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Sandrine Levasseur
(OFCE)

Observatoire Français des Conjonctures Économiques
69, Quai d'Orsay 75340 Paris Cedex 07
Tel : 01 44 18 54 00 Fax : 01 45 56 06 15
E-mail: ofce@ofce.sciences-po.fr Web: http://www.ofce.sciences-po.fr

Updating empirical evidence on business cycles synchronization between CEECs and the euro area: How important is the recent period?

Sandrine Levasseur[†]

Abstract

Our findings indicate that the former split of CEECs in terms of business cycles synchronization with the euro area does not hold as soon as the recent period is taken into account. While Slovenia and Poland continue to appear as suitable EMU members due to their high – and growing – GDP co-movements with the euro area, Hungary does no longer belong to this group. By contrast, Slovakia has presented for few years a high degree of business cycle synchronization with the euro area – comparable to the one of Slovenia – which has not been captured by previous empirical studies. Our findings show also that Lithuania does not participate in the general trend of higher GDP co-movements with the euro area. Furthermore, an analysis by GDP components reveals that internal components rather than external ones predominantly account for growing GDP synchronization between CEECs and the euro area.

Keywords : business cycles, Central and Eastern European Countries.

JEL codes : E32,C22, P20, F15.

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† Institutional address: Observatoire français des conjonctures économiques (OFCE), 69 Quai d'Orsay, 75 340 Paris cedex 07. Tél. +33(0)1 44 18 54 24. Fax : +33(0)1 44 18 54 78.
sandrine.levasseur @sciences-po.fr

1. Introduction

Upon joining the European Union (EU), adoption of the euro constitutes another important step for Central and Eastern European countries (CEECs), as they have no option to opt-out of monetary union. In that purpose, CEECs have to fulfil the so-called Maastricht criteria whereas participating for at least two years in the "new" European exchange rate mechanism (ERM-II, hereafter)[1]. Note that Slovenia has already adopted the euro, entering European and Monetary Union (EMU) on the 1st January 2007 while Lithuania was refused as not fulfilling the inflation criteria. Slovakia is targeting entry in the euro area for 2009 which may be effective if the country goes on successfully in curbing inflation and containing public deficit. All the three Baltic countries and Bulgaria are currently participants in the ERM-II whereas Hungary, Poland and the Czech republic have pushed back their timetables. The government of Romania has not yet specified a date to participate in the ERM-II.

While the EU officials put emphasis on the respect of nominal criteria for entering EMU, empirical researchers have rather focused on the business cycles synchronization across countries for evaluating the desirability of sharing a common currency. Especially, following the theory of optimal currency area (OCA), a strong degree of business cycles synchronization across EMU members reduces the cost of giving up an independent exchange rate and monetary policy. This view finds its roots in prices and wages rigidities as well as insufficient labour mobility to absorb the impact of (temporary) asymmetrical shocks across countries, as put first by Mundell fifty years ago. Some authors, among others Frankel and Rose (1998), have nevertheless challenged this view, arguing that OCA criteria may be "endogenous" to the adoption of a common currency or, put differently, that countries which do not satisfy OCA criteria *ex-ante* may yet satisfy them *ex-post*. Their argument is that sharing a common currency stimulates trade flows across countries which, in turn, induce higher business cycles synchronization.

With the prospect of future EMU membership for the CEECs, a lot of empirical studies have been devoted to evaluate the degree of business cycles between CEECs and the euro area (or Germany)[2]. From this literature using either simple correlations of GDP co-movements or more sophisticated methodologies, two main findings emerge. First, CEECs exhibit a quite different degree of business cycles synchronization with the euro area. More precisely, Poland, Hungary and Slovenia were considered as more suitable EMU members than other CEECs, especially Lithuania or Slovakia. Second, as soon as time spans are not too short and cover at least the very beginning of the new millennium, the business cycles of CEECs and the euro area are found increasingly synchronized over time, which is interpreted as a consequence of deeper trade integration within the EU (*i.e.* as a proof of the endogeneity of OCA) although most of CEECs are not yet EMU members.

To date, however, there is no systematic empirical evidence on which *GDP components* may drive the co-movements between CEECs and the euro area. Especially, are external components much more important than internal ones? How does the contribution of each component evolve over time? Does EU membership in 2004 for most of CEECs change significantly the degree of co-movements compared to the previous period? Darvas and Szapary (2005) and, to some extent, Carmignani (2005), Benczur and Ratfai (2005) make a first step in this direction by analysing the co-movements of some GDP components.

[1] The Maastricht criteria consist in limits on inflation, interest rate, fiscal deficit and government debt. All these criteria are nominal in their nature. After completing the mandatory two-years in ERM-2, the country may apply for joining EMU based on an exam of its Maastricht criteria over the previous year.

[2] See Fidrmuc and Korhonen (2006) for a meta-analysis based on 35 empirical studies.

In this paper, we begin with an extension of Darvas and Szapary (2005) in three directions. *First,* we use a longer time span, adding most of four years of quarterly data over the recent period. By this way, we cover the first years of EU membership for most of CEECs. *Second*, we include data for Bulgaria, Romania and Croatia, which have not been extensively investigated in previous studies as noted by Fidrmuc and Korhonen (2004). We then offer empirical evidence on these countries which is interesting *per se*. *Third,* we use all demand components, including public consumption. We are then able to assess if – and to which extent – GDP co-movements are policy-driven *versus* trade-driven, for instance.

While useful, simple (cross-country) correlations based on raw data have the main drawback to conflate shocks and the responses of the economy to those shocks. The paper goes on with a structural VAR analysis (SVAR), allowing for a distinction between demand and supply shocks affecting CEECs and the euro area. The SVAR methodology was pioneered by Bayoumi and Eichengreen (1993) in the context of assessing OCA theory for actual EMU members, then was extensively applied for CEECs and the euro area[3]. Our updated SVAR analysis allows us to assess if supply shocks continue to be the main source of business cycles synchronization between CEECs and the euro area, as found in previous empirical works.

The paper concludes on the desirability of EMU membership based on "new" GDP co-movements and estimates of shocks affecting CEECs and the euro area.

2. Key evidence on co-movements of GDP and its main components

In what follows, we report the correlation of real GDP growth rates – and of its components – for each CEEC with the euro area[4]. Quarterly data are taken from Eurostat and available for most of countries and variables since 1995. For each variable, growth rates are computed as fourth differences of the natural logarithm (except for changes in inventories). For most of CEECs, we consider a standardized full period running from 1996 to 2006 and two sub-periods (*i.e.* 1996-2001 and 2002-2006) to get some insights on the developments of co-movements or, put differently, on the postulated endogeneity of OCA. Notable exceptions are Croatia and Romania for which data are respectively available since 1997 and 1999. Consequently, the full period is shorter for these two countries and, their first sub-period runs from 1998-2001 for Croatia and 2000-2001 for Romania.

In our commentaries, we grant a particular attention to the significance of coefficients to avoid an arbitrary split of CEECs according to their degree of co-movements with the euro area[5]. In that respect, considering the Hodrick-Prescott filter as an extracting measure of business cycles does not change the qualitative results, albeit affecting the numerical values of coefficients[6].

[3] According to Fidrmuc and Korhonen (2006), the SVAR methodology accounts for 18 empirical studies out of 35 aiming to assess the degree of business cycles synchronization between CEECs and the euro area. While some authors may consider monetary shocks alongside (real) demand and supply shocks, the basic SVAR with only real shocks remains predominantly used (*i.e.* 13 out of 35).

[4] The euro area we consider in this paper consists in twelve members (the eleven pioneers members of 1999 and Greece which joined EMU in 2001), excluding then Slovenia, Malta and Cyprus.

[5] This has been rarely made in previous studies, to the notable exception of Carmignani (2005).

[6] Cross-country correlations based on Hodrick-Prescott filters are available upon request to the author.

2.1.GDP co-movements

Results reported in Table 1 (in the Appendix) confirm the picture of heterogeneity between CEECs in terms of GDP co-movements with the euro area, as already found in previous studies. Over the full period, only four CEECs present a positive (and significant) correlation of GDP growth rates with the euro area (Poland, Hungary, Slovenia and, to a lesser extent, Bulgaria). At the other extreme, Lithuania and Slovakia present a negative (and significant) correlation of their GDP growth rates with the euro area. For the remaining CEECs, correlations are either positive or negative, but not significantly different from 0 at the 10 % level.

Comparing the correlations over 1996-2001 with those over 2002-2006, we observe that the GDP co-movements with the euro area has increased over time for most of CEECs. The increase of GDP co-movements is particularly impressive for Slovakia which ranges among the highest correlations over the 2002-2006 period. Increases in GDP co-movements are also quite large for countries like the Czech republic, Slovenia and Latvia. In this general picture, notable exceptions are Hungary for which the decrease in GDP co-movements with the euro area is very sharp and, to a lesser extent, Bulgaria and Croatia.

2.2. Private consumption co-movements

The private consumption of CEECs and the euro area is by far less synchronized than their GDP (Table 2)[7]. Over the full period, most of CEECs report negative (and significant) private consumption correlations with the euro area. A notable exception is Bulgaria for which the correlation of private consumption with the euro area is significantly positive.

Interestingly, over the time, the correlation of private consumption growth rates with the euro area has substantially increased for most CEECs, turning significantly positive in the case of Romania, Latvia and Slovenia for the 2002-2006 period. A notable exception is Hungary for which the correlation of private consumption with the euro area falls from a (significant) positive value to a (significant) negative value between 1996-2001 and 2002-2006.

The increase in private consumption synchronization over the recent period – except for Hungary – is an important point to notice, as previous empirical studies based on earlier data cannot uncover this feature. It is important to note however that it cannot be explained by a higher cross-country insurance against the consumption risk, as capital outflows of CEECs towards more advanced EU countries remain small. Rather, more "normal" consumption fluctuations may account for this feature, after painful adjustment due to the transition from planned to market economy (Darvas and Szapary, 2005).

2.3. Gross fixed capital formation co-movements

As for the GDP variable, there is a large heterogeneity between CEECs in terms of gross fixed capital formation (GFCF) co-movements with the euro area (Table 3). Over the full period, four of them (Poland, Slovenia, Bulgaria and Romania) exhibit positive (and significant) correlations with the euro area while, at the other extreme, three others (Croatia, the Czech republic and Lithuania) exhibit negative (and significant) correlations. For the remaining CEECs, correlations either negative or positive are no longer significant.

[7] Such a finding constitutes one of the six major puzzles in international macroeconomics put forward by Obsfeld and Rogoff (2000). Indeed, under complete financial markets, cross-country correlations of consumption would tend toward unity even if their GDP exhibit low correlations as a result of idiosyncratic shocks.

Comparing the recent period to the previous one, we observe increases in GFCF correlations with the euro area for most of CEECs. In particular, both Slovakia and Romania are reporting a very large increase in GFCF correlation, turning significantly positive over the recent period as for Poland and Slovenia. Hungary is again a notable exception, exhibiting a negative (albeit insignificant) correlation.

2.4. Changes in inventories co-movements

Changes in inventories of CEECs are poorly correlated with those of the Euro area, with no substantial modification over the recent period (Table 4). Only Romania was reporting a negative (and significant) correlation for the 2000-2001 period. But this negative correlation does no longer characterize the recent period.

2.5. Final consumption of government co-movements

The final consumption of government of CEECs is also in general poorly correlated with the one of the euro area (Table 5). Over the full period, only the Czech republic has a significant (and positive) correlation with the euro area. For the recent period, i.e. 2002-2006, while we detect an increase in the governmental final consumption correlations, only Croatia is reporting a positive (and significant) correlation. This result is particularly striking as EU membership would have to constraint – and then to synchronize – the fiscal policy via the Stability and Growth Pact (SGP) and the Maastricht criteria. Restraining further the time span to assess more precisely the impact of the SGP on CEECs government behaviour does not change importantly the correlations[8]. Data of final consumption of government do not confirm the view according to which the SGP would push toward greater fiscal policy synchronization within the EU. However, as soon as we consider data of fiscal position as a percent of GDP, the positive role of SGP (and fiscal Maastricht criteria) in synchronizing fiscal positions becomes evident for most of CEECs. Exceptions are Hungary and Slovakia (see Table 5 bis). In Hungary, this is evidently due to the public finances' mistakes of the Socialist-led coalition while, in Slovakia, the implementation of tax flat may account for that feature.

2.6. Exports and imports co-movements

Exports and imports of CEECs and the euro area are by far the most correlated variables among demand components (Tables 6 and 7). Moreover, looking at Table 1, there is a strong evidence of a highly positive relationship between GDP and trade variables co-movements, suggesting that exports and imports are important factors in synchronizing business cycles of CEECs and the euro area. This feature is even better illustrated by considering the cross-correlations of CEECs imports and euro area exports and, symmetrically, of CEECs exports and euro area imports (Tables 6 bis and 7 bis). Higher (and very often significant) cross-correlations of trade variables over 2002-2006 than over 1996-2001 show that trade integration within the EU is becoming deeper, thus contributing to higher GDP co-movements[9].

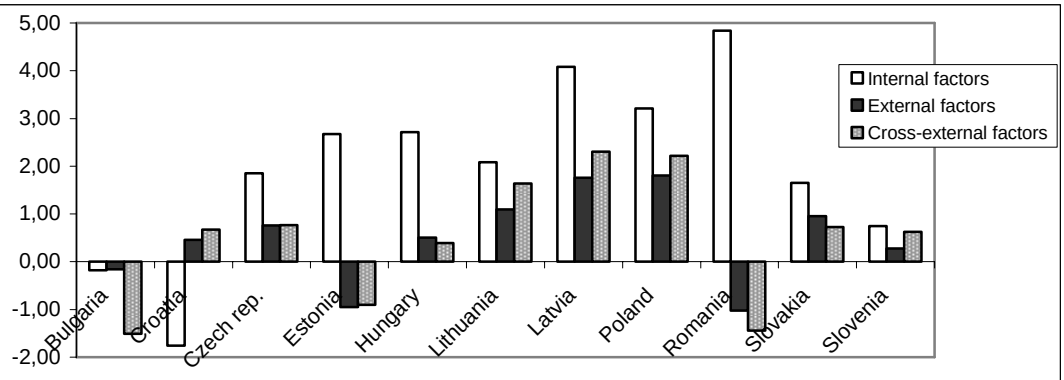
[8] In the case of CEECs joining EU in May 2004, the SGP applies to fiscal position of 2003. As specified in the EU legislation, a procedure for "excessive deficit" is applied as soon as the fiscal deficit is reaching the limit of 3 % of GDP. In May 2004, this was the case in 4 out of 8 CEECs new EU members (the Czech Republic, Hungary, Poland and Slovakia). See Levasseur (2007).

[9] We take as granted that strong trade links across countries are conducive to high business cycles synchronization, as shown by a large empirical literature beginning with Frankel and Rose (1998). See Fidrmuc and Korhonen (2006) for references on this point.

2.7. Synthesis on the evolution of GDP co-movements and contributing components

Updating empirical evidence on business cycles synchronization of CEECs with the euro area reveals interesting features. First, there is a general trend towards greater GDP co-movements with the euro area. The increase in GDP co-movements is particularly large for Slovakia, which ranges among the highest GDP co-movements with the euro area over the recent period. Nevertheless, in this general trend towards higher synchronization, Hungary is a notable exception, exhibiting a very sharp decline of its GDP co-movements with the euro area. Those two latter features were uncovered by previous empirical studies based on earlier data. Finally, Lithuania is yet much lagging behind other CEECs in terms of GDP co-movements with the euro area, especially compared to Slovenia which is placed first in this respect.

Considering the correlations of main GDP components – and their developments over time – reveals other interesting features. Especially, internal variables such as private consumption and GFCF have played a growing role in explaining the GDP co-movements over the recent period. This point is particularly made clear in Graph 1 which reports the aggregated contribution of consumption and GFCF components *versus* exports and imports components to changes in GDP co-movements between the two sub-periods. As evidenced, internal factors have been predominant in explaining changes in GDP co-movements. External factors have also contributed – generally in a positive manner – to changes in GDP co-movements with the euro area, but to a lesser extent. Notable exceptions are Estonia and Romania where external factors correlations have decreased in context of higher GDP co-movements. Exports rather than imports account for a large share of this finding (see Tables 6 and 7).



Graph 1: Contribution of internal *versus* external factors to changes in GDP co-movements between 1996/2001 and 2002/2006*

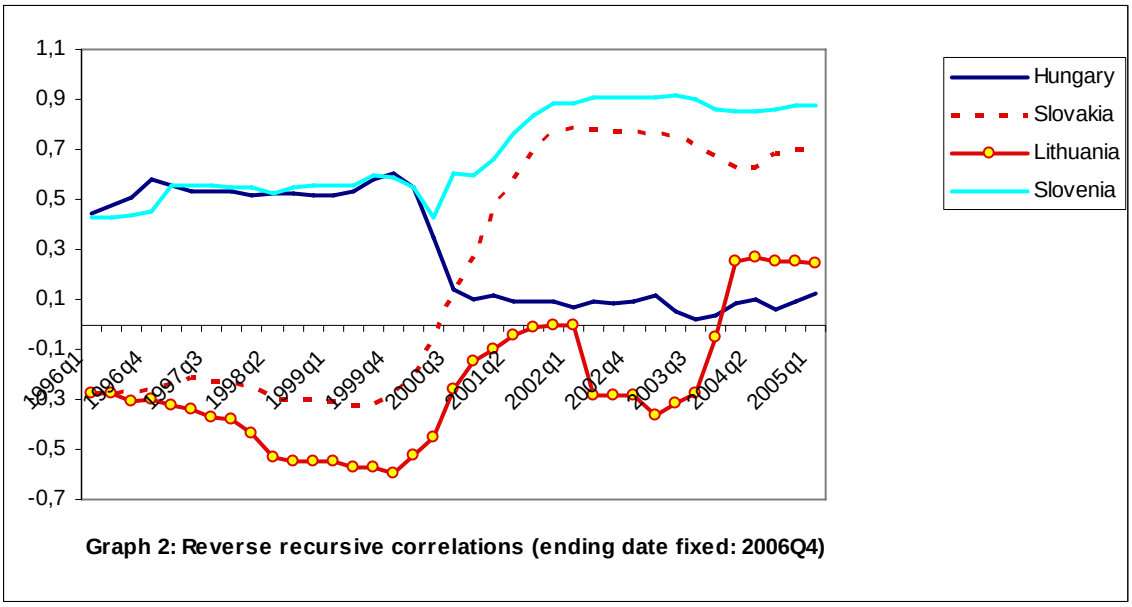
*Internal factors are defined as private consumption and GFCF while external factors as exports and imports. Cross-external factors refer to imports (resp. exports) of the euro area and exports (resp. imports) of CEECs.
For each CEEC, the contribution of internal factors to the change in GDP co-movements with the euro area is computed as the "change in the sum of private consumption and GFCF correlations" to the "change in GDP correlations" between 1996/2001 and 2002/2006. And, similarly for the external and cross-external factors.
Source: Eurostat; own computations.

3. How to date changes in business cycles synchronization? The case of Hungary, Slovakia and Lithuania based on GDP variables.

Are previous findings due to our specific time span choices? Or, are they robust to different time spans? In that purpose, we have run "rolling" correlations. Box A presents briefly the three methods of rolling we used. However, to save space, we report and comment only the results for the reverse recursive analysis and for four CEECs (Hungary, Lithuania, Slovakia and Slovenia)[10]. More precisely, in the cases of Hungary and Slovakia, we are interested in the (approximated) dating of changes in co-movements with the euro area, those two countries representing opposite cases. We also focus on Lithuania which does not appear to participate in the general trend of higher co-movements over time, remaining very poorly correlated with the euro area. Is it due to specific time choices we made? In a benchmark purpose, we report the results for Slovenia which is the frontrunner in terms of business cycles synchronization with the euro area.

The reverse recursive analysis of GDP co-movements – in which the ending date is held fixed, in our case 2006Q4 – shows that Hungary became poorly correlated with the euro area in the course of 2000 (Graph 2). Put differently, for Hungary, all GDP co-movements computed with data of the 2000s give rise to insignificant correlations. That contrasts with the experience of Slovenia, for which the GDP co-movement with the euro area shows quite strong increases in the 2000s, to reach impressive correlations around 0.90. Slovakia makes considerable progress toward GDP synchronization with the euro area in the very beginning of 2001. After that date, all its GDP co-movement with the euro area becomes significantly positive, reaching high values of coefficients. Finally, Lithuania does not follow a trend as positive as Slovakia, remaining poorly correlated with the euro area since the new millennium. Indeed, albeit positive, GDP co-movements of Lithuania with the euro area are insignificant for the 2004-2006 period.

Thus, our main finding concerning GDP co-movements with the euro area are robust to different time spans: in the very beginning of the 2000s, Slovakia was synchronizing its GDP with the one of the euro area while Hungary was desynchronizing. Lithuania remains poorly synchronized with the euro area, contrasting in this respect with the two other Baltic States (Estonia and Latvia).



Graph 2: Reverse recursive correlations (ending date fixed: 2006Q4)

[10] Results for other CEECs and other "rolling correlations" are available upon request to the author.

Box A

"Rolling correlations" allow to assess the robustness of coefficient correlations to the time span.

The "pure rolling method" imposes to choose arbitrarily the length of window, we set to 20 in our case. With a dataset of 44 quarters (*i.e.* from 1996Q1 to 2006Q4), the first correlation is based on the 20 first quarters (*i.e.* 1996Q1-2000Q4), the second correlation on the 20 following quarters (*i.e.* 1996Q2-2001Q1) and so on, finishing with a correlation based on 20 quarters from 2001Q1-2006Q4. This method is a first way to date potential changes in co-movements, with a fixed number of quarters. In our case, 20 quarters correspond to 5 years of (rolling) data, which seems to us reasonable both in terms of "cycle" length and statistically speaking.

The "recursive method" holds the starting date as fixed (*i.e* 1996Q1 in our case), and the window size grows as the ending date is advanced. With a dataset of 44 quarters starting in 1996Q1 and an initial window of 20 quarters, the first correlation is based on the 20 first quarters (*i.e.* 1996Q1-2000Q4), the second correlation on the 21 first quarters (*i.e.* 1996Q1-2001Q1) and so on, finishing with a correlation based on 44 quarters from 1996Q1 to 2006Q4. This method analyses how each new quarter (or, updating of the dataset) affects the coefficient correlation. Considering that most of previous empirical studies have used data from1995/1996 to 2002 to compute correlations, this method allows measuring the "bias" due to "omitting" recent data.

The "reverse recursive method" holds the ending date as fixed (*i.e* 2006Q4 in our case), and the window size shrinks as the starting date is advanced. With a dataset of 44 quarters, the first correlation is based on 44 quarters (*i.e.* 1996Q1-2006Q4), the second correlation on 43 quarters excluding the first one (*i.e.* 1996Q2-2006Q4) and so on. We stop the reverse recursive correlations to 2005Q1 as starting date, which corresponds to a correlation based on 8 quarters. The four or five last correlations we report in Figure A must be thus considered with caution, due to the small numbers of quarters to compute them. This method is another way to date potential changes in co-movements, allowing a focus on the more recent period and to date the "beginning" of the recent period.

4. Further evidence on shocks affecting CEECs and the euro area

This section is devoted to a SVAR analysis, allowing for a distinction between demand and supply shocks affecting CEECs and the euro area. It complements usefully a simple (cross-country) correlations analysis, which has the drawback to conflate shocks and the responses of the economy to those shocks.

For each CEEC and the euro area, we consider a two-variable VAR, consisting in GDP and prices (*i.e.* GDP deflators)[11]. Data for GDP deflators are taken from the IMF for CEECs and from Eurostat for the euro area. The data of GDP deflators are missing for Bulgaria and Croatia over a sufficient long time period, so that these two countries are excluded from the SVAR analysis. Since variables are expressed as first differences of the natural logarithm, data have been seasonally adjusted using the X12 procedure where appropriate. In most of cases, the optimal lag length for the VAR came to between 3 and 6 according to LR information criteria, except for Slovenia (1 lag) and Estonia (9 lags). As other information criteria give very different optimal lag lengths for these two countries (generally between 3 and 6), all lags were set to 3 in the interest of standardizing and to conserve degrees of freedom[12].

[11] The reader will refer to Bayoumi and Eichengreen (1993) for a detailed presentation of the methodology and to Fidrmuc and Korhonen (2006) for papers applying this methodology to CEECs and the euro area.

[12] We have checked that the lag length does not alter the qualitative results. As no large difference was found, we report here the results with the standardized value of three lags. Note also that in some cases (especially Lithuania), the GDP deflator turns to be an AR(2) process rather than an AR(1) process according to the ADF and PP tests of unit root. For robustness checks, we have then followed Süppel (2003) in considering that inflation data are trend-stationary processes and adjusting for a long run HP trend (with a smoothing parameter of 1600) before entering the VAR estimation. Qualitative results are no longer altered by the use of de-trended GDP deflators. Tests of unit root are available from the author upon request.

Shocks are identified from the VAR residuals by assuming that demand shocks cannot have a permanent effect on GDP. This assumption is derived from an AD/AS model with sticky prices. The model implies that demand shocks should raise prices in both the short and long run, while supply shocks should lower prices. Since these responses are not imposed by the estimation procedure, they can be thought of as over-identifying restrictions useful in testing whether the shocks that have been identified from their effect on output actually correspond to the demand and supply shocks in the model. In our case, the over-identifying restriction is satisfied for most of countries, meaning that some of the long-term assumptions underlying the model are not completely satisfied in all countries.

Tables 8 and 9 report the correlations of supply and demand shocks between CEECs and the euro area, resulting from the SVARs. Correlations of demand shocks are clearly higher than correlations of supply shocks for most of countries. Moreover, we observe an increase in demand shocks correlations over 2002-2006 compared to 1996-2001. Considering the previous findings of higher private consumption and GFCF co-movements between CEECs and the euro area, higher demand shocks correlations are no longer surprising. By contrast, supply shocks of CEECs and the euro area are poorly correlated, whatever the sub-period[13]. Nevertheless, some countries like Lithuania, Poland and, especially, the Czech republic do not participate in this general trend of higher demand shocks synchronization with the euro area. For Lithuania, this finding can be easily explained by oil products and CIS markets. For Poland and the Czech republic, this finding is at first look very hard to reconcile with the finding of higher private consumption and GFCF co-movements. Note, however, that monetary and fiscal policies in these two countries may have been used to counter the *effect* of asymmetrical demand shocks with the euro area or, alternatively, may have been a *source* of asymmetrical demand shocks. In particular, as allowed by a flexible exchange rate arrangement, monetary activism may have been quite large in Poland and the Czech republic.

5. Conclusion

In this paper, we have shown how important are the recent years in the business cycles synchronization between CEECs and the euro area. In particular, we point out that over the recent period, internal factors *versus* external ones have played a growing role in explaining the business cycles synchronization, despite a deeper trade integration between new and old EU members.

Finally, based on an updated empirical evidence, if a high degree of GDP co-movements with the euro area over the recent period is a criterion for adopting the euro in CEECs, the actual EMU membership of Slovenia is making no mistake at all while early EMU membership of Slovakia, Latvia, Estonia and Poland appears quite a good option. But, if we consider that a high degree of demand shocks synchronization with the euro area is a better criterion – assuming that supply shocks are by far more permanent than demand ones, so that monetary policy can adjust the sole (temporary) demand shocks – only Slovenia and Latvia may still participate in EMU[14]. Thus, even if Slovakia pass successfully its exam of Maastricht criteria in 2008, such a finding puts out that an early adoption of the euro could be desirable.

[13] Using earlier data, Fidrmuc and Korhonen (2003) as well as Süppel (2003) find that correlations of demand shocks are lower than correlations of supply shocks, contrasting with our results. Taking into account the more recent period thus alters considerably the results.

[14] The extent to which changes in monetary conditions can be used to smooth the effect of supply shocks is a lively debated issue in the literature. While supply shocks are viewed as requiring a structural adjustment in which monetary activism has to play no role at all, some authors argue that monetary activism can be yet used in the short run to favour a smooth adjustment towards the new long run equilibrium.

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Appendix:

Tab.1: Correlation of GDP growth rates with the euro area

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	0,30 (**)	0,61 (***)	0,34	-0,27
Croatia (1)	-0,20	0,16	0,00	-0,16
Czech republic	-0,24	-0,30	0,46 (**)	0,76
Estonia	0,22	0,39 (*)	0,72 (***)	0,34
Hungary	0,44 (***)	0,70 (***)	0,07	-0,63
Latvia	0,10	0,24	0,81 (***)	0,57
Lithuania	-0,28 (*)	-0,15	0,01	0,15
Poland	0,47 (***)	0,36 (*)	0,68 (***)	0,32
Romania (2)	-0,01	0,13	0,51 (**)	0,39
Slovakia	-0,28 (*)	-0,47 (**)	0,79 (***)	1,26
Slovenia	0,43 (***)	0,20	0,89 (***)	0,68
Unweighted average	0,09	0,17	0,48	0,31

Tab.2: Correlation of private consumption growth rates with the euro area

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	0,31 (**)	0,64 (***)	0,50 (**)	-0,14
Croatia (1)	-0,58 (***)	-0,39	-0,34	0,05
Czech republic	-0,38 (**)	-0,45 (**)	0,21	0,66
Estonia	-0,49 (***)	-0,57 (***)	0,18	0,75
Hungary	-0,08	0,45 (**)	-0,64 (***)	-1,10
Latvia	-0,35 (**)	-0,30	0,56 (***)	0,86
Lithuania	-0,36 (**)	-0,06	0,36	0,42
Poland	0,18	-0,18	0,24	0,42
Romania (2)	-0,37 (*)	-0,33	0,58 (***)	0,92
Slovakia	-0,36 (**)	-0,72 (***)	0,26	0,98
Slovenia	0,21	0,17	0,47 (**)	0,31
Unweighted average	-0,21	-0,16	0,22	0,37

Tab.3: Correlation of gross fixed capital formation growth rates with the euro area

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	0,40 (**)	0,40 (**)	0,59 (***)	0,19
Croatia (1)	-0,49 (***)	-0,43	-0,20	0,23
Czech republic	-0,37 (**)	-0,53 (***)	0,21	0,74
Estonia	-0,20	-0,18	-0,03	0,15
Hungary	0,06	0,27	-0,35	-0,62
Latvia	0,09	0,06	0,39	0,33
Lithuania	-0,28 (*)	-0,31	-0,12	0,20
Poland	0,56 (***)	0,32	0,92 (***)	0,59
Romania (2)	0,36 (*)	-0,32	0,64 (***)	0,95
Slovakia	-0,24	-0,55 (**)	0,55 (**)	1,10
Slovenia	0,48 (***)	0,38 (*)	0,58 (***)	0,21
Unweighted average	0,03	-0,08	0,29	0,37

(1) Instead 1998Q1/2006Q4 and 1998Q1/2001Q4 for respectively the full period and the first sub-period.
(2) Instead 2000Q1/2006Q4 and 2000Q1/2001Q4 for respectively the full period and the first sub-period.

Tab.4: Correlation of changes in inventories with the euro area (growth rates)

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	-0,11	-0,11	n.a.	n.a.
Croatia (1)	-0,06	0,21	-0,12	-0,33
Czech republic	-0,01	0,01	-0,32	-0,33
Estonia	0,04	0,06	0,02	-0,03
Hungary	-0,17	-0,03	-0,25	-0,23
Latvia	-0,07	-0,09	-0,04	0,05
Lithuania	-0,19	-0,24	-0,06	0,18
Poland	0,01	-0,01	0,01	0,02
Romania (2)	-0,08	-0,63 (***)	0,01	0,64
Slovakia	-0,02	-0,12	0,10	0,22
Slovenia	-0,01	-0,01	0,15	0,16
Unweighted average	-0,06	-0,09	-0,05	0,03

Tab.5: Correlation of final consumption of government with the euro area (growth rates)

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	0,01	0,00	0,12	0,12
Croatia (1)	0,00	-0,36	0,54 (**)	0,90
Czech republic	0,29 (***)	0,19	0,38	0,19
Estonia	0,21	0,26	0,07	-0,19
Hungary	0,11	0,01	0,16	0,15
Latvia	**-0,23**	-0,37 (***)	0,16	0,53
Lithuania	0,00	0,10	-0,42 (***)	-0,52
Poland	**-0,01**	0,07	-0,26	-0,33
Romania (2)	**-0,02**	-0,14	-0,05	0,09
Slovakia	**-0,05**	-0,21	0,29	0,50
Slovenia	**-0,15**	-0,24	0,06	0,30
Unweighted average	0,01	-0,06	0,10	0,16

Tab.5 bis: Correlation of fiscal positions with the euro area

	1999Q1/2006Q4	2002Q1/2006Q4	2003Q1/2006Q4	2004Q1/2006Q6
Bulgaria	-0,17	0,60 ***	0,77* ***	0,79 ***
Croatia (1)	n.a.	n.a.	n.a.	n.a.
Czech republic	0,19	0,37	0,48 **	0,14
Estonia	-0,33 *	0,38 *	0,46 **	0,50 **
Hungary	0,42 **	-0,14	-0,38	-0,36
Latvia	-0,39 **	0,34	0,49 **	0,31
Lithuania	-0,46 ***	0,66 ***	0,76 ***	0,81 ***
Poland	0,64 ***	0,52 **	0,53 **	0,33
Romania	n.a.	n.a.	n.a.	n.a.
Slovakia	-0,73 ***	-0,08	-0,33	-0,62 ***
Slovenia	-0,37 **	0,73 ***	0,77 ***	0,77 ***
Unweighted average	-0,13	0,38	0,35	0,30

(***), (**), (*) stands for significantly different from 0 at 1%, 5 % and 10 % levels, respectively.

Tab.6: Correlation of exports growth rates with the euro area

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	0,41 (***)	0,52 (***)	0,38	-0,13
Croatia (1)	0,09	0,11	0,14	0,03
Czech republic	0,61 (***)	0,70	0,74 (***)	0,04
Estonia	0,74 (***)	0,91 (***)	0,50 (**)	-0,41
Hungary	0,77 (***)	0,74 (***)	0,75 (****)	0,01
Latvia	0,28 (*)	0,37 (*)	0,17	-0,20
Lithuania	0,04	0,11	0,05	-0,06
Poland	0,31 (**)	0,34	0,47 (**)	0,13
Romania (2)	0,57 (***)	0,68	0,32	-0,36
Slovakia	0,10	0,10	0,41 (*)	0,31
Slovenia	0,70 (***)	0,82	0,82	0,00
Unweighted average	0,42	0,49	0,43	-0,06

Tab.7: Correlation of imports growth rates with the euro area

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	0,38 (**)	0,44 (**)	0,62 (***)	0,18
Croatia (1)	-0,30 (*)	-0,13	-0,23	-0,10
Czech republic	0,33 (**)	0,11	0,65 (***)	0,53
Estonia	0,62 (***)	0,66 (**)	0,75 (***)	0,09
Hungary	0,79 (***)	0,86 (***)	0,54 (***)	-0,33
Latvia	-0,09	-0,25	0,57 (***)	0,82
Lithuania	-0,26 (*)	-0,27	0,05	0,32
Poland	0,41 (**)	0,30	0,74 (***)	0,44
Romania (2)	0,68 (***)	0,68 (*)	0,65 (***)	-0,03
Slovakia	0,10	-0,18	0,72 (***)	0,90
Slovenia	0,50 (***)	0,54	0,73 (***)	0,19
Unweighted average	0,29	0,25	0,53	0,27

Tab.6 bis: Correlation between imports of the euro area and exports of the CEECs

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	0,22	0,16	0,69 (***)	0,53
Croatia (1)	0,03	-0,14	0,32	0,45
Czech republic	0,53 (***)	0,53 (**)	0,74 (***)	0,21
Estonia	0,69 (***)	0,76 (***)	0,63 (***)	-0,14
Hungary	0,75 (***)	0,77 (***)	0,64 (***)	-0,13
Latvia	0,07	0,01	0,30	0,30
Lithuania	-0,23	-0,24	-0,10	0,14
Poland	0,33	0,33	0,56 (**)	0,22
Romania (2)	0,46 (*)	0,66 (*)	0,12	-0,53
Slovakia	0,33 (*)	0,41 (*)	0,53 (**)	0,12
Slovenia	0,56 (***)	0,62 (***)	0,72 (***)	0,09
Unweighted average	0,34	0,35	0,47	0,11

Tab.7 bis: Correlation between exports of the euro area and imports of the CEECs

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Bulgaria	0,36 (**)	0,48 (**)	0,36	-0,12
Croatia (1)	-0,07	0,30	-0,26	-0,56
Czech republic	0,48 (***)	0,36 (*)	0,73 (***)	0,37
Estonia	0,76 (***)	0,87 (***)	0,71 (***)	-0,16
Hungary	0,75 (***)	0,75 (***)	0,63 (***)	-0,12
Latvia	-0,01	-0,10	0,53 (**)	0,64
Lithuania	-0,01	0,05	0,25	0,20
Poland	0,37 (**)	0,24	0,72 (***)	0,48
Romania (2)	0,72 (***)	0,70 (***)	0,67 (***)	-0,02
Slovakia	0,08	-0,16	0,64 (***)	0,80
Slovenia	0,41 (***)	0,41 (**)	0,74 (***)	0,33
Unweighted average	0,35	0,35	0,52	0,17

(***), (**), (*) stands for significantly different from 0 at 1%, 5 % and 10 % levels, respectively.

(1) Instead 1998Q1/2006Q4 and 1998Q1/2001Q4 for respectively the full period and the first sub-period.

(2) Instead 2000Q1/2006Q4 and 2000Q1/2001Q4 for respectively the full period and the first sub-period.

Tab.8: Correlation of supply shocks with the euro area

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Czech republic	-0,17	-0,17	-0,12	0,05
Estonia	-0,18	-0,09	-0,28	-0,19
Hungary	0,02	0,07	0,01	-0,06
Latvia	-0,20	-0,20	-0,25	-0,05
Lithuania	0,15	0,21	-0,06	-0,27
Poland	-0,10	-0,08	-0,07	0,01
Romania (1)	0,30	0,53	0,09	-0,45
Slovakia	-0,15	-0,25	0,00	0,25
Slovenia	0,04	0,20	-0,17	-0,36
Unweighted average	-0,03	0,02	-0,09	-0,12

Tab.9: Correlation of demand shocks with the euro area

	1996Q1/2006Q4	1996Q1/2001Q4	2002Q1/2006Q4	Changes in correlation
Czech republic	0,14	0,27	-0,11	-0,38
Estonia	0,26	0,24	0,33	0,08
Hungary	0,29	0,20	0,32	0,12
Latvia	0,41 (***)	0,27	0,64 (***)	0,37
Lithuania	0,06	0,06	0,05	-0,01
Poland	0,08	0,08	0,08	0,00
Romania (1)	-0,10	-0,13	-0,10	0,04
Slovakia	0,07	0,00	0,22	0,22
Slovenia	0,49 (***)	0,45 (***)	0,55 (***)	0,09
Unweighted average	0,19	0,16	0,22	0,06

(***), (**), (*) stands for significantly different from 0 at 1%, 5 % and 10 % levels, respectively.

(1) Instead 1998Q1/2006Q4 and 1998Q1/2001Q4 for respectively the full period and the first sub-period.