Jarko Fidrmuc and Iikka Korhonen

The euro goes East

Implications of the 2000-2002 economic slowdown for synchronisation of business cycles between the euro area and CEECs

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Abstract

We assess the correlation of supply and demand shocks between current countries in the euro area and EU accession candidates from 1993/1995 to 2002. Supply and demand shocks are recovered from estimated structural VAR models of output growth and inflation. Notably, the economic slowdown between 2000 and 2002 increased heterogeneity of business cycles between the euro area and acceding counties. We find that several acceding countries have a quite high correlation of underlying shocks with the euro area and conclude that continuing integration within the EU is likely to align the business cycles of these countries in a manner similar to the synchronisation of supply and demand shocks we document for the EU in the 1990s.

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The euro goes East

Implications of the 2000-2002 economic slowdown for synchronisation of business cycles between the euro area and CEEs

Tiivistelmä

Tutkimuksessa tarkastellaan nykyisten euroalueen maiden ja EU:n tulevien jäsenmaiden kysyntä- ja tarjontasokkien korrelaatiota vuodesta 1993 vuoteen 2002. Kysyntä- ja tarjontasokit on laskettu estimoiduista rakenteellisista VAR-malleista. Tuloksien mukaan talouskasvun hidastuminen vuosina 2000–2002 lisäsi suhdannevaihtelun erilaisuutta euroalueen ja tulevien EU-maiden välillä. On kuitenkin huomattava, että monien maiden tapauksessa sokkien korrelaatio on jo varsin suuri. Tuleva EU-jäsenyys ja syvenevä taloudellinen integraatio lisännevät sokkien korrelaatiota, kuten nykyisissä EU-maissa 1990-luvulla.

Asiasanat: optimaalinen valuutta-alue, EU:n laajentuminen, rakenteellinen VAR.

1   Introduction

Soon after they accede to the European Union (EU) in 2004, the new member states will have to consider their timetables for joining Economic and Monetary Union (EMU). Adoption of the euro, in turn, will promote the integration of the acceding economies with the rest of the euro area. While these Central and Eastern European countries (CEECs) are likely to gain in the long run from the reduced transaction costs, the loss of monetary sovereignty may create problems in the near term as they attempt to catch up with the economic standard of other euro participants. Given the relatively low weight of CEECs compared to the current members of the euro area, these countries are likely to bear the brunt of necessary adjustments to the euro area's common monetary policy.

The costs of participation in the EMU depend to a certain extent on the similarity between business cycles in the euro area and acceding countries.[1] Numerous studies assess the potential gains and problems related to CEEC participation in the euro area, and our survey of this literature finds a surprisingly large majority support the view that acceding countries have business cycles already fairly well synchronised with the EU area − a criterion they need to meet under the optimum currency area (OCA) theory. Fidrmuc (2001a) questions this view, however, arguing that the available time period needed to establish such synchronization is too short to reliably base such an assumption. Indeed, many of these studies review periods of seven years or less, implying that only a single business cycle is covered by the available data.

For this reason, the slowdown of the EU economy in 2000-2002 may provide useful information on the similarity of business cycles between countries in the euro area and CEECs. We thus examine the correlation of supply and demand shocks between the CEECs and the euro area, including the recent slowdown of the economy. Our purpose is to assess whether the EU acceding countries belong to the same optimum currency area as current members of the monetary union. In particular, we update data used by Fidrmuc and Korhonen (2001) for the second half of the 1990s. Frenkel and Nickel (2002), using a different source of data for slightly more recent period, also follow this approach. Next, we compare our results to these two studies. In general, we find the recent slowdown has increased the heterogeneity within the EU, as well as within CEECs. This is particularly true for demand shocks. Nevertheless, several transition countries (especially Poland and Hungary) display comparably high correlations of supply shocks. As a result, these countries likely face lower costs than other acceding countries from participation in the euro area. More flexible policies appear desirable for the remaining CEECs.

We recover the supply and demand shocks from two-variable (output and inflation) vector autoregressive (VAR) models with the help of the decomposition developed by Blanchard and Quah (1989). Different shocks are identified from the VAR residuals with the help of a restriction that demand shocks cannot have a permanent effect on output. The same procedure has been used before to assess whether the current European monetary union constitutes an optimum currency area by e.g. Bayoumi and Eichengreen (1993).

A priori, it seems reasonable to expect a high correlation of business cycles. Most CEEC foreign trade is conducted with EU countries (see Fidrmuc, 2001a). We see that the synchronisation of business cycles, especially that of supply shocks, positively correlates with certain indicators on transition progress and integration into the EU.

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[1] These countries are expected to participate in ERM II soon after their accessions to the EU. Our results also apply to the fixed exchange rate policy they must adopt during their participation in ERM II.

The paper is organised as follows: section 2 reviews literature on optimum currency area theory as it relates to the acceding countries of Central and Eastern Europe.[2] Section 3 describes data used to recover supply and demand shocks. In the fourth section, we estimate shocks and assess their nature across countries. We look at potential factors affecting the synchronization of business cycles in the CEECs with the EU section 5. The final section offers concluding remarks.

2   The optimum currency area theory and the EMU enlargement

The optimum currency area theory originates with Mundell (1961), who proposed that a country would find it more advantageous to peg the external value of its currency when the business cycles of the two countries are highly correlated. In practice, this correlation is never perfect, but the problem of asymmetric shocks is alleviated as long as factors of production can move between the countries (or regions). After the breakdown of the Bretton Woods system, OCA analysis was regularly used to assess the desirability of having a fixed exchange rate in different countries. Generally, it was found that especially labour movement between countries (or regions in Europe) was extremely low, making fixed exchange rates undesirable on these grounds (see McKinnon, 2002).

A revival in the empirical testing of the OCA theory preceded the introduction of European monetary union. These empirical studies typically assess the correlations between the German business cycle and those of other potential member countries. Influential contribution by Bayoumi and Eichengreen (1993) recovers the underlying supply and demand shocks in the prospective members of the monetary union using the technique developed by Blanchard and Quah (1989).[3] Their basic assumption is that an economy can be hit by either demand or supply shocks. Demand and supply shocks are identified with the help of the restriction that the long-term impact of demand shocks on output is zero. Only supply shocks are assumed to have a permanent effect on output. In addition, Bayoumi and Eichengreen designate an "over-identifying" restriction, i.e. that the accumulated effects of supply and demand shocks on prices are negative and positive, respectively. As this condition is not imposed on the model, its fulfilment can be used to check the consistency of the results.

Bayoumi and Eichengreen's approach can be justified within a neo-Keynesian model of aggregate supply and demand curves (McKinnon, 2000). The framework is based on sticky wages, which cause a gradual adjustment process to a new equilibrium if an economy is hit by demand or supply shocks. The neo-Keynesian model distinguishes between short- and long-run equilibria for the economy. Thus, economic policy can reduce the adjustment costs, for example, through the selection of an appropriate exchange rate regime (i.e. floating exchange rates against fixed exchange rates or participation in a monetary union).

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[2] We define Central and Eastern European Countries (CEECs) as Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

[3] They also assess whether the United States constitutes an optimum currency area under the same method.

Upon joining the EU, new members are expected to also participate in monetary union.[4] Kopits (1999) describes the EMU process in detail. Basically, applicants first join the EU, then enter the exchange rate mechanism (ERM II), and finally, when they meet Maastricht convergence criteria, accede to monetary union. A key issue is the timing of membership in the monetary union and the optimal interim exchange rate arrangement. If the acceding country business cycle is correlated to a significant degree with the euro area, the costs to that country for giving up monetary independence may not be very high.

In this section, we survey the literature related to testing the OCA criteria in the EU acceding countries. Several papers investigate the issue. While they apply various methods and reach different results, they generally find that the business cycles in the most advanced acceding countries are about as synchronised with the euro area as some of the peripheral members in the euro area. However, there is considerable uncertainty as to the robustness of the results.

A related strand of literature looks at the convergence of level of economic activity (and prices) between the acceding countries and the EU. Although the issue of business cycle correlation is probably more important for monetary policy, long-term convergence (or lack of thereof) can also impact the functioning of a monetary union. The level of GDP in the CEECs during the period of centrally planned systems grew slowly in relation to Western Europe. Thus, the divergence between Western and Eastern Europe grew in the 1970s and 1980s, and this increasing welfare gap between market and centrally planned economies in Europe was a major reason for the introduction of early reforms in some CEECs.

Estrin and Urga (1997) find only limited evidence of convergence in the former Soviet Union or within various groups of Central European command economies. More surprisingly, Fidrmuc et al. (1999) conclude that the Czech Republic and Slovakia converged neither between 1950 and 1990 nor within a sub-sample from 1970 to 1990. In contrast, Kočenda (2001) and Kutan and Yigit (2002) find increasing convergence between the acceding countries and the EU.

Table 1 lists papers that assess the correlation of business cycles of acceding countries with the euro area business cycle (or some proxy thereof). It is immediately apparent that this topic has been approached from several different angles in recent years. While several contributions utilise the structural VAR approach, many papers take the much simpler approach of merely looking at the cyclical variation around an estimated trend (usually trend of industrial production). Availability of data places some obvious limits on testing options.

Frenkel et al. (1999) and Frenkel and Nickel (2002) use an approach similar to that of Bayoumi and Eichengreen. They recover quarterly supply and demand shocks for various countries, including most acceding countries. Frenkel et al. (1999) find that the correlation between shocks in the euro area and in the nonparticipating EU member states is quite high, as it is for the remaining EFTA countries. The correlation of shocks is quite different between the euro area (proxied by Germany and France) and the acceding countries. Unfortunately, there are difficulties in interpreting the results. Perhaps the most serious caveat relates to data used for estimation. Frenkel et al. use quarterly data from the first quarter of 1992 to the second quarter of 1998. The time period is quite short − a problem that really cannot be avoided in such studies. More importantly, the first two or three years in the sample belong to the period of transformational recession for some of the acceding countries, i.e. output losses relate to the change in the economic system. This makes the

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[4] Newcomers have no option to opt-out of monetary union.

interpretation of economic shocks problematic. In our different and longer sample, this problem is alleviated to a certain degree. Horvath (2000) and Frenkel and Nickel (2002) also use longer samples, although for a smaller set of comparative countries.

We also treat seasonal effects differently than in other papers. Indeed, previous studies pay little attention to this issue. Both Horvath (2000) and Frenkel and Nickel (2002) estimate VAR models with four lags. We find that shorter lag structure is more appropriate when seasonal dummies are used. The overall performance of the models is improved as well (this model specification is further supported by the Akaike information criterion).

Some studies use different measures of correlation between business cycles in the euro area (or the EU) and acceding countries. Boone and Maurel (1998) calculate correlation coefficients between the cyclical components of industrial production and unemployment rates for the acceding countries (except for the Baltic countries) against Germany and the EU. They generally find a relatively high degree of business cycle correlation for the acceding countries with Germany, higher than e.g. for Portugal or Greece. This implies relatively low costs for giving up monetary sovereignty and entering a monetary union with Germany.

Boone and Maurel (1999) abandon the methodology used in their earlier work to assess the similarity between business cycles in selected acceding countries (the Czech Republic, Hungary, Poland and Slovakia) against Germany and the EU. They fit a time series model for the unemployment rate in an accession country using EU (German) unemployment shocks derived in a separate regression. Under this framework, they start with by asking how large a share of the variation in the unemployment rate can be explained by German or EU-wide shocks. They then look at correlation in the propagation of the shock. Boone and Maurel find that the share of variation explained by the German shocks is fairly high for all acceding countries and highest for Hungary and Slovakia. The acceding countries with the highest correlations of responses to a German shock are Poland and Slovakia. Boone and Maurel conclude that the business cycles in these countries are close enough to the German cycle so that participating in the monetary union would bring net benefits.

Korhonen (2003) examines monthly indicators of industrial production in the euro area and nine acceding countries in Central and Eastern Europe.[5] The issue of correlation is assessed with the help of separate VARs for the first difference of the euro area production and production in each of the acceding countries. The correlation of impulse responses to a euro-area shock is taken as evidence of symmetry of the business cycles. Korhonen finds that some of the advanced acceding countries (especially Hungary) exhibit a high correlation with the euro area business cycle. Moreover, correlation seems to be at least as high as in some smaller EMU members (e.g. Portugal and Greece).

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[5] Bulgaria is excluded.

Table 1. Studies on correlation of business cycles between EU acceding countries and euro area

Study, year of publication	Methodology and variables	Acceding countries	Comparison country/area	Period analyzed
Boone and Maurel (1998)	Correlation of detrended industrial production and unemployment	BLG, CZE, HU, PL, ROM, SL, SI	EU and DE	M1:1990-M11:1997
Boone and Maurel (1999)	Share of changes in unemployment rate explained by European or German shocks and correlation of their impulse-response functions	CZE, HU, PL, SL	EU and DE	M1:1991-M12:1997
Frenkel et al. (1999)	SVAR (correlation of supply and demand shocks), GDP and prices	BLG, CZE, EST, HU, LV, LT, PL, ROM, SL, SI	FRA and DE	Q1:1992-Q2:1998
Horvath (2000)	SVAR (correlation of supply and demand shocks), GDP and prices	BLG, CZE, EST, HU, LV, LT, PL, SL, SI	FRA, DE, IT and UK	Q1:1993-Q4:2000
Fidrmuc (2001)	Correlation of detrended industrial production (endogeneity)	CZE, HU, PL, SL, SI	DE	M1:1991/3-M12:1999
Fidrmuc and Korhonen (2001)	SVAR (correlation of supply and demand shocks), GDP and prices	BLG, CRO, CZE, EST, HU, LV, LT, PL, ROM, SL, SI	Euro area and euro area countries	Q2:1993-Q4:2000
Frenkel and Nickell (2002)	SVAR (correlation of supply and demand shocks), GDP and prices	BLG, CZE, EST, HU, PL, SL, SI	FRA, DE, and IT	Q1:1993-Q4:2001
Babetski et al. (2002)	SVAR (time-varying correlation coefficients of supply and demand shocks), GDP and prices	BLG, CZE, EST, HU, LV, LT, PL, ROM, SL, SI	EU and DE	Q1:1990-Q4:2000
Maurel (2002)	Correlation of detrended industrial production (endogeneity)	EST, CZE, HU, PL, ROM	EU countries	M1:1993-M12:1997
Korhonen (2003)	Correlation of VAR impulse functions, industrial production	CZE, EST, HU, LV, LT, PL, ROM, SL, SI	Euro area	M1:1992/3/5-M12:2000

BLG = Bulgaria, CRO = Croatia, CZE = the Czech Republic, DE = Germany, EST = Estonia, FRA = France, HU = Hungary, IT = Italy, LV = Latvia, LT = Lithuania, PL = Poland, ROM = Romania, SL = Slovakia, SI = Slovenia, UK = United Kingdom
SVAR = Structural vector autoregressive model, VAR = Vector autoregressive model

Fidrmuc (2001a) and Maurel (2002) rely on the endogeneity hypothesis of optimum currency area criteria laid down in Frankel and Rose (1998). Fidrmuc shows that the convergence of business cycles relates to intra-industry trade, but finds no significant relation between business cycles and bilateral trade intensity. Furthermore, he finds that the business cycle (defined as detrended industrial production) strongly correlates with the German cycle in Hungary and Slovenia, and Poland to a lesser extent. Moreover, due to the high degree of intra-industry trade, he identifies a significant potential for increasing the correlation between business cycles in the EU and acceding countries (Hungary, Slovenia, Poland, the Czech Republic, and Slovakia).

Both Fidrmuc (2001a) and Maurel (2002) emphasise the determinants of business cycle correlation, i.e. they test the endogeneity hypothesis of optimum currency area. They both find that intra-industry trade increases the symmetry of business cycles. This is

relevant if one believes that a higher per capita GDP in the acceding countries will be associated with more intra-industry trade.

A few studies attempt to test whether the correlation of business cycles has changed over the time. Babetski et al. (2002) use a Kalman filter to estimate time-varying correlation coefficients for supply and demand shocks in the acceding countries vis-à-vis shocks in the EU and Germany. They find that the correlation of demand shocks has increased during the 1990s, whereas correlation of the supply shocks has not increased to the same degree. Korhonen (2003) estimates correlation of impulse functions from two-variable VARs for two separate sub-periods (1992-1995 and 1996-2000) and finds that the correlation of business cycles increased clearly in the second half of the 1990s in the Czech Republic, Hungary, and Slovenia. These results suggest that increasing integration of the EU acceding countries with the EU has increased business cycle correlation and may continue to do so in the future.

In summary, empirical evidence seems to indicate that economic cycles in the most advanced acceding countries are highly correlated with the euro-area cycle. This seems to be especially true for Hungary and perhaps Slovenia. Although the Baltic countries were not usually included in the aforementioned studies, there is also evidence that Estonia has achieved a certain degree of convergence with the euro-area cycle. Indeed, correlation of business cycles in several of the most advanced acceding countries appears to match or exceed the convergence of several of the smaller, peripheral monetary union members.

3   Correlation of GDP and inflation

Our data set confirms that the business cycles in some CEECs converged with the business cycle of the EU area in the second half of the 1990s and thereafter (see Table 1). At the beginning of the 1990s, production development in the CEECs was determined by the "transitional" recession (see Campos and Coricelli, 2002). Recovery in these countries, however, has been strongly influenced by growing exports to the EU. As a result, the business cycle of the EU has increasingly determined the developments in the CEEC economies since 1993.

In particular, the correlation of real GDP growth between the euro area and Hungary (0.72 between 1995 and 2002) has been only slightly lower than the corresponding correlation of euro countries on average (0.77 between 1991 and 2002).[6] The business cycles of Slovenia, Estonia, Latvia, and Poland also followed the pattern of euro area development. In contrast, GDP development in the Czech Republic, Lithuania, and Slovakia has been dominated by domestic factors.

Beyond the correlation of business cycles, Figure 1 suggests a possible relation between the similarity of GDP development and inflation. Those countries displaying a high and positive correlation of GDP growth also show a high and positive correlation of inflation. Within the euro area, increasing competitive pressures within in the single market may have caused this relation.

Given this GDP and inflation correlation, we identify two (or three) country groups. First, we have a group of candidate countries with a low similarity of both price and GDP development. This group includes the Czech Republic, Lithuania, and Slovakia. The second group includes EU countries and Estonia, Latvia and Slovenia. From the point of

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[6] To deal with seasonality, we report correlations for the fourth difference of (quarterly) data in the euro area and in the selected countries. We deal similarly with price data.

view of GDP development, Denmark, Ireland, Hungary, Bulgaria, Canada, Finland, and the Netherlands also belong to this group. As these countries experience different price development than the euro area, they might be better treated as a separate group or subgroup.

In general, the CEECs are a less homogeneous group than the EU countries or the euro area. This is also true for particular regional groupings in Central and Eastern Europe (e.g. the Visegrad countries and the Baltic states). The policy implications of these results are, however, restricted as they do not reveal the role of underlying demand and supply shocks.

Figure 1. Correlation of GDP growth and inflation between selected countries and the euro area
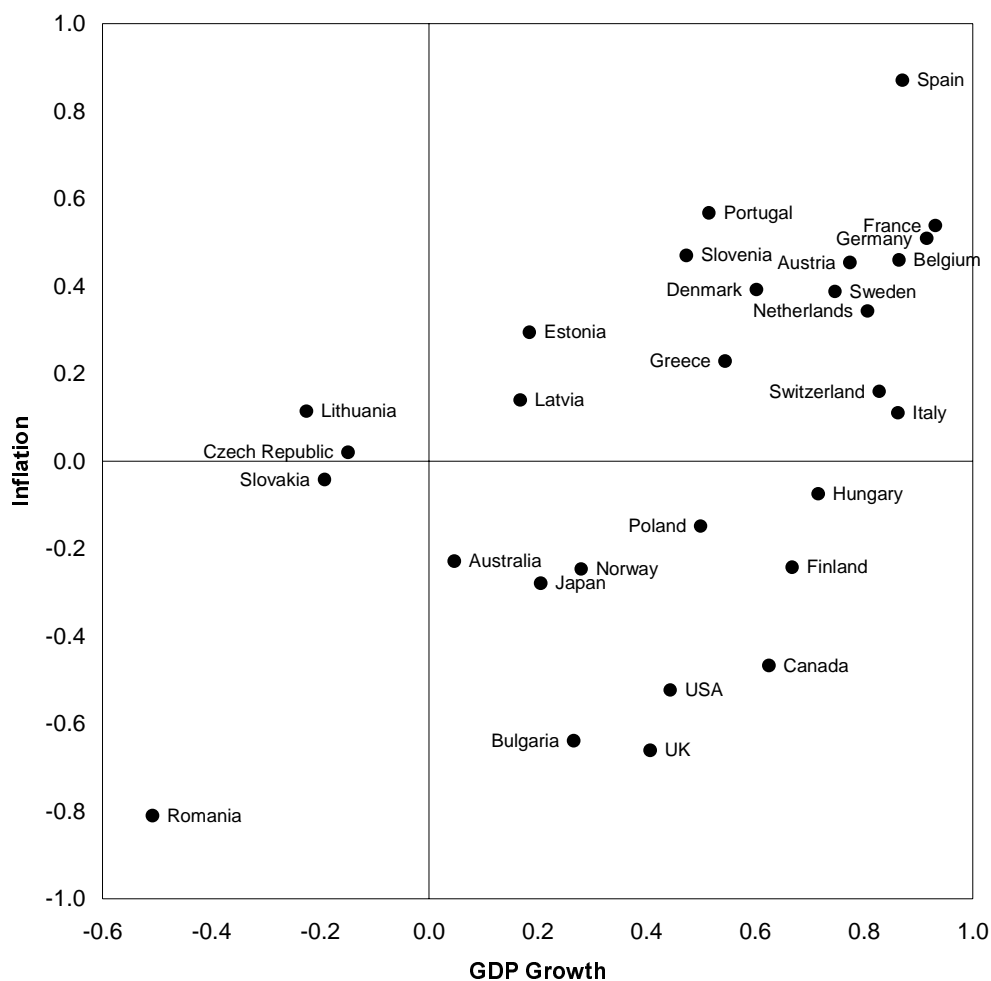
4   Similarity of supply and demand shocks

We now assess the correlation of supply and demand shocks in the EU acceding countries vis-à-vis the euro area. In addition, we calculate the same correlations for some current members of the euro area. These correlations should give us a benchmark against which to assess the acceding countries' correlations. In an earlier paper, we estimated shocks for a shorter time period (Fidrmuc and Korhonen, 2001). Here, we expand the time series.
Our assessment of the correlation between supply and demand shocks starts by estimating two-variable vector autoregressive models for all the individual countries and the euro area (published by Eurostat as an aggregate of all member countries).[7]

Our VAR variables are first differences of (the log of) real quarterly GDP and in (the log of) prices (GDP deflator). Eurostat has seasonally adjusted the time series for the euro area and OECD countries. For the time series of the acceding countries, which are not seasonally adjusted, we included three seasonal dummies. The VAR lag length is chosen according to sequential likelihood ratio tests for different lag lengths. This generally is the same lag length as the one chosen with the Akaike information criterion. The optimum lag length is usually two or three quarters. The over-identifying restriction mentioned in Section 2 (i.e., the accumulated effects of supply and demand shock on prices are negative and positive, respectively) is satisfied in almost all VARs. The exceptions are Estonia, Italy, Lithuania, Poland, Slovakia, Spain, and the UK. This implies that some of the long-term assumptions underlying the model are not completely satisfied in all countries.

From the estimated VARs, we recover the underlying supply and demand shocks as described in the previous section. Figure 2 shows the contemporaneous correlation between supply and demand shocks in the euro area and individual countries.

The correlation of demand shocks is clearly lower than correlation of supply shocks for most countries. In fact, the difference has increased from our previous calculations in Fidrmuc and Korhonen (2001). There are natural explanations for decreasing correlation of demand shocks for some countries. For example, Hungary moved into more flexible exchange rate regime vis-à-vis the euro in 2001. More generally, during the past two years most acceding countries have grown much more rapidly than the euro area. This partly reflects differing economic policies (e.g. fiscal deficits have been higher in the acceding countries, on average). Notably, many current euro area members exhibit a surprisingly low correlation of demand shocks. For Germany, perhaps, this is understandable given that reunification affected the German economy throughout the 1990s. At the same time, the other large euro area economies (France, Italy and Spain) have high correlations of demand shocks. In Finland's case, a severe recession in the first half of the 1990s seems to have induced the low correlation of demand shocks.

We view the correlation of supply shocks to be more important for assessing the degree of business cycle integration. The differences in demand shocks mostly emanate from different economic policies. As economic policies should be considerably more similar within a monetary union, the correlation of demand shocks should also increase. Moreover, with the disappearance of the effects of individual exchange rates, monetary

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[7] The VARs for the OECD countries and the euro area are estimated with data starting in the first quarter of 1991 (1991Q1). For the acceding countries the data periods vary more: We have data from 1992Q1 for Slovenia, 1993Q1 for Slovakia, 1994Q4 for the Czech Republic, Bulgaria, Estonia and Latvia, 1995Q1 for Hungary, Lithuania and Poland, but only 1997Q1 for Romania. All time series are uniformly available to 2002Q2. The authors will provide further details on VAR estimation results on request.

policy is essentially similar across countries.[8] Therefore, the correlation of supply shocks reveals more about the underlying similarity of economies. Among the acceding countries, Poland seems to have the highest correlation of supply shocks − over 0.6. The Czech Republic, Hungary and Latvia have all correlations of approximately 0.2. This is roughly comparable to the situation of Denmark or Greece. For Estonia, the correlation of both shocks appears tiny, and for Lithuania and Slovakia correlation of supply shocks is negative. The result for Lithuania is not surprising; this small economy is structurally different from most European countries. For example, a single oil refinery accounts for a significant share of industrial production. Also, Lithuania continues to be quite dependent on trade with Russia and other CIS countries. Moreover, from April 1994 to February 2002, the Lithuanian currency, the litas, was pegged to the US dollar. This obviously affected demand shocks.

Demand and supply shocks in the EU acceding countries are generally not as highly correlated with the euro area shocks as shocks in the larger euro area member countries. However, in comparison with smaller euro area countries, some acceding countries do quite well. Business cycles in Poland, the Czech Republic, Hungary, and Latvia seem to be reasonably well correlated with the euro area cycle. On the other hand, results for Estonia, Slovakia, and Lithuania are less encouraging. Nevertheless, it should be kept in mind that our results are derived from reasonably short time series. Comparisons with the earlier studies (Fidrmuc and Korhonen, 2001, and Frenkel and Nickel, 2002) reveal that results are in some cases quite sensitive to the data period chosen. Moreover, several acceding countries have undergone e.g. several foreign exchange rate regime changes during the past years. This has possibly affected their demand shocks. .

Figure 2 Correlation of supply and demand shocks between selected countries and the euro area

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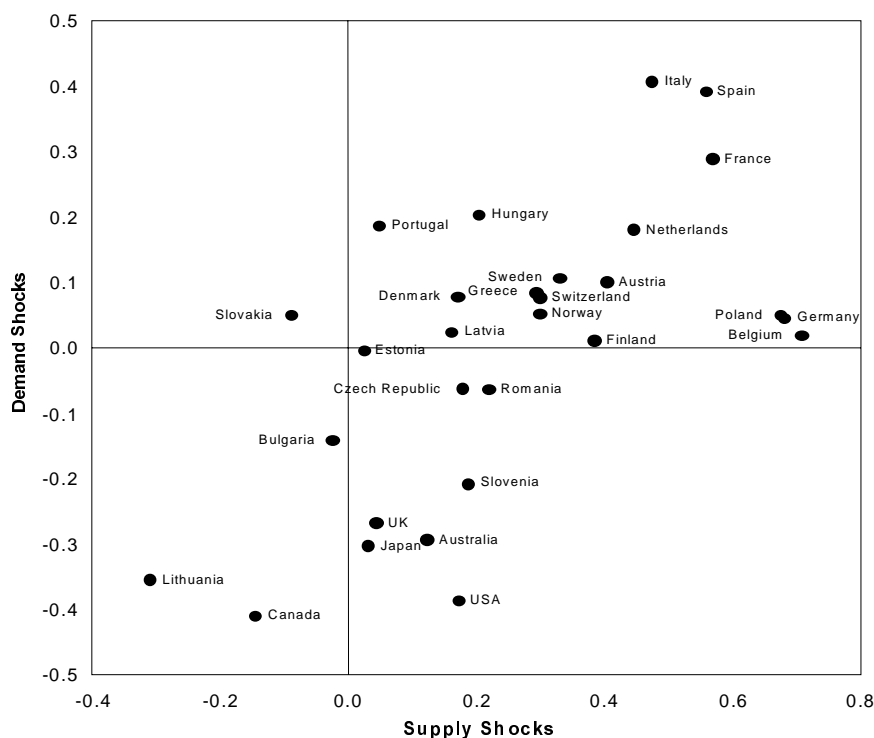
[8] Although one must allow for the possibility that similar monetary policy will have different effects in different countries, perhaps because of the different financial systems.

5 Will more CEECs eventually meet OCA criteria?

What explains the convergence in cycles identified in most available studies and our above estimations? Fidrmuc (2001a) emphasises the importance of trade intensity and intra-industry trade in fostering common cyclical behaviour. Kaitila (2001) looks at the foreign trade of the acceding countries, finding that Hungary and Estonia, in particular, have moved toward more skill-intensive products in their EU trade. Foreign direct investment seems to explain this shift to a large degree. Increasing similarity of production and intra-industry trade may also account for similarity in economic cycles.

Table 2 addresses some of these factors. As we examine only ten acceding countries, we rely on simple correlation analyses and do not analyse various possible directions of causality due to the low number of observations. If not specified otherwise, these indicators are reported for 2001. As before, we emphasise the pattern of supply shocks, but we can also observe a positive correlation between supply and demand shocks (see Figure 2). Due to the effect on current income, supply shock effects should be transmitted to demand shocks.

As expected, we note a high correlation between supply shocks and the EU's share of exports and imports of acceding countries. Demand shocks also reveal a high correlation with the export shares to the EU. We also note possible structural arguments for the OCA endogeneity. In particular, high intra-industry trade and high industrial shares seem likely to contribute to the synchronisation of business cycles. We find significant correlations of both supply and demand shocks with the levels of intra-industry trade in 1998 taken from Fidrmuc (2001b). The share of industrial production is positively correlated with supply shocks, but there is zero correlation with demand shocks. By contrast, we find only low correlation of GDP per capita with both types of shocks. Thus, the level of economic development of the countries does not influence the synchronisation of business cycles. This finding further confirms that income convergence is not a necessary precondition for a participation in a currency area.

Surprisingly, foreign direct investment per capita does not appear to have significant effects on supply shocks, but is positively correlated with demand shocks. It seems that either foreign direct investment was not yet associated with important technology transfers or that the timing of technology transfers is different from investment decisions. In contrast, foreign direct investment is likely to have instantaneous demand effects. Finally, we find that both supply and demand shocks are correlated with fiscal deficits. So far, fiscal policy has, in principle, been an instrument to coordinate economic development in CEECs with the EU economy. However, this policy tool will lose importance once Maastricht fiscal criteria must be fulfilled (see Székely, 2002). Most acceding countries are currently running substantial fiscal deficits. They will have to slash spending and move closer to balanced budgets.

In summary, EU accession is likely to increase the synchronisation of business cycles of other CEECs, mainly through trade and structural channels. Nevertheless, some adjustments, mainly those related to fiscal consolidation, will be necessary.

Table 2. Endogeneity of OCA criteria in acceding countries

	Supply Shocks	Demand Shocks	Data Source
Supply shocks	-	0.517	Own Estimations
Exports to EU	0.767	0.760	WIIW, IMF
Imports from EU	0.735	0.220	WIIW, IMF
Share of intra-industry trade	0.330	0.249	Fidrmuc (2001b)
Share of industrial production	0.325	0.032	EBRD (2002)
GDP per capita, current prices	0.274	-0.042	EBRD (2002)
FDI per capita, flows	0.035	0.239	EBRD (2002)
Government balance	-0.566	-0.359	EBRD (2002)

6   Conclusions

In this paper, we assessed the correlation of supply and demand shocks between the euro area and EU accession candidates as compared to selected countries between 1993/1995 and 2002. Supply and demand shocks were recovered from structural vector autoregressive models. We find that the correlation of supply shocks differs considerably from country to country. Also, correlation of demand shocks in the acceding countries with euro area is usually lower than the correlation of supply shocks.

Some acceding countries are at least as well correlated with the euro area shocks as some current members of EMU. The two countries with the highest correlation of supply shocks are Poland and Hungary. Not coincidentally, these two countries have also received large amounts of foreign direct investment in per capita terms and they have very extensive trade relations with euro area countries (and the EU in general). Hungary also has a high correlation of demand shocks. For many other acceding countries, the degree of correlation is clearly lower. This holds true even for some of the most advanced transition countries, e.g. the Czech Republic and Slovenia.

Thus, our findings partially confirm the results of Frenkel et al. (1999), Boone and Maurel (1999), Fidrmuc (2001a), Frenkel and Nickel (2002), and Korhonen (2003). In these studies, the Hungarian economic cycle is quite well correlated with the European cycle. The same applies to Slovenia and perhaps Poland. Hungary and Slovenia are small economies geographically close to the EU. It is therefore unsurprising that their economic cycles are correlated with the EU (and the euro area). The correlation for other acceding countries has so far been lower, but the situation may change with EU accession.

As compared to earlier results using similar data and methods, reported e.g. by Fidrmuc and Korhonen (2001) and Frenkel and Nickel (2002), the economic slowdown of 2000 to 2002 particularly increased the heterogeneity of demand shocks in the CEECs. Nevertheless, some acceding countries still show correlation of business supply and demand shocks corresponding to levels observed within the euro area. Indeed, the reduction of growth rates in Poland has increased the similarity of Polish business cycle with the EU.

The synchronisation of supply and demand shocks is likely to increase with EU accession as a result of increased trade intensity and structural improvements (higher shares of intra-industry trade and industrial production). However, unlike in recent years, fiscal policy will most likely be unavailable for the management of the cyclical development of the acceding countries.

Our study confirms several policy conclusions. First, for certain acceding countries (e.g. Hungary), joining the euro area quickly does not imply large welfare losses from asymmetric business cycles. Correlation of their supply and demand shocks with the euro area is about the same as for smaller countries in the euro area's periphery. A reasonably short time within ERM II may also be expected for these countries. For others (e.g. Lithuania and Slovakia), the correlation of shocks remains low and implies that rapid moves to monetary union could prove to detrimental for them. The same argument may also apply to ERM II membership, although this arrangement offers wide fluctuation bands around the central parity and a chance to change the central parity, if needed. By the same token, one might also argue that membership in the monetary union by itself will foster integration and higher correlation of business cycles.

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