

Why so different from other CEECs – Poland's cyclical divergence from the euro area during the recent financial crisis

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Abstract

The aim of the article is to provide a plausible explanation for the relatively good performance of the Polish economy and the resulting cyclical divergence from the euro area during the recent financial crisis. The investigation of the factors which contributed to this divergence is particularly important in the light of Poland's prospective accession to the euro area, as it may indicate the problem of asymmetric shocks affecting both economies or asymmetric responses to shocks. The results point out to two reasons for the differential output trajectory in Poland as compared to other CEECs: (i) lower exposure to foreign shocks being the result of a lower degree of economic openness, and (ii) resilient internal activity, which may be the result of structural characteristics of the Polish economy. The recent cyclical decoupling might, however, contribute to the acceleration of Poland's real convergence to the euro area and consequently speed up the cyclical convergence process.

Keywords: business cycles synchronisation, propagation of shocks, transmission of cyclical fluctuations, real convergence

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1. Introduction

In the aftermath of the global financial crisis, triggered by the collapse of the U.S. subprime mortgage market, the global economy was hit by severe adverse shocks and consequently experienced a sharp and protracted downturn. With 1.7% y/y Poland was the only EU member state to show real GDP growth in 2009. The resilience of the Polish economy was particularly conspicuous when compared to other Central and Eastern European countries (CEECs¹), whose economies shrank to a similar extent as the EU-15. This was despite the relative underdevelopment of CEECs' financial markets, i.e. lower exposure to the primary cause of the crisis. What is more, the differential performance across the new EU member states during the recent slowdown was clearly at odds with the results of numerous previous studies (for the latest reference, see Fidrmuc, Korhonen 2006; Adamowicz et al. 2009; Skrzypczyński 2009; Konopczak 2009; Marczewski, Konopczak 2009), according to which it was Poland whose degree of business cycle synchrony with the euro area was one of the highest among CEECs. This paper's aim is to find a plausible explanation for this phenomenon. Therefore, we shed some light on economic developments in Poland and other new EU member states during the recent slowdown and on this basis we attempt to disentangle the causes of differences in those developments within the group. In order to achieve these goals we investigate into the following areas: (1) business cycles' developments, (2) trajectories of structural shocks affecting the economies, (3) composition of shocks by their origin, i.e. whether they originate home or abroad, (4) propagation mechanisms of shocks into the economy, and (5) sectoral economic developments.

The rest of the paper is organised as follows. In Section 2 we outline econometric tools for business cycle analysis that were applied in the paper and in Section 3 we summarise the empirical results of the analysis, giving answers to the questions posed.

2. Methodology and data

We base our investigation on an eclectic approach by employing a number of tools for business cycle analysis which allows to extract and combine different kinds of information. We investigate the business cycle developments basing on the output gaps extracted from the GDP and its supply and expenditure components by means of the Christiano-Fitzgerald filter (Christiano, Fitzgerald 2003). Leads and lags of the cyclical fluctuations were established on the basis of a dating algorithm developed by Harding and Pagan (2002). In order to get a detailed insight into output developments we analyse the trajectories of structural shocks obtained from sVAR models – first by applying the Blanchard-Quah identification scheme (Blanchard, Quah 1989), and next the Clarida-Gali decomposition (Clarida, Gali 1994). On the basis of identified sVAR models we are able to investigate such characteristics of the considered economies as the propagation mechanisms (impulse response functions) and composition of structural impulses (forecast error variance decomposition).

¹ For the purpose of the analysis the CEECs group consists of the so-called Visegrad countries: the Czech Republic (CZ), Hungary (HU), Poland (PL) and Slovakia (SK).

2.1. Extraction of cyclical components

In order to isolate cyclical fluctuations from the GDP series and its supply and expenditure components we applied the asymmetric Christiano-Fitzgerald filter (Christiano, Fitzgerald 2003). Its advantage over the most common band-pass alternative, i.e. the Baxter-King filter (Baxter, King 1995), is that it uses the whole time series for the calculation of the cyclical component and therefore allows to extract it at each data point. For this reason there is no loss of data at the ends of the sample, which allows for the analysis of the recent developments.

The approximation to the ideal band-pass filter proposed by Christiano and Fitzgerald (2003) can be written as:

$$\hat{y}_t^c = \sum_{j=-(T-t)}^{t-1} \hat{B}_{j,t}^{CF} y_{t-j} \quad t=1,2,...,T \quad (1)$$

with a frequency response function of:

$$\hat{B}^{CF}(e^{-i\omega}) = \sum_{j=-(T-t)}^{t-1} \hat{B}_{j,t}^{CF} e^{i\omega j} \quad (2)$$

The filter weights $\hat{B}_{j,t}^{CF}$ are obtained by minimising the following loss function:

$$Q = \int_{-\pi}^{\pi} |B(e^{-i\omega}) - \hat{B}^{CF}(e^{-i\omega})|^2 f_y(\omega) d\omega \quad (3)$$

where $B(e^{-i\omega})$ is a response function of the ideal band-pass filter and $f_y(\omega)$ is a spectral density of y_t at frequency ω . The solution to this minimisation problem depends on the characteristics of the series, i.e. its spectral density. Owing to the fact that the true representation of the process is unknown, Christiano and Fitzgerald suggest to solve the problem on the assumption that the data is generated by a random walk, which is in line with the fact that most macroeconomic series exhibit the so-called Granger spectral shape, i.e. low frequencies dominate the spectrum. Assuming non-stationarity of the series the minimisation problem is solved under the restriction that:

$$\sum_{j=-(T-t)}^{t-1} \hat{B}_{j,t}^{CF} = 0, \quad t=1,2,...,T \quad (4)$$

Due to the fact that the weights vary over time, the problem is solved for each sample observation. The optimal weights obtained from the above minimisation problem are given by the following formula:

$$\hat{B}_{j,t}^{CF} = \begin{cases} \frac{1}{2} B_0 - \sum_{k=0}^{j-1} B_k, & j = t-1 \\ B_j, & j = t-2, ..., t-T+1, \quad t=1,2,...,T \\ \frac{1}{2} B_0 - \sum_{k=j+1}^0 B_k, & j = t-T \end{cases} \quad (5)$$

where B_j ($j = 0, \dots, T$) is the weight sequence of the ideal filter:

$$B_j = \begin{cases} \frac{\sin(\frac{2\pi j}{\tau_{max}}) - \sin(\frac{2\pi j}{\tau_{min}})}{\pi j}, & j \neq 0, \quad j = (-\infty; +\infty) \\ \frac{2}{\tau_{max}} - \frac{2}{\tau_{min}}, & j = 0 \end{cases} \quad (6)$$

2.2. Turning points detection

Leads and lags of the CEECs cyclical fluctuations *vis-à-vis* the euro were established on the basis of a dating algorithm developed by Harding and Pagan (2002), building upon Bry and Boschan (1971).

A turning point occurs at time t if the value of a cyclical component at $t(y_t^c)$ is a local extremum relative to the two quarters on either side. For peaks we get the following condition:

$$(y_{t-2}^c, y_{t-1}^c) < y_t^c > (y_{t+1}^c, y_{t+2}^c) \quad (7)$$

and similarly for troughs:

$$(y_{t-2}^c, y_{t-1}^c) > y_t^c < (y_{t+1}^c, y_{t+2}^c) \quad (8)$$

Additionally, the algorithm enforces a minimum duration of each phase (two quarters) and a complete cycle (five quarters), and ensures that peaks and troughs alternate.

2.3. Extraction of structural shocks

In order to extract the underlying structural shocks affecting economies we follow the approach pioneered by Blanchard and Quah (1989), which consists in identifying impulses within a VAR model on the basis of their impact in the long run on the endogenous variables. It is assumed that the structure of the economy is represented by a structural VAR model:

$$\Gamma Y_t = B(L)Y_t + \varepsilon_t \quad (9)$$

where $B(L)$ represents a matrix of lag polynomials of order s and ε_t are interpreted as structural innovations (zero-mean and uncorrelated). All endogenous variables are assumed to be stationary. Owing to the simultaneity bias, the model is estimated in the reduced form. Assuming the invertibility of Γ matrix we can solve (9) for Y_t :

$$Y_t = \Gamma^{-1}B(L)Y_t + \Gamma^{-1}\varepsilon_t \quad (10)$$

which yields the reduced-form VAR model:

$$Y_t = A(L)Y_t + e_t \quad (11)$$

where $A(L) = \Gamma^{-1}B(L)$ and $e_t = \Gamma^{-1}\varepsilon_t$.

The moving average representation of the process can be derived as follows (stationarity condition satisfied owing to I(0)-ness of endogenous variables):

$$\begin{aligned}(I - A(L))Y_t &= e_t \\ Y_t &= (I - A(L))^{-1}e_t \\ Y_t &= (I + A(L) + A(L)^2 + \dots)e_t \\ Y_t &= e_t + C_1e_{t-1} + C_2e_{t-2} + \dots\end{aligned}\tag{12}$$

Reduced-form residuals are linear combinations of structural innovations, since $e_t = \Gamma^{-1}\varepsilon_t$. By substituting this into the above we arrive at the structural moving average representation:

$$Y_t = \sum_{i=0}^{\infty} D_i \varepsilon_{t-i} \tag{13}$$

where $D_i = C_i \Gamma^{-1}$. The elements of D_i matrix represent impulse response parameters of the endogenous variables to structural innovations at lag i . Blanchard and Quah propose to impose restrictions on the cumulated (long-run) impulse response matrix, i.e. $D(1) = \sum_{i=0}^{\infty} D_i$.

The parameters of the $D(1)$ matrix are recovered from the estimates of the reduced model on the basis of the applied identification scheme. Combining (12) and (13) we arrive at:

$$D(1)\varepsilon_t = C(1)e_t \tag{14}$$

where $D(1)$ and $C(1)$ are long-run impulse response matrices of the structural and non-structural shocks, respectively. The variance of (14), the long-run variance Ω , takes the following form:

$$\Omega = D(1)D(1)' = C(1)\Sigma_e C(1)' \tag{15}$$

since $\Sigma_e = I$. The parameters of $D(1)$ are obtained by substituting $C(1)$ and Σ_e in (15) with their estimates. The estimate of Γ matrix is given by:

$$\hat{\Gamma} = \hat{C}(1)\hat{D}^{-1}(1) \tag{16}$$

on the basis of which the structural shocks are recovered:

$$\hat{\varepsilon}_t = \hat{\Gamma}\hat{e}_t \tag{17}$$

In order to extract structural shocks we apply three identification schemes. First, following Bayoumi (1991) and Bayoumi and Eichengreen (1992) we use a slightly modified version of Blanchard and Quah (1989) framework, with the growth rate of real GDP, Δy_t , and consumer prices (instead of unemployment that was used in the original article), Δp_t , as endogenous variables. On the basis of this approach we are able to identify two types of structural innovations – supply ($\varepsilon_{y,t}$) and demand ($\varepsilon_{p,t}$). Conforming to the implications of the Fisher model (1977), Blanchard and Quah (1989) propose to assume that in the long run real GDP can be affected only by supply shocks. This requires the following zero-constraint on the cumulative impact of shocks:

$$\begin{aligned}
\begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix} &= \sum_{i=0}^{\infty} D_i \varepsilon_{t-i} = \sum_{i=0}^{\infty} \begin{bmatrix} d_{11i} & d_{12i} \\ d_{21i} & d_{22i} \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i} \\ \varepsilon_{pt-i} \end{bmatrix} \\
\sum_{i=0}^{\infty} D_i &= \begin{bmatrix} d_{11} & d_{12} \\ d_{31} & d_{32} \end{bmatrix} = \begin{bmatrix} \cdot & 0 \\ \cdot & \cdot \end{bmatrix}
\end{aligned} \tag{18}$$

On the basis of the Blanchard-Quah decomposition we cannot however distinguish transmission of foreign impulses from internal shocks, that is the shocks obtained when controlling for transmission effects. However, by extending the Blanchard-Quah model to a two-country framework we are able to identify shocks by their origin, that is whether they originate home or abroad. Internal and external shocks for each CEEC can be obtained from a four-variable VAR model with the growth rate of real GDP and CPI, at both domestic and the euro area level, as endogenous variables. The structural moving average representation of the model takes the following form:

$$\begin{bmatrix} \Delta y_t^{EA} \\ \Delta p_t^{EA} \\ \Delta y_t^{CEEC} \\ \Delta p_t^{CEEC} \end{bmatrix} = \sum_{i=0}^{\infty} \begin{bmatrix} d_{11i} & d_{12i} & d_{13i} & d_{14i} \\ d_{21i} & d_{22i} & d_{23i} & d_{24i} \\ d_{31i} & d_{32i} & d_{33i} & d_{34i} \\ d_{41i} & d_{42i} & d_{43i} & d_{44i} \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i}^{EA} \\ \varepsilon_{pt-i}^{EA} \\ \varepsilon_{yt-i}^{CEEC} \\ \varepsilon_{pt-i}^{CEEC} \end{bmatrix} \tag{19}$$

Apart from the standard restriction that the demand shocks do not affect GDP in the long run, it is additionally assumed that the CEECs' country-specific shocks cannot determine the euro area variables in the long run (which is in line with their status of small open economies). This translates into the following zero-restrictions:

$$\sum_{i=0}^{\infty} D_i = \begin{bmatrix} d_{11} & d_{12} & d_{13} & d_{14} \\ d_{21} & d_{22} & d_{23} & d_{24} \\ d_{31} & d_{32} & d_{33} & d_{34} \\ d_{41} & d_{42} & d_{43} & d_{44} \end{bmatrix} = \begin{bmatrix} \cdot & 0 & 0 & 0 \\ \cdot & \cdot & 0 & 0 \\ \cdot & 0 & \cdot & 0 \\ \cdot & \cdot & \cdot & \cdot \end{bmatrix} \tag{20}$$

On the basis of the Blanchard-Quah decomposition it is also impossible to distinguish real demand from nominal (monetary policy) shocks. Owing to the fact that this distinction may provide some additional insight into economic developments during the crisis, we also apply the Clarida and Gali (1994) identification scheme. It is based on a stochastic version of the Mundell-Fleming-Dornbusch open economy model (Obstfeld 1985).

The model consists of four equations. The open economy IS equation states that the demand for output is decreasing in the real exchange rate and a (real) demand shock (which may capture e.g. fiscal shocks) and decreasing in the real interest rate. The standard LM equation represents an equilibrium between the real model supply and the real money demand, the latter depending on a real income and a nominal interest rate. The third equation describes price setting process. It states that the price level in period t is an average of the market clearing price expected in period

$t - 1$ to prevail in period t , and the price that would actually clear the output market in period t . It is worth to notice that this specification allows for two extreme cases: (i) of fully flexible prices with output supply determined, and (ii) of fixed prices with output demand determined. The final equation in the model is the UIP condition. Output and money supply as well as demand term are random walks affected respectively by idiosyncratic supply, nominal and demand shocks.

Following this approach the original Blanchard-Quah model is extended into a trivariate system with real effective exchange rate² (q_t) as an additional endogenous variable. Conforming to the implications of the Obstfeld model with fully flexible prices, Clarida and Gali (1994) propose the following identifying restrictions: (i) in the long run the real GDP can be affected only by supply shocks, (ii) in the long run REER can be influenced by both supply and real demand shocks, but not by nominal demand shocks, i.e.:

$$\begin{aligned} \begin{bmatrix} \Delta y_t \\ \Delta q_t \\ \Delta p_t \end{bmatrix} &= \sum_{i=0}^{\infty} D_i \varepsilon_{t-i} = \sum_{i=0}^{\infty} \begin{bmatrix} d_{11i} & d_{12i} & d_{13i} \\ d_{21i} & d_{22i} & d_{23i} \\ d_{31i} & d_{32i} & d_{33i} \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i} \\ \varepsilon_{qt-i} \\ \varepsilon_{pt-i} \end{bmatrix} \\ \sum_{i=0}^{\infty} D_i &= \begin{bmatrix} d_{11} & d_{12} & d_{13} \\ d_{21} & d_{22} & d_{23} \\ d_{31} & d_{32} & d_{33} \end{bmatrix} = \begin{bmatrix} . & 0 & 0 \\ . & . & 0 \\ . & . & . \end{bmatrix} \end{aligned} \quad (21)$$

The expected sign patterns of these shocks on output, the real exchange rate and the price level generated by the model are as follows. A supply shock should produce a depreciation of the currency, a fall in price level and a rise in output. A real demand shock should appreciate the currency, increase the price level and output in the short run. Finally, a nominal shock should produce a depreciation of the currency (though not permanent), a rise in the price level and a transitory positive impact on output.

2.4. Data source

The data used in the analysis come from the Eurostat database. The sample covers the quarterly data from the first quarter of 1995 (for the Czech Republic: from the beginning of 1998) to the first quarter of 2010. All series were seasonally adjusted using the TRAMO/SEATS procedure. The specification of VAR models was decided on basing on the one hand upon lag length criteria and on the other upon residuals' autocorrelation tests. Unreported results regarding stationarity testing and models' specification are available from authors on request.

The economic structures were defined on the basis of the following statistical classifications: (i) NACE (6 branches) for value added, (ii) COICOP (10 groups of products and services) for private consumption, (iii) CPA (6 groups of fixed assets) for investments, (iv) BEC (19 basic categories aggregated into capital, consumption and intermediate goods) for exports and imports.

² REER is CPI-deflated. An increase of the REER means a real appreciation.

3. Empirical results

In this section we make a detailed insight into the output developments during the recent downturn, prompted by the global financial shock, i.e. we analyze trajectories of business cycles and shocks affecting economies, composition of shocks by their origin, propagation mechanisms of shocks into real economy and sectoral economic performance. On this basis we attempt to find plausible explanations for the differential performance across the new EU member states in that period.

3.1. Economic performance during the financial crisis

Two potential reasons for the relative resilience of the Polish economy compared to other CEECs seem plausible: (i) the difference in the propagation mechanism of foreign shocks into the domestic economy that would manifest itself in lags in the business cycle or (ii) internal factors, e.g. the policy reactions or structural characteristics.

The onset of the recent contraction phase (i.e. the recent peak) of the Polish business cycle coincided with the euro area (Figure 1 in the Appendix). The same situation was to be observed in the Czech Republic, whereas in Hungary and Slovakia the peak of the cycle appeared with a one-quarter lag. Therefore the relatively good performance of the Polish economy cannot to be attributed to lags in the transmission mechanism, i.e. to a phase shift compared to other CEECs.

The depth, duration and consequently steepness of the downturn were the factors that distinguished the Polish cycle. The deviation from the trend in the case of Poland amounted to merely 1 percentage point, whereas in the other new EU member states it amounted to 3–4 percentage points – even more than in the euro area, despite a lower direct exposure to the financial turmoil. What is more, the upturn of the Polish cycle appeared a quarter before it appeared in any of the other analysed countries.

In order to get a detailed insight into differential output developments within the CEECs' group we proceed to analyzing the trajectories of structural shocks affecting the economies during the crisis. First, we apply the Blanchard-Quah identification scheme (18) and its internationally-extended version (20). By comparing for each CEEC the series of shocks extracted on the basis of these two schemes, that is the overall as well as internal supply and demand shocks, we may assess whether the recent economic downturn they experienced is to be attributed to the transmission of foreign impulses or rather their internal developments.

As can be seen in Figure 2, in the second half of 2008 the economy of the euro area was hit by massive adverse shocks (amounting to approximately three standard deviations) – both supply and demand. Poland was also subject to negative overall shocks, but of a much smaller magnitude (around one standard deviation). Interestingly, negative overall impulses in Poland can be entirely attributed to the transmission mechanism, since the internal shocks that affected the economy in the midst of the financial crisis were highly positive. This resulted in a massive slump in recursive correlation coefficients of internal Polish shocks with the euro area overall impulses. Contrary to the case of Poland, negative overall impulses in other CEECs can be attributed not only to transmission mechanisms, but also to their internal activity developments. It seems, therefore,

that the recession experienced by those countries were not only the result of contagion, but also of internal mechanisms.

In order to decompose the demand shock into its real and nominal component, we move on to another identification scheme, that is the Clarida-Gali decomposition (21). The results reveal that the differential trajectory of demand shocks in Poland and the euro area is the result of different paths of nominal demand (monetary policy) shocks (Figure 3).

In the case of real demand shocks, i.e. the preference shocks relative to the 'rest-of-the-world' Poland was hit to a similar extent as the euro area, which manifested itself in a massive nominal depreciation of the Polish zloty reflected in the real depreciation of the similar size. As regards nominal demand shocks, at the end of 2008 both Poland and the euro area underwent a period of monetary policy relaxation in response to the financial turmoil. However, the outcome of this action in terms of the actual nominal shocks affecting both economies was different. Namely, the monetary easing didn't prevent strongly negative price shocks in the euro area, proving to be insufficient in terms of output stabilisation. In Poland, in turn, nominal shocks in that period were positive. In international competitiveness terms it can be argued that the strong nominal depreciation of the Polish zloty, despite positive price adjustments, created a sufficient cushion against the external shock, which was not a case for the mainly price adjustments which occurred in the euro area.

The observed divergence between Poland and the euro area in the case of supply and nominal shocks stands in stark contrast to the trajectory of these shocks prior to the crisis. Until the end of 2007 Poland exhibited the highest degree of symmetry in this respect with the euro area of all the Visegrad countries. Consistent with the above descriptive analysis, the recursive correlation coefficients of the Polish supply and nominal shocks *vis-à-vis* the euro area fell dramatically during the recent downturn, contrary to the situation in other CEECs. The degree of symmetry of supply and nominal shocks with the euro area in those countries increased considerably in the crisis period, which can clearly be attributed to the transmission effect. All the analysed economies were subject to adverse real demand shocks, which can be related to the global capital flight from the emerging countries. All the analysed economies were subject to adverse real demand shocks, which can be related to the global capital flight from the emerging countries rather than to domestic components of demand.³

To sum up, the analysis of structural shocks that hit the considered economies in the aftermath of the recent financial crisis revealed that the resilience of internal activity was the factor that distinguished Poland from other CEECs. Namely, country-specific shocks were highly positive in Poland in that period, contrary to other new EU member states, though Poland was hit to a similar extent by the slump in international trade capital flows. In the next subsection we try to pinpoint those characteristics of the Polish economy that might have cushioned the impact of adverse global shocks.

³ Weber (1997) notes that the real demand shocks are highly correlated with the real exchange rate and demonstrates that these shocks do not have a significant impact on output. He concludes that this kind of shocks is a 'catch-all' term which reflects what is left of real exchange rate movements that cannot be forecast from other variables in the system. In these lines we argue that the global capital flight from the emerging countries was the 'missing chain' in the systems for CEECs in the crisis period.

3.2. Plausible explanations

The severity of the recent downturn was in the case of Poland considerably lower than in other Visegrad countries, which can be attributed to its relatively resilient internal activity. In this section we attempt to examine different characteristics of the considered countries in order to find possible explanations for this phenomenon.

First of all, it can be assumed that the recent crisis was exogenous from the perspective of developing and emerging economies, i.e. was transmitted from the advanced countries. That is why the exposure of an economy to foreign shocks should play a key role in determining the evolution of the business cycle in that period.

The share of euro area shocks in structural impulses determining the output in Poland has been by far the lowest of all the CEECs (Figure 4). This applies in particular to the euro area demand shocks, and can be related to the degree of openness and the size of the domestic market of the analysed economies. What is more, the exposure of the Polish economy to shocks originating in the euro area did not change during the recent downturn, contrary to other Visegrad countries. The observed rise in susceptibility of the Czech Republic, Hungary and Slovakia to foreign shocks at the end of the sample might explain the considerable convergence of their business cycles *vis-à-vis* the euro area (as measured by recursive correlation coefficients) in that period.

Apart from different exposure to foreign impulses, the propagation of those shocks into the domestic economy may also explain the variation of economic performance among the CEECs. The impulse response of GDP to euro area shocks is notably different in the considered economies (Figure 5). The reaction of the output in Hungary by far surpasses the reaction in other countries. Poland and the Czech Republic, on the other hand, seem to be least reactive to the developments in the euro area. These two factors combined, that is much lower exposure and much lower responsiveness, could have made the transmission mechanism in Poland much weaker than in other CEECs.

The investigation into the sectoral developments in the CEECs, compared to the euro area, might also shed some light on the reasons of differential output trajectories. The evolution of Polish cyclical components in some sectors did not differ from other CEECs, nor the euro area; in some sectors, however, Poland exhibited a disparate behaviour (Figure 6). It seems that this outcome was not a coincidence and can be related to structural characteristics of the analysed economies.

On the expenditure side the relatively good performance of the Polish economy can be mainly attributed to private consumption developments. Firstly, the onset of the contraction phase in the Polish consumption lagged behind the peak of the euro area consumption cycle by four quarters. Secondly, the depth of the downturn was much lower: Poland did not experience negative deviations from the trend during the recent crisis. A mild slowdown could also be observed in the Czech Republic, however, similarly to Slovakia and Hungary and contrary to Poland, the synchrony of the cyclical component with the euro area increased considerably at the end of the sample (being the result of a quicker response to the euro area contraction than in the previous period), which points to the transmission of shocks. No sign of convergence of the Polish private consumption cycle *vis-à-vis* the euro area during the recent crisis suggests that the consumers' behaviour in Poland did not react to the global crisis. This result is also consistent with the trajectory of the extracted nominal demand shocks, which indicates that – unlike in other countries – the Polish internal demand (primarily consumption owing to CPI inflation being a proxy for price developments) reacted positively to monetary easing.

This phenomenon can be tracked down to the structure of the consumption expenditures in Poland, compared to other considered economies (Figure 7). Despite considerable convergence that has taken place in this respect since the 90s, Poland has the most dissimilar consumption patterns *vis-à-vis* the euro area, as measured by the Landesmann index (together with Hungary). According to Landesmann and Székely (1995) this index is calculated according to the following formula:

$$S_L^{CEEJ} = \sum_{i=1}^n \sqrt{(s_{CEEJ}^i - s_{EA}^i)^2 \left(\frac{s_{CEEJ}^i}{100}\right)}$$

where s^i stands for the percentage share of i th category in the structure and $CEEJ$ for the j th CEEC. The index takes values between 0 and 1. The lower the value, the smaller the disparities in economic structures.

The share of inelastic expenditure (food and beverages, as well as housing, water, electricity and gas) in the overall consumption basket in Poland is the highest of all CEECs (approximately 5 percentage points higher than in other Visegrad countries, and as much as 12 percentage points higher than in the euro area). The share of ‘dispensable’ expenditure (on restaurants and hotels, as well as recreation and culture) is, on the other hand, the lowest (5 percentage points lower than on average in other CEECs and 7 percentage points lower than in the euro area). Therefore, the structure of private consumption might have buffered the impact of adverse global shocks on the Polish household demand.

Contrary to consumption developments, the investment demand relative to the trend fell in Poland to a similar extent as in the euro area. What is more, until the first quarter of 2010 there were no signs of recovery in this respect. Oddly enough, this was despite the highest (together with Slovakia, which also experienced a sharp fall) share of the so-called other construction works, which comprises mainly public investment in infrastructure, fairly resilient to unfavourable macroeconomic conditions (Figure 8). This indicates a risk-averse approach to investing, mainly in machinery and transport equipment, exhibited by entrepreneurs in reaction to the financial crisis. These decisions could possibly be underpinned by a higher share of FDI in the aggregate investments in Poland, as compared to the euro area, and a sharp fall of FDI inflows during the financial crisis.

In reaction to the global collapse of trade in the aftermath of the crisis, Poland’s exports fell to a similar extent as in the euro area. Owing to a high degree of their openness, other CEECs experienced even deeper slump. Poland’s imports, on the other hand, fell dramatically in 2009 (the maximum deviation from trend amounted to almost 15 percentage points, whereas in the euro area merely to 10 percentage points). This phenomenon can also be tracked down to the structure of trade in the analysed countries (Figure 9). In the case of the euro area and the Czech Republic the composition of exports and imports is fairly symmetrical. Consequently, the deviation of their imports and exports from the trend were of similar magnitude. In Poland and Slovakia, on the other hand, the share of capital goods in imports is much higher and of consumption goods – much lower than in exports. Private consumption is in general much less volatile than investment (likewise, during the recent downturn the deviation from the trend in the analysed countries was much higher in the case of investment demand than consumption expenditure). Therefore the

structural disparity of exports and imports could explain much higher depth of imports' slump in Poland⁴. In Slovakia, however, such divergence did not take place. This outcome could be, in turn, explained by the composition of consumption goods exports in both countries (Figure 10). The share of durable consumer goods in Slovak exports is much higher than in Poland. In the case of non-durable goods the situation is the opposite. That is why the foreign demand for Polish consumer goods is much less susceptible to unfavourable economic developments than in Slovakia.

The trajectory of the supply side components of GDP are in line with the previous findings, according to which the relatively good performance of the Polish economy is the result of the dichotomy in the cyclical behaviour of externally-exposed (exports and investments) and internal (consumption) economic activity. Namely, the industrial sector seems to have been the only one severely affected by the recent global crisis. However the depth of the slump was much lower as compared to other analysed countries. Market services and construction sector, on the other hand, proved to be fairly resilient to the crisis. This is the reflection of the fact that services account for a large proportion of private consumption, whereas the downturn in construction building was offset by a high proportion of public investments, fuelled by EU structural funds.

The composition of GDP (Figure 11) together with the sectoral evolution of the business cycle may also explain differences in cyclical behaviour across CEECs. Namely, the share of industry in Poland is the lowest, whereas that of non-financial market services (especially trade) – the highest among the Visegrad countries. Public services resilience, the sector having second highest (after Hungary) share in the GDP, was also an important output stabilizing factor. Taking into account the difference in the susceptibility of these sectors to foreign shocks, structural disparities may to some extent stand behind the differential performance of the analysed countries during the recent crisis.

4. Conclusions

In conclusion, the differential output trajectory in Poland and other CEECs can be ascribed to two major factors: (i) lower share of internationally-driven components (manufacturing, exports) in GDP and consequently lower responsiveness of output to foreign shocks and lower share of those shocks in structural impulses, and (ii) the dichotomy in internal activity being the result of differential structural characteristics. The first factor have for long been recognised in the discussion on the sources of variation of economic activity within the CEEC group. The second one, however, is an important contribution of this paper. It seems, namely, that domestically-oriented sectors (market services and construction), as well as consumption demand in all CEECs except for Poland experienced a considerable convergence towards euro area developments in the aftermath of the crisis. This may indicate an increase in the interdependency (risk sharing) between those countries and the euro area. Poland, on the other hand, experienced a notably different trajectory of internal shocks and, consequently, internal economic activity. This outcome suggests that Poland's relatively high degree of synchronisation with the euro area may diminish, which may negatively influence the balance of costs and benefits of euro adoption. On the other hand, the relative structural characteristics of the Polish economy may change as a result of

⁴ An immediate and strong reduction of imports of the second-hand passenger cars due to the zloty depreciation should be considered as additional factor contributing to this slump.

a disparate cyclical behaviour, as compared to the euro area. The consumption patterns are to a great extent the reflection of the level of disposable income of consumers⁵. Therefore, in consequence of the acceleration of real convergence process (in terms of GDP *per capita*) of the Polish economy during the recent crisis, the disparity of consumption patterns relative to the euro area may also shrink. This could make Poland's output more volatile, but at the same time it may contribute to cyclical convergence and consequently allow Poland to fully enjoy the benefits of the prospective accession to the euro area.

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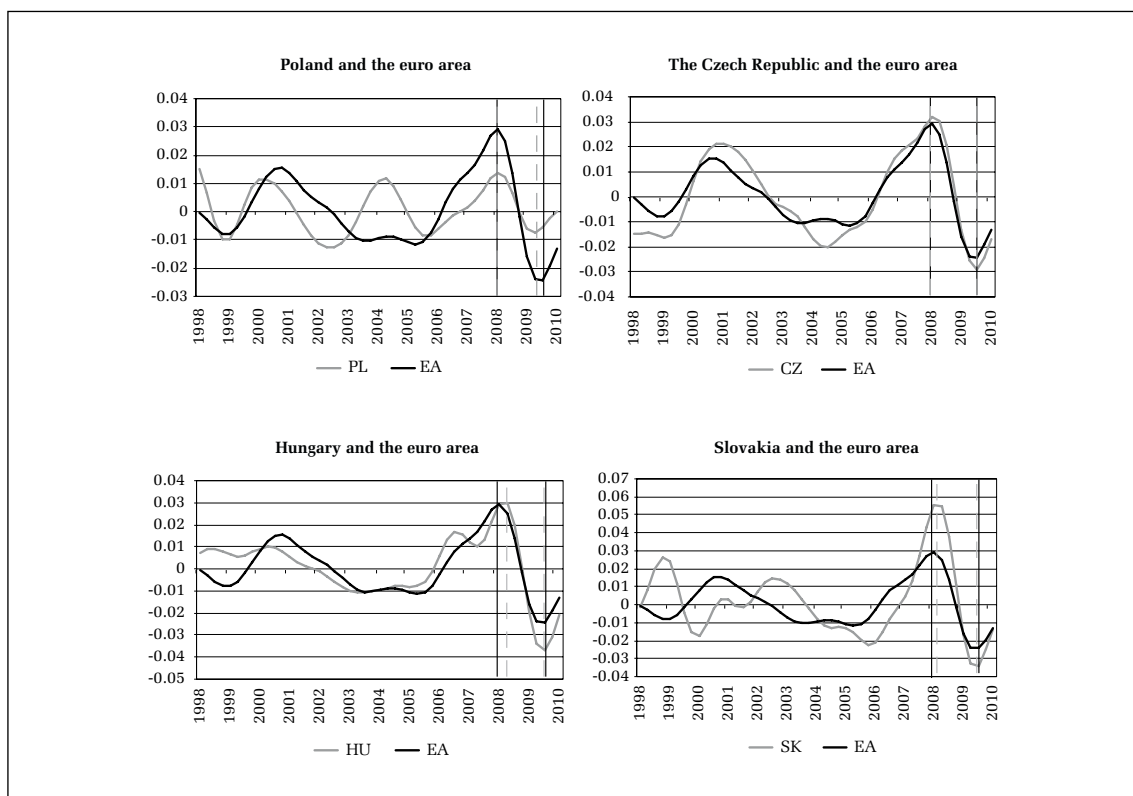
⁵ According to the Linder hypothesis (Linder 1961) GDP *per capita* is the most important determinant of the demand structure.

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Appendix

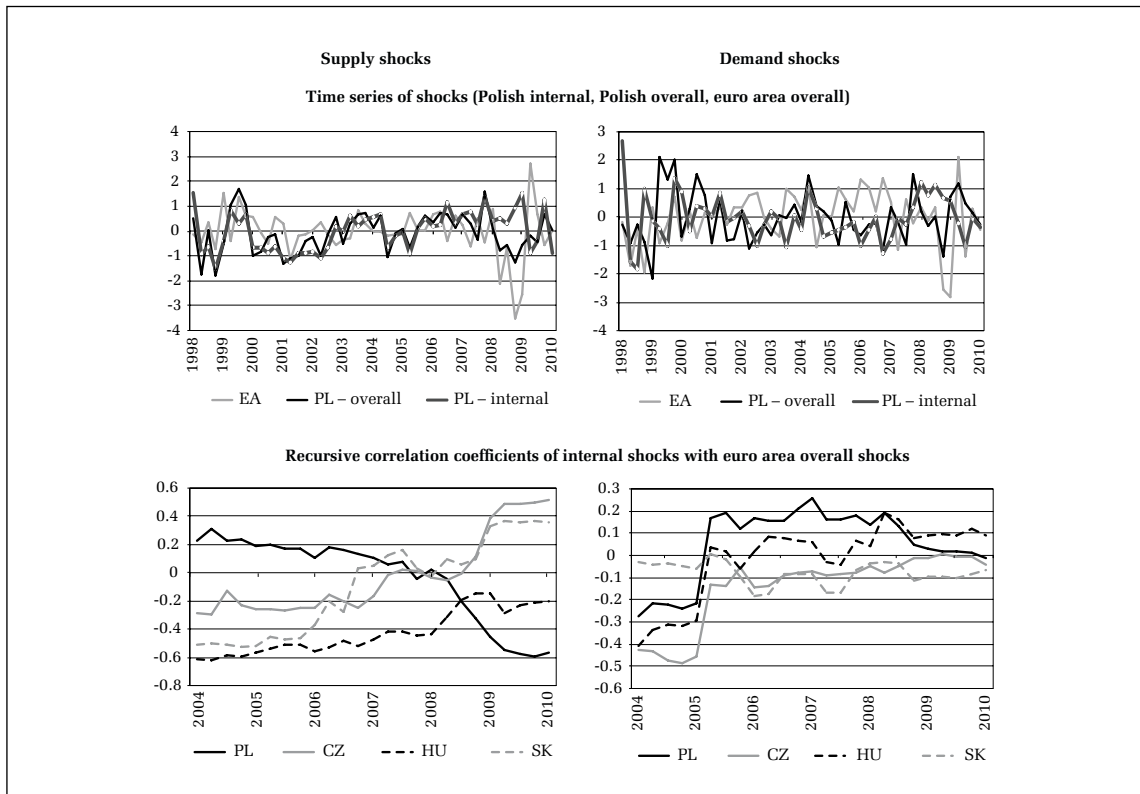
Figure 1

Cyclical components of (log) GDP



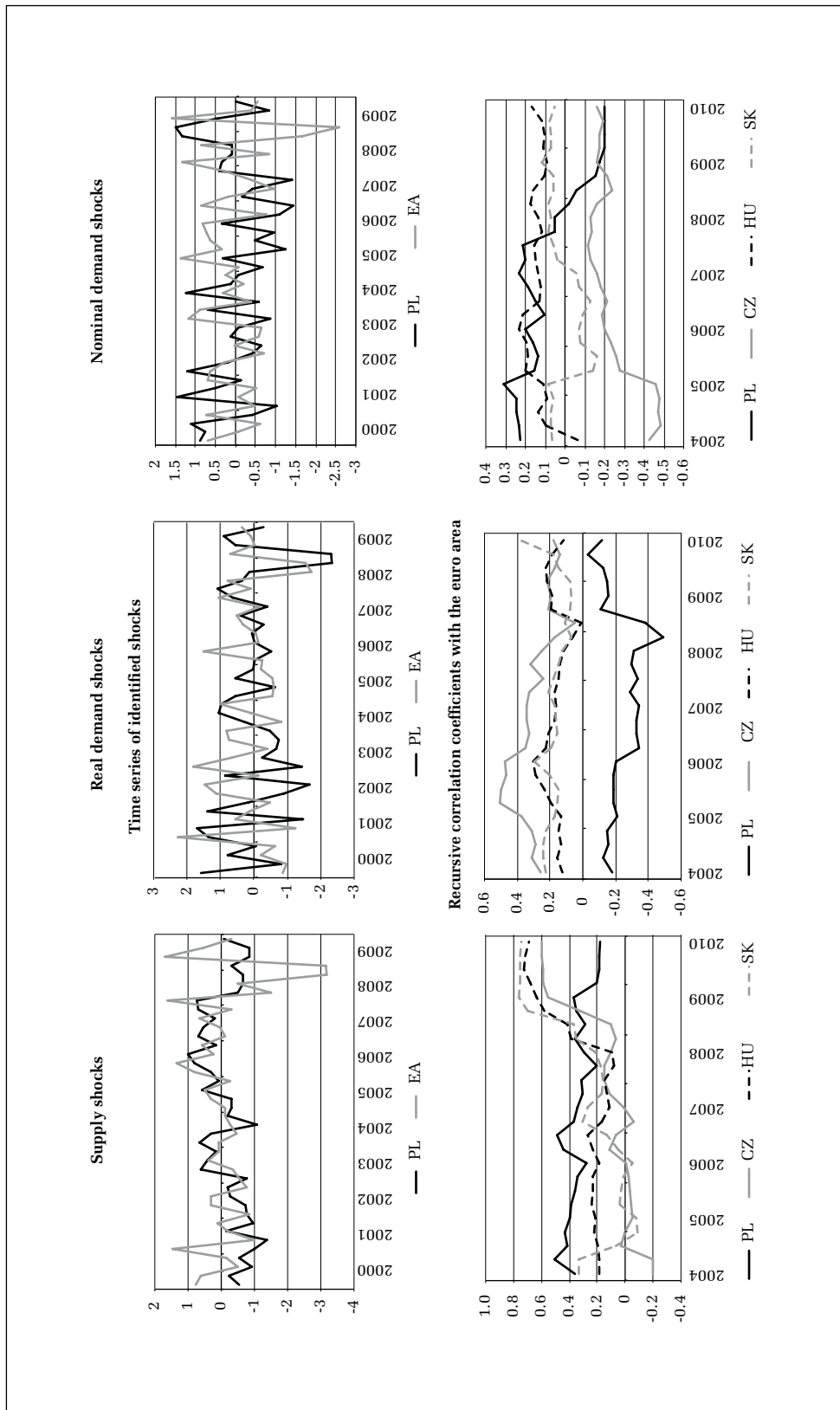
Note: Turning points are flagged by vertical lines (black for the euro area, grey for CEECs).

Figure 2
Supply and demand shocks



Note: The overall shocks were extracted from a two-variable VAR (GDP, CPI) model by applying the Blanchard-Quah decomposition. Internal shocks were identified on the basis of a four-variable VAR (with GDP and CPI in the euro area and each country's counterparts) by applying the internationally-extended Blanchard-Quah scheme. Correlation coefficients were computed in rolling windows of fixed length (9 years) starting from the first quarter of 1995.

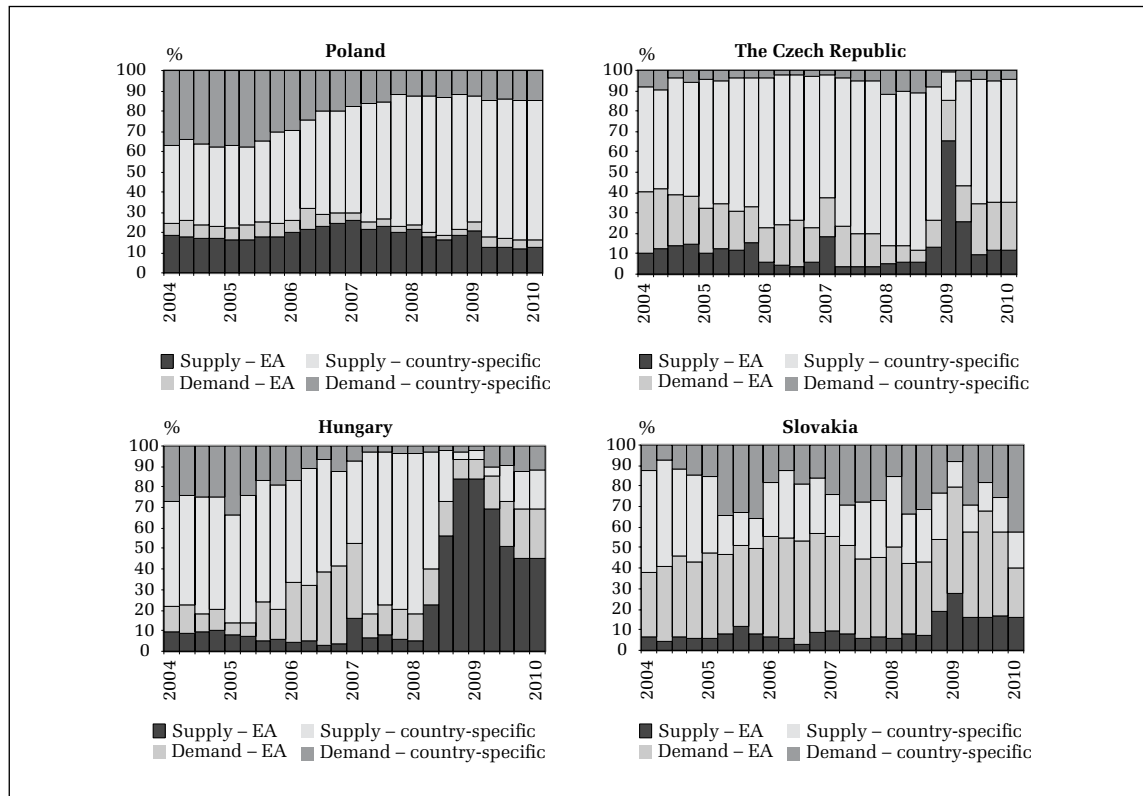
Figure 3
Supply, real and nominal demand shocks



Note: The structural shocks were identified on the basis of a trivariate VAR (GDP, REER, CPI) by applying the Clarida-Gali decomposition. Correlation coefficients were computed in rolling windows of fixed length (9 years) starting from the first quarter of 1995.

Figure 4

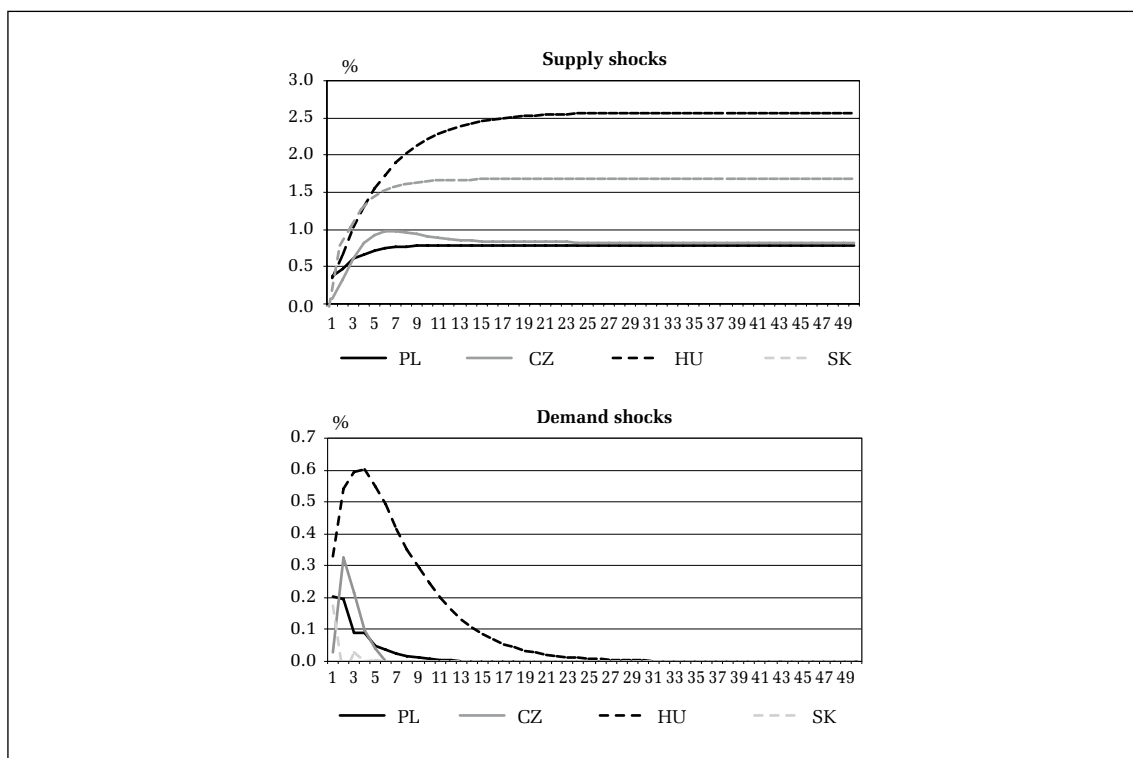
CEECS' GDP forecast error variance decomposition



Note: The decompositions were obtained from four-variable VAR models (with GDP and CPI in the euro area and their CEECs counterparts) estimated in fixed starting-point windows (the first subsample being the first quarter of 1995 to the first quarter of 2004). The results for each subsample are flagged with the last observation.

Figure 5

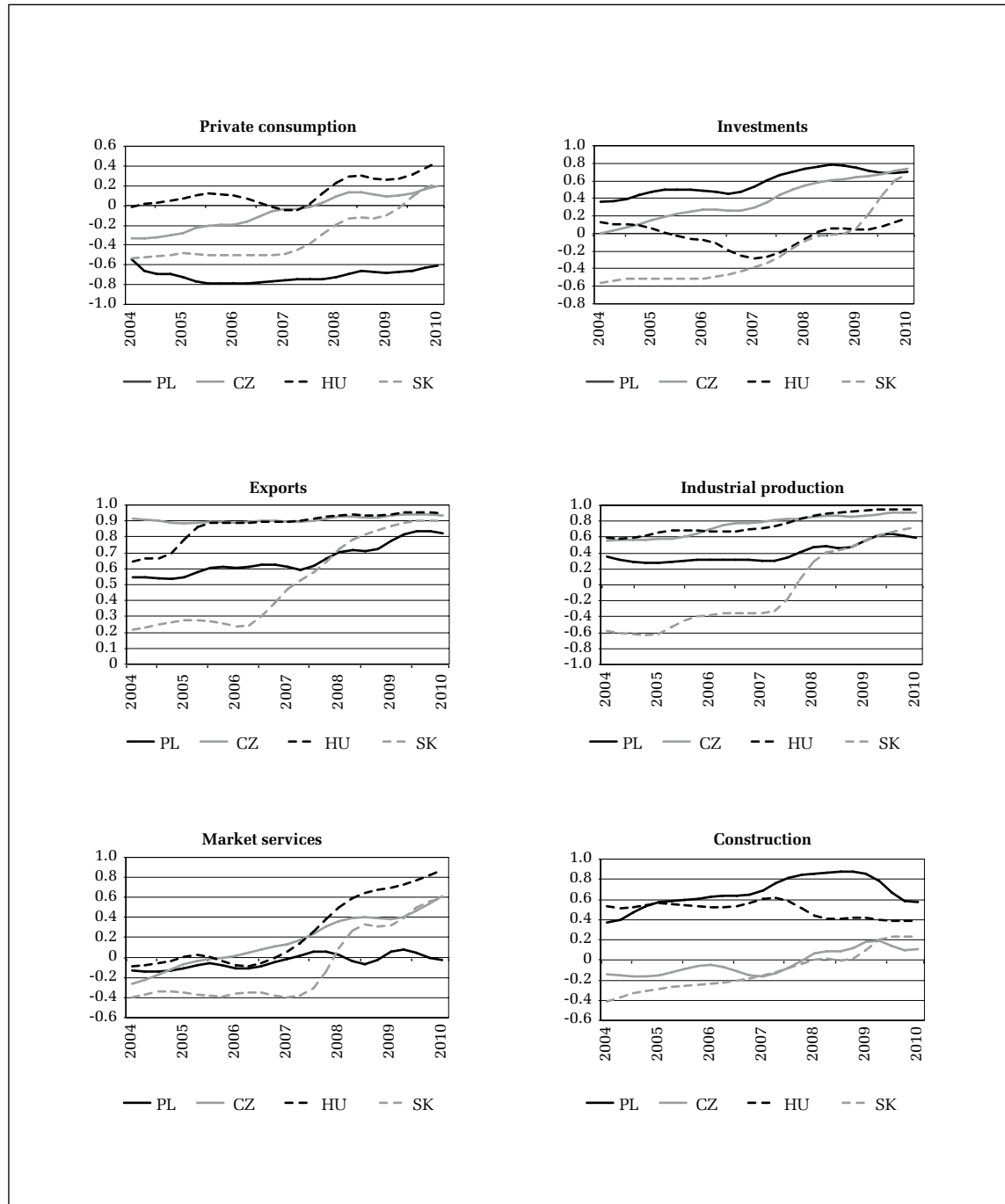
CEECs' GDP cumulative response to euro area shocks



Note: The impulse response functions were obtained from four-variable VAR models (with GDP and CPI in the euro area and their CEECs counterparts).

Figure 6

Recursive correlation coefficients of GDP expenditure and supply components with their euro area counterparts



Note: Correlation coefficients were computed in rolling windows of fixed length (9 years) starting from the first quarter of 1995.

Figure 7

Structure of private consumption

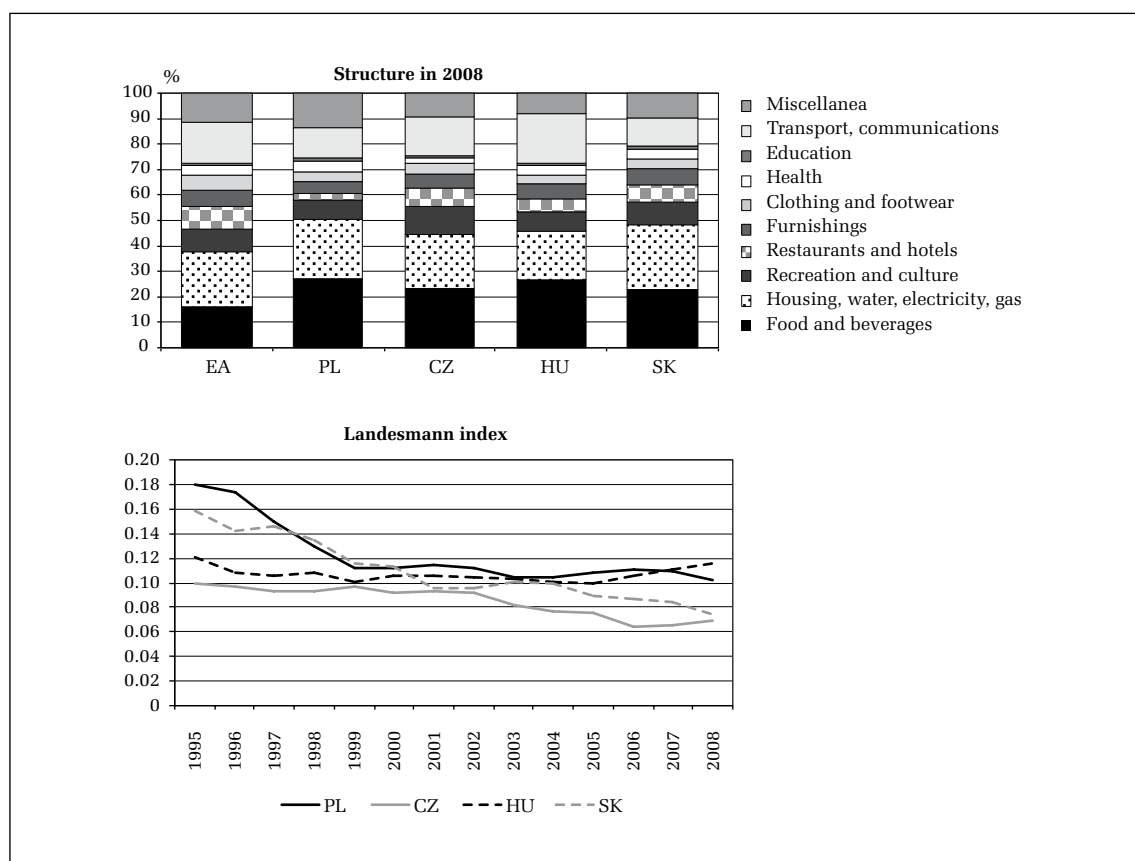


Figure 8
Structure of gross fixed capital formation

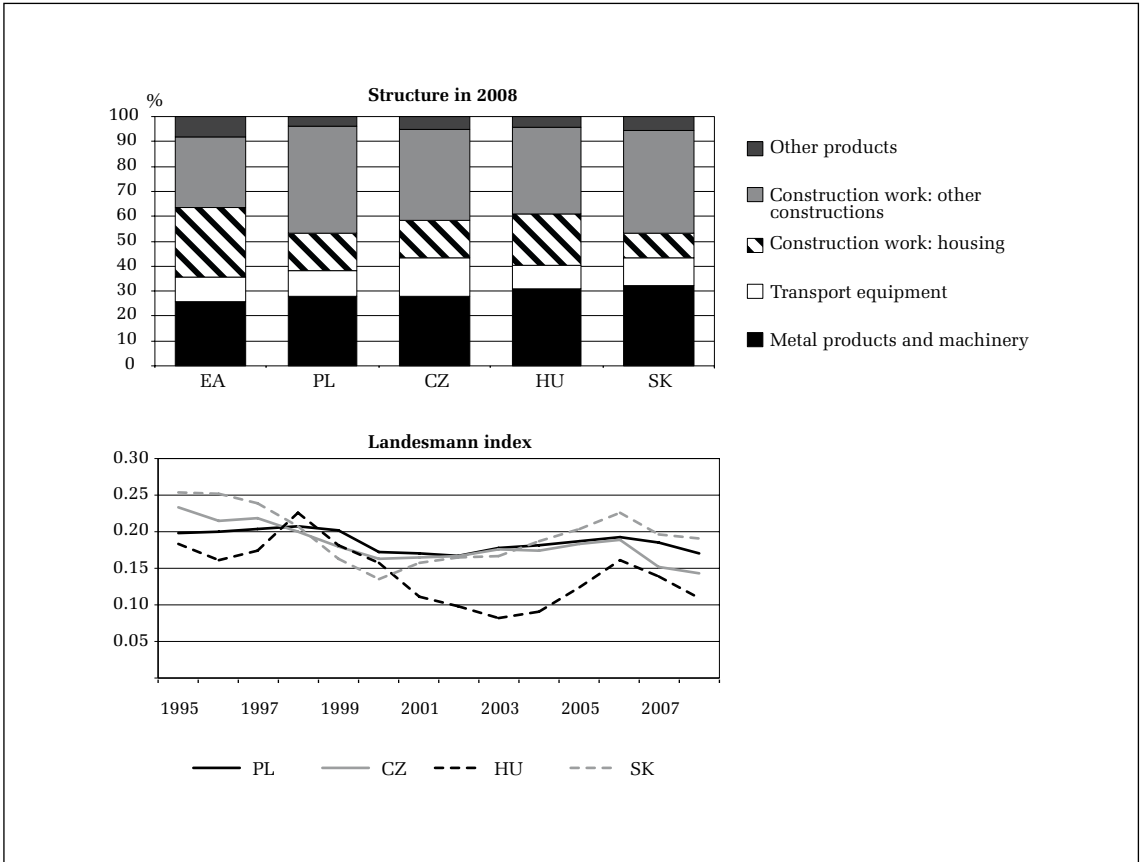
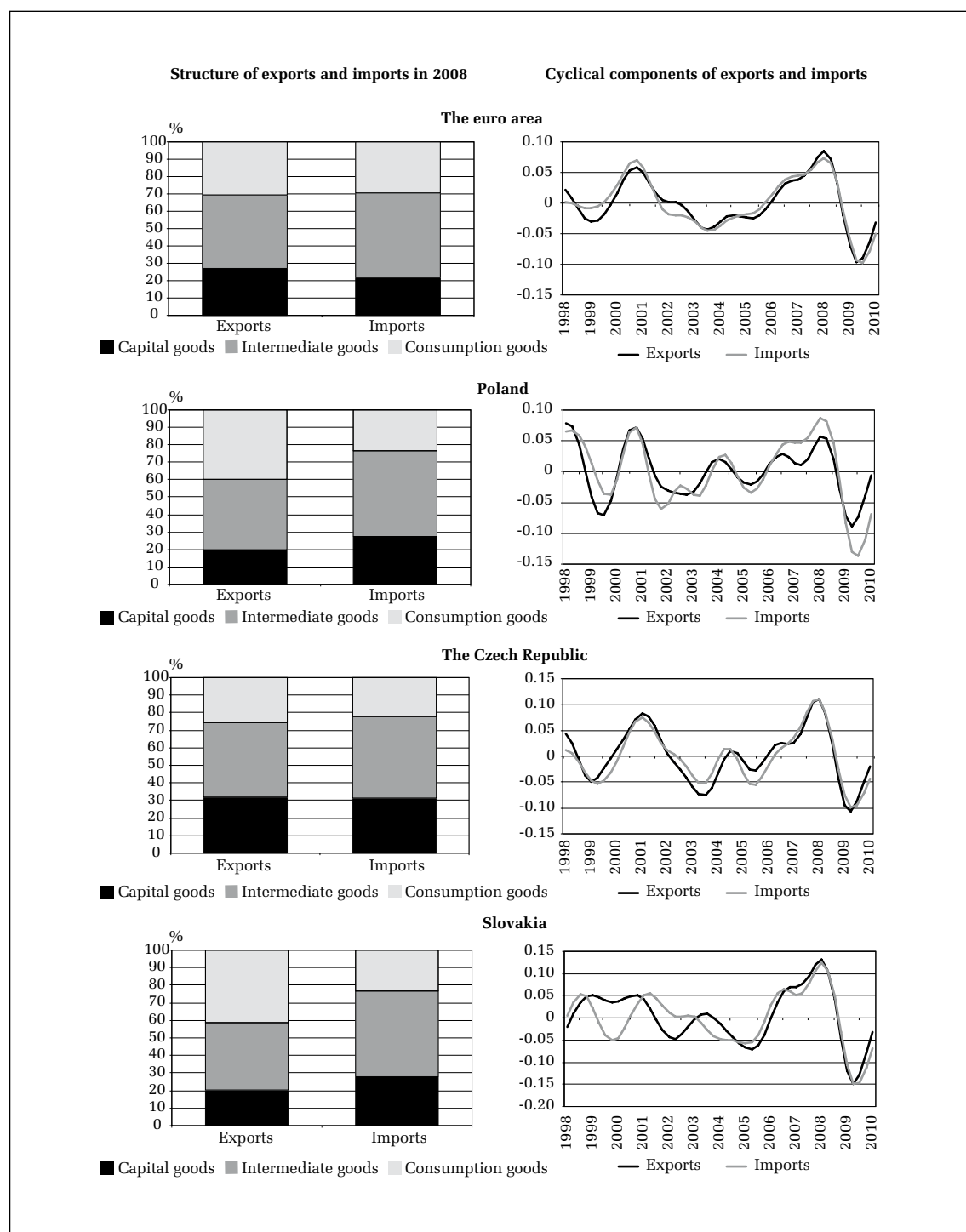


Figure 9

The cyclical components of exports and imports and economic structures in 2008



Note: The structure for Hungary could not be computed due to incomplete data.

Figure 10

Composition of consumption goods exports in Poland and Slovakia



Figure 11

Structure of GDP

