Entrepreneurial Business and Economics Review

2013, Vol. 1, No. 3

Aggregate Demand Disturbances in the Visegrad Group and the Eurozone

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A B S T R A C T

Objective: The main goal of the paper is to evaluate, in a comparative manner, the degree of similarities in aggregated demand disturbances in the Visegrad Group (the Czech Republic, Hungary, Poland and Slovakia, collectively: V4) and the Eurozone economies from 1995 to 2013.

Research Design & Methods: The underlying demand disturbances are extracted using the structural vector auto-regression (SVAR) model with the long-run restrictions. The identification scheme is based on the theoretical aggregate supply-aggregate demand (AS-AD) model. The obtained approximations of unobservable demand shocks are then used to infer on their correlation structures.

Findings: The demand shocks among the four economies are described by the highest correlation among all chosen sub-samples. The dynamic approach revealed that the synchronization of the demand shocks in the V4 Group was stronger even when compared to the EMU core. The adjustments to the demand shocks in the V4 countries are relatively flexible and these economies converge to long-run equilibria at a fast pace.

Implications & Recommendations: The V4 countries fulfil substantial criteria of an optimum currency area and could benefit from adoption of a single currency, as well as a common monetary policy.

Contribution & Value Added: This comparative empirical study brings evidence on the similarities in aggregate demand shocks within the V4 and EMU countries.

Article type: research paper

Keywords: optimum currency area; economic shocks; SVAR; Visegrad Group

JEL codes: E32, F15, F44, C32

Published by Centre for Strategic and International Entrepreneurship – Krakow, Poland

K. Beck's part of the article was prepared within the project "Convergence in countries and regions of the European Union" funded by the Polish National Science Centre, decision No. DEC-2011/01/N/HS4/03077.

Suggested citation:

Beck, K., & Janus, J. (2013). Aggregate Demand Disturbances in the Visegrad Group and the Eurozone. *Entrepreneurial Business and Economics Review, 1*(3), 7-19.

INTRODUCTION

The recent financial turmoil and economic downturn, along with the sovereign debt crisis, exposed significant institutional weaknesses of the Economic and Monetary Union (EMU). These events, however, also affected the Visegrad Group (V4) countries. In Poland, Hungary and the Czech Republic, the crisis led to the re-emergence of debates concerning the strategic decisions of euro adoption. In Slovakia, which joined the single currency area in 2009, there has been a discussion concerning the effects of euro on the macroeconomic performance in the last year. One of the key characteristics that allows to evaluate actual and potential benefits of a monetary union is the degree of similarity of aggregate shocks among integrating economies. In particular, the evidence on aggregate demand shocks distribution in V4 economies is helpful to answer the question whether a single monetary policy (one-size-fits-all) is advisable for the V4 Group as a whole, as well as for each of the countries.

The main goal of the paper is to evaluate, in a comparative manner, the degree of similarities in aggregated demand disturbances in the V4 and EMU economies from 1995 to 2013. The shocks are identified using the structural vector auto-regression (SVAR) model with the long-run, AS-AD restrictions. The obtained approximations of unobservable shocks are then used to infer on correlation structures of shocks and to build impulse response functions of output to these shocks. We specifically test the hypothesis that the similarity of macroeconomic shocks within the V4 Group has been greater than among the EMU countries.

The paper is structured as follows. Section 2 briefly reviews the developments in the optimum currency area (OCA) theory and empirical studies on macroeconomic shocks. Section 3 outlines the model used to identify the disturbances, along with data and their properties. Section 4 reports on the empirical results and provides a discussion. Section 5 concludes and underlines our basic findings.

LITERATURE REVIEW

Most of the initial works on the OCA theory were concerned with condition which an effectively performing monetary union must fulfil (Mundell, 1961; McKinnon, 1963; Kenen, 1969). It was proved that, in the absence of independent monetary policy and flexible exchange rates, member countries must either reveal symmetrical distribution of aggregate demand shocks or possess properly working alternative adjustment mechanisms (i.e. flexible wages/prices, mobile labour force or fiscal federalism). A high degree of symmetrical distribution was firstly attributed to economic openness and diversification of production in economies. Further research, however, provided a more dynamic analysis that led to two contradicting views (de Grauwe & Mongelli, 2005). The first one, the ‘European Commission View’ (Commission of the European Communities 1990), later developed into the hypothesis of the endogeneity of optimum currency area criteria (Frankel & Rose, 1998), states that integrating economies will be characterized with more symmetrical distribution of shocks, due to an increase in intra-industry trade. Opposite argument, known as the ‘Krugman’s View’, suggests that on-going integration leads to a higher specialization in regions and causes distribution of shocks to be more idiosyncratic (Krugman, 1993).

The main body of the empirical research on the OCA has been conducted through analyses of cyclical components of real GDP, as well as various factors that influence their coherence among countries. There is evidence that the business cycles synchronization in the EMU is affected by international trade, patterns of specialization and capital mobility (Lee & Azali, 2010; Imbs, 2004; Kalemli-Ozcan, Papaioannou & Peydro, 2009; Siedschlag, 2010; Silvestre, Mendonca & Passos, 2009). Some authors indicate gravitational variables to be main drivers of cycles congruence (Baxter & Koutraparitsas, 2004; Böwer & Guillemineau, 2006), while others recognize the impact of structural similarities and congenial institutions on cycles correlation (Beck, 2014; Sachs & Schleer, 2013). It has also been concluded that an increasing business cycles synchronization in Eurozone may be mainly attributed to global rather than regional tendencies (Bordo & Helbling, 2011; Lehwald, 2012). Fidrmuc and Korhonen have identified 35 different publications that confirm a rather high correlation between business cycles in the EMU and Central and Eastern European Countrie (CEECs) (Fidrmuc & Korhonen, 2006). On the other hand, Darvas and Szapary find that among the CEECs, only Hungary, Poland and Slovakia have achieved a high degree of synchronization with the 'old' EU countries (Darvas & Szapáry, 2008) which is further confirmed by this study.

MATERIAL AND METHODS

The theoretical identification of unobservable shocks in the study is given by the aggregate supply-aggregate demand model (AS-AD). This model grasps both static (short-run) and dynamic dependencies between the aggregate production (y) and prices (p). The upward-sloping AS curve consists of the expected price level (p^e) and the natural GDP (y_n), and can be formulated as (Benigno, 2009):

$$p - p^e = \frac{(1-\alpha)\left(\sigma^{-1}+\eta\right)}{\alpha}\left(y - y_n\right) \tag{1}$$

where σ denotes an elasticity of intertemporal substitution of consumption, and η is a labour supply elasticity. The parameter ($1 - \alpha$) is interpreted as a fraction of firms adjusting prices to the profit-maximizing levels in a given period and allows for transitory rigidities (see Calvo, 1983). The downward-sloping AD curve depends on the natural levels of production and prices[1], and may be shifted by either fiscal or monetary policies:

$$y = \bar{y} + (g - \bar{g}) - \sigma\left[i - \left(\bar{p} - p\right) - \left(\bar{\tau_c} - \tau_c\right)\right] - \sigma \ln \beta \tag{2}$$

where g denotes the volume of public expenditure, i is a nominal interest rate, τ_c is a rate of consumption taxes, and β is a households utility discount factor. AS shock in this identification scheme permanently influences both output and price levels. AD shock only temporarily changes the output that gradually returns to the long-run equilibrium.

According to the mainstream economic theory and the OCA theory, monetary policy can influence only aggregated demand shocks, ergo the problem of supply shocks is

[1] Bars in the equation (2) denote natural values of particular variables.

beyond the scope of this paper[2]. The underlying AD shocks can be extracted in a specific version of the SVAR (Bayoumi & Eichengreen, 1993; Blanchard & Quah, 1989). The estimated system must be a representation of an infinite moving-average process of economic variables (X_t) and economic shocks ε_t. For a bivariate AS-AD model, vector X_t consists of the first differences of the basic variables: Δy_t and Δp_t. Using the lag operator L, it can be re-written as:

$$\begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix} = \sum_{i=0}^{\infty} L^i \begin{bmatrix} a_{11i} & a_{12i} \\ a_{21i} & a_{22i} \end{bmatrix} \begin{bmatrix} \varepsilon_{dt} \\ \varepsilon_{st} \end{bmatrix} \quad (3)$$

with the underlying supply and demand shocks denoted respectively as ε_{st} and ε_{dt}. Assuming that both Δy_t and Δp_t are weakly stationary, and using the Wold's theorem, X_t can be reduced to a standard vector-autoregression, in which estimated residuals for each dependent variable are e_{yt} and e_{pt}. In order to transform this system into the structural model, we display residuals in terms of the structural shocks and impose four restrictions to properly identify the SVAR. The first two restrictions come from a regular normalization of variance of both shocks. The third one states that supply and demand shocks are independent. The fourth restriction is theory-based and comes directly from the AS-AD specification. If a demand shock only temporarily influences output, then its cumulative effect on the changes in output must be equal to zero. The last step of the specification involves additional qualitative (over-identifying) restrictions imposed on the model (Taylor, 2004).

The empirical estimation of the model covers quarterly data on real GDP and prices (GDP deflator) for the 23 European economies[3]. The data covering period 1995q2 to 2013q1 was obtained from the Eurostat Database. Based on the ADF (Said & Dickey, 1984) and KPSS (Kwiatkowski, Phillips, Schmidt & Shin, 1992) tests, we conclude that both output and prices for every country in the sample are I(1) processes[4], and the model can be estimated with four lags. Diagnostic tests applied to residuals (e.g. normality, auto-correlation) showed no clear statistical evidence to reject the models.

RESULTS AND DISCUSSION

The average values of correlation coefficient for demand disturbances were calculated for the entire period. Taking into account different geographical areas, correlation coefficients were computed for the whole sample (whole), euro area (ea), core countries[5] (core), peripheral countries[6] (per), core and periphery[7] (core-per), and V4 countries (Table 1). This analysis revealed unexpected results. The average correlation of

[2] All the results for supply shocks are available upon request.

[3] Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, the United Kingdom. The reliable time-series for Bulgaria, Croatia, Ireland, Malta and Romania do not cover the entire period of 1995-2013.

[4] All the time-series statistics are available upon request.

[5] Austria, Belgium, France, Germany, Italy, Luxembourg and the Netherlands.

[6] Cyprus, Finland, Greece, Portugal, the Slovak Republic, Slovenia and Spain.

[7] Excluding correlations within core and within periphery groups, e.g. Germany and Greece, but not Germany and France nor Greece and Spain.

shocks among V4 countries is the highest (0.243) among all considered samples. The value of this coefficient is 0.2 higher than the one for entire sample. Even core countries of the euro area are characterized by lower value of mean demand shock correlation coefficient (0.137). Demand shocks similarity among all the members of the EMU is considerably lower. The lowest value of coefficient was obtained for the EMU periphery countries (-0.028), what brings about the notion of high heterogeneity among those countries. The corresponding measure for core-periphery sample is 0.01, what suggests that monetary policy appropriate for core countries might not be in the best interest of periphery. This result implies that among the chosen sub-samples V4 countries are best candidates to form a monetary union. Very high correlation of shocks among V4 countries implies that a common monetary authority should be able to effectively implement monetary policy that may serve the interest of the entire area.

Table 1. Descriptive statistics of correlation coefficients of demand shocks for of EU countries (1996q2-2013q1)

Sample	whole sample	euro area	core	periphery	core-periphery	V4 countries
Mean	0.041	0.025	0.137	-0.028	0.01	0.243
Median	0.04	0.022	0.137	-0.043	0.002	0.259
Maximum	0.677	0.451	0.451	0.265	0.436	0.494
Minimum	-0.403	-0.287	-0.135	-0.287	-0.248	0.070
Standard Deviation	0.165	0.15	0.144	0.134	0.141	0.151
Observations	253	105	21	28	56	6

Source: own calculations.

The analysis of demand shocks similarity using pairs of countries brings about very clear-cut conclusions (Table 2). Firstly, Poland and the Czech Republic are characterized by an extremely high correlation coefficient of demand shocks (0.494), which implies that they are eligible candidates for a monetary union formation. Secondly, in the case of the Czech Republic, the two best candidates for a common currency introduction are, respectively, Poland and Hungary (0.269), and in the case of Hungary, Poland (0.264) and the Czech Republic (0.269). Taking into consideration the fact that regarding Poland, Hungary is the third country with the highest correlation coefficient, one may conclude that these three countries are eligible candidates to form an efficiently functioning monetary union. The situation, however, is different in case of Slovakia which is characterized by a relatively high correlation coefficient of demand shocks only with Poland (0.255), and by rather low ones with the Czech Republic (0.070) and Hungary (0.105).

Pairwise correlations were also calculated for 15 EMU countries in the sample, with exception of previously analyzed Slovakia. Mean values of correlation coefficient for Austria with the entire sample, the euro area and core countries are respectively 0.00, 0.01 and 0.07 (Table 3). This indicates that Austria has unfavourable perspectives for successful monetary union formation, even though it is characterized by relatively high values of coefficient with Finland, France and Germany. The situation is much more suitable for Belgium with respective mean values equal to 0.12, 0.13 and 0.17. Cyprus has a mean value of -0.01 for correlation coefficient with core countries. This indicates that optimal monetary policy for core countries may not be adequate for the Cypriot

economy. The case of Estonia is very similar to Cyprus – the country has a low capability for successful monetary union formation. The one exception is an extremely high value of correlation coefficient with the United Kingdom (0.68). Finland also presents rather poor perspectives for participation in monetary union. Highest values for this country are above 0.2 and the three top candidates are from outside of the Eurozone.

Table 2. Pairwise correlation coefficients of demand shocks of V4 with EU countries (1996q2-2013q1)

Poland		Hungary		Czech Republic		Slovakia	
Country	**r**	**Country**	**r**	**Country**	**r**	**Country**	**r**
Czech	0.494	Czech	0.269	Poland	0.494	Belgium	0.436
Denmark	0.330	Poland	0.264	Hungary	0.269	Cyprus	0.265
Hungary	0.264	Finland	0.231	Finland	0.191	Poland	0.255
Latvia	0.258	Greece	0.176	Denmark	0.183	Lithuania	0.185
Slovakia	0.255	Cyprus	0.157	Belgium	0.154	Latvia	0.153
Sweden	0.251	Sweden	0.150	Slovenia	0.148	Hungary	0.105
Finland	0.249	Latvia	0.142	Austria	0.102	Greece	0.096
Belgium	0.238	Germany	0.139	Lithuania	0.102	Denmark	0.081
Cyprus	0.237	Lithuania	0.108	Netherlands	0.086	Spain	0.081
Lithuania	0.194	Slovakia	0.105	Portugal	0.072	Finland	0.075
Greece	0.149	Denmark	0.077	Slovakia	0.070	Czech	0.070
Germany	0.134	Portugal	0.069	Germany	0.062	France	0.062
France	0.127	UK	0.066	Greece	0.022	Sweden	0.023
Netherlands	0.061	Estonia	0.029	Sweden	0.004	Netherlands	-0.010
Austria	0.040	Slovenia	-0.004	France	-0.036	Portugal	-0.019
UK	0.001	Belgium	-0.008	UK	-0.048	UK	-0.048
Spain	-0.007	Italy	-0.012	Italy	-0.064	Italy	-0.050
Luxembourg	-0.029	Netherlands	-0.078	Spain	-0.108	Germany	-0.052
Italy	-0.070	France	-0.094	Cyprus	-0.114	Austria	-0.063
Portugal	-0.088	Luxembourg	-0.119	Estonia	-0.124	Estonia	-0.082
Estonia	-0.100	Spain	-0.157	Latvia	-0.141	Slovenia	-0.132
Slovenia	-0.113	Austria	-0.193	Luxembourg	-0.151	Luxembourg	-0.179
mean	0.131	mean	0.060	mean	0.053	mean	0.057

Source: own calculations.

The average values of correlation coefficient for France with the entire sample, the euro area and core countries are respectively 0.11; 0.14 and 0.28, which indicates that France can successfully form a monetary union, particularly with the core countries (Table 4). Respective values for Spain are -0.03, 0.00 and 0.11, what leads to an opposite conclusion. Latvia has extremely high value of correlation coefficient with Lithuania, what could be explained by their proximity. Best candidates to form an optimum currency area with Germany can be found among core countries, although values of correlation coefficient are only moderate. Greece is characterized by negative correlations both with euro area (-0.02) and core countries (-0.05).

Two best candidates for monetary union formation with Italy are Slovenia and Spain, yet even in the case of this countries shocks correlations are rather small (Table 5). Mean values for Italy are close to zero, what is also true for Luxembourg. On the other hand, Luxembourg reveals a rather high shock similarity with other core countries, even though two best candidates for Luxembourg are from outside the EMU. The Netherlands is characterized by close to zero mean values with the entire sample, as well as with the

EMU, and rather high with the core countries. Taken together, the Netherlands and France seem to be exceptionally good candidates to form a monetary union. Mean values for Portugal are all negative and the country is characterized by the highest demand shock similarity with Austria (0.16). This result indicates that Portugal should not seek monetary unification with any of analyzed countries. Much like the Netherlands, Slovenia is characterized by the average values of coefficients close to zero, with the entire sample and the Eurozone, but rather high with the core countries. Two best candidates for monetary union with Slovenia are Italy and the Netherlands.

Table 3. Pairwise correlation coefficients of demand shocks of Austria, Belgium, Cyprus, Estonia and Finland with EU countries (1996q2-2013q1)

Austria		Belgium		Cyprus		Estonia		Finland	
Partner	**r**	**Partner**	**r**	**Partner**	**r**	**Partner**	**r**	**Partner**	**r**
Finland	0.207	Slovakia	0.436	Latvia	0.361	UK	0.677	Poland	0.249
France	0.200	Denmark	0.349	Slovakia	0.265	Lithuania	0.091	Denmark	0.234
Germany	0.193	France	0.339	Lithuania	0.263	Latvia	0.074	Hungary	0.231
Portugal	0.115	Netherlands	0.268	Poland	0.237	Hungary	0.029	Netherlands	0.210
Belgium	0.110	Poland	0.238	Greece	0.178	Cyprus	-0.010	Austria	0.207
Czech	0.102	Finland	0.195	Hungary	0.157	Luxembourg	-0.027	Belgium	0.195
Spain	0.084	Czech	0.154	Sweden	0.111	Greece	-0.037	Czech	0.191
Netherlands	0.060	Slovenia	0.148	UK	0.083	Germany	-0.048	UK	0.187
Poland	0.040	Germany	0.147	Germany	0.043	Finland	-0.053	Sweden	0.168
Sweden	0.030	Luxembourg	0.137	Denmark	0.033	Italy	-0.056	France	0.151
UK	-0.006	Austria	0.110	Belgium	0.031	Belgium	-0.060	Slovenia	0.142
Denmark	-0.016	Latvia	0.102	Estonia	-0.010	Sweden	-0.061	Latvia	0.139
Luxembourg	-0.020	Sweden	0.096	Portugal	-0.050	Slovakia	-0.082	Germany	0.086
Slovenia	-0.028	Portugal	0.068	France	-0.055	Poland	-0.100	Slovakia	0.075
Slovakia	-0.063	Spain	0.060	Czech	-0.114	Slovenia	-0.106	Greece	0.055
Latvia	-0.071	UK	0.038	Italy	-0.118	Netherlands	-0.111	Italy	0.051
Italy	-0.099	Italy	0.032	Slovenia	-0.118	Czech	-0.124	Portugal	0.041
Lithuania	-0.117	Cyprus	0.031	Spain	-0.122	Austria	-0.137	Lithuania	-0.041
Estonia	-0.137	Hungary	-0.008	Finland	-0.132	Portugal	-0.146	Estonia	-0.053
Cyprus	-0.179	Estonia	-0.060	Luxembourg	-0.149	France	-0.187	Spain	-0.116
Hungary	-0.193	Lithuania	-0.088	Austria	-0.179	Denmark	-0.246	Cyprus	-0.132
Greece	-0.205	Greece	-0.096	Netherlands	-0.248	Spain	-0.287	Luxembourg	-0.182
Mean	0.000	mean	0.123	mean	0.021	mean	-0.046	mean	0.095
EU mean	0.011	EU mean	0.128	EU mean	-0.020	EU mean	-0.085	EU mean	0.058
core mean	0.074	core mean	0.172	core mean	-0.097	core mean	-0.089	core mean	0.103

Source: own calculations.

The results of a dynamic approach are presented as a 9-element rolling window of correlation coefficient (Figure 1). The analysis of pairwise correlation coefficients reveals no tendencies over time with respect to demand shock similarity. Although, one can observe a sharp increase in values of correlation for early stages of the crisis and the downturn right afterwards (ca. 2007-2009). This might indicate that the economies of V4 countries reacted similarly at the beginning of the crisis, but due to differences in economic fundamentals and implemented policies they subsequently diverged. The investigation of the average values of correlation coefficients for V4 and the EMU brings clear evidence that, during the entire period, demand shock similarity among V4 countries was considerably higher than for the EMU. This indicates that the V4 is closer

to being an optimum currency area than the EMU. V4 mean correlations are characterized by a higher variability which can be attributed to relatively small size of the sample comparing with the Eurozone.

Table 4. Pairwise correlation coefficients of demand shocks of France, Spain, Latvia, Germany and Greece with EU countries (1996q2-2013q1)

France		Spain		Latvia		Germany		Greece	
Partner	**r**	**Partner**	**r**	**Partner**	**r**	**Partner**	**r**	**Partner**	**r**
Denmark	0.463	Denmark	0.205	Lithuania	0.509	France	0.342	Latvia	0.335
Netherlands	0.451	France	0.200	Cyprus	0.361	Denmark	0.205	Sweden	0.332
Germany	0.342	Slovenia	0.180	Greece	0.335	Austria	0.193	Lithuania	0.301
Belgium	0.339	Italy	0.170	Poland	0.258	Netherlands	0.174	Cyprus	0.178
Luxembourg	0.218	Luxembourg	0.128	Slovakia	0.153	Luxembourg	0.174	Hungary	0.176
Austria	0.200	Netherlands	0.091	Hungary	0.142	Belgium	0.147	Poland	0.149
Spain	0.200	Austria	0.084	UK	0.140	Hungary	0.139	France	0.123
Slovenia	0.163	Slovakia	0.081	Finland	0.139	Poland	0.134	Denmark	0.116
Finland	0.151	Belgium	0.060	Sweden	0.134	Finland	0.086	Slovakia	0.096
Poland	0.127	Portugal	0.028	Belgium	0.102	Czech	0.062	Finland	0.055
Greece	0.123	Germany	0.015	Portugal	0.086	Cyprus	0.043	UK	0.040
Sweden	0.115	Poland	-0.007	Estonia	0.074	Slovenia	0.022	Czech	0.022
Italy	0.112	Sweden	-0.032	France	-0.002	Spain	0.015	Luxembourg	0.016
Slovakia	0.062	Czech	-0.108	Luxembourg	-0.010	Italy	-0.008	Italy	0.016
Latvia	-0.002	Finland	-0.116	Denmark	-0.036	Estonia	-0.048	Estonia	-0.037
UK	-0.026	Cyprus	-0.122	Italy	-0.048	Slovakia	-0.052	Netherlands	-0.044
Czech	-0.036	Hungary	-0.157	Germany	-0.069	Latvia	-0.069	Portugal	-0.087
Portugal	-0.045	UK	-0.234	Austria	-0.071	Portugal	-0.079	Belgium	-0.096
Cyprus	-0.055	Latvia	-0.253	Czech	-0.141	Sweden	-0.097	Germany	-0.156
Hungary	-0.094	Greece	-0.259	Netherlands	-0.201	UK	-0.141	Austria	-0.205
Lithuania	-0.174	Lithuania	-0.270	Slovenia	-0.208	Greece	-0.156	Slovenia	-0.208
Estonia	-0.187	Estonia	-0.287	Spain	-0.253	Lithuania	-0.274	Spain	-0.259
mean	0.111	mean	-0.027	mean	0.063	mean	0.037	mean	0.039
EU mean	0.138	EU mean	0.000	EU mean	0.026	EU mean	0.052	EUmean	-0.018
core mean	0.277	core mean	0.107	core mean	-0.043	core mean	0.170	core mean	-0.049

Source: own calculations.

The employed SVAR model was then used to build impulse response functions of output to aggregate demand disturbances. The functions obtained both for the V4 countries and the Eurozone economies strictly fit the AS-AD framework, and confirm that demand shocks only temporarily influence output (Figure 2)[8]. Except for Slovakia, which converges towards the equilibrium substantially longer, the effects of demand shocks on output in the V4 Group gradually diminish, and GDP levels return to the steady state after around six quarters. For the remaining three economies, the strongest impacts of AD shocks to GDP is observed after 2 or 3 quarters. The demand disturbances in other EU

[8] The impulse response functions for aggregate supply shocks are not reported, and available upon request.

economies are considerably more idiosyncratic. There are examples of high sensitivity to shocks (Greece), their long-lasting persistence (France), and strong overshooting in the adjustment (Germany). Smaller countries (e.g. Austria, Finland) tend to experience shocks of significantly higher magnitude than larger economies (e.g. Italy, Germany). The values of reaction functions of these economies to demand shocks, as measured in the sixth quarter, are either above or below the level to which V4 economies converge. Altogether, even when compared to the major EMU economies, the V4 countries reveal relatively similar and flexible adjustment to demand shocks with absence of considerable volatility.

Table 5. Pairwise correlation coefficients of demand shocks of Italy, Luxembourg, Portugal and Slovenia with EU countries (1996q2-2013q1)

Italy		Luxembourg		Netherlands		Portugal		Slovenia	
Partner	**r**	**Partner**	**r**	**Partner**	**r**	**Partner**	**r**	**Partner**	**r**
Slovenia	0.282	Sweden	0.310	France	0.451	Austria	0.115	Italy	0.282
Spain	0.170	Denmark	0.222	Denmark	0.328	Italy	0.091	Netherlands	0.218
France	0.112	France	0.218	Belgium	0.268	Latvia	0.086	Denmark	0.202
Portugal	0.091	Germany	0.174	Slovenia	0.218	Czech	0.072	Spain	0.180
Netherlands	0.055	Belgium	0.137	Finland	0.210	Hungary	0.069	France	0.163
Finland	0.051	Spain	0.128	Germany	0.174	Belgium	0.068	Czech	0.148
Denmark	0.044	Netherlands	0.126	Luxembourg	0.126	Finland	0.041	Belgium	0.148
Belgium	0.032	Greece	0.016	Spain	0.091	Slovenia	0.040	Finland	0.142
Greece	0.016	Lithuania	0.012	Czech	0.086	Spain	0.028	Portugal	0.040
Germany	-0.008	Latvia	-0.010	Poland	0.061	Slovakia	-0.019	Germany	0.022
Hungary	-0.012	Austria	-0.020	Austria	0.060	France	-0.045	Hungary	-0.004
UK	-0.018	Estonia	-0.027	Italy	0.055	Cyprus	-0.050	Austria	-0.028
Latvia	-0.048	Poland	-0.029	UK	0.044	Sweden	-0.067	Luxembourg	-0.074
Slovakia	-0.050	Slovenia	-0.074	Slovakia	-0.010	Germany	-0.079	Estonia	-0.106
Estonia	-0.056	Hungary	-0.119	Greece	-0.044	Lithuania	-0.086	UK	-0.108
Czech	-0.064	UK	-0.122	Hungary	-0.078	Greece	-0.087	Poland	-0.113
Poland	-0.070	Italy	-0.135	Estonia	-0.111	Poland	-0.088	Sweden	-0.117
Austria	-0.099	Cyprus	-0.149	Portugal	-0.127	UK	-0.091	Cyprus	-0.118
Cyprus	-0.118	Czech	-0.151	Latvia	-0.201	Netherlands	-0.127	Slovakia	-0.132
Luxembourg	-0.135	Portugal	-0.156	Sweden	-0.236	Estonia	-0.146	Latvia	-0.208
Sweden	-0.149	Slovakia	-0.179	Cyprus	-0.248	Luxembourg	-0.156	Greece	-0.208
Lithuania	-0.176	Finland	-0.182	Lithuania	-0.403	Denmark	-0.172	Lithuania	-0.245
mean	-0.007	mean	0.000	mean	0.032	mean	-0.027	mean	0.004
EU mean	0.020	EU mean	-0.009	EU mean	0.061	EU mean	-0.016	EU mean	0.021
core mean	-0.027	core mean	0.061	core mean	0.145	core mean	-0.019	core mean	0.104

Source: own calculations

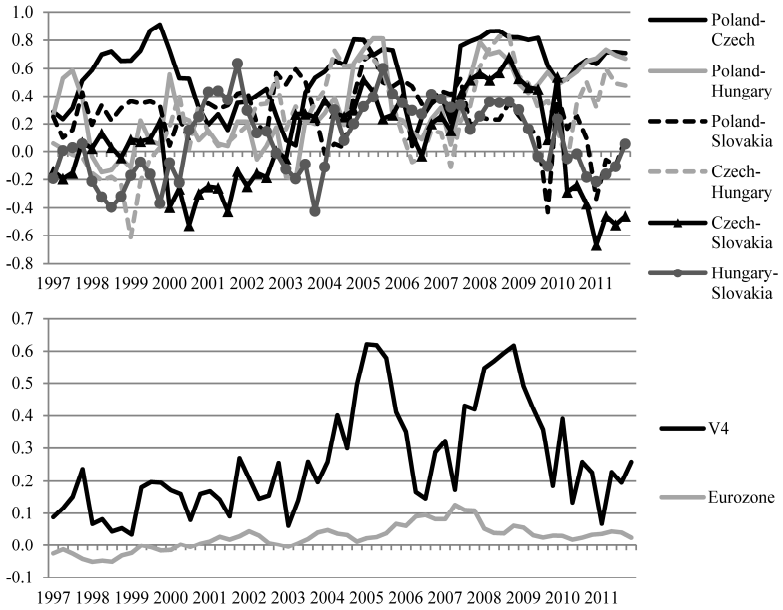

Figure 1. Pairwise correlations of demand shocks of V4 countries and average correlations of demand shocks of the Eurozone in a nine-element rolling window (1996q2-2013q1)

Source: own elaboration.

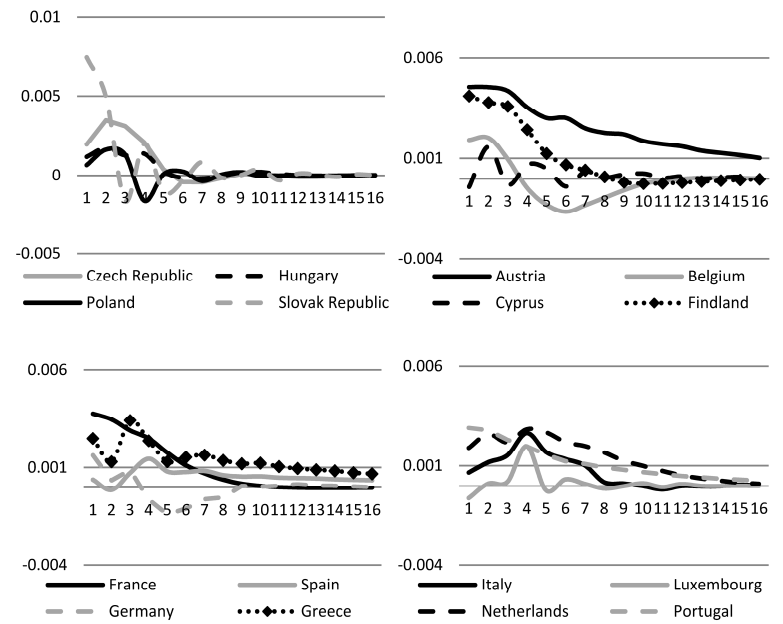

Figure 2. Demand shocks: impulse response functions of output in the V4 and selected Eurozone economies

Source: own elaboration.

CONCLUSIONS

The goal of the paper was to assess the degree of similarities in macroeconomic demand disturbances between the V4 and EMU countries from 1995 to 2013. The coherence of this types of aggregate shocks among economies is one of the leading factors indicating whether the benefits associated with the adoption of a common currency outweigh its costs. Based on the SVAR model estimated for each country, we extracted underlying demand shocks, computed their correlations and measured adjustments of output to these shocks. First of all, the results suggest that the Eurozone is far from being an optimum currency area. With the exceptions of few outlying pairs of countries (e.g. France and the Netherlands), the distribution of demand shocks across states is significantly idiosyncratic. As a consequence, the possibility of an effective performance of the Eurozone as a whole is questionable. On the contrary, the V4 countries are characterized by higher demand shock similarity. Over the entire period of 1995-2013, the average value of correlation coefficients of demand disturbances within the V4 group was higher, not only when compared to the EMU, but also to the core Eurozone countries. This, in turn, along with the evidence derived from the impulse response functions analysis, indicates that common monetary policy might be more appropriate for the V4 rather than for the Eurozone economies.

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Published by Centre for Strategic and International Entrepreneurship – Krakow, Poland