of current account adjustments and the role of real exchange rates in the current account determination in the EMU. Despite a limited evidence of most theoretical models in explaining causal relationship between real exchange rates and the current account, authors confirmed above relationship with significant validity and subject to non-linear effects. Lee a Chinn (2006) analyzed implications of real exchange rate fluctuations on the current account development in 7 most developed industrial countries. Authors suggest that while the variation in the current account is mostly determined by temporary shocks, permanent shocks seem to be much more crucial in explaining the variation in the real exchange rate. At the same time, their results confirmed validity of the intertemporal opened economy model. Sek a Chuah (2011) explored causality between the exchange rate changes and the current account adjustments in 6 Asian countries. Authors surprisingly conclude that the current account did not change much expected after the crisis. They suggest it is due to adjustments that authorities made in countries' financial policies to reduce the excessive exchange rates volatility. Obstfeld a Rogoff (2005) focused their investigation on estimation of effects of global current account imbalances reduction on exchange rates (USD, EUR and Asian currencies) equilibrium path in the model with alternative scenarios. Gruber and Kamin (2005) examined the global pattern of current

account imbalances by estimating panel regression models for 61 countries over the period 1982-2003. Authors suggest that traditional determinants do not provide a comprehensive explanation of large current account imbalances for the U.S. economy and Asian countries emphasizing an increased importance of role of financial crises itself. Mendoza (1995) examined the relationship between terms of trade, trade balances and business cycles using a three-sector intertemporal equilibrium model and a large multi-country database. His results indicate that terms of trade shocks associated with sudden real exchange rate shifts account for nearly ½ of actual total output variability.

Bayoumi, Harmsen and Turunen (2011) examined competitiveness issues within the Euro Area. Authors estimated responsiveness of both intra and extra Euro Area export volumes to changes in competitiveness using panel data. Their results suggest that long-term price elasticities for intra-Euro Area exports are at least double those for extra-Euro Area exports, so traditional real effective exchange rate indexes may overstate the effectiveness of euro depreciation in restoring exports growth in the Euro Area periphery. Belke and Dreger (2011) traced current account imbalances according to the catching up and competitiveness factors using paneleconometric techniques. Their results are in line with intertemporal approach confirming the existence of asymmetric imbalances between rich and poor countries. Moreover, real exchange rate movements are associated with changing patterns in current accounts that is why authors provide a rich evidence about the changes in competitiveness associated with unit labor costs adjustments. Chen, Milesi-Ferretti and Tressel (2012) examined origins of the current account imbalances within the Euro Area countries in terms of the relative importance of intra-Euro Area factors and external trade shocks. While generally confirming the traditional explanations for the rising imbalances, authors highlighted a large impact of competitiveness issues and asymmetric trade developments vis-à-vis China, Central and Eastern Europe and oil exporters. Comunale and Hessel (2014) aimed to investigate the relative role of price competitiveness and domestic demand as drivers of the current account imbalances in the Euro Area by employing panel error correction models for exports, imports and the trade balance. Their results indicate that although differences in price competitiveness have an influence, differences in domestic demand are more important than is often realized. Gaulier and Vicard (2012) analyzed design patterns of current account imbalances in the Euro Area. Authors investigated that while current account dynamics are correlated with unit labor costs (ULC) and imports, they are not correlated with exports. Losses in cost competitiveness do not appear to have been the cause

of deficits, but rather a symptom of a demand shock leading to price-level drift in the non-tradable sector. Holinski, Kool and Muysken (2012) documented a growing divergence between current account imbalances in northern and southern euro area countries from 1992 to 2007. Authors suggest that systematic monitoring of external imbalances and implementation of better coordinated policies to prevent the emergence of unsustainably large imbalances in the euro area is advisable. Rusek (2013) analyzed the long-term dynamics of the competitiveness in the individual Eurozone countries by estimating both external (current account) and internal (fiscal stance and credit dynamics) positions. Author suggest that changes in competitiveness associated with real effective

Berger and Nitsch (2010) studied bilateral trade balances for 18 European countries during the period 1948-2008. Following their results it seems that the introduction of the euro was followed by a considerable widening in trade imbalances among Euro Area members, even after allowing for permanent asymmetries in trade competitiveness within pairs of countries or in the overall trade competitiveness of individual countries. Real exchange rates and growth differentials significantly determined the direction of imbalances. In their later study (Berger and Nitsch, 2012) authors examined association between trade and financial linkages on the same sample of the countries. Hobza and Zeugner (2014) explored the role of financial links in the accumulation and then adjustment of current account imbalances in the Euro Area. Their results indicate that the geography of financial flows can differ quite markedly from trade flow patterns and suggest that the nexus between surpluses in the 'core' with deficits in the periphery went along financial rather than trade interlinkages. Lane and Milesi-Ferretti (2002) examined the link between the net foreign position, the trade balance and the real exchange rate. Authors shown that the relation between external wealth and the trade balance within and across countries is related to the rates of return on external assets and liabilities and the rate of output growth.

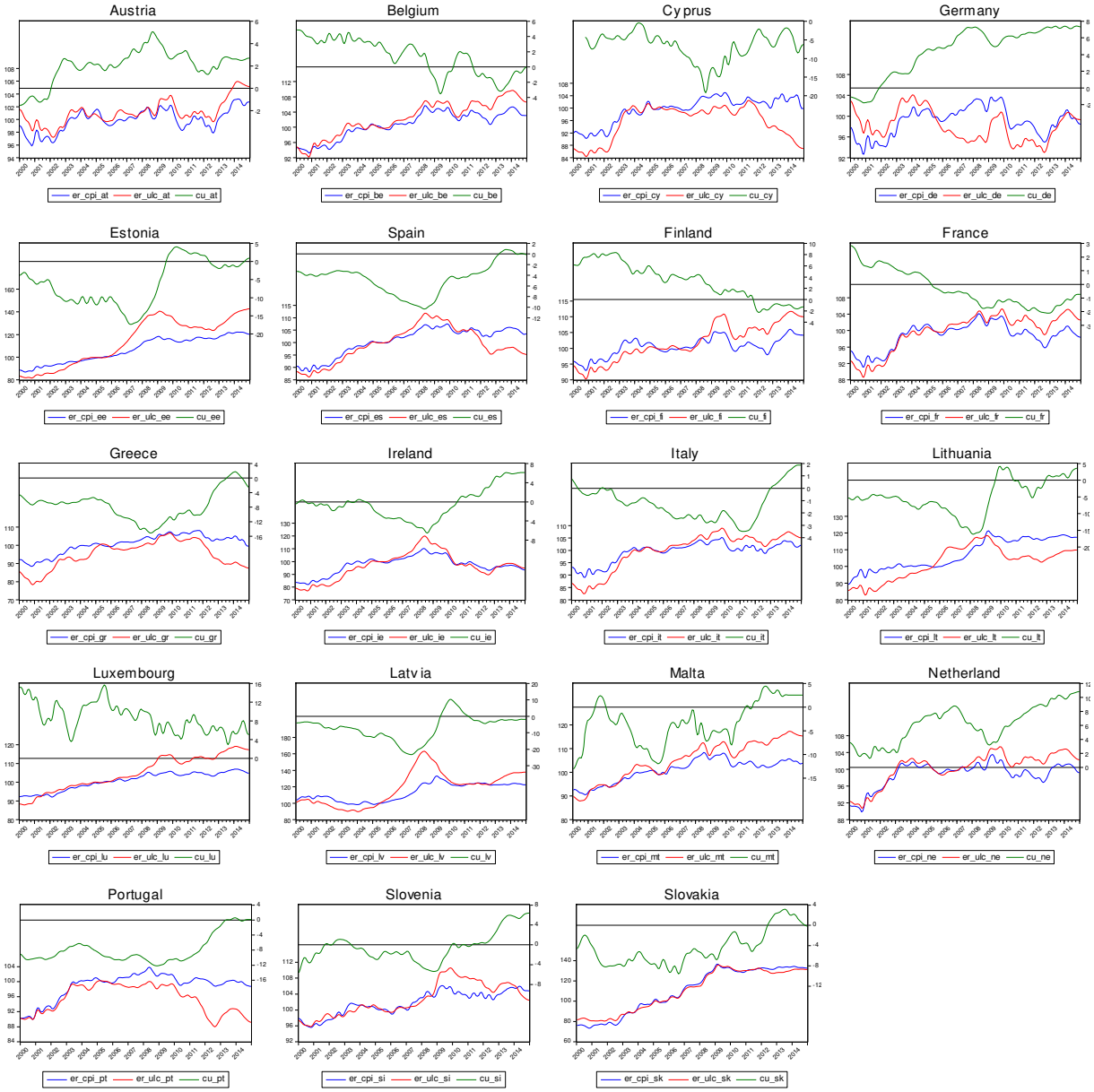
3. Main Trends in Current Account Imbalances in the Euro Area

Asymmetric external imbalances have become obvious since the establishment of the Euro Area. Increasing divergence in the current account balances between North and South of the Euro Area revealed bottlenecks in the architecture of the single monetary union. Recent economic crisis even increased heterogeneity within the Euro Area. Moreover, credibility of the single currency and low interest rate policy encouraged a significant capital flows from

North to South of the Euro Area and contributed to the debt accumulation by both private and public sectors.

Large current account deficits fueled by real exchange rate appreciation and strong domestic demand indicates a significant loss of competitiveness in the periphery countries. Figure 1 provides a brief overview of main trends in real exchange rates and current accounts in the Euro Area member countries.

Figure 1 Real Effective Exchange Rates and Current Accounts (2000M1-2014M12)



Note: CPI based real effective exchange rate (REER_CPI) and ULC based real effective exchange rate (REER_ULC) are expressed as indexes (left axis in figures) (2005 = 100). Current account is expressed as percentage share on GDP (CU) (right axes in figures).

Source: Compiled by author based on data taken from IMF - International Financial Statistics (November 2015). Time series for CPI and ULC based REER we drawn from Eurostat (November 2015).

While all countries from the group experienced real exchange rate appreciation (based on both consumer prices and unit labor costs) during the whole pre-crisis period since the birth of the Euro, this trend is clearly the strongest in the periphery countries. However, similar trend is also present in Baltic countries[2] and Slovakia which suffered from large current account deficits too. However, the loss in competitiveness is more significant considering costs (unit labor costs) rather than prices (consumer prices) that provides supportive evidence about another convenient channel of demand driven current account imbalances. Large current consumption and associated accumulation of private and public debt even emphasize generally expected implications of intertemporal choice in countries represented weaker part of the common currency area. As a result, significant trend in consumer prices and unit labor costs based real exchange rates discrepancies in the most countries indicates asynchronous effects of processes that determine internally caused changes in the relative external competitiveness.

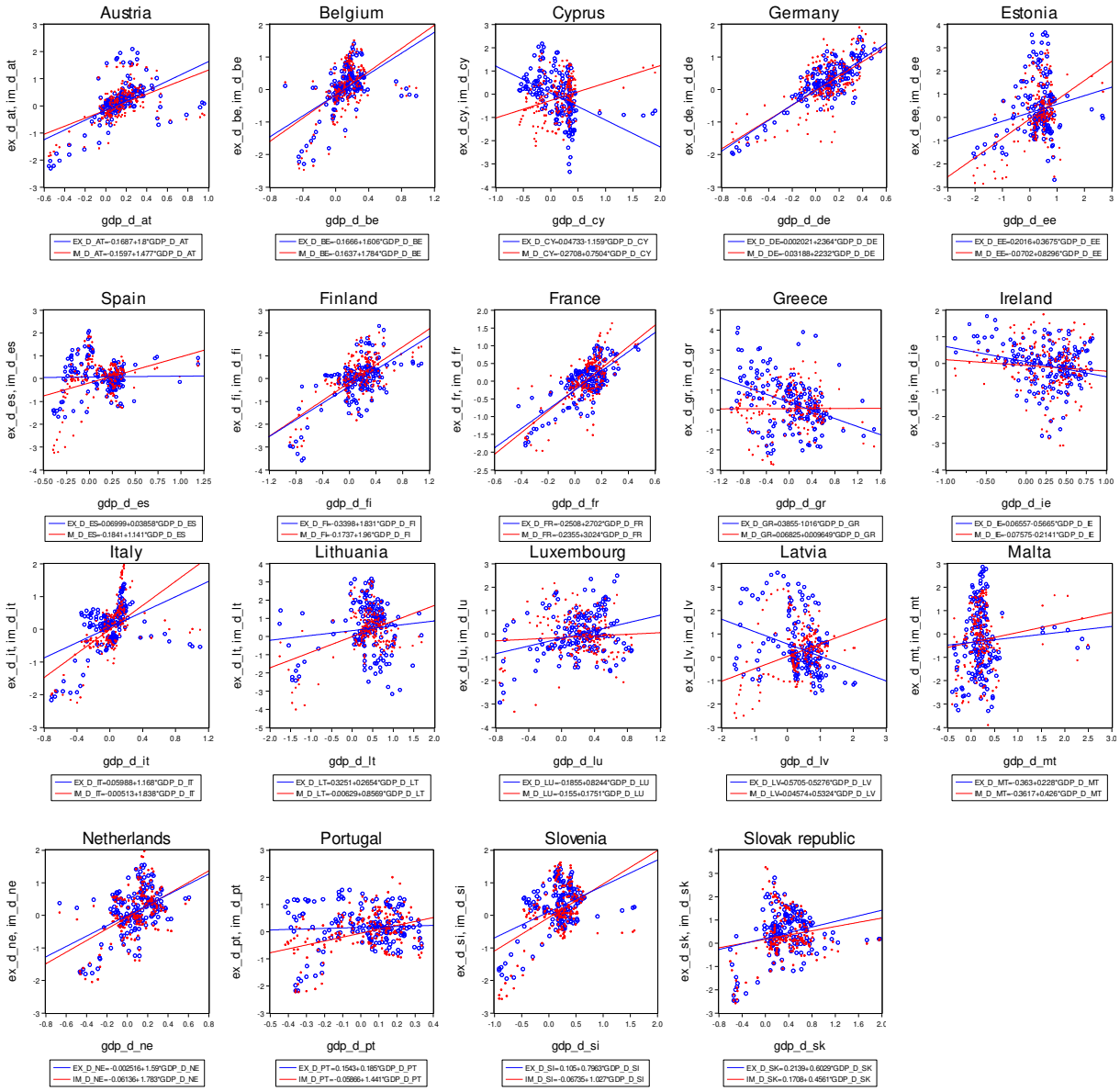
Figure 1 also indicate sudden break at the end of the pre-crisis trend in both current accounts and real exchange rates in all countries that even emphasize distortionary effects of the crisis period. Most deficit countries experienced almost immediate sharp though temporary improvement in the current account balances accompanied by the real exchange rate depreciation induced by a drop in consumer prices and unit labor costs (that decreased even more). Economic crisis and associated recession clearly reduced demand incentives that even contributed to the reduction in current account deficits that is why the net effect of the price and costs related boost in the competitiveness on the external imbalances is the subject of the recent empirical research.

Figure 2 depicts mutual relationship (simple linear regression) between the dynamics of real output and the dynamics of exports and imports in the Euro Area member countries. In most countries economics growth seems to have positive effect on export performance. However, the situation seems to be different in almost all deficit countries. Growth rates of the real output are negatively associated with export performance in Cyprus, Greece, Ireland, and Latvia while in Spain and Portugal we have observed just a negligible positive relationship between real output and export dynamics. Results for all six countries indicate competitiveness issues in good times, though good news in bad times. The problem is even more significant (in good times) in small open economies like Ireland and Latvia. On the

[2] Estonia, Latvia and Lithuania operated in the pegged exchange rate regime during the whole pre-crisis period outside the Euro Area.

other, all above mentioned countries experienced significant decrease in real exchange rates (with higher dynamics in unit labor costs based real exchange rate) that boosted their export performance, putting exports into the role of a significant driver of their post-crisis economic recovery.

Figure 2 Dynamics of Export and Import Shares on GDP and Dynamics of Real Output (2000M1-2014M12)



Note: Dynamics of export share (EX_D) and import (IM_D) shares on GDP are expressed as the relative change in the monthly percentage share of export and imports of goods on GDP. Real output dynamics (GDP_D) is expressed as monthly percentage change of the seasonally adjusted real output. Both variables are seasonally adjusted.

Source: Compiled by author based on data taken from IMF - International Financial Statistics (November 2015).

More comprehensive picture about the competitiveness issues revealed a comparison of the mutual relationship between the dynamics of export and import shares. Asymmetric

dynamics of exports and imports shares in Cyprus and Latvia indicates risks of negative current account development in good times. As a result, periods of economic growth during the pre-crisis era resulted in persisting and excessive current account deficits in these countries. Asymmetric dynamics of both exports and import shares was also observed in Greece thought the results for imports are clearly affected by the crisis period (the results for the pre-crisis period indicates strong positive correlation between real output and import shares dynamics). All remaining countries experienced symmetric dynamics of both export and import shares. Moreover, comparison of the correlation relationship between dynamics of export and import share and dynamics of real output for most of the core countries in the North of Euro Area for the pre-crises and extended period (not presented here) indicates significant increase in the intensity of this relationship during the extended period (this result is confirmed by decomposed results presented in Tables 1 and 2).

The size and openness of individual countries does not seem to be a significant determinant of export and import shares on total output. However, differences between correlations of total output dynamics and dynamics of exports and imports shares in countries with persisting current account deficits is mostly significant. Finally, crisis period affected dynamics of export and import shares in all countries emphasizing its redistributive effects, cross-country expenditure shifting and related competitiveness issues that is why more comprehensive investigation of the effects of the overall demand dynamics and current account balances in both surplus and deficit countries is necessary.

Table 1 summarizes correlation relationships between export shares and real output dynamics in the Euro Area member countries decomposed into three years long sub-periods. Detailed results revealed important implications for deficit and surplus countries for both pre-crisis and crisis periods.

Table 1 Dynamics of Export Share on GDP and Dynamics of Real Output (2000M1-2014M12)

	2000-2002	2003-2005	2006-2008	2009-2011	2012-2014
Austria	-0.2709	0.7017	0.8889	0.8450	0.5520
Belgium	0.1019	0.6329	0.7152	0.8929	0.4172
Cyprus	-0.0981	0.5334	-0.0877	0.3270	0.3784
Germany	0.1819	0.7781	0.9389	0.9819	0.2102
Estonia	-0.1600	-0.6676	0.0710	0.8453	-0.1524
Spain	0.7391	0.1283	0.6633	0.9462	-0.3995
Finland	0.5577	0.1690	0.5532	0.8718	-0.2185
France	0.6611	0.7466	0.5735	0.9777	0.2422
Greece	-0.0117	-0.7009	-0.0024	-0.4746	-0.3474
Ireland	0.6990	0.2075	-0.5981	-0.6234	0.1243
Italy	-0.1141	0.7905	0.9497	0.9641	-0.4165
Lithuania	-0.2726	-0.1163	-0.3489	0.6761	0.2090
Luxembourg	-0.0895	0.6815	-0.5514	0.8430	-0.1197
Latvia	-0.4574	-0.2649	-0.5230	-0.4040	-0.1444
Malta	0.1067	-0.2979	-0.4251	0.7431	-0.1535
Netherland	0.0609	0.6877	0.8119	0.9398	-0.7091
Portugal	-0.2533	-0.0302	0.5762	0.5722	-0.6118
Slovenia	0.0529	0.5010	0.7670	0.9603	-0.5101
Slovakia	-0.3063	-0.6525	0.5855	0.8337	-0.4010
average	**0.0593**	**0.2015**	**0.2925**	**0.6378**	**-0.1027**

Note: Data represents coefficients of mutual correlations between dynamics of export share on GDP and dynamics of real output.

Source: Author's calculation.

Early stage (2000-2002) followed by the establishment of the Euro Area indicates weak relationship between dynamics of export performance and total output (except for Finland, France, Ireland and Spain). Low dynamics of total output in Western Europe was affected by recession in European Union during 2000 and 2001 while later new Euro Area members from Eastern Europe were recovering from the end of 1990s recession. As a result, most countries experienced diverse dynamics of total output and exports. Second stage (2003-2005) was characterized by the boost in performance and the most of countries experienced a significant strengthening in the correlation between total output and export dynamics. However, Baltic countries, Greece, Malta and Portugal still suffered for low dynamics in export performance and Slovak republic experienced significant boost in export performance (correlation still negative). During the third period (2006-2008) the correlation of total output and export performance even strengthened, though it remained still negative for Greece, Latvia, Lithuania and Malta (correlation even weakened). The results for Cyprus and Luxembourg was affected by reduced export performance due to higher real output dynamics and at the end of this sub-period the correlation already captured asynchronous trend caused by the negative effect of the arising crisis on the total output dynamics. Early crisis sub-period (2009-2011) revealed a substantial increase in the mutual relationship between total output

and export performance dynamics in almost all countries (significant deterioration followed by improvement in both variables with increased sensitivity of export shares indicating higher dynamics in external demand in both directions). However, we also have observed a strengthening in the asynchronous trend in Greece, Ireland and Latvia caused the boost of the export performance. While export driven recovery helped all three countries to improve their overall performance, highly volatile export dynamics and lagged real output improvements caused deepening in the negative correlation between real output and export share performance. The last sub-period (2012-2014) brought a substantial decrease in the mutual relationship between both variables. It refers to changed patterns of the economic recovery during the later stages of the post-crisis period based on increased dynamics of domestic components of aggregate demand.

Table 2 summarizes correlation relationships between import shares and real output dynamics in the Euro Area member countries decomposed into three years long sub-periods. Detailed results revealed important implications for deficit and surplus countries for both pre-crisis and crisis periods.

Table 2 Dynamics of Import Shares on GDP and Dynamics of Real Output (2000M1-2014M12)

	2000-2002	2003-2005	2006-2008	2009-2011	2012-2014
Austria	-0.0669	0.4907	0.5603	0.8501	0.6046
Belgium	0.1808	0.6644	0.4012	0.8793	0.4459
Cyprus	0.3200	0.7310	0.3023	0.8274	0.5353
Germany	0.3679	0.4244	0.4810	0.9287	0.6183
Estonia	0.3178	-0.7703	0.3956	0.9004	0.3448
Spain	0.6082	0.1381	0.9125	0.9459	0.7884
Finland	0.6967	-0.1733	0.5497	0.9335	-0.0236
France	0.3860	0.5120	0.5643	0.9724	0.0590
Greece	-0.3028	-0.1348	0.1061	-0.1407	0.3515
Ireland	0.5755	0.3644	0.1220	-0.2632	-0.2127
Italy	0.3649	0.6596	0.7723	0.9434	0.6630
Lithuania	-0.4451	-0.4396	0.0579	0.8035	0.4421
Luxembourg	-0.6321	-0.3481	-0.5081	0.7550	-0.1637
Latvia	-0.0219	-0.1499	0.7192	0.6789	0.4460
Malta	0.3587	-0.2064	-0.4140	0.6414	-0.1475
Netherland	0.0843	0.7164	0.7577	0.9371	-0.5563
Portugal	-0.0334	0.5985	0.3883	0.7924	0.4843
Slovenia	-0.2399	0.2727	0.8701	0.9798	-0.2767
Slovakia	-0.4229	-0.5601	0.4263	0.8445	-0.2210
Average	**0.1103**	**0.1468**	**0.3929**	**0.7479**	**0.2201**

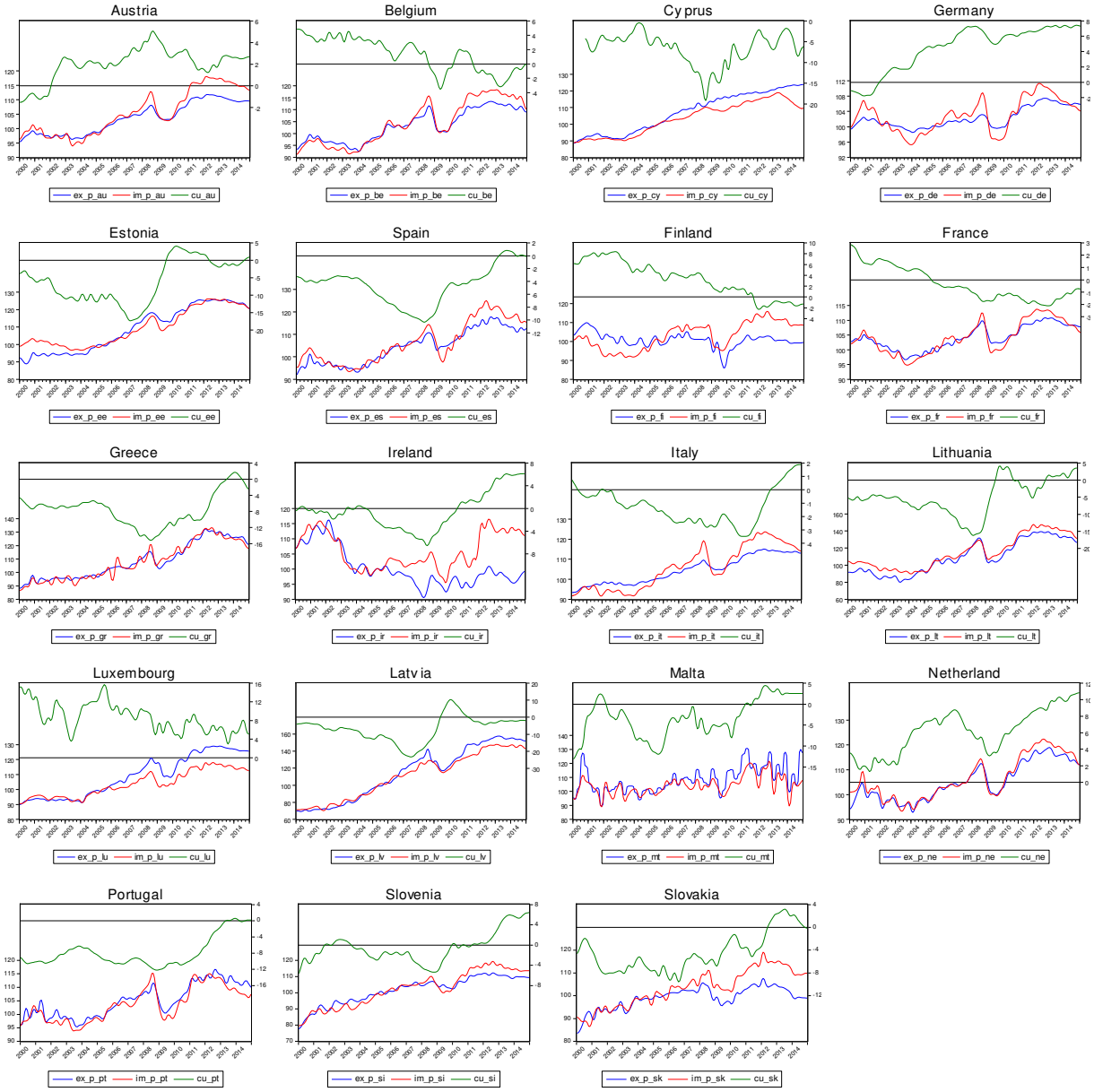
Note: Data represents coefficients of mutual correlations between dynamics of import share on GDP and dynamics of real output.

Source: Author's calculation.

Similarly to the results from the Table 1, early stage (2000-2002) indicates generally weak relationship between dynamics of import shares and total output for the whole group of countries. However, this time the results indicate more diverse trends in individual countries (strong positive correlation in eight countries and strong negative correlation in four-five countries). Negative development in countries at the beginning of the period was thus associated with diverse effects on demand for both domestic and foreign goods. Next sub-period (2003-2005) brought a minor increase in the correlation of both variables. Still persisting negative correlations experienced mostly smaller, more opened and/or weak performing economies due to higher volatility in the dynamics of import shares. During the third period (2006-2008) most of countries experienced improvement in the relationship between dynamics of total output and import shares. The only exception with negative correlations remained just two countries - Luxembourg and Malta in which the design of the growth pattern induced a reduction in the shares if imports on the total output. Early crisis sub-period (2009-2011) was associated with a significant increase in the correlation between total output and import performance dynamics in almost all countries. Only exceptions are Greece (with suppressed positive imports dynamics since the beginning of the crisis period) and Ireland (with less depressed imports during the initial stage of the crisis period). The last sub-period (2012-2014) brought a substantial decrease in the mutual relationship between both variables. Similarly to the results from the Table 1 our results refers to changed patterns of the economic recovery during the later stages of the post-crisis period based on increased dynamics of domestic components of aggregate demand associated with less dynamics of demand for foreign goods though we have observed some exceptions (Cyprus, Greece, Portugal, Spain).

Figure 3 provides a brief overview of main trends in export prices, import prices and current accounts in the Euro Area member countries. An increase in terms of trade (prices of exports-to-prices of import ratio) is usually associated with the current account improvement provided low price elasticity of exports and imports. However, persisting increase in terms of trade (due to exchange rate or domestic prices shifts) is obviously followed by deterioration in international competitiveness especially with increasing lag. Single currency and fixed nominal exchange rate environment in the common currency area allows adjustments in the term of trade only via domestic prices. As a result, demand and costs related channels of domestic prices dynamics represent crucial determinants of external competitiveness of individual Euro Area member countries.

Figure 3 Export Prices, Import Prices and Current Account (2000M1-2014M12)



Note: Export prices (EX_P) and import prices (IM_P) are expressed as indexes (left axis in figures) (2005 = 100). Current account (CU) is expressed as percentage share in GDP (CU) (right axes in figures).

Source: Compiled by author based on data taken from IMF - International Financial Statistics (November 2015). Time series for CPI and ULC based REER we drawn from Eurostat (November 2015).

Prices of exports and imports in individual Euro area member countries did not follow common trend. Most of the countries experienced increasing trend in the development of export and import prices since 2000-2003 (as direct effect of the recession in European Union during 2000 and 2001). However, there is still enough room to recognize some different patterns in this general trend. Countries from past Eastern bloc (Baltic countries, Slovak republic and Slovenia) that operated outside the Euro Area during the whole pre-crisis period experienced almost continuous increase in the prices of exports and imports due to generally

lower national price levels and price level convergence fueled by strong territorial orientation of their foreign trade toward Western European countries. Most of old EU member countries operated within the Euro Area experienced more dynamic increase in import prices (narrowly followed by the dynamics of export prices) (especially during last 3 years before the crises) fueled by strong domestic demand accelerated by low interest rate policy conducted by ECB. Crisis period changed this trend in several ways. First, the overall dynamics of export and import prices during the early stages of the crisis period decreased due to drop in demand incentives. Second, overall dynamics of export prices decreased more significantly due to higher decrease in external demand (in comparison with domestic demand). Third, asynchronous dynamics in prices of exports and imports affected mainly small and opened economies. Forth, increased dynamics in import prices since 2010 till 2012 was fueled by early wave of economic recovery fueled by low interest rate environment heavily managed by activities of ECB.

Table 3 Terms of Trade (2000M1-2014M12)

	2000-2002	2003-2005	2006-2008	2009-2011	2012-2014
Austria	99.34	100.71	98.41	97.89	95.09
Belgium	101.98	100.73	98.67	97.66	96.15
Cyprus	101.38	101.59	103.24	105.52	105.72
Germany	98.71	101.51	97.79	100.10	98.65
Estonia	92.48	98.45	102.26	102.41	100.05
Spain	97.77	99.76	99.21	99.53	95.72
Finland	107.82	104.24	95.33	93.35	90.47
France	100.43	100.91	99.35	100.23	98.72
Greece	101.86	100.73	100.52	98.10	100.86
Ireland	112.96	110.52	113.63	95.50	89.78
Italy	102.58	102.97	96.09	98.08	95.17
Lithuania	90.34	95.72	97.95	95.66	95.03
Luxembourg	98.50	100.14	105.87	108.71	110.30
Latvia	97.01	99.33	104.32	104.94	105.73
Malta	102.91	101.59	103.37	106.62	108.17
Netherland	97.83	99.97	99.83	98.80	97.65
Portugal	101.49	101.14	100.12	101.86	102.39
Slovenia	101.56	102.12	99.37	98.56	95.43
Slovakia	99.89	99.84	96.73	93.36	90.62
Average	**100.36**	**101.16**	**95.90**	**99.84**	**98.51**

Note: Data represents averaged ratios of export-to-import price index.
Source: Author's calculation.

More detailed information on averaged export-to-import prices ratios (terms of trade) in the Euro Area member countries provides Table 3. Most countries experienced improvement in the terms of trade between two initial sub-periods. Recovery from early 2000 crisis generally did not provide negative effect on the terms of trade in the whole group of

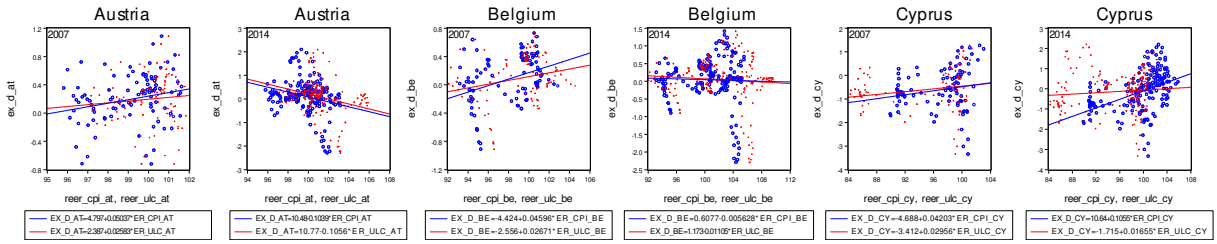
countries. Moderate decrease in term of trade experienced Belgium, Finland, Greece, Ireland, Malta, and Portugal. Newcomers from past Eastern bloc still experienced unfavorable terms of trade fueling negative current account development though keeping foreign exports more competitive.

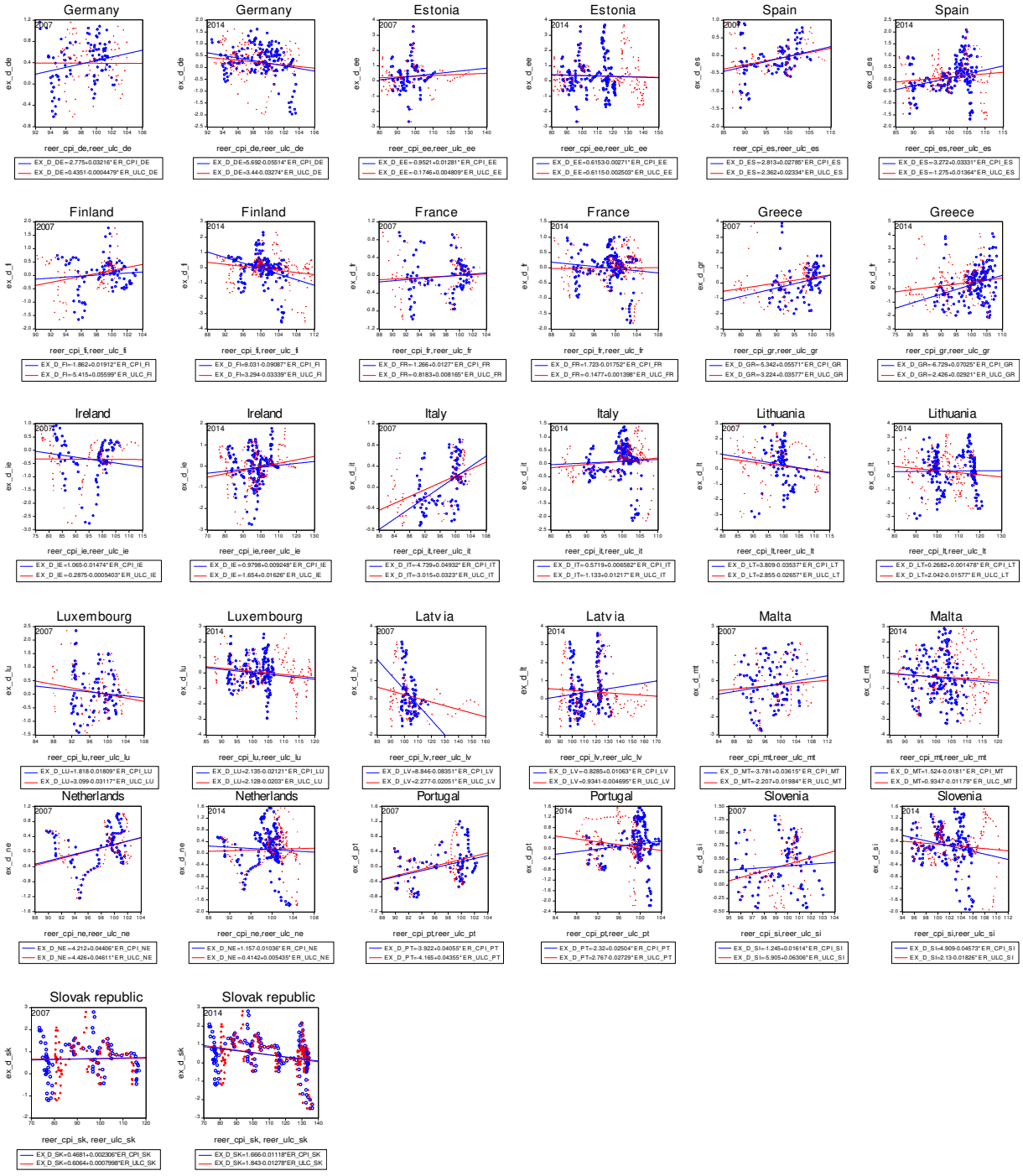
Substantial decrease in demand for both foreign exports and domestic imports during early stages of the crisis period resulted in decrease in terms of trade and thus slightly improved price competitiveness of international trade in the whole group of countries. However, some countries (i.e. Cyprus, Estonia, Spain, Greece, Ireland, Lithuania, Latvia, Malta, Netherlands, Slovak republic) did not experience a drop in terms of trade and suffered from relative reduction in the price competitiveness at the early stage of the crisis period though deficit countries experienced a significant improvement in the current account balances. Early recovery period during the economic crisis (2009-2011) brought a significant improvement in terms of trade in the whole group of countries though most of deficit countries experienced an opposite trend that was i.e. in Baltic countries and Slovak republic associated with another moderate deterioration in the current account balances. During the last sub-period terms of trade moderately decreased in the whole sample of countries though Cyprus, Greece, Luxembourg, Latvia, Malta, and Portugal experienced an opposite trend.

While the general trend in the development of terms of trade provide reasonable facts about exports and imports dynamics for North and South of the Euro Area as well as new Euro Area member countries from the past Eastern bloc, more comprehensive insight into current account determination is necessary.

Figure 4 reveals mutual relationships (simple linear regression) between exports shares on GDP and REER based on both CPI and ULC in the Euro Area member countries. Results indicates mixed conclusions about the effects of changes in prices and costs related competitiveness and associated dynamics in the exports shares.

Figure 4 Dynamics of Exports Shares on GDP and Real Exchange Rates (CPI and ULC based) Dynamics (2000M1-2014M12)





Note: Dynamics of exports share on GDP (EX_D) is expressed as the relative change in the percentage share of exports of goods on GDP_ CPI based real effective exchange rate (REER_CPI) and ULC based real effective exchange rate (REER_ULC) is expressed as index (2005 = 100). Year 2007 in figures means period 2000-2007 while year 2014 in figures means period 2000-2014.

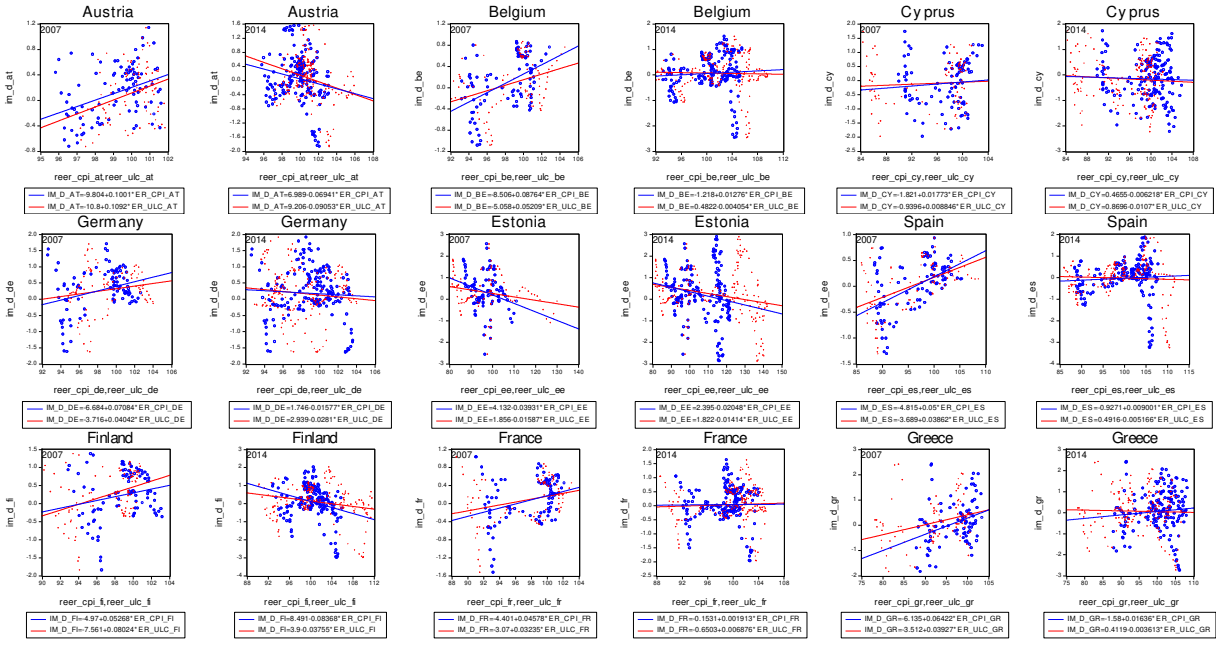
Source: Author's calculation.

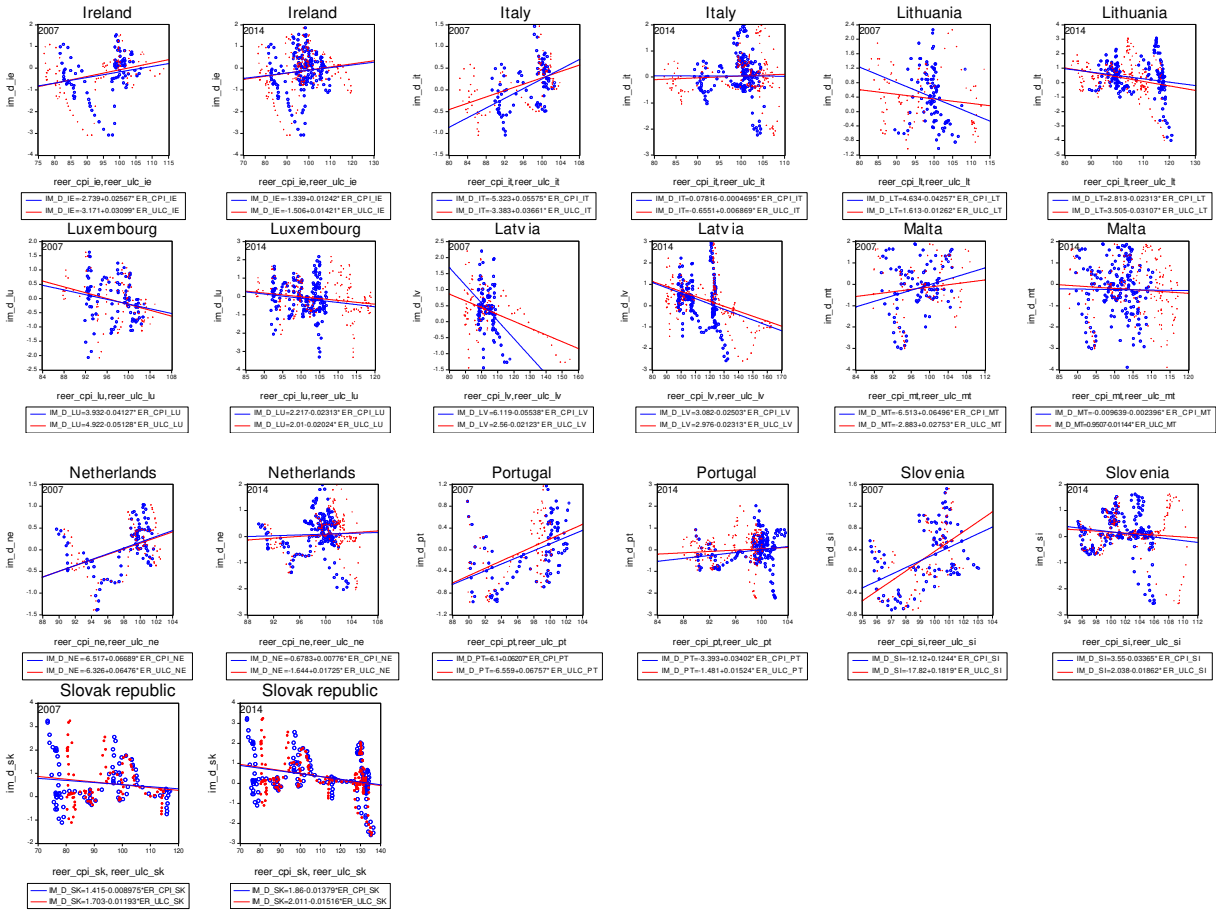
An increase in REER indicates a reduction in the competitiveness that is why reduction in the dynamics of exports share or negative relationship is generally expected. Surprisingly, export dynamics in most of the Euro Area member countries was associated with increasing trend (appreciation) in both CPI and ULC based REER indicating reduced

importance of price and costs related effects on export performance though generally low dynamics of exports in the periphery countries of the Euro Area indicates the negative role of the loss in external prices and costs related competitiveness (Gaulier and Vicard, 2012; Chen, Milesi-Ferretti and Tressel, 2012; Sanchez and Varoudakis, 2013). Minor exceptions were examined in case of Germany (ULC), France (both CPI and ULC), Ireland (both CPI and ULC) Luxembourg (both CPI and ULC) and most of new Euro Area member countries. However, crisis period clearly changed this picture making export performance of almost Euro Area members much more sensitive to the changes in external competitiveness based on both CPI and ULC. Significant decrease in external demand during the crisis period increased the role of prices and costs related determinants of export performance.

Figure 5 reveals mutual relationships (simple linear regression) between import shares on GDP and REER based on both CPI and ULC in the Euro Area member countries. Results indicates mixed conclusions about the effects of changes in prices and costs related competitiveness and associated dynamics in the import shares. However, key conclusions about the relative importance of the prices and costs related determinants of imports for the pre-crisis and extended periods are completely different in comparison with exports.

Figure 5 Dynamics of Imports Share on GDP and Real Exchange Rate (CPI and ULC based) Dynamics (2000M1-2014M12)





Note: Dynamics of imports share on GDP (IM_D) is expressed as the relative change in the percentage share of imports of goods on GDP_ CPI based real effective exchange rate (REER_CPI) and ULC based real effective exchange rate (REER_ULC) is expressed as index (2005 = 100). Year 2007 in figures means period 2000-2007 while year 2014 in figures means period 2000-2014.

Source: Author's calculation.

Dynamics of import shares on GDP was positively correlated with appreciation of both CPI and ULC based REER in almost all countries but the new Euro Area member countries. Putting together results of Figures 4 and 5 we suggest that price and costs related determinants of external competitiveness had reduced role in determining the external current account imbalances making domestic and foreign demand drivers much more important in these five countries from the Central and Eastern Europe. In all remaining Euro Area member countries real exchange rate appreciation had a positive effect on import dynamics. As a result, imports and its price and costs related determinants represented more significant driver of trends in current account balances than exports exogenously determined by the dynamics in foreign demand leaving less room to prices and costs related determinants. Effects of the crisis period are also presented in Figure 5 and reflects reduced role of REER shifts in determining external positions of both North and South of the Euro Area.

4. Econometric Model

VAR models represent dynamic systems of equations in which the current level of each variable depends on past movements of that variable and all other variables involved in the system. Residuals of vector ε_t represent unexplained movements in variables (effects of exogenous shocks hitting the model); however as complex functions of structural shocks effects they have no economic interpretation. Structural shocks can be still recovered using transformation of the true form representation into the reduced-form by imposing a number of identifying restrictions. Applied restrictions should reflect some general assumptions about the underlying structure of the economy and they are obviously derived from economic theory. There are two general (most used) approaches to identify VAR models. (I) Cholesky decomposition of innovations implies the contemporaneous interactions between exogenous shocks and the endogenous variables are characterized by a Wald causal chain. Ordering of endogenous variables then reflects expected particular economy structure following general economic theory assumptions. However, the lack of reasonable guidance for appropriate ordering led to the development of more sophisticated and flexible identification methods - (II) structural VAR (SVAR) models. Identifying restrictions implemented in SVAR models reflect theoretical assumptions about the economy structure more precisely.

We employ a VAR methodology to analyze effects of unexpected real exchange rate and demand shifts on current account adjustments in the Euro Area member countries. Cholesky decomposition of variance-covariance matrix of reduced-form VAR residuals is implemented to estimate effects of real exchange rate appreciation and increase in overall demand on the current accounts deterioration.

True model is represented by the following infinite moving average representation:

$$AX_t = B(L)X_{t\text{-}1} + B\varepsilon_t \qquad (1)$$

where X_t represents n x 1 a vector including endogenous variables of the model, $B(L)$ is a n x n polynomial consisting of the matrices of coefficients to be estimated in the lag operator L representing the relationship among variables on the lagged values, each of A and B represent n x n matrices which coefficients will be specified later, ε_t is n x 1 vector of identically normally distributed, serially uncorrelated and mutually orthogonal errors (white noise disturbances that represent the unexplained movements in the variables, reflecting the influence of exogenous shocks):

$$E(\varepsilon_t)=0, \quad E(\varepsilon_t\varepsilon_t')=\Sigma_\varepsilon=\mathrm{I}, \quad E(\varepsilon_t\varepsilon_s') = [0] \quad \forall t \neq s \tag{2}$$

Vector X_t consists of six endogenous variables - real output $(y_{r,t})$, money supply (m_t), core inflation (p_t), short-term nominal interest rates $(ir_{n,t})$, real exchange rate $(er_{r,t})$ and current account (cu_t). In the six-variable VAR model $(X_t = [y_{r,t}, m_t, p_t, ir_{n,t}, er_{r,t}, cu_t,])$ we assume six exogenous shocks that contemporaneously affects endogenous variables - demand shock $(\varepsilon_{y,t})$, nominal shock $(\varepsilon_{m,t})$, inflation shock $(\varepsilon_{p,t})$, monetary policy shock $(\varepsilon_{ir_n,t})$, exchange rate shock $(\varepsilon_{er_r,t})$ and current account shock $(\varepsilon_{cu_n,t})$.

Structural exogenous shocks from equation (1) are not directly recoverable due to the complexity of information included in true form VAR residuals. As a result, structural shocks cannot by correctly identified. It is then necessary to transform true model into following reduced form

$$X_t = A^{-1}B(L)X_{t-1} + A^{-1}B\varepsilon_t = C(L)X_{t-1} + e_t \tag{3}$$

where $C(L)$ is the polynomial of matrices with coefficients representing the relationship among variables on lagged values and e_t is a n x 1 vector of normally distributed errors (shocks in reduced form) that are serially uncorrelated but not necessarily orthogonal:

$$E(e_t)=0, \quad \Sigma_e=E(e_te_t')=A_0E(e_te_t')A_0'=A_0A_0', \quad E(e_te_s') = [0] \quad \forall t \neq s \tag{4}$$

Relationship between reduced-form VAR residuals (e_t) and structural shocks (ε_t) can be expressed as follows:

$$e_t = A^{-1}B\varepsilon_t \text{ or } Ae_t = B\varepsilon_t \tag{5}$$

As we have already noted at the beginning of the section we implement a Cholesky identification scheme to correctly identify structural shocks. In order to identify our model there must be exactly $n^2-\left[\left(n^2-n\right)/2\right]$ relationships among 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 A_0 based on the Cholesky decomposition of the reduced-form VAR residual matrix that define matrix A_0 as a lower triangular matrix. The lower triangularity of A_0 (all elements above the diagonal are zero) implies a recursive scheme (structural shocks are identified through reduced-form VAR residuals) 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 A_0 implies that particular contemporaneous interactions between some exogenous shocks and some endogenous variables are restricted reflecting causal (distribution) chain of interaction transmission. It is clear that the Wald causal chain is incorporated via convenient ordering of variables.

Considering lower triangularity of a matrix A_0 the equation (5) can be rewritten as follows:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{bmatrix} e_{y_r,t} \\ e_{m,t} \\ e_{p,t} \\ e_{ir_n,t} \\ e_{er_r,t} \\ e_{cu,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{y_r,t} \\ \varepsilon_{m,t} \\ \varepsilon_{p,t} \\ \varepsilon_{ir,t} \\ \varepsilon_{er_r,t} \\ \varepsilon_{cu,t} \end{bmatrix} \quad (6)$$

Correct identification of exogenous structural shocks reflecting Cholesky ordering of variables denotes following assumptions:

- Real output doesn't contemporaneously respond to the shock from any other endogenous variable of the model.
- Money supply doesn't contemporaneously respond to inflation, interest rates, exchange rate and current account shocks, while it is contemporaneously affected only by the real output shock.
- Inflation doesn't contemporaneously respond to interest rates, exchange rate and current account shocks, while it is contemporaneously affected by real output and money supply shocks.
- Interest rates don't contemporaneously respond to exchange rate and current account shocks, while it is contemporaneously affected by real output, money supply and inflation shocks.
- Exchange rate doesn't contemporaneously respond to the current account shock, while it is contemporaneously affected by real output, money supply, inflation and interest rates shocks.
- Current account is contemporaneously affected by shocks from all of endogenous variables of the model.

After initial period endogenous variables may interact freely without any restrictions.

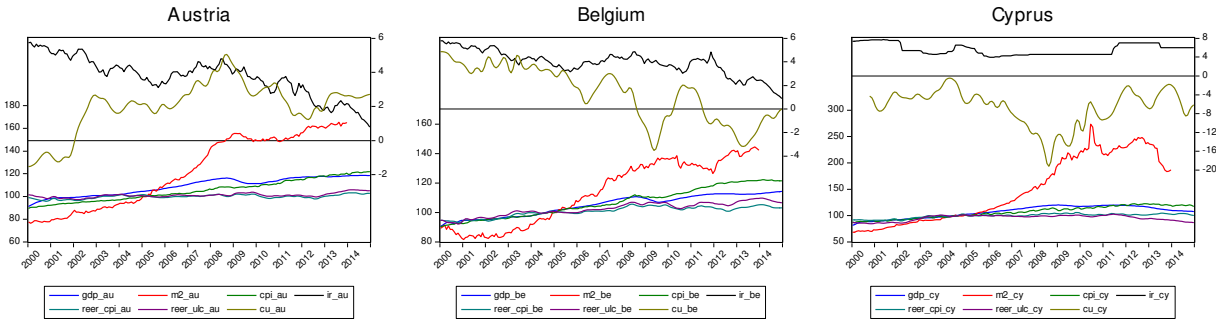
Estimated VAR model is used to compute impulse response functions to analyze responses of the current account to the positive one standard deviation real exchange rate and demand shocks in the Euro Area member countries as well as the relative contribution of both shocks in explaining adjustments in current accounts. To check the robustness of empirical results we estimate the model considering different ordering of the endogenous variables in models with time series for two different periods (pre-crisis period - model A (2000M1-2007M12) and extended period - model B (2000M1-2014M12)):

- model 1 $\left(X_t = \left[y_{r,t}, m_t, p_t, ir_{n,t}, er_{r,t}, cu_t\right]\right)$
- model 2 $\left(X_t = \left[y_{r,t}, er_{r,t}, m_t, ir_{n,t}, p_t, cu_t\right]\right)$
- model 3 $\left(X_t = \left[y_{r,t}, p_t, m_t, ir_{n,t}, er_{r,t}, cu_t\right]\right)$

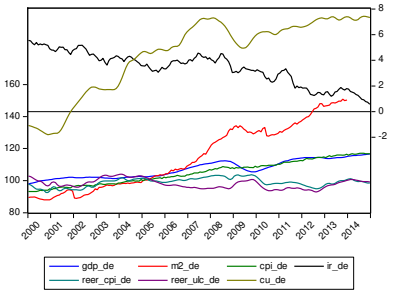
5. Data and Results

To estimate effects of the unexpected real exchange rate and demand shifts on current account adjustments in the Euro Area member countries we employ monthly data for period 2000M1-2007M12 (model A) consisting of 96 observations and for period 2000M1-2014M12 (model B) consisting of 180 observations for the following endogenous variables - real output (nominal industrial production deflated by GDP deflator), money supply (monetary aggregate M2), inflation (core inflation), long-term interest rates (long-term nominal interest rates of government bonds with ten years maturity), real exchange rate (both CPI and ULC deflated nominal effective exchange rate) and current account of the balance of payment (Figure 6).

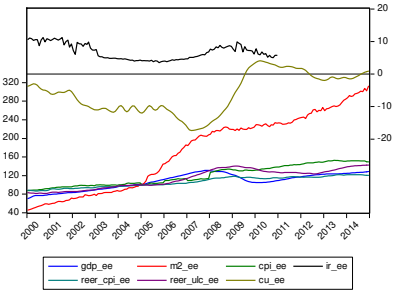
Figure 6 Real Output, Money Supply, Inflation, Interest Rates, Real Effective Exchange Rates (CPI and ULC based) and Current Account (2000M1-2014M12)



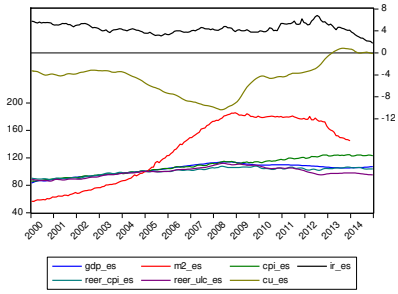
Germany



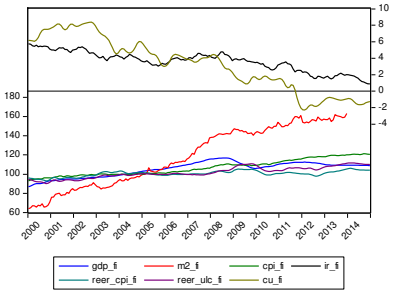
Estonia



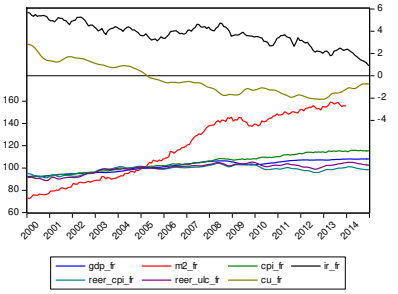
Spain



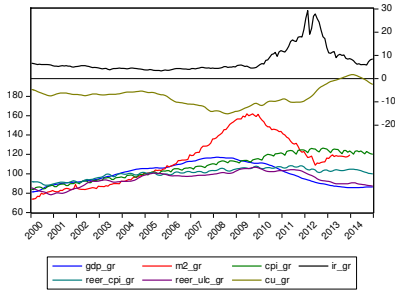
Finland



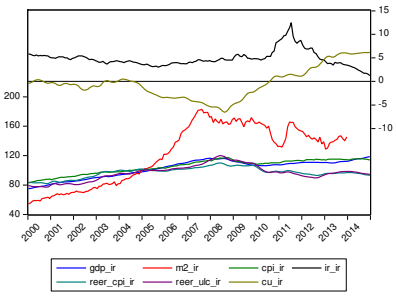
France



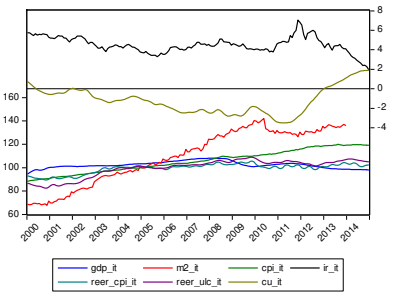
Greece



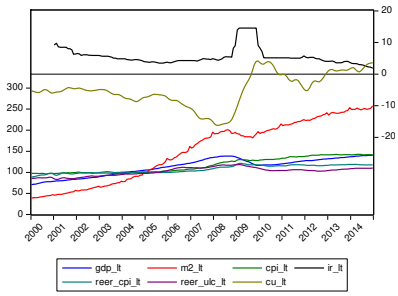
Ireland



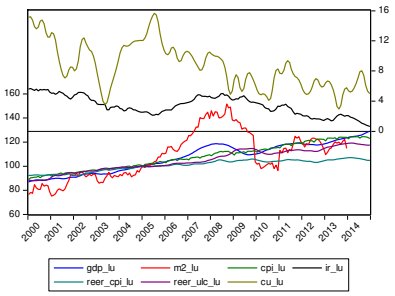
Italy



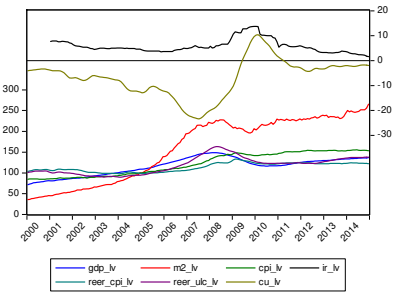
Lithuania



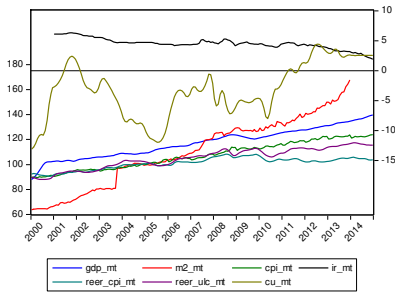
Luxembourg



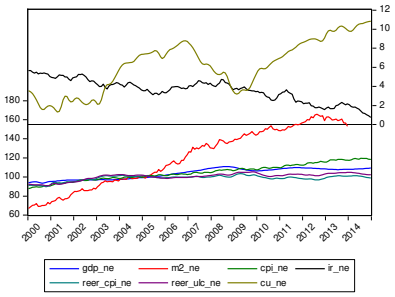
Latvia



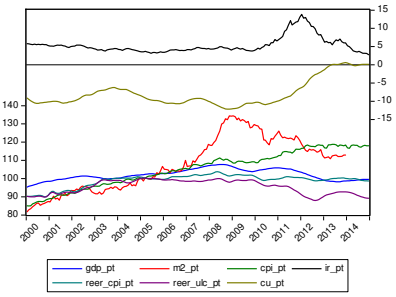
Malta



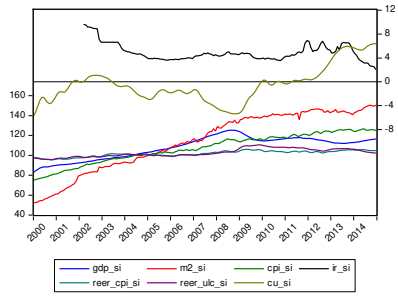
Netherlands

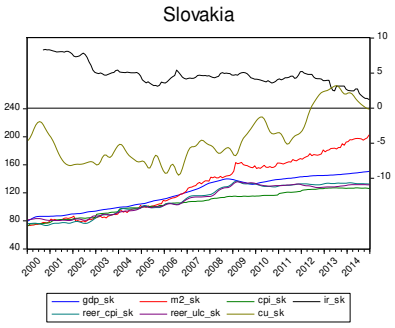


Portugal



Slovenia





Note: Endogenous variables - real output (GDP), money supply (M2), inflation (CPI) and CPI/ULC based real effective exchange rate (REER_CPI, REER_ULC) are expressed as indexes (left axis in figures) (2005 = 100). Interest rates (IR) and current account (CU) are expressed in percentage (right axis in figures).

Source: Compiled by author based on data taken from IMF - International Financial Statistics (November 2015). Time series for CPI and ULC based REER we drawn from Eurostat (November 2015).

Estimation of two models is in line with the primary objective of the paper to reveal a relationship between the dynamics of real exchange rate and overall demand and current account adjustments considering possible implications of the crisis period on estimated results. Time series for real output, money supply, inflation, interest rates and current account were drawn from IMF database (International Financial Statistics, November 2015). Time series for CPI and ULC based REER we drawn from Eurostat (November 2015). Time series for real output, money supply, inflation and current account were seasonally adjusted.

To correctly identify exogenous shocks hitting the model as well as to compute impulse-response functions it is necessary VAR model to be stationary. To check stationarity of the model it is necessary to test the time series for unit roots and cointegration.

A. Testing Procedures

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were computed to test endogenous variables for the unit roots presence. Both ADF and PP tests indicate that most of variables are non-stationary on values so that the null hypothesis of a unit root presence cannot be rejected for any of time series. Testing variables on first differences indicates that time series are stationary. We may conclude that variables are integrated of order 1 I(1).

Because there are endogenous variables with a unit root on values it is necessary to test time series for cointegration using the Johansen and Juselius cointegration test (we found reasonable to include variables I(0) for testing purposes following economic logic of expected results). The test for the cointegration was computed using two lags as recommended by the AIC (Akaike Information Criterion) and SIC (Schwarz Information Criterion).

Results of Johansen cointegration tests confirmed our results of unit root tests. Both trace statistics and maximum eigenvalue statistics (both at 0.05 level) indicate that there is no cointegration among endogenous variables of the model.

To test the stability of VAR models we also employed a number of diagnostic tests. We found no evidence of serial correlation, heteroskedasticity and autoregressive conditional heteroskedasticity effect in disturbances. The model also passes the Jarque-Bera normality test, so that errors seem to be normally distributed. VAR models seem to be stable also because inverted roots of the model for each country lie inside the unit circle. Detailed results of time series testing procedures are not reported here to save space. Like any other results, they are available upon request from the author.

Following results of the unit root and cointegration tests we estimated the model using variables in first differences so that we can calculate impulse-response functions and variance decomposition for all nineteen Euro Area member countries. Following the main objective of the paper we focus on interpretation of responses of the current account to the positive one standard deviation real exchange rate (increase in REER) and demand shocks and the relative contribution of both shocks in explaining adjustments in current accounts. To observe effects of changes in relative competitiveness associated with sudden shifts REER and overall demand on current account adjustments we estimate models with CPI and ULC based REER separately.

We also observe effects of the crisis period on the current account determination in Euro Area member countries by comparing the results for estimated models using time series for two different periods - model A (2000Q1-2007Q4) and model B (2000Q1-2014Q4). Changed ordering of variables didn't seem to affect results of the analysis. Considering that impulse-response functions are not very sensitive to the ordering of endogenous variables we present results of both models (model A and B) with default ordering of endogenous variables (detailed results for two models different ordering of variables are available upon request from the author).

B. Impulse-Response Functions

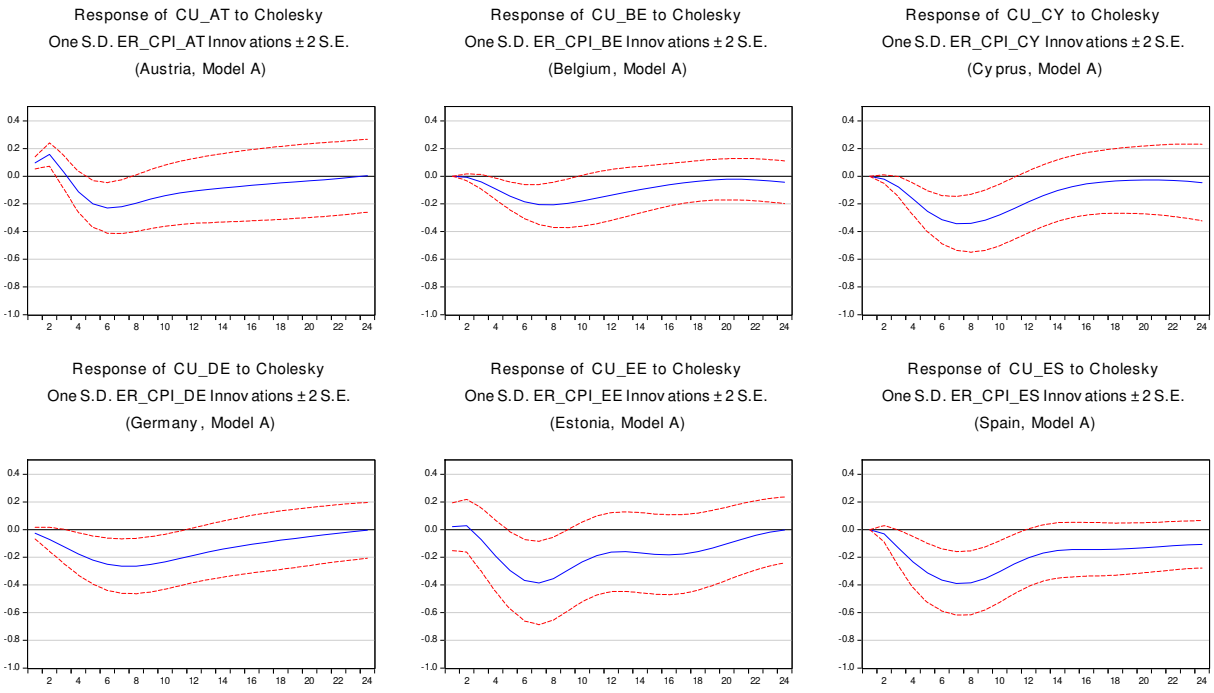
Effects of real exchange rates and demand shifts on current account adjustments in the Euro Area member countries are examined from estimated responsiveness of current accounts to the positive (appreciation) one standard deviation real exchange rate and demand shock

employing monthly data for two subsequent periods 2000-2007 (model A) and 2000-2014 (model B). Results seem to be sensitive to overall performance of the countries considering differences in the response patterns of the current accounts between core and periphery of the Euro Area.

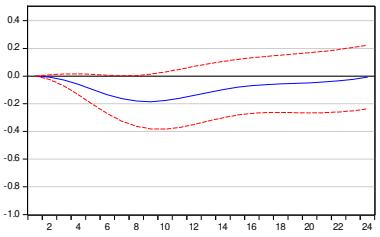
While current accounts in the group of periphery countries seem to be more responsive to the REER shocks revealing more dynamic cross-country expenditure shifting effects, current accounts in the core countries seem to be less vulnerable to the shifts in competitiveness associated with real exchange rate appreciation.

In the Figure 7 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (CPI based) shocks in the model with time series for the pre-crisis period (model A1) in the Euro Area member countries.

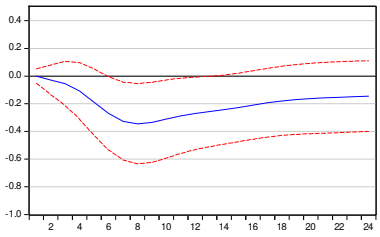
Figure 7 Responses of Current Account to REER (CPI based) Shocks (2000M1-2007M12) (Model A1)



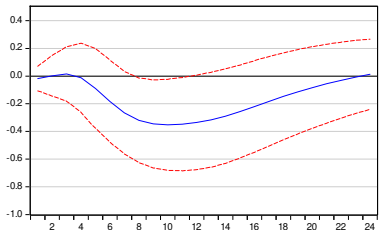
Response of CU_FI to Cholesky
One S.D. ER_CPI_FI Innovations ± 2 S.E.
(Finland, Model A)



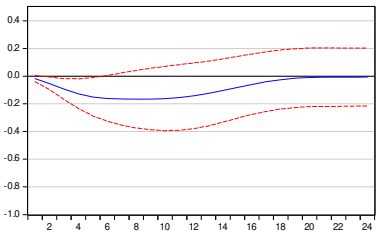
Response of CU_FR to Cholesky
One S.D. ER_CPI_FR Innovations ± 2 S.E.
(France, Model A)



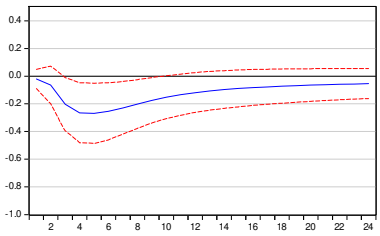
Response of CU_GR to Cholesky
One S.D. ER_CPI_GR Innovations ± 2 S.E.
(Greece, Model A)



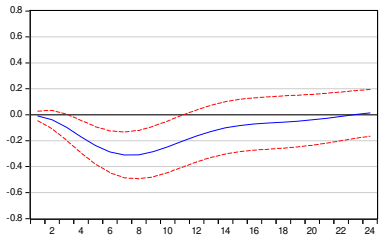
Response of CU_IE to Cholesky
One S.D. ER_CPI_IE Innovations ± 2 S.E.
(Ireland, Model A)



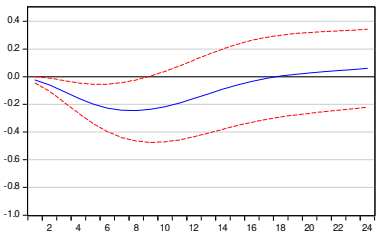
Response of CU_IT to Cholesky
One S.D. ER_CPI_IT Innovations ± 2 S.E.
(Italy , Model A)



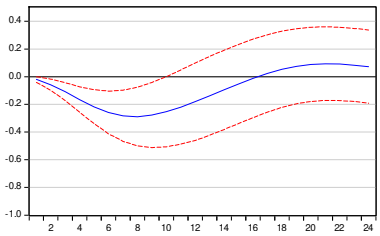
Response of CU_LT to Cholesky
One S.D. ER_CPI_LT Innovations ± 2 S.E.
(Lithuania, Model A)



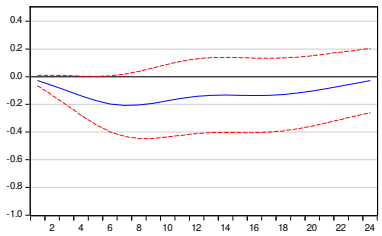
Response of CU_LU to Cholesky
One S.D. ER_CPI_LU Innovations ± 2 S.E.
(Luxembourg, Model A)



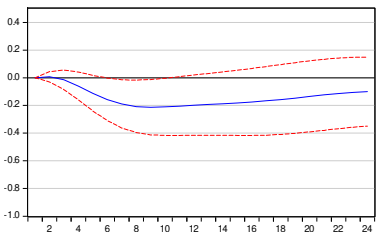
Response of CU_LV to Cholesky
One S.D. ER_CPI_LV Innovations ± 2 S.E.
(Latvia, Model A)



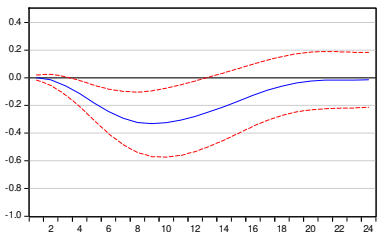
Response of CU_MT to Cholesky
One S.D. ER_CPI_MT Innovations ± 2 S.E.
(Malta, Model A)



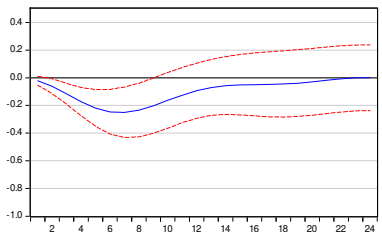
Response of CU_NE to Cholesky
One S.D. ER_CPI_NE Innovations ± 2 S.E.
(Netherlands, Model A)



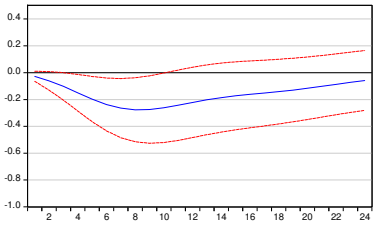
Response of CU_PT to Cholesky
One S.D. ER_CPI_PT Innovations ± 2 S.E.
(Portugal, Model A)



Response of CU_SI to Cholesky
One S.D. ER_CPI_SI Innovations ± 2 S.E.
(Slovenia, Model A)



Response of CU_SK to Cholesky
One S.D. ER_CPI_SK Innovations ± 2 S.E.
(Slovakia, Model A)



Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (CPI based) shock in each of the Euro Area member countries.

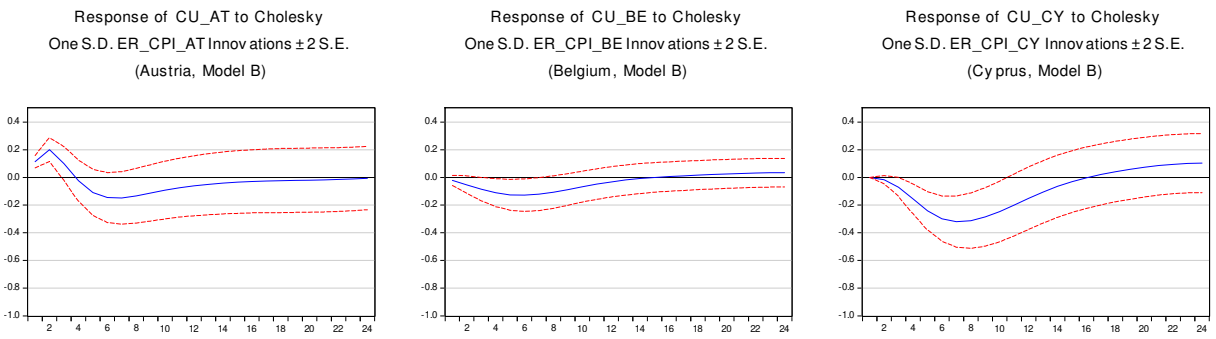
Source: Author's calculation.

Estimated responsiveness of current accounts to the Cholesky positive one standard deviation REER shock (appreciation of the CPI based real exchange rate) revealed interesting implications of a reduced price-determined competitiveness in the Euro Area member countries during the pre-crisis period. Unexpected shift (increase) in REER was followed by the current account deterioration in each individual country. Negative effect of the shock culminated within the sixth and twelfth month since the shock followed by a converging trend in the current account to its pre-shock equilibrium. Exchange rate shock seems to be neutral in the long run and its effect on the current account was just temporary.

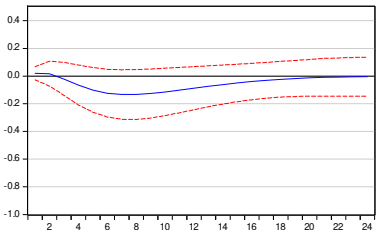
Moreover, we have examined just minor differences in the response pattern of current accounts between the core and periphery of the Euro Area. We suggest that generally higher dynamics in the price level in the South of the Euro Area contributed to the reduction in the competitiveness of the periphery countries. However, similarity of the responsiveness of current accounts between core and periphery countries indicates that changes in competitiveness measured by real exchange rates (CPI based) played a less important role in explaining considerable asynchronous trend in current accounts between North and South of the Euro Area. Responsiveness of current accounts to the positive CPI based real exchange rate shock in the new Euro Area member countries (from Central and Eastern Europe) that operated outside the Euro Area during the pre-crisis period was generally more dynamic though not the highest from the whole group. It generally followed expected adjustment of the current account in the small opened economies.

In the Figure 8 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (CPI based) shocks in the model with time series for the extended period (model B1) in the Euro Area member countries.

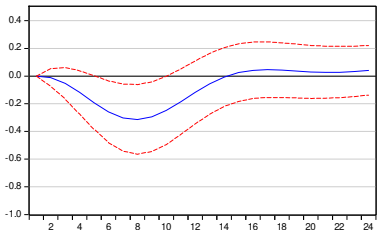
Figure 8 Responses of Current Account to REER (CPI based) Shocks (2000M1-2014M12) (Model B1)



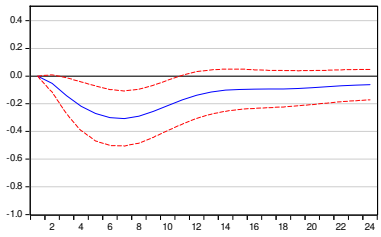
Response of CU_DE to Cholesky
One S.D. ER_CPI_DE Innovations ± 2 S.E.
(Germany, Model B)



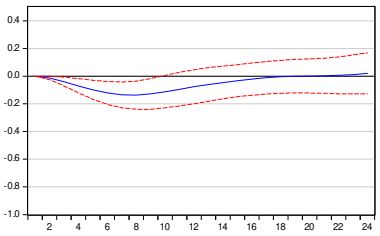
Response of CU_EE to Cholesky
One S.D. ER_CPI_EE Innovations ± 2 S.E.
(Estonia, Model B)



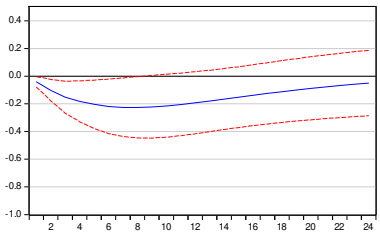
Response of CU_ES to Cholesky
One S.D. ER_CPI_ES Innovations ± 2 S.E.
(Spain, Model B)



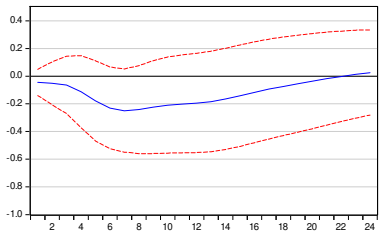
Response of CU_FI to Cholesky
One S.D. ER_CPI_FI Innovations ± 2 S.E.
(Finland, Model B)



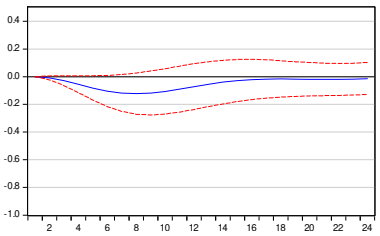
Response of CU_FR to Cholesky
One S.D. ER_CPI_FR Innovations ± 2 S.E.
(France, Model B)



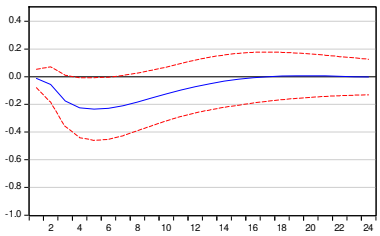
Response of CU_GR to Cholesky
One S.D. ER_CPI_GR Innovations ± 2 S.E.
(Greece, Model B)



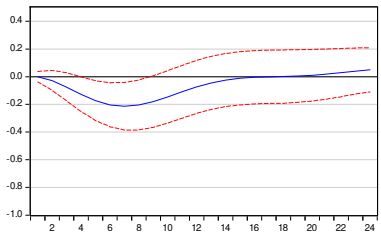
Response of CU_IE to Cholesky
One S.D. ER_CPI_IE Innovations ± 2 S.E.
(Ireland, Model B)



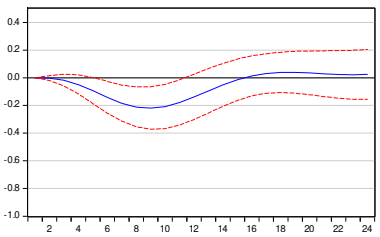
Response of CU_IT to Cholesky
One S.D. ER_CPI_IT Innovations ± 2 S.E.
(Italy, Model B)



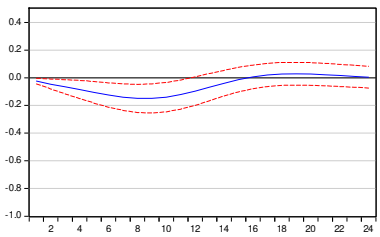
Response of CU_LT to Cholesky
One S.D. ER_CPI_LT Innovations ± 2 S.E.
(Lithuania, Model B)



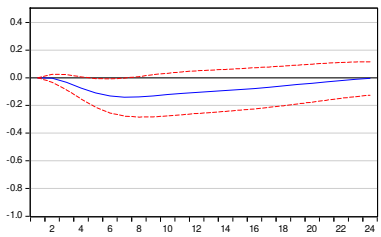
Response of CU_LU to Cholesky
One S.D. ER_CPI_LU Innovations ± 2 S.E.
(Luxembourg, Model B)



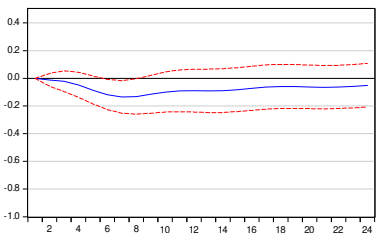
Response of CU_LV to Cholesky
One S.D. ER_CPI_LV Innovations ± 2 S.E.
(Latvia, Model B)



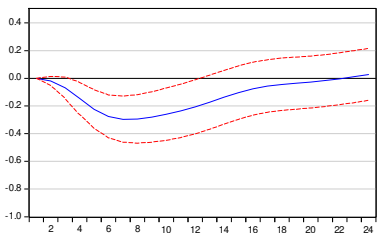
Response of CU_MT to Cholesky
One S.D. ER_CPI_MT Innovations ± 2 S.E.
(Malta, Model B)



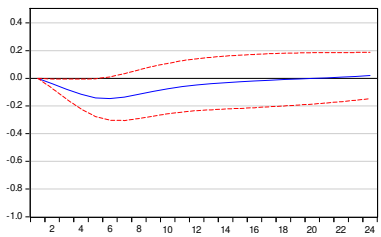
Response of CU_NE to Cholesky
One S.D. ER_CPI_NE Innovations ± 2 S.E.
(Netherlands, Model B)

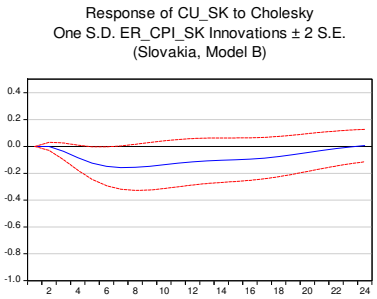


Response of CU_PT to Cholesky
One S.D. ER_CPI_PT Innovations ± 2 S.E.
(Portugal, Model B)



Response of CU_SI to Cholesky
One S.D. ER_CPI_SI Innovations ± 2 S.E.
(Slovenia, Model B)





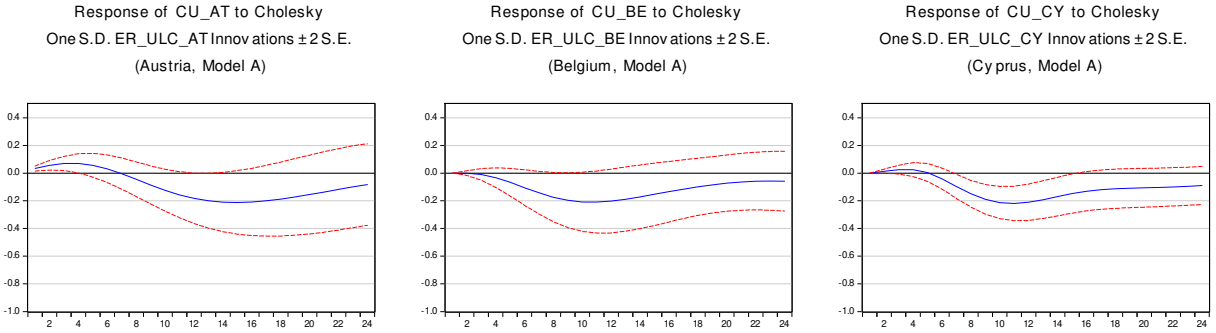
Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (CPI based) shock in each of the Euro Area member countries.

Source: Author's calculation.

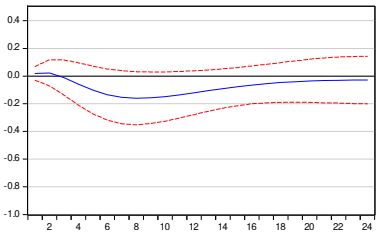
Crisis period affected responsiveness of current accounts to the positive real exchange rate (CPI based) shock in both groups of countries as it has revealed some differences in its key characteristics. While the loading phase of the current account responses to the real exchange rate (CPI based) shock was quite similar to the results from the pre-crisis period (effect of the shock culminated within one year since the shock), the overall durability and intensity of the current account deterioration seems to be reduced in all countries. As a result, the overall exposure of current accounts to the exchange rate shock decreased in both core and periphery countries of the Euro Area. Similar pattern in the current account responsiveness was also investigated in the new Euro Area member countries. We suggest that the core countries experienced less dynamic deterioration in their current accounts that makes them less vulnerable to the price related drop in competitiveness induced by real exchange rate appreciation.

In the Figure 9 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (ULC based) shocks in the model with time series for the pre-crisis period (model A2) in the Euro Area member countries.

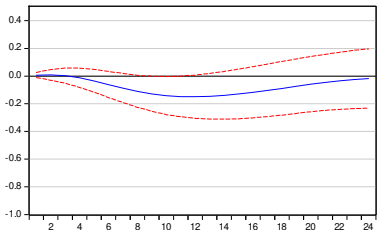
Figure 9 Responses of Current Account to REER (ULC based) Shocks (2000M1-2007M12) (Model A2)



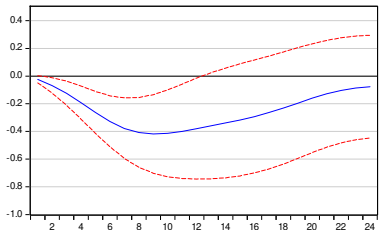
Response of CU_DE to Cholesky
One S.D. ER_ULC_DE Innovations ± 2 S.E.
(Germany, Model A)



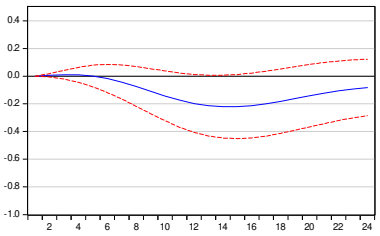
Response of CU_EE to Cholesky
One S.D. ER_ULC_EE Innovations ± 2 S.E.
(Estonia, Model A)



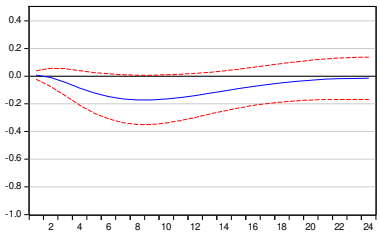
Response of CU_ES to Cholesky
One S.D. ER_ULC_ES Innovations ± 2 S.E.
(Spain, Model A)



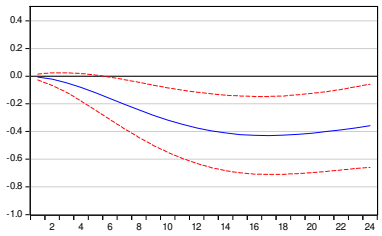
Response of CU_FI to Cholesky
One S.D. ER_ULC_FI Innovations ± 2 S.E.
(Finland, Model A)



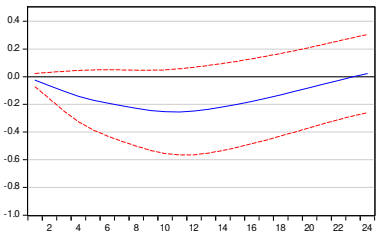
Response of CU_FR to Cholesky
One S.D. ER_UL_FR Innovations ± 2 S.E.
(France, Model A)



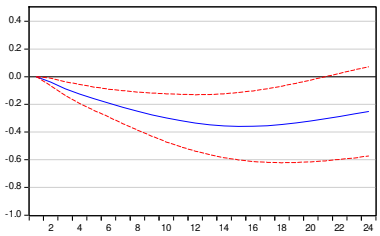
Response of CU_GR to Cholesky
One S.D. ER_ULC_GR Innovations ± 2 S.E.
(Greece, Model A)



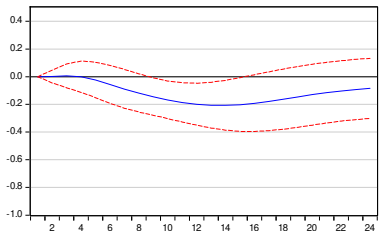
Response of CU_IE to Cholesky
One S.D. ER_ULC_IE Innovations ± 2 S.E.
(Ireland, Model A)



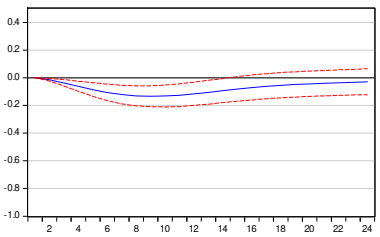
Response of CU_IT to Cholesky
One S.D. ER_ULC_IT Innovations ± 2 S.E.
(Italy, Model A)



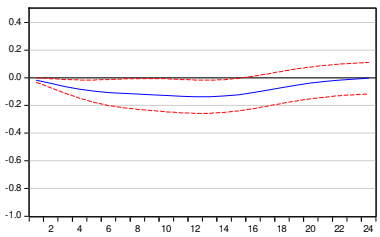
Response of CU_LT to Cholesky
One S.D. ER_ULC_LT Innovations ± 2 S.E.
(Lithuania, Model A)



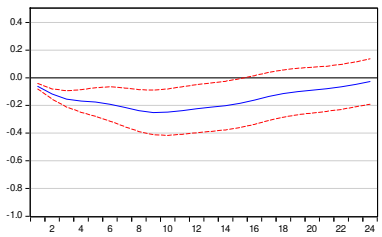
Response of CU_LU to Cholesky
One S.D. ER_ULC_LU Innovations ± 2 S.E.
(Luxembourg, Model A)



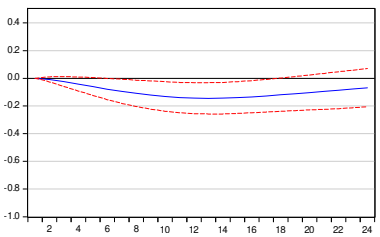
Response of CU_LV to Cholesky
One S.D. ER_ULC_LV Innovations ± 2 S.E.
(Latvia, Model A)



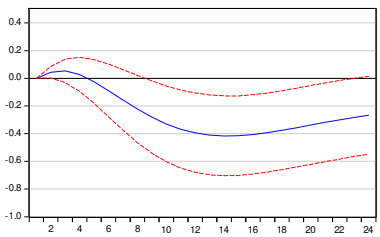
Response of CU_MT to Cholesky
One S.D. ER_ULC_MT Innovations ± 2 S.E.
(Malta, Model A)



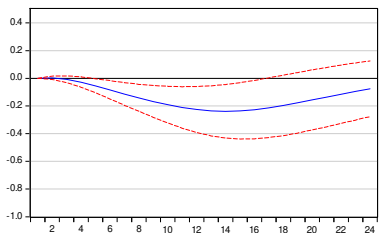
Response of CU_NE to Cholesky
One S.D. ER_ULC_NE Innovations ± 2 S.E.
(Netherlands, Model A)

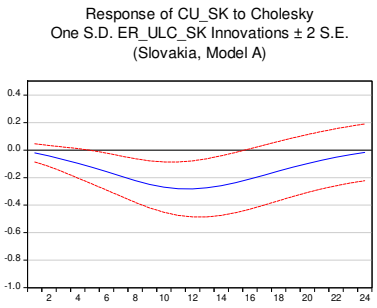


Response of CU_PT to Cholesky
One S.D. ER_ULC_PT Innovations ± 2 S.E.
(Portugal, Model A)



Response of CU_SI to Cholesky
One S.D. ER_ULC_SI Innovations ± 2 S.E.
(Slovenia, Model A)





Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (ULC based) shock in each of the Euro Area member countries.

Source: Author's calculation.

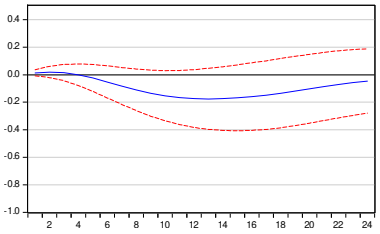
Estimated responsiveness of current accounts to the Cholesky positive one standard deviation REER shock (appreciation of the ULC based real exchange rate) revealed interesting implications of a reduced labor costs-determined competitiveness in the Euro Area member countries during the pre-crisis period. Unexpected shift (increase) in REER was followed by the current account deterioration in all countries. However, our results indicate significant differences in the current account response patterns between the core and periphery of the Euro Area (as well as considering our results for CPI based real exchange rate shocks). Loading phase of the drop in the current accounts in the periphery countries increased that is why the negative effect of the shock culminated within ninth and eighteenth month since the shock. The overall dynamics as well as durability in the current account responsiveness also increased in this group of countries. On the other hand, the core countries seems to be less vulnerable to the drop in labor costs-determined competitiveness as their current account deteriorated with clearly reduced dynamics after the positive real exchange rate shock. The overall durability of the current account convergence to its pre shock equilibrium was also much reduced in the core of the Euro Area. Exchange rate shock seems to be neutral in the long run and its effect on the current account was just temporary.

Responsiveness of current accounts to the positive ULC based real exchange rate shock in the new Euro Area member countries that operated outside the Euro Area during the pre-crisis period was generally less dynamic in Baltic countries than in Slovak republic and Slovenia.

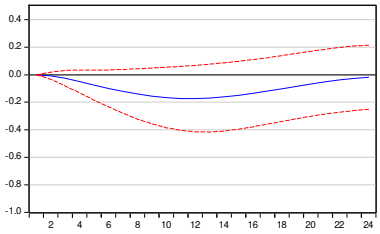
In the Figure 10 we summarize results of impulse-response functions of current accounts to positive (appreciation) real effective exchange rate (ULC based) shocks in the model with time series for the pre-crisis period (model B2) in the Euro Area member countries.

Figure 10 Responses of Current Account to REER (ULC based) Shocks (2000M1-2014M12) (Model B2)

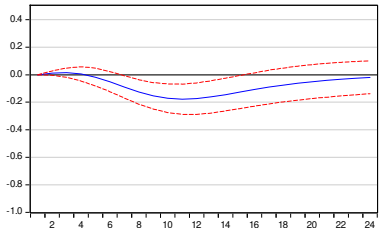
Response of CU_AT to Cholesky
One S.D. ER_ULC_AT Innovations ± 2 S.E.
(Austria, Model B)



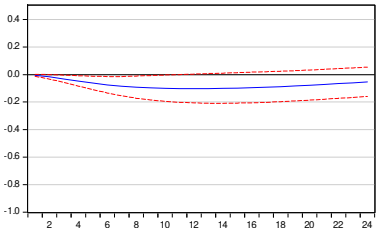
Response of CU_BE to Cholesky
One S.D. ER_ULC_BE Innovations ± 2 S.E.
(Belgium, Model B)



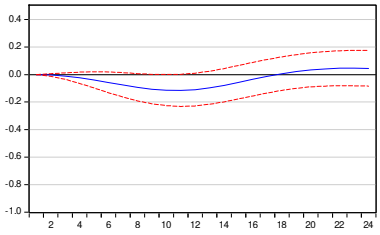
Response of CU_CY to Cholesky
One S.D. ER_ULC_CY Innovations ± 2 S.E.
(Cyprus, Model B)



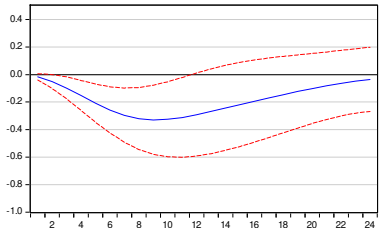
Response of CU_DE to Cholesky
One S.D. ER_ULC_DE Innovations ± 2 S.E.
(Germany, Model B)



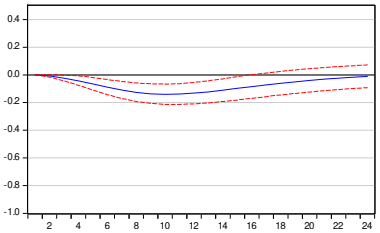
Response of CU_EE to Cholesky
One S.D. ER_ULC_EE Innovations ± 2 S.E.
(Estonia, Model B)



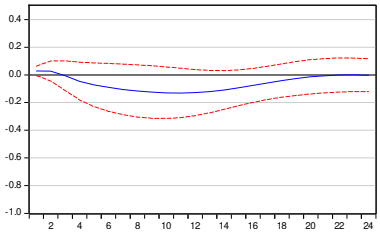
Response of CU_ES to Cholesky
One S.D. ER_ULC_ES Innovations ± 2 S.E.
(Spain, Model B)



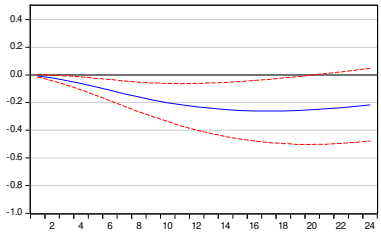
Response of CU_FI to Cholesky
One S.D. ER_ULC_FI Innovations ± 2 S.E.
(Finland, Model B)



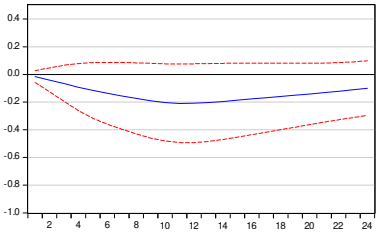
Response of CU_FR to Cholesky
One S.D. ER_UL_FR Innovations ± 2 S.E.
(France, Model B)



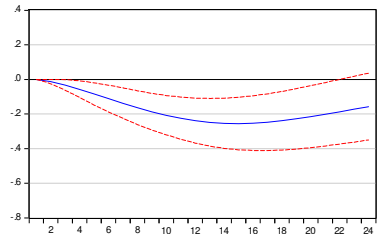
Response of CU_GR to Cholesky
One S.D. ER_ULC_GR Innovations ± 2 S.E.
(Greece, Model B)



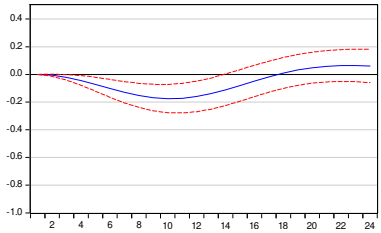
Response of CU_IE to Cholesky
One S.D. ER_ULC_IE Innovations ± 2 S.E.
(Ireland, Model B)



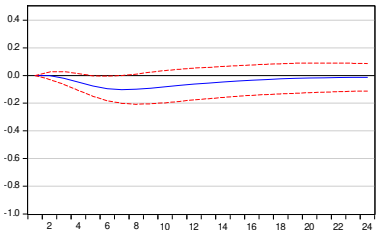
Response of CU_IT to Cholesky
One S.D. ER_ULC_IT Innovations ± 2 S.E.
(Italy, Model B)



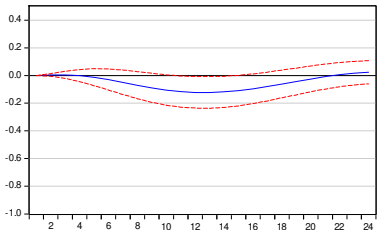
Response of CU_LT to Cholesky
One S.D. ER_ULC_LT Innovations ± 2 S.E.
(Lithuania, Model B)



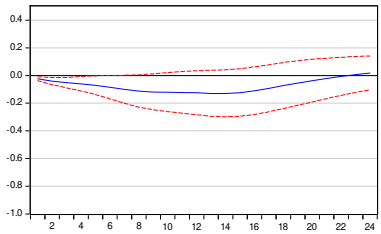
Response of CU_LU to Cholesky
One S.D. ER_ULC_LU Innovations ± 2 S.E.
(Luxembourg, Model B)

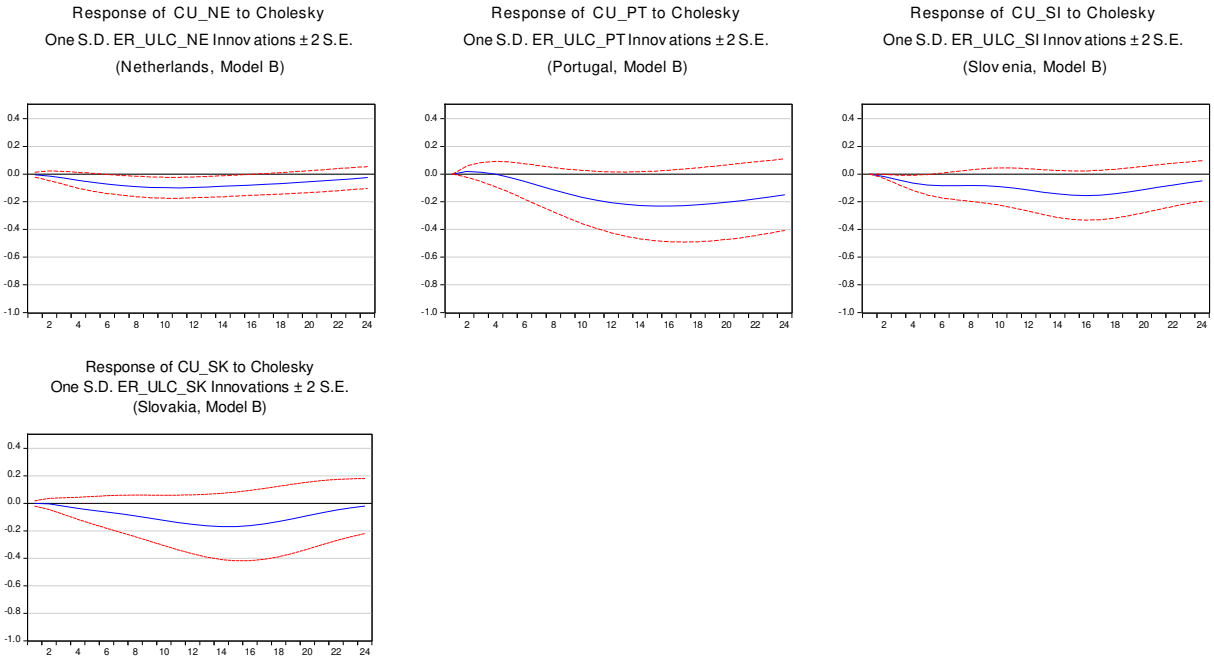


Response of CU_LV to Cholesky
One S.D. ER_ULC_LV Innovations ± 2 S.E.
(Latvia, Model B)



Response of CU_MT to Cholesky
One S.D. ER_ULC_MT Innovations ± 2 S.E.
(Malta, Model B)





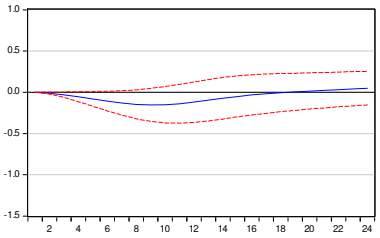
Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation real effective exchange rate (ULC based) shock in each of the Euro Area member countries.
Source: Author's calculation.

Crisis period affected responsiveness of current accounts to the positive exchange rate (ULC based) shock in both core and periphery of countries. Generally, the overall vulnerability of current accounts to the drop in labor costs-determined competitiveness decreased in all Euro Area countries. Reduced dynamics and durability of the current account deterioration in both groups of countries indicate less important role of the labor costs related determinants of competitiveness especially in countries that experienced just a minor improvement in their external imbalances (Italy). Similar pattern in the current account responsiveness was also investigated in the new Euro Area member countries. However, reduced vulnerability of current accounts to the labor costs-determined competitiveness in countries that experienced a significant improvement in their external imbalances (Portugal, Greece and Spain) indicates that internal (labor costs-driven) devaluation and related improvement in competitiveness does not represent a convenient vehicle for reducing their external imbalances.

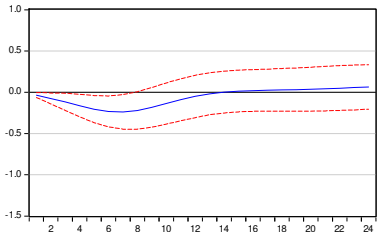
In the Figure 11 we summarize results of impulse-response functions of current accounts to positive (appreciation) demand shocks in the model with time series for the pre-crisis period (model A3) in the Euro Area member countries.

Figure 11 Responses of Current Account to Demand Shock (2000M1-2007M12) (Model A3)

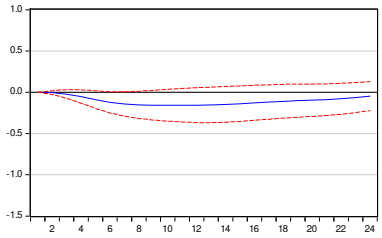
Response of CU_AT to Cholesky
One S.D. GDP_AT Innovations ± 2 S.E.
(Austria, Model A)



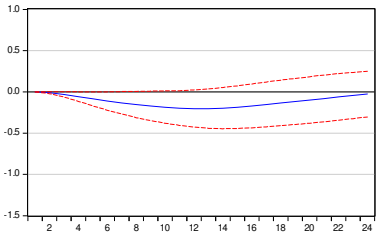
Response of CU_BE to Cholesky
One S.D. GDP_BE Innovations ± 2 S.E.
(Belgium, Model A)



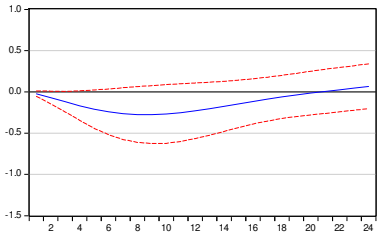
Response of CU_CY to Cholesky
One S.D. GDP_CY Innovations ± 2 S.E.
(Cyprus, Model A)



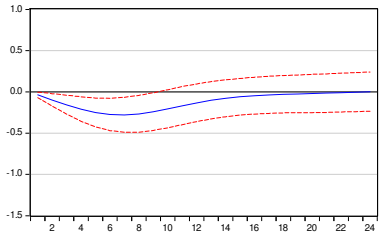
Response of CU_DE to Cholesky
One S.D. GDP_DE Innovations ± 2 S.E.
(Germany, Model A)



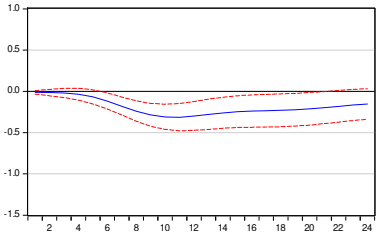
Response of CU_EE to Cholesky
One S.D. GDP_EE Innovations ± 2 S.E.
(Estonia, Model A)



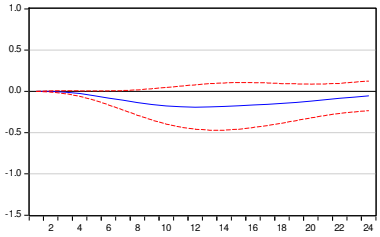
Response of CU_ES to Cholesky
One S.D. GDP_ES Innovations ± 2 S.E.
(Spain, Model A)



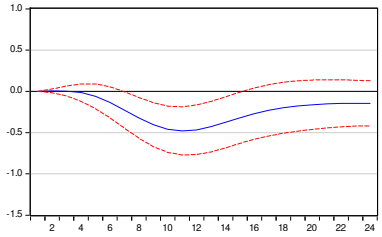
Response of CU_FI to Cholesky
One S.D. GDP_FI Innovations ± 2 S.E.
(Finland, Model A)



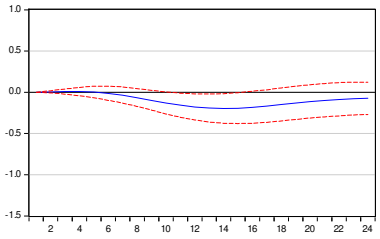
Response of CU_FR to Cholesky
One S.D. GDP_FR Innovations ± 2 S.E.
(France, Model A)



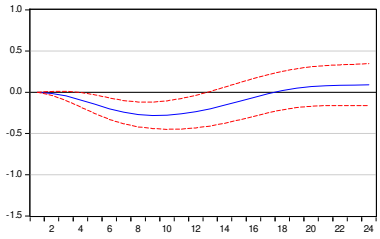
Response of CU_GR to Cholesky
One S.D. GDP_GR Innovations ± 2 S.E.
(Greece, Model A)



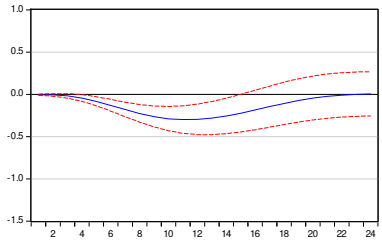
Response of CU_IE to Cholesky
One S.D. GDP_IE Innovations ± 2 S.E.
(Ireland, Model A)



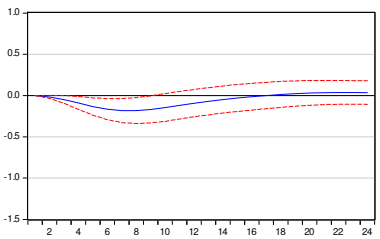
Response of CU_IT to Cholesky
One S.D. GDP_IT Innovations ± 2 S.E.
(Italy, Model A)



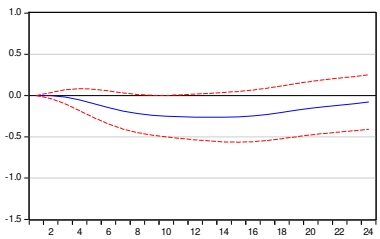
Response of CU_LT to Cholesky
One S.D. GDP_LT Innovations ± 2 S.E.
(Lithuania, Model A)



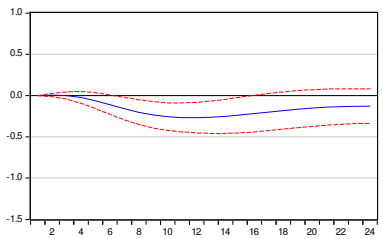
Response of CU_LU to Cholesky
One S.D. GDP_LU Innovations ± 2 S.E.
(Luxembourg, Model A)

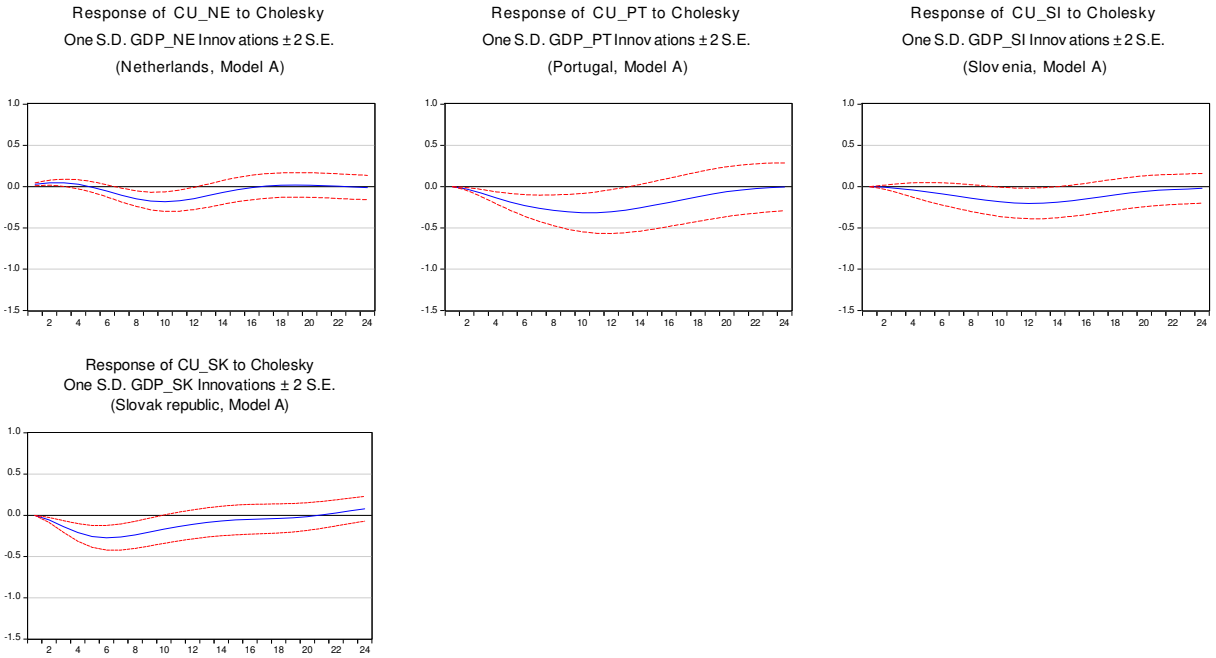


Response of CU_LV to Cholesky
One S.D. GDP_LV Innovations ± 2 S.E.
(Latvia, Model A)



Response of CU_MT to Cholesky
One S.D. GDP_MT Innovations ± 2 S.E.
(Malta, Model A)





Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation demand shock in each of the Euro Area member countries.

Source: Author's calculation.

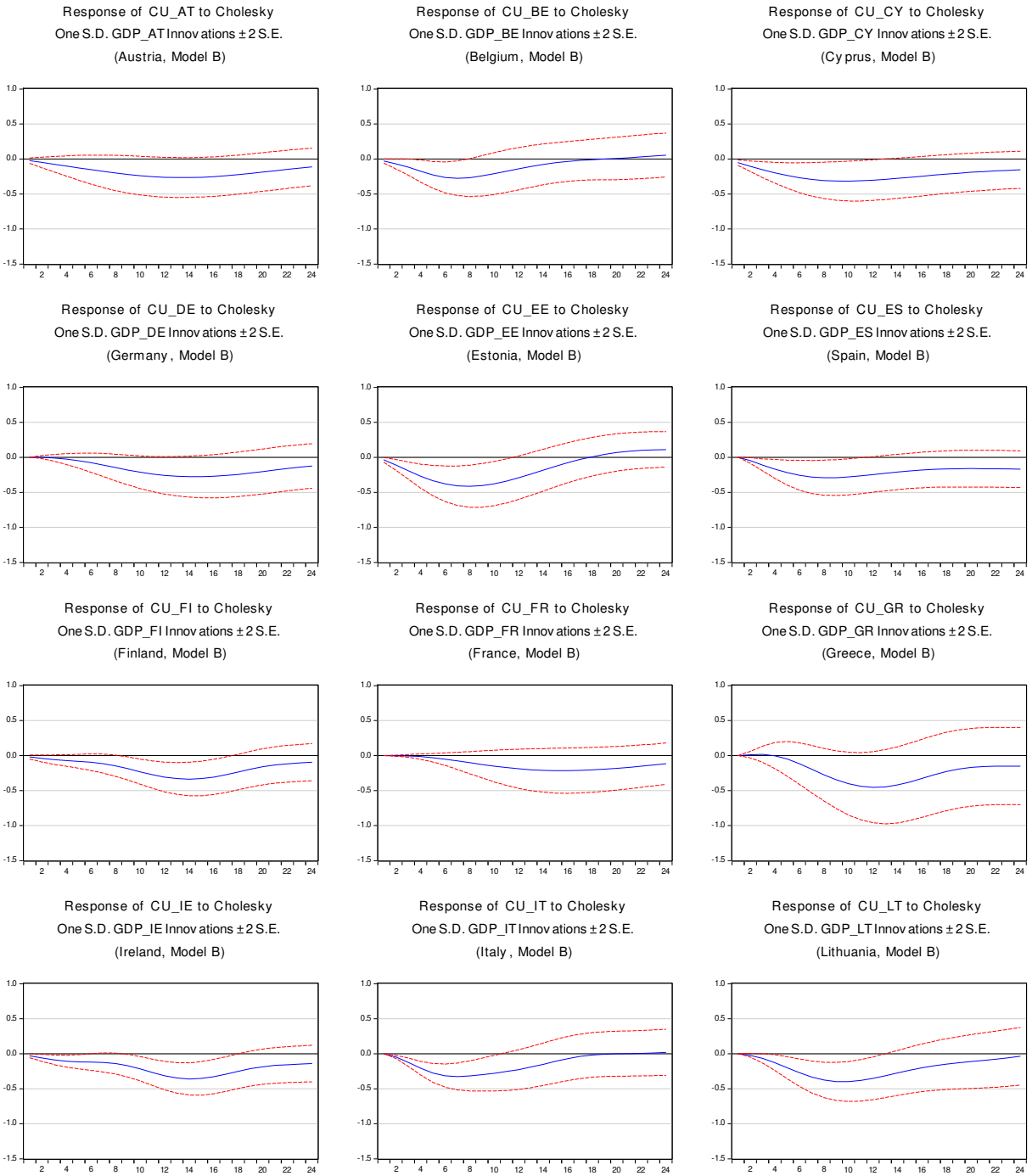
Estimated responsiveness of current accounts to the Cholesky positive one standard deviation demand shock revealed interesting implications of a demand driven external imbalances in the Euro Area member countries during the pre-crisis period. Unexpected shift (increase) in demand was followed by the current account deterioration in all countries. However, our results indicate significant differences in the current account response patterns not only between the core and periphery of the Euro Area but also within both sub-groups of countries. Together with different dynamics in the initial current account deterioration (generally higher in the periphery and all new Euro Area member countries but Slovenia; though countries operated outside the Euro Area during the pre-crisis period) we have also examined quite different length of the initial loading phase of the effect of the shock on the current account deterioration. Effect of the shock in the periphery countries had shorter durability (except for Greece and Portugal), culminated with reduced lag length and was followed by generally more dynamic current account deterioration. Demand shock seems to be neutral in the long run and its effect on the current account was just temporary in all countries.

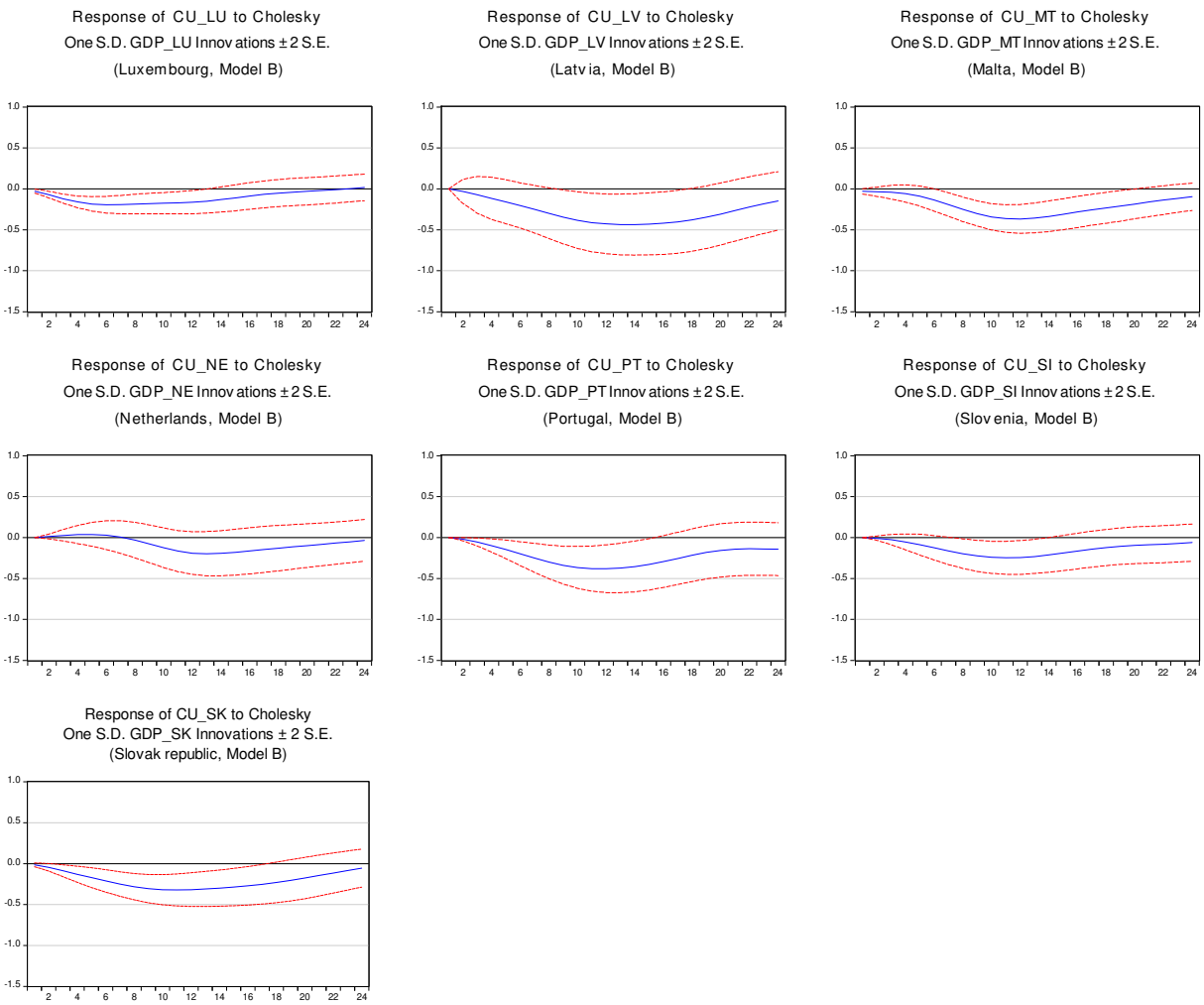
Responsiveness of current accounts to the positive demand shock in the new Euro Area member countries that operated outside the Euro Area during the pre-crisis period was generally more durable though we have examined some differences in the length of the initial loading phase of the shock.

It seems that demand shocks contributed more to the current account imbalances in the periphery of the Euro Area (considering large current account deficits in the pre-crisis period) that in the core countries as suggested by Sanchez and Varoudakis (2013).

In the Figure 12 we summarize results of impulse-response functions of current accounts to positive (appreciation) demand shocks in the model with time series for the pre-crisis period (model B3) in the Euro Area member countries.

Figure 12 Responses of Current Account to Demand Shock (2000M1-2014M12) (Model B3)





Note: Curves represent responses of current account (CU) to the positive (appreciation) one standard deviation demand shock in each of the Euro Area member countries.

Source: Author's calculation.

Crisis period affected responsiveness of current accounts to the positive demand shock in both core and periphery of countries. Contrary to our results for real exchange rates (both CPI and ULC based), current account responsiveness to the unexpected demand shock increased in both groups of countries during the crisis period. We have observed more dynamic and durable current account deterioration also in new Euro Area member countries.

We suggest that crisis period intensified demand driven redistributive effects that seems to have more important role on the current account determination that changes in price and cost related competitiveness. Significant reduction in demand during the initial stage of the crisis period contributed to general improvement in the current account imbalances between North and South of the Euro Area and as a result, in the Euro Area as a whole.

C. Variance Decomposition

Table 4 summarizes relative contributions of the CPI based REER shock, ULC based REER shock and demand shock to the conditional variance of current accounts in the Euro Area member countries during pre-crisis (model A) and extended (model B) periods.

Table 4 Variance Decomposition of Current Accounts (in per cent)

Austria							Belgium							Cyprus						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.23	1.89	0.00	0.00	0.06	0.31	1	0.00	0.00	0.12	0.00	0.00	0.00	1	1.61	2.12	0.00	0.00	0.00	0.03
6	8.56	7.93	8.03	6.19	0.99	1.40	6	9.98	8.05	8.96	10.48	1.33	1.58	6	11.36	10.01	9.61	8.81	0.96	1.47
12	14.63	12.48	17.24	12.56	9.74	9.82	12	13.94	9.56	12.40	15.00	8.67	10.32	12	14.73	13.09	14.28	13.60	13.10	14.90
24	18.36	16.38	20.32	17.46	18.39	24.27	24	12.78	9.48	13.60	12.87	16.61	21.54	24	18.37	15.12	19.77	18.91	18.75	24.05

Germany							Estonia							Spain						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.00	0.00	0.31	0.00	0.28	1	0.00	0.00	0.00	0.00	0.00	0.00	1	0.00	0.24	0.00	0.18	0.00	0.21
6	4.15	3.90	5.89	6.39	0.53	1.58	6	5.27	6.85	4.20	3.20	0.75	1.27	6	8.35	6.39	7.42	6.74	1.14	1.80
12	14.88	12.28	15.79	13.78	13.92	14.47	12	15.83	14.32	13.83	12.06	6.17	7.39	12	13.17	12.18	14.96	13.08	12.98	14.61
24	20.77	16.89	17.93	12.64	17.89	20.29	24	21.13	20.23	21.42	20.68	14.46	19.43	24	18.69	16.55	21.56	17.43	19.23	21.78

Finland							France							Greece						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.14	0.00	0.32	0.00	0.00	1	0.03	0.00	0.00	0.26	0.12	0.15	1	0.12	0.00	0.00	0.13	0.32	0.25
6	7.26	6.28	5.87	5.06	1.19	2.06	6	7.14	7.03	6.38	6.06	1.77	2.07	6	7.29	6.58	7.15	7.02	2.04	1.96
12	13.27	11.34	13.67	11.44	12.08	13.17	12	15.25	13.87	14.19	13.48	11.36	13.08	12	12.54	11.36	13.06	12.58	13.47	14.02
24	17.96	16.79	18.29	16.29	19.05	24.57	24	19.32	18.32	20.87	19.28	18.25	19.54	24	19.38	18.52	20.27	19.35	20.21	25.61

Ireland							Italy							Lithuania						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.18	0.00	0.14	0.21	0.28	1	0.00	0.00	0.00	0.00	0.17	0.14	1	0.15	0.00	0.00	0.00	0.27	0.15
6	6.83	5.91	6.04	5.87	1.36	1.27	6	7.27	7.01	6.31	6.22	1.94	2.04	6	4.24	4.15	4.01	3.76	1.78	2.08
12	12.17	11.64	11.63	10.39	11.14	12.75	12	14.84	13.35	13.84	13.05	9.65	11.38	12	15.85	14.87	14.73	14.35	7.48	7.89
24	17.46	16.30	16.49	16.09	18.53	22.43	24	17.28	16.43	16.39	15.89	17.45	19.51	24	22.14	21.53	20.51	19.59	16.39	19.99

Luxembourg							Latvia							Malta						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock		Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.00	0.14	0.18	0.00	0.00	1	0.00	0.00	0.14	0.11	0.00	0.00	1	0.00	0.27	0.00	0.31	0.00	0.00
6	5.21	5.16	5.49	5.27	1.17	1.65	6	5.44	5.02	6.22	6.07	1.78	1.94	6	8.75	8.23	7.33	7.10	1.11	1.39
12	13.84	13.22	14.38	14.75	9.14	9.49	12	12.78	12.43	14.52	14.80	8.45	8.76	12	13.89	13.47	12.76	12.25	10.38	11.23
24	17.89	16.43	18.49	17.94	14.76	18.54	24	19.58	19.04	20.14	19.32	17.59	21.48	24	19.51	17.39	19.36	18.24	17.31	20.56

Netherlands				Portugal				Slovenia			
Horizon (months)	REER Shock	REER Shock	Demand Shock	Horizon (months)	REER Shock	REER Shock	Demand Shock	Horizon (months)	REER Shock	REER Shock	Demand Shock

	(CPI)		(ULC)					(CPI)		(ULC)					(CPI)		(ULC)			
	A	B	A	B	A	B		A	B	A	B	A	B		A	B	A	B	A	B
1	0.00	0.00	0.00	0.00	0.17	0.21	1	0.24	0.21	0.00	0.00	0.16	0.19	1	0.00	0.12	0.00	0.14	0.00	0.00
6	7.57	7.08	7.47	6.50	1.78	1.95	6	6.88	6.03	6.56	6.24	2.12	2.27	6	5.32	5.25	5.07	4.33	1.19	1.54
12	12.14	12.07	14.15	13.66	11.36	13.23	12	14.18	13.75	15.06	14.55	14.77	15.56	12	13.39	13.65	11.29	11.16	9.66	10.12
24	13.78	12.99	15.38	15.00	15.27	19.41	24	17.97	16.99	19.27	18.38	21.20	23.94	24	18.42	17.96	17.38	17.32	18.77	22.30

Slovak republic						
Horizon (months)	REER Shock (CPI)		REER Shock (ULC)		Demand Shock	
	A	B	A	B	A	B
1	0.31	0.25	0.00	0.00	0.15	0.19
6	7.43	7.14	6.34	5.21	1.17	1.88
12	12.39	11.87	11.84	11.25	12.23	13.15
24	19.58	19.32	17.38	17.04	19.77	23.27

Note: Relative contributions of structural shocks to the conditional variance of current accounts in models A (2000M1-2007M12) and B (2000M1-2014M12).
Source: Author's calculations.

Decomposition of conditional variance of current accounts in the Euro Area member countries revealed information about the relative importance of real effective exchange rate and demand shocks in determining external balances in the North and South of the euro Area.

First, during first six months since the shocks both CPI and ULC based REER shocks contributed into the adjustments of the current accounts with higher intensity (between 5 to 10 percent) than demand shocks in all countries. While the relative importance of both shocks slightly increased over time, their contribution steadily diminished in the long run. We did not observe any clear determination pattern that would enable us to make any reasonable differences between North and South of the Euro Area. Current accounts in the new Euro Area member countries were generally more vulnerable to the real exchange rate shocks than the average of the Euro Area.

Second, the relative contribution of the demand shock during first six month since the shock was generally negligible and did not determine current account adjustments with any significant magnitude. However, its importance significantly increased during the second half of the year since the shock in most countries. The relative importance of the demand shock became comparable to the real exchange rate shocks during the second year since shock and even dominated in some countries (Finland, Italy, Netherlands, Portugal, Slovenia and Slovak republic). Its importance even increased over longer period of time.

Third, crisis period slightly reduced the relative importance of prices and costs related determinants of external competitiveness in favor demand of drivers in all Euro Area member countries. As a result, the relative importance of both CPI and ULC based REER shocks moderately decreased over the whole observed period since shock (2 years). At the same time

the relative importance of demand shock clearly increased in all countries though with higher intensity in smaller and more opened economies (new Euro Area members included).

6. Conclusion

Examination of the effects associated with changes in price and costs-determined competitiveness on current account deficits in the Euro Area member countries revealed interesting implications of existing differences in performance between the core and periphery on the external intra-Eurozone imbalances. Our results indicate that current accounts in the periphery countries was more vulnerable the exchange rate (both CPI and ULC based) shocks than in the core countries. However, differences are more significant in case of costs-determined changes in competitiveness induced by unexpected real exchange rate shifts.

Current accounts in the periphery countries of the Euro Area were also more vulnerable to the demand shocks in terms of both intensity and durability of the effect associated with the current account adjustments. Moreover, while the relative importance of the real exchange rate shocks dominated just within first six months since the shock, increased vulnerability to the demand shock over longer period of time reduces well expected benefits of the prices and costs related boost in competitiveness and associated reduction in the current account deficits. This idea is even more reasonable provided that crisis period generally reduced vulnerability of current accounts in the all Euro Area member countries to the real exchange rates shocks and increased their responsiveness to the demand shocks. Higher relative importance of demand shocks in explaining conditional variability of current accounts in the whole Euro Area during the crisis period even emphasizes these conclusions.

While competitiveness issues (higher dynamics of prices and labor costs) in the periphery countries can explain a significant deterioration in the external imbalances of the periphery countries during the pre-crisis period, decreased vulnerability of current accounts to the real exchange rate shocks during the crisis period reduces applicability of internal devaluation as a convenient vehicle for a reduction in external imbalances in these countries.

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References

ARGHYROU, M.G., CHORTAREAS, G. (2008) Current Account Imbalances and Real Exchange Rates in the Euro Area, *Review of International Economics*, 9(5): 747-764

ARMINGEON, K., BACCARO, L. (2012) Political Economy of the Sovereign Debt Crisis, *Industrial Law Journal*, 41(3): 254-275

BAYOUMI, T., HARMSEN, R., TURUNEN, J. (2011) Euro Area Export Performance and Competitiveness, [IMF Working Paper, No. 140/2011], Washington D.C., International Monetary Fund, 16 p.

BELKE, A., DREGER, CH. (2011) Current Account Imbalances in the Euro Area: Catching up or Competitiveness?, [DIW Discussion Papers, No. 1106/2011], Berlin, German Institute for Economic Research, 21 p.

BERGER, H., NITSCH, V. (2010) The Euro's Effect on Trade Imbalances, [IMF Working Paper, No. 226/2010], Washington D.C., International Monetary Fund, 30 p.

BERGER, H., NITSCH, V. (2012) Bilateral Imbalances in Europe, [Darmstadt Discussion Papers in Economics, No. 214/2012], Darmstadt, Darmstadt University of Technology, 21 p.

BUSSIERE, M., FRATZSCHER, M., MULLER, G.J. (2004) Current Account Dynamics in OECD and EU - An Intertemporal Approach, [European Central Bank, Working Paper, No. 311/2004] Frankfurt, European Central Bank, 38 p.

CALVO, G., REINHART, C. (2002) Fear of Floating, *Quarterly Journal of Economics*, 117(2): 379-408

CHEN, R., MILESI-FERRETTI, G.M., TRESSEL, T. (2012) External Imbalances in the Euro Area, [IMF Working Paper, No. 236/2012], Washington D.C., International Monetary Fund, 50 p.

CHINN, M. (2005) A Primer on Real Effective Exchange Rates: Determinants, Overvaluation, Trade Flows and Competitive Devaluations, [NBER Working Paper, no. 11521], Cambridge, National Bureau of Economic Research, 39 p.

COMUNALE, M., HESSEL, J. (2014) Current Account Imbalances in the Euro Area: Competitiveness or Financial Cycle?, [DNB Working Paper, No. 443/2014], Amsterdam, De Nederlandsche Bank, 46 p.

GAULIER, G., VICARD, V. (2012) Current Account Imbalances in the Euro Area: Competitiveness or Demand Shock?, [BDF Quarterly Selection of Articles, No. 27/2012], Paris, Banque de France, 26 p.

GRUBER, J.W., KAMIN, S. (2005) Explaining the Global Pattern of Current Account Imbalances, Board of Governors of the Federal Reserve System, [Board of Governors FRS,

International Finance Discussion Papers No. 846/2005], Washington D.C., Federal Reserve System, 44 p.

HOBZA, A., ZEUGNER, S. (2014) The 'Imbalanced Balance' and Its Unravelling: Current Accounts and Bilateral Financial Flows in the Euro Area, [EC Economic Papers, No. 520/2014], Brussels, European Commission, 25 p.

HOLINSKI, N., KOOL, C.J.M., MUYSKEN, J. (2012) Persistent Macroeconomic Imbalances in the Euro Area: Causes and Consequences, Federal Reserve Bank of St. Louis *Review*, 94(1): 20 p.

KANG, J.S., SHAMBAUGH, J.C. (2013) The Evolution of Current Account Deficits in the Euro Area Periphery and the Baltics: Many Paths to the Same Endpoint, [IMF Working Paper, No. 169/2013], Washington D.C., International Monetary Fund, 22 p.

LANE, P., MILESI-FERRETTI, G.M. (2002) External Wealth, the Trade Balance, and the Real Exchange Rate, *European Economic Review*, 46(6): 1049–1071

LEE, J., CHINN, M.D. (2006) Current Account and Real Exchange Rate Dynamics in the G7 Countries, *Journal of International Money and Finance*, 25(2006): 257-274

MENDOZA, E.G. (1995) The Terms of Trade, the Real Exchange Rate, and Economic Fluctuations, *International Economic Review*, 36(1): 101-137

MIRDALA, R. (2013a) Current Account Adjustments and Real Exchange Rates in the European Transition Economies, *Journal of Applied Economic Sciences*, 8(2): 210-227

MIRDALA, R**.** (2013b) Fiscal Imbalances and Current Account Adjustments in the European Transition Economies, *Journal of Applied Economic Sciences*, 8(3): 323-352

OBSTFELD, M., ROGOFF, K.S. (2005) Global Current Account Imbalances and Exchange Rate Adjustments, *Brookings Papers on Economic Activity*, 36(1): 67-123.

RUSEK, A. (2013) The Competitiveness Dynamics in the Eurozone, *Global Journal of Management and Business Research Finance*, 13(5): 33-38.

SANCHEZ, J.L.D., VAROUDAKIS, A. (2013) Growth and Competitiveness as Factors of Eurozone External Imbalances. Evidence and Policy Implications, [WB Policy Research Working Paper, No. 6732/2013], Washington D.C., World Bank, 50 p.

SEK, S.K., CHUAH, C.L. (2013) The Dynamic of the Current Account in Emerging East-Asian: Does Exchange Rate Matter? International Journal of Trade, Economics and Finance, 2(4): 293-299

STAVÁREK, D. (2011) European exchange rates volatility and its asymmetrical components during the financial crisis, [Mendelu Working Papers in Business and Economics, No. 17/2011], Brno, Mendel University in Brno, 28 p.