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Structural convergence and monetary integration in Europe

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In the run-up to EMU, academic economists generally concluded the EU as a whole was not an optimum currency area (OCA). An important reason was the lack of structural convergence between the potential members of the monetary union. Nevertheless, the euro area currently consists of twelve countries. In the near to medium future, twelve additional countries will become EU Members; most of these countries have announced they want swift euro area entry. This paper reviews the literature on optimum currency areas to clarify the concept of structural convergence in the context of monetary integration. In addition, we operationalise OCA theory to assess structural convergence within Europe. The available evidence indicates considerable divergence within the current euro area and a generally slow process of convergence. In contrast, a number of new EU entrants have converged significantly in recent years towards levels of at least some existing members.

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1 Introduction

The introduction of euro coins and banknotes on 1 January 2002 was a milestone in the process of modern European monetary integration. Twelve of the fifteen current European Union (EU) Member States have relinquished their monetary autonomy to form the euro area. In the run-up to Economic and Monetary Union (EMU), there was a lively academic debate on the pros and cons of a common currency for Europe. The formal criteria for entry into the euro area, the so-called Maastricht criteria, played a subordinate role in this debate. In fact, some argued that these ‘nominal’ convergence criteria were neither necessary nor sufficient to form a successful monetary union^{2,3}. Instead, the academic discussions focussed mainly on the structural economic features of the potential participants in order to assess the optimality of monetary integration⁴.

The theory of optimum currency areas (OCA), as first put forward by Mundell (1961)⁵, provides a general framework for evaluating the economic prospects of a common currency. OCA theory suggests criteria that help to judge the costs and benefits of a monetary union. These criteria focus on the probability that countries face asymmetric economic shocks and on the ability of their economies to adjust swiftly after such shocks. If two or more countries generally face similar shocks and have flexible adjustment mechanisms in place to deal with them, they could consider forming a monetary union. In these circumstances they no longer need the exchange rate as an adjustment mechanism. Authors that tried to operationalise the OCA framework and apply it to Europe generally concluded that the EU as a whole is not an optimum currency area, but that monetary integration might be beneficial for some subset of countries⁶. Notwithstanding these views, EMU went ahead in 1998 with

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² See for example Bayoumi and Eichengreen (1997) and de Grauwe (1996).

³ Nevertheless, the nominal convergence criteria of Maastricht served a useful purpose as they fostered monetary and fiscal discipline in the run-up to EMU.

⁴ In this paper the terms monetary integration and monetary unification (or union) are used interchangeably. In the literature, these terms sometimes have slightly different meanings; see Tavlas (1993) for a categorisation of monetary integration.

⁵ Other seminal contributions are by Kenen (1969) and McKinnon (1963).

⁶ See for example Bayoumi and Eichengreen (1996) and Gros (1996).

eleven Member States⁷. The large number of countries that joined from the start is a sign of the political importance EU Member States attach to being a part of the euro area. In recent years, however, the academic balance also seems to have shifted somewhat in favour of a relatively large euro area. Studies on the endogeneity of OCA criteria suggest that countries that are not suitable for a monetary union *ex ante* might be so *ex post*, because of dynamic effects caused by unification itself.

In the coming years, the EU faces an unprecedented enlargement of up to twelve new members, mostly Central and Eastern European (CEE) countries⁸. A number of these accession countries have already indicated they want to join the euro area soon after becoming a member of the EU. Formally, this is possible after fulfilling the Maastricht criteria on exchange rate stability, government finances, inflation and long-term interest rates⁹. However, in line with the reasoning for the current euro area countries, a full assessment of the optimality of giving up their own currency should also take into account the structural features of their respective economies¹⁰.

This article tries to clarify and operationalise the concept of structural convergence in the context of monetary integration by reviewing the existing literature, in particular the theory of optimum currency areas. Furthermore, we apply a number of structural convergence criteria to the current EU members and the CEE accession countries to assess the level of convergence. The literature review reveals that OCA theory is not able to provide conclusive answers to the question of monetary integration. Nonetheless, and for lack of a better alternative, it still serves as a reasonable framework for analysing this question. In particular, OCA theory stresses the importance of structural convergence for a successful monetary union and puts forward a number of criteria to test it. The available evidence suggests that considerable divergence remains within the current euro area. Moreover, convergence is slow. In contrast, a number of CEE accession countries have converged substantially over the past few years, at least up to the level of some current euro area members.

The remainder of the paper is structured as follows. In the next section, we define structural convergence in the context of monetary integration. The third section lists the different structural indicators that have been proposed in the theoretical and empirical literature. We also present available

⁷ Greece joined two years later.

⁸ The first wave of EU-enlargement in 2004 will consist of Malta, Cyprus and eight CEE countries. The paper will focus on the former communist CEE countries as they experience a comparable transition path. These are Estonia, Czech Republic, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia. Two other CEE countries, Bulgaria and Romania, are expected to join after 2006. Furthermore, Turkey is a candidate country with which negotiations have not yet started. Croatia announced it will apply for membership in 2004.

⁹ Entry is even obligatory upon fulfilment of the criteria, as the new Member States do not have a so-called 'derogation', like the UK and Denmark.

¹⁰ This emphasis on structural features, it can be argued, is even more important given the real convergence -in terms of GDP per capita- these countries still face. The process of real convergence through higher productivity growth could easily lead to different dynamics than the rest of the euro area, demanding distinct policy reactions.

data on the current EU Member States and, where available, the CEE accession countries. All indicators are of an economic nature. Even though we admit that the political framework is at least as important as the economic framework, it is outside the scope of this paper¹¹. Section four concludes and tries to identify some ways forward for the countries involved as well as future research.

2 Structural convergence

2.1 *Nominal vs. structural convergence*

In economics, convergence normally means the narrowing of variation of some economic variable within a group of countries or the catching up of a country with another country or group of countries¹². The second meaning is relevant when comparing the CEE countries with the current euro area countries. The Maastricht requirements are called nominal convergence criteria, as the variables to test convergence, such as inflation and interest rates, are nominal ones. The assumption is that these criteria are sufficient to test a country's readiness to enter EMU. This assumption was not necessarily accepted in the academic literature, as can be seen from a number of articles that dealt with the issue of optimality of monetary integration in Europe without using the Maastricht-criteria¹³. Instead, authors looked at structural indicators such as similarity of production structures or the flexibility of the labour market. De Grauwe (1996) argues that nominal convergence is neither necessary nor sufficient to form a successful monetary union. Nominal convergence is not necessary, because countries with (temporarily) different inflation rates may have similar economic structures. It is not sufficient, because two countries with (temporarily) similar inflation rates can have very different adjustment mechanisms in the case of an economic shock. In this paper we try to identify indicators of structural convergence to complement the Maastricht criteria. Structural convergence implies that the CEE countries develop the same set of structural characteristics as the euro area countries, which are presumably already converged. In the context of monetary integration, the OCA framework can be a useful tool to measure structural convergence.

2.2 *What does the theory on optimum currency areas tell us?*

In his seminal article on optimum currency areas, Mundell (1961) suggested that two countries should adopt a common currency when the gains in terms of money changing and valuation outweigh the costs that result from the loss of the exchange rate as a stabilisation instrument. In a larger currency

¹¹ In fact, some go as far as to consider the political will to integrate the single most important condition for adopting a common currency. See, for example, Mintz (1970).

¹² See for example Abramovitz and David (1996).

¹³ See for example Bayoumi and Eichengreen (1993, 1997), Belke and Gros (1999), Demertzis, Hughes Hallet and Rummel (2000) and Eichengreen (1990).

area, money is better at fulfilling its functions as unit of account and medium of exchange¹⁴. In other words, enlarging a currency area lowers transaction costs, including currency exchange and search costs. Additionally, monetary integration eliminates exchange rate risk, which reduces uncertainty and thus improves allocative efficiency. The costs come when a country in a monetary union suffers from an adverse economic shock. In that case, the absence of the monetary policy instrument implies higher adjustment costs. However, these could turn out rather modest if economies have alternative adjustment mechanisms. Therefore, the costs of monetary union are inversely related to the symmetry of economic disturbances and the ability to deal with such disturbances¹⁵. When shocks are completely symmetric across countries or their economies have flexible responses to these shocks, there is no need for autonomous monetary policy¹⁶.

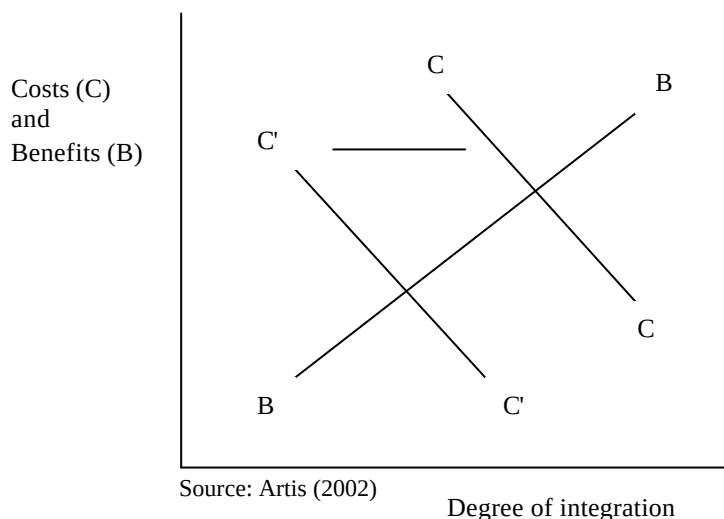
McKinnon (1963) already stressed the importance of openness in the context of optimum currency areas. The core of his argument is that if we move across the spectrum from closed to open economies, flexible exchange rates become both less effective as a control device for external balance and more damaging to internal price-level stability. The costs and benefits of joining a monetary union can be illustrated using a simple diagram (figure 1)¹⁷. They can be seen as a function of the degree of integration between two (or more) countries. The upward sloping line (BB) represents the positive relationship between benefits and the degree of integration. In contrast, the cost line (CC) is downward sloping, as a higher degree of integration should lead to fewer asymmetric shocks. If countries have effective adjustment mechanisms other than monetary policy, the CC line will be closer to the origin. Also, economic reforms which lead to more flexible adjustment will cause an inward shift of the cost curve (C'C'), making a monetary union more attractive.

¹⁴ Though Mundell did not mention it, the same can be said about the third standard function of money, as a store of wealth.

¹⁵ The terms 'disturbances' and 'shocks' are used interchangeably.

¹⁶ The focus in this paper is on the probability of asymmetric shocks and the flexible adjustment mechanisms as an alternative for monetary policy in case of such asymmetric shocks. In practice, it can be the case that countries face completely symmetric shocks, but still exhibit diverging business cycles due to different transmission of these shocks. Monetary policy in the euro area is an example of a symmetric shock with potentially asymmetric transmission. The degree of asymmetry is determined to a considerable extent by factors that are discussed in this paper. In addition, financial structure potentially plays a significant role. For an overview of the issues and some empirical studies on Europe, see for example Borio (1996), Clausen and Hayo (2002), van Els et al. (2003), Hughes Hallet and Piscitelli (1999), OECD (1999, 2000), Sala (2001) and Suardi (2001). Another issue we do not deal with any further is the possibility that countries react to symmetric shocks with a similar, but low degree of flexibility. In theory, these countries could form a monetary union, albeit not a very successful one. For the remainder of the paper it is assumed that countries need a sufficient level of symmetry in shocks as well as flexible adjustment mechanisms to deal with any type of shock.

Figure 1. Costs and benefits of participating in a Monetary Union



2.3 Convergence criteria

OCA theory suggests a number of criteria to operationalise the concepts of symmetry in shocks and the vulnerability of economies in the event of an asymmetric shock. The symmetry of economic shocks is determined by the similarity of economic structures. Countries with the same sectoral production structure can expect to experience the same external shocks. In one of the early contributions to the literature, Kenen (1969), put forward that countries with diversified economies are natural candidates for a currency union, as no external shock that hits a particular industry will necessitate a monetary policy response. In practice, economies do not need to be fully diversified as long as their production structures are similar enough. The importance of production structure as a determinant of business cycle symmetry is confirmed in recent empirical studies¹⁸.

As already indicated, openness is important in the context of monetary integration because it influences the relative costs and benefits of giving up monetary policy. More open economies have more to gain in terms of transaction costs and less to lose in terms of stabilisation. In addition, openness is also a relevant variable through a link with the symmetry of shocks. The idea is that the more countries trade, the more they will be subject to similar economic disturbances. This is particularly the case when countries trade in similar goods; i.e. trade consists mainly of intra-industry trade. Using thirty years of data on twenty OECD countries, Frankel and Rose (1997, 1998) find evidence that countries with closer trade links tend to have more tightly correlated business cycles¹⁹. In

¹⁷ Emerson et al. (1990) provides an extensive overview of the cost and benefits on monetary integration in the European context. A review can be found in Artis (1991).

¹⁸ See for example Imbs (1999) and Kalemli-Ozcan et al. (2001).

¹⁹ Research by Jansen and Stokman (2003) suggests that, in addition to goods integration, capital integration has also played a role in synchronising business cycles in recent years. For a sample of industrial countries in the period 1995-2001 they find that FDI linkages can explain the pattern of international business cycle linkages better than foreign trade relations.

addition, Fidrmuc (2002a) finds that intra-industry trade in particular induces the convergence of business cycles in OECD countries.

Given that countries face asymmetric shocks, different adjustment mechanisms can cushion the effects of these shocks. The ability to adjust to economic shocks is the result of the interplay of a country's economic institutional framework and non-economic, perhaps cultural, preferences²⁰. The functioning of economic institutions is strongly influenced by government policy. Mundell (1961) proposed high factor mobility, in particular labour mobility, as a main criterion for a currency area²¹. However, such mobility is likely to be modest in the short run and could display its effect in the course of time. To mitigate the effect of adverse shocks, price flexibility can be a good alternative for factor mobility. Especially in the short term, nominal adjustments can alleviate shocks and lessen the need for capital or labour to move. As Buiter (2000) rightly points out, the exchange rate regime is a matter of macroeconomic insignificance if there are no significant nominal cost and price rigidities. Unfortunately, nominal rigidities are commonplace.

One branch of the literature has looked at the similarity of economic cycles in order to determine whether countries have converged enough²². The implication is that countries with a high correlation of business cycles will have the same structural characteristics and therefore do not need independent monetary policy. The main problem with these types of studies is that they give no insight into the underlying causes of the observed level of synchronicity. Moreover, it is hard to distinguish initial demand and supply shocks from the policy responses. Demertzis et al. (2000) suggest that a good part of the symmetry observed in the shocks to the EU economies is due to policy interventions, rather than to any natural symmetry in the underlying economy. When analysing the readiness of the CEE countries to adopt the euro, additional problems arise. Identifying and measuring the shocks perturbing the accession countries in the past is very difficult and it is hard to justify the assumption that the patterns revealed in the historical sample would remain valid in the future (Buiter and Grafe, 2001).

²⁰ One can argue that non-economic preferences are - at least partially - reflected in economic institutions.

²¹ Labour and capital mobility are each other's complement. Workers can go to where employment opportunities exist or companies can move to where there is sufficient labour supply (given that the price is right). Capital mobility as an adjustment channel is not examined in this paper, but it is safe to say that international (financial) capital mobility is considerable and without many barriers. In general, financial market integration not only serves as a direct adjustment channel, mainly through FDI, but can also serve as a shock absorber by functioning as a diversification mechanism. In other words, if a country is hit by an adverse country-specific shock, its holdings of foreign (fixed or portfolio) capital can provide for insurance and smooth the income effect of the adverse shock. Currently, this mechanism does not yet seem to play an important role; see for example Méltz and Zumer (1999) and OECD (1999). Alternatively, fiscal transfers between countries can soften the blow. There has been considerable discussion on the need for Europe to have a transnational transfer mechanism. See for example Casella (1993) and Krugman (1993). The main outcome is that even though fiscal transfers could play an important role in the short term, there is considerable danger that transfers get a more permanent character, thereby slowing the necessary adjustment. Moreover, in contrast to US states, euro area countries still have substantial power to smooth expenditures over time, even within the constraints of the Stability and Growth Pact.

For these reasons we have chosen to focus only on the underlying structures and adjustment mechanisms that determine the long run suitability of a monetary union.

2.4 *The ‘new’ OCA theory*

In the decades that followed Mundell’s initial contribution, OCA theory has been modified a number of times, but the basic ideas survived. The signing of the Maastricht Treaty revived interest in the theory of optimum currency areas. In the 1990’s, there were a number of attempts to operationalise the theory and give it empirical backing²³. Unfortunately, this has not led to a unified framework in which countries can be compared directly in order to determine unambiguously whether they should form a currency area. Nonetheless, it is safe to say that in recent years the so-called ‘new’ optimum currency area theory has put more emphasis on the advantages that monetary integration offers (Tavlas, 1993). An important benefit that was neglected in the early days is the positive reputation effects for countries with a history of high inflation. Also, the costs of losing the exchange rate instrument are not considered as high as before: the instrument becomes blunt when it is used too often, as expectations start to play a role²⁴. Moreover, changes in nominal exchange rates do not always foster adjustments of external disequilibria, as was assumed by the ‘old’ optimum currency area theory. It is important to note that the original OCA theory was developed in a time when international financial integration was limited and foreign exchange and capital controls were widespread. In such a framework, independent monetary policy can be a much stronger policy instrument.

2.5 *What happens after monetary union?*

In recent years, there has been a debate on the question whether monetary integration leads to greater symmetry in shocks through integration or to increased asymmetry as integration leads to specialisation. Krugman (1993) puts forward the latter argument. He argues that specialisation in Europe is limited by barriers to trade and high transportation costs. As these progressively disappear through technological innovation, the single market programme and monetary integration, the incentive to reap scale economies and agglomeration benefits may rise and production becomes more concentrated in particular regions. This in turn leads to higher asymmetry of shocks throughout the monetary union. Krugman presents some evidence that suggests a higher degree of specialisation in the US, a long-standing monetary union, than in Europe.

²² Examples can be found in Bayoumi and Eichengreen (1993), Gros (1996) and Korhonen (2003).

²³ See for example Bayoumi and Eichengreen (1996) and Eichengreen (1990).

²⁴ This point is derived from both the literature on the vertical Phillips curve and that on time-consistency of monetary policy. As Artis (1991) puts it: ‘the displacement of the Phillips curve by the “natural rate of unemployment” as the place to start analysis is going to mean that the only benefit of floating exchange rates is the ability to choose a different rate of inflation from other countries. Regarding the time-consistency literature, Tavlas (1993) writes: ‘Barro and Gordon (1983) have shown that, to gain a reputation of credibility, authorities

The opposing view is that some of the OCA criteria are endogenous and that monetary union leads to greater symmetry of business cycles. The argument, as presented by Frankel and Rose (1997, 1998), is as follows. Entry into a currency union may raise international trade linkages (and therefore the benefits foregone by not joining a currency union). More importantly tighter international trade ties can be expected to affect the nature of national business cycles. From a theoretical viewpoint, closer international trade could result in either tighter or looser correlations of national business cycles. Closer trade ties could lead to more specialisation, which in turn could make business cycles more idiosyncratic. However, if demand shocks (or other common shocks) predominate, or if intra-industry trade accounts for most trade, then business cycles may become more similar across countries when they trade more. The question which effect dominates is essentially empirical. In their subsequent calculations Frankel and Rose use a panel of bilateral trade and business cycle data for twenty industrialised countries over a time-span of thirty years. The results indicate that closer trade links result in more closely correlated business cycles across countries. Their conclusion, therefore, is that a country is more likely to satisfy the criteria for entry *ex post* than *ex ante*.

Other authors have tried to detect a trade-effect from monetary unification, using cross-section and historical analyses²⁵. A number of these studies have found support for the hypothesis that currency unions have positive trade effects, but the results differ widely and are not unambiguous. In short, the empirical question has not received a definitive answer. What will happen in the particular case of the euro area now and after future entry remains an open question. It is possible that both integration and specialisation effects are going on at the same time. Even if specialisation effects dominate, these will not necessarily respect national boundaries. In other words, it becomes more and more likely that relevant regions, in which certain industries are concentrated, will include two or more countries (de Grauwe, 2000). In any case, the euro area is far away from a monetary union with strongly specialised regions, so the debate has limited relevance for Europe today. If, however, the specialisation hypothesis turns out to be right in the long run, this puts even more emphasis on the need for alternative adjustment mechanisms, such as price flexibility or labour mobility, in case of adverse shocks.

3 Convergence indicators

We now discuss the criteria of the previous section in more detail. In particular, we try to operationalise the criteria with the use of indicators. It will become clear that not all identified criteria can be easily transformed into accessible indicators. This is caused by lack of data combined with

must pursue a policy rule that is time consistent.’ A rule is not time consistent if it is expected to become sub-optimal in a future period, so that governments will face high incentives to change it.

methodological difficulties. Where available, we look at the data for all individual EU countries and the CEE countries. We will compare these with the relevant euro area benchmark. Using different years, we try to reveal the trends in the convergence process. For most tables we will also add one or more 'outside' countries that can serve to put the data in a broader perspective.

3.1 *Structure of production*

From the start, it should be noted that measuring the convergence in production structures has important limitations and one should be careful with interpreting any particular indicator. It is *a priori* not clear what the relevant level of aggregation is. By definition, high levels of industry disaggregation reveal greater specialisation between countries. The implications for monetary policy, however, become limited as the impact of a particular industry on overall output falls with a rising level of disaggregation.

There are different ways in which the production structure of an economy can be measured. The most straightforward one is by comparing the relative size of the different sectors. A commonly used division is between agriculture, industry, and services. However, such a rough division still leaves considerable room for specialisation within sectors. Krugman (1993) developed an output divergence index to measure the degree of specialisation in any given country compared to another country or group of countries. The index is the sum of the absolute differences in share between the given country and the benchmark in a number of economic sectors. OECD (1999) calculations report ambiguous results about the convergence of production structures in Europe over the last decades. A regional specialisation index, using employment in 3 sectors (agriculture, industry and services), suggests a slightly declining level of regional specialisation over the period 1986 to 1996. However, an output divergence index, using eight sectors and comparing individual countries with the euro area average, shows a slight overall divergence over the period 1980 to 1995. Bayoumi and Eichengreen (1996) also report an increasing degree of specialisation in eight EU countries in the 1970s and 1980s. Using Krugman's methodology, table 1 presents new calculations of the output divergence index for the EU countries (except Ireland), the CEE countries (except Bulgaria) and, for reference, Japan and the United States. Using six different sectors, the production structure of each of the countries is compared to the euro area as a whole²⁶.

²⁵ See for example Flandreau and Maurel (2001), Frankel and Rose (2000), Glick and Rose (2002), Rose (2000) and Thom and Walsh (2002). For an overview, see Alesina et al. (2002).

²⁶ We use the euro area, because this is the relevant benchmark for any individual country wishing to adopt the euro at this moment. An alternative would be to include all potential members (EU and accession countries) and assess the individual countries against this benchmark. However, it is not clear when the 'outs' might join. Moreover, it can be expected that the current accession countries join the euro area at different points in time. Therefore, it is uncertain when such a broad benchmark might become the relevant one.

Table 1 Output divergence index¹

constant prices (1995), based on NACE-A6

	1995	2001
Austria	11	11
Belgium	6	8
Finland	15	18
France	10	7
Germany	9	9
Greece	27	33
Italy	11	9
Luxembourg	31	33
Netherlands	8	9
Portugal	15	11
Spain	19	18
average euro area*	15	15
Denmark	15	13
Sweden	9	14
UK	6	5
Czech Republic	33	38
Estonia	27	33
Hungary	16	21
Latvia	40	40
Lithuania	41	43
Poland	40	46
Romania	60	57**
Slovak Republic	34	34
Slovenia	25	24
Japan	20	23**
US***	9	9**

1) the output divergence index is based on 6 main sectors, corresponding to the NACE-A6 standard: agriculture, industry, construction, wholesale and retail trade, professional services and other service activities.

source: Eurostat

* no data for Ireland available

** data for 2000

***source: OECD

The results indicate considerable differences between the production structures of the countries considered. All CEE countries display a considerably higher index than the average of the euro area countries²⁷. Only Hungary and Slovenia have a lower number than at least one of the current participants, while Estonia and the Slovak Republic are close. Romania is clearly the most divergent. The differences between CEE countries and the euro area follow a similar pattern: industry, domestic trade and, to a lesser extent, agriculture are much larger in CEE countries, while the service sectors

²⁷ All euro area averages presented in tables are simple arithmetic averages of all euro area countries.

(other than trade) are much smaller²⁸. Perhaps more worrying than these current differences, is the apparent lack of convergence. This implies that most CEE countries still have a long way to go before they have the type of service economy that is most common for the countries of the euro area.

Within the euro area one can roughly distinguish three groups. A group of seven countries has a divergence index of around 10%. Finland and Spain form a middle group. The only two 'outliers' are Luxembourg and Greece. Luxembourg has an atypically small industrial sector and by far the largest financial sector. Greece is at the other end of the spectrum, having relatively large agricultural and domestic trade sectors, but relatively small industrial and professional service sectors. The euro area as a whole does not display any clear trend between 1995 and 2001. The underlying data show convergence within the first group and further divergence of the outliers. The 'outs', i.e. the EU countries that so far have not joined the euro area, would all fall within the first group of the euro area; ironically the UK is closest to the euro area average of all current EU Member States. Perhaps not surprisingly, the US would also rank among the 'core' countries of the euro area.

As mentioned above, these results have to be interpreted with care as the level of aggregation could substantially influence the results²⁹. To get some idea of the robustness of the results, we made the same calculations after sub-dividing industry and financial intermediation, the two largest sectors³⁰ (see table 2). As expected, the eight sector index on average shows higher numbers, albeit only by a small margin. Even though introducing more sectors does change the ranking of some individual countries, the relative position of the CEE countries (for which data are available) does not change.

²⁸ One further remark seems in place here. In general, larger countries can be expected to have more diversified production structures than smaller ones. For the euro area countries, this is tentatively confirmed by a simple ranking correlation of 0.7. As the accession countries are relatively small in terms of GDP, they can be expected to be less diversified than most euro area countries.

²⁹ Not only the level of aggregation, but also the data source itself can influence the results for the Krugman index. For example, Rostowski (2002) finds a much lower index for Poland, but this is caused by a different standard division in sectors in the old Eurostat data.

³⁰ For this we used OECD national accounts data that give very similar results to the Eurostat data.

Table 2 Output divergence index

based on 8 sectors

	2000
Austria	13
Belgium	9
Finland	20
France	9
Germany	11
Greece	33
Italy	10
Luxembourg	28
Netherlands	13
Portugal	13
Spain	21
average euro area*	16
Denmark	16
Hungary	22
Czech republic	36
Poland	48

8 sectors: agriculture; mining and quarrying; manufacturing;
electricity, gas and water supply; construction; wholesale
and retail trade; financial services; other service activities

source: OECD National Accounts 2002

3.2 *Openness*

A standard way to measure openness to trade is the ratio of exports plus imports over GDP. In addition, the literature review suggests that in particular the level of intra-industry trade is relevant as a measure of true integration between countries. The share of intra-industry trade in total trade is commonly measured by the so-called Grubel-Lloyd index. Openness towards the rest of the euro area - defined as half the ratio of exports plus imports over GDP- is currently at about 18% on average; of this trade about 60% consists of intra-industry trade³¹. Tables 3 and 4 present these data in more detail and again compare the individual euro area countries with the 'outs', the CEE countries and a few reference countries. Because trade data can be very volatile from one year to another, especially for the CEE countries, we use 3-year averages when calculating openness.

In table 3 we define openness as the average of the imports and exports as a percentage of GDP. The three columns respectively show the openness of individual countries towards the rest of the world, the ratio of this trade with the euro area and the resulting openness towards the euro area. The results reveal that half of the current euro area countries have imports and exports with the other EMU members of around 10% of GDP. This is roughly the same for the 'outs', Denmark, Sweden and the

UK. Portugal and Ireland now form the middle group and the outliers are the Netherlands and Belgium/Luxembourg. These countries pull the average up to 17%, slightly up from the period 1993-1995. The table also illustrates the low level of trade integration between the three major economic blocks: the openness of the US and Japan towards the euro area is around 1% of GDP. In contrast, Switzerland is more open towards the euro area than nearly all current members.

Table 3 Openness ¹

	(1) Openness to world		(2) Ratio EMU/world		(3)= (1)*(2) Openness to EMU	
	1993-1995	1999-2001	1993-1995	1999-2001	1993-1995	1999-2001
Austria	25	33	0.62	0.61	16	20
Belgium+Luxembourg	55	68	0.62	0.62	34	42
Finland	25	29	0.34	0.34	9	10
France	17	22	0.50	0.52	9	12
Germany	19	25	0.45	0.43	8	11
Greece	15	16	0.55	0.47	9	8
Ireland	54	60	0.32	0.31	17	18
Italy	18	19	0.50	0.49	9	9
Netherlands	38	52	0.57	0.53	22	28
Portugal	25	26	0.64	0.67	16	18
Spain	17	20	0.58	0.58	10	11
average euro area	30	35	0.50	0.49	15	17
Denmark	24	29	0.47	0.47	11	13
Sweden	27	31	0.44	0.43	12	13
UK	21	21	0.48	0.50	10	10
Bulgaria	37	41	0.39	0.46	15	19
Czech Republic	38	58	0.49	0.61	18	35
Estonia	59	67	0.43	0.42	25	28
Hungary	30	60	0.55	0.62	16	37
Latvia	38	36	0.25	0.36	9	13
Lithuania	51	41	0.31	0.32	16	13
Poland	20	25	0.57	0.56	11	14
Romania	23	30	0.44	0.56	10	17
Slovak Republic	47	64	0.31	0.51	14	33
Slovenia	45	50	0.69	0.62	31	31
Japan	7	9	0.12	0.12	1	1
Switzerland	26	33	0.61	0.60	16	20
US	9	10	0.14	0.15	1	1

source: IMF, Direction of Trade Statistics

1 Openness = 0.5 * (import, goods + export, goods) / GDP

³¹ Own calculations based on IMF and OECD data.

All CEE countries have reached a considerable degree of openness with the euro area in recent years. Five of the CEE countries (Hungary, Estonia, Slovenia, Czech and Slovak Republics) trade more with the euro area than any of the current euro area members, with the exception of Belgium/Luxembourg³². Only Latvia, Lithuania, Poland and Romania are less open than the average of euro area countries. Nonetheless, all have stronger trade relations with the euro area than six of the current members³³. In terms of convergence, all but two countries (Lithuania and Slovenia) increased their openness towards the euro area in the course of the 1990s. Most notable in this respect are Hungary and the Czech and Slovak Republics; they roughly doubled their openness towards the euro area within a decade from already reasonably high levels.

It seems too early to tell whether the endogenous trade-effects of monetary union, as predicted by authors like Rose (2000) actually take place within the euro area. Nonetheless, the data do not look very promising yet as overall openness has grown stronger than openness between euro area countries. Intensive trade relations with economies outside the monetary union can lead to future asymmetric shocks. All euro area countries trade significantly with third countries. Partially, this reflects trade with the 'outs' and the CEE countries. Presumably, these will all become part of the monetary union at some point, thus raising the ratio of EMU trade to world trade. In general, the trading partners (and traded goods) outside the euro area are mainly a potential problem if they are particular to one or a few countries. Good examples are the Baltic States and Finland. Their ratio of EMU/world trade is partially a reflection of the relatively intensive trade relations with Russia. This might leave these economies vulnerable to economic developments in Russia.

To measure intra-industry trade we calculate the commonly used Grubel-Lloyd index. If the index is 0, all exports and imports are in different types of goods. In that case countries are fully specialised and all trade is inter-industry. A value of 100 means that imports and exports are of the same size in all types of goods so that all trade is intra-industry. Different types of trade are captured in measurements of intra-industry trade: horizontal trade in similar products with differentiated varieties (e.g. cars of similar class and price range); trade in vertically differentiated products distinguished by quality and price (e.g. Italy exports high-quality clothing and imports lower-quality clothing); and vertical specialisation of production that results in trade in similar goods at different stages of production (OECD, 2002). The assumption is that trade in goods of, say, a lower quality will be affected differently - perhaps less - in case of an asymmetric shock. Correlation between intermediate and

³² IMF trade data for the whole period are only available for the two countries together.

³³ As with the output divergence index, size matters. Smaller economies can be expected to be more open and, in this particular case, more open towards the euro area. Estimating a gravity equation could shed some light on the question whether countries trade exceptionally much or little with the euro area. A simple ranking correlation for the euro area (0.1) suggests that the size-openness relation is not that strong within the euro area; as could be expected, taking openness towards the world increases this correlation (to 0.3).

finished goods will probably be high, but there will most likely be a lagged effect. These examples show that even intra-industry trade can still cover relatively heterogeneous goods. This makes an unambiguous interpretation in the context of monetary integration more difficult. To illustrate this point, research in the mid-1990s by Aturupane et al. (1997) indicates that 80 to 90% of the intra-industry trade between the CEE countries and the EU concerns trade in goods of varying quality (i.e. vertically differentiated products).

Table 4 presents the development of the Grubel-Lloyd index throughout the last decade³⁴. Both the euro area and the CEE countries show considerable heterogeneity when it comes to the level of intra-industry trade in total trade. In the euro area, the more mature industrial economies have high shares. A middle group, consisting of Finland, Ireland and Portugal, still has shares of well over 50%. Greece is again an outlier, with a very low 26%. For some euro area countries, especially Portugal, intra-industry trade has increased significantly over the last decade. Others, like Finland, Ireland and in particular Greece seem to have stabilised at relatively low levels. This could potentially be a source of future asymmetric shocks.

In the course of the 1990s, the CEE countries as a whole have shown a substantial increase in their level of intra-industry trade. However, a more detailed look reveals important differences. Four of the more advanced CEE countries, namely Hungary, the Czech and Slovak Republics and Slovenia, have shown a strong growth of intra-industry trade and surpassed the euro area average. There seems to be a strong relation between the rising share of intra-industry trade and the high and increasing inflows of foreign direct investment over the 1990s, especially from Germany. It is consistent with the increase of Greenfield investments by multinational firms in these countries. Some of the CEE countries have more moderate levels of intra-industry trade while Bulgaria and Latvia even fail to show a rising trend. Nonetheless, only Latvia has an index that is lower than Greece. Looking at the 'outside' countries, the low figure for Japan seems to confirm the impression of a relatively closed economy with a specialised export sector and very specific imports.

³⁴ Data for the euro area were not available.

Table 4 Intra-industry trade with EU-15Grubel-Lloyd index¹

Country	1993	1996	2000
Austria	na	77	82
Belgium	81	82	85
Finland	na	56	57
France	86	88	88
Germany	77	81	77
Greece	27	29	26
Ireland	60	55	56
Italy	65	70	73
Luxembourg	na	na	67
Netherlands	74	74	72
Portugal	47	58	61
Spain	69	72	76
average euro area	65	67	68
Denmark	66	66	69
Sweden	na	77	77
UK	82	80	79
Bulgaria	46	42	39
Czech Republic	58	64	74
Estonia	17	45	57
Hungary	57	70	75
Latvia	13	25	20
Lithuania	15	28	37
Poland	45	47	58
Romania	30	36	41
Slovak Republic	42	57	68
Slovenia	61	71	71
Japan	40	52	45
US	73	76	73

Source: Eurostat

1.) Grubel-Lloyd index =

$$100 * (1 - (\text{sum,all sectors } |(\text{export,per sector} - \text{import,per sector})| / \text{sum,all sectors}(\text{export,per sector} + \text{import,per sector})))$$

3.3 Labour market flexibility

In theory, the most important shock absorber would be nominal wage (and price) flexibility³⁵.

However, nominal wage flexibility has traditionally been very low as workers, supported by unions, find it hard to accept a downward adjustment of their wages. Real wages have been somewhat more flexible. The body of research in this field is not always easy to interpret and sometimes produces seemingly conflicting outcomes. The OECD (2000a) reports that real wages in the euro area react

³⁵ For wage flexibility to function as an adjustment mechanism, it needs to be complemented by product market flexibility so that lower costs are quickly transmitted into lower prices. See Nicoletti et al. (1999) for a framework to assess product market regulation.

more slowly to changes in unemployment than in the US. Pauli (2002), on the other hand, finds that wages in the US are not more sensitive to unemployment changes than in Germany, France and the Netherlands. Looking at regional rather than national data, Baddely et al (2000) find that real wage (in)flexibility varies across regions both in the EU and the US, but on average, regional wages are no less flexible in EU core regions than in the US states. Taken together the empirical evidence indicates that the economies of continental Europe display slow, but relatively strong nominal adjustment, whereas the US and the UK show fast but moderate adjustment³⁶.

There have been a number of studies that investigated the role that labour mobility can play in adjusting to economic shocks³⁷. Different studies indicate that labour mobility is much more important as an adjustment mechanism in the US than in Europe. For example, Eichengreen (1990) finds that labour mobility is three times higher in the United States (US) than in Europe. Blanchard and Katz (1992) provide evidence that labour migration plays a major role in reducing interstate unemployment differentials in the US. Decressin and Fatas (1995) adapt the framework of this study to compare US States and European regional labour markets and conclude that labour mobility plays a relatively small role in the adjustment of European labour markets.

The overall picture that emerges is one in which most European labour markets are slow to adjust to economic imbalances; the lack of labour mobility and short term wage flexibility leads to relatively large sacrifices in the long term. In contrast, the US has swifter wage adjustment in the short term, combined with a more important role for labour mobility as an additional adjustment mechanism. Unfortunately, the empirical research has scarcely led to easy to interpret indicators of labour market flexibility. Moreover, data are hard to find, especially for the CEE countries. As the available data material covers labour mobility, we will focus on this criterion in the remainder of this paper.

The minor importance of external labour mobility in Europe (i.e. between countries of the EU) is reflected in the EU migration figures. The number of EU nationals resident in another Member State is only 5.5 million out of 370 million, equivalent to 1½% of the population (OECD, 1999). Because most migrants are of working age, the share of workers from other EU countries in the labour force is slightly higher. Generally, this share stays below 3%, with some countries (Finland, Italy) having a negligible percentage of foreign EU workers. Exceptions are Belgium, with a share over 5% and especially Luxembourg where around 40% of the workforce comes from other EU countries. Interestingly, the proportion of non-nationals from countries other than the EU is currently almost twice that of EU nationals living in another Member State. This pushes the total for Luxembourg over

³⁶ See also van Dalen et al (2003); this study includes a number of additional empirical references.

50%, while in Germany and France, more than 5% of the labour force is foreign³⁸. This is still low compared to the US, where it is 10%.

Theoretically, one would expect that external mobility in Europe is lower than domestic mobility, due to barriers such as language or incompatibility of social security systems. However, as table 5 illustrates, domestic mobility is still lower in all euro area countries than in the US, commonly used as the relevant benchmark for Europe³⁹. Only the UK, one of the ‘outs’ has gross migration levels comparable to the US. The level of internal migration is especially low in the southern European countries Italy and Spain. The available data for the CEE countries is limited to two countries. Hungary and the Czech Republic have very different figures. Hungary scores with the best of the euro area countries, France and the Netherlands, while the Czech Republic is only slightly above the worst performer, Italy.

Table 5 Domestic mobility

Annual gross migration between regions,
as a percentage of total population

	1995
Belgium	1.27
Finland	0.92
France	1.58 *
Germany	1.24
Italy	0.53 *
Netherlands	1.61
Spain	0.60
average euro area	1.11
Sweden	1.61
UK	2.30 *
Czech republic	0.56 *
Hungary	1.50 *
Japan	2.45
US	2.40 *

Source: OECD 2000 Employment Outlook

*) data year 1998

³⁷ In the context of this paper, we focus on geographical mobility as an adjustment mechanism. For a full study of the labour market dynamics one should also include non-spatial mobility. See for example OECD (1999) for more details and an overview of studies on labour mobility.

³⁸ Data for the CEE countries were not available.

³⁹ Because migration is not exclusively motivated by work, these figures must be regarded as an upper boundary of labour mobility.

Data on gross migration need to be interpreted with care. For example, the results of Fidrmuc (2002b) suggest that migration in a number of CEE countries indeed responds to inter-regional wage differentials, while its responsiveness to unemployment is weaker. However, the effect of wage differentials on migration is only partially consistent with regional adjustment occurring via migration. Although wage differences have a positive effect on migration, they are positively correlated with overall mobility – both immigration and emigration, with net migration hardly being affected. Hence, depressed regions experience low overall migration (inbound and outbound) rather than a net outflow of migrants. These results suggest that the data in table 5 provide little guidance for assessing the well functioning of the labour market in these countries. To see how the results of table 5 relate to net migration, which seems to be the relevant benchmark if one looks at labour market interactions, table 6 reports these numbers for a few countries concerned. Unfortunately, no CEE countries are included. Generally, the results are comparable with those of gross mobility: migration is much higher in the US than in Europe. However, the data indicate that Italy has higher net migration than Germany and the UK, whereas the latter had the highest gross mobility and Italy the lowest.

Table 6 Net Migration Rate
as percentage of regional population

	1980-9	1990-5
Germany	0.34	0.31
Italy	0.33	0.40
UK	0.26	0.20
US	0.84	0.87

Source: Obstfeld and Peri (1998)

Various explanations for differences in labour market flexibility, both in terms of wage adjustments and mobility of labour, have been put forward in the literature. Social policies and institutions seem to play an important role. These can be expressed, *inter alia*, by replacement rates for unemployed and employment protection legislation. Riboud et al. (2002) find that on average the strictness of employment protection is the same in the CEE countries and the EU, but much lower than in the US. De Nederlandsche Bank (2001) reports that net replacement rate (defined as the ratio between the net social security benefit and net wage level) is 63% in the US, against an average of around 80 to 85% in the euro area. More important than the level of social benefits seems to be the longer duration which explains why migration within Europe, unlike in the US appears to be insensitive to unemployment developments. In addition, it is suggested that unions play an important role, as they increase the bargaining power of employees.

Labour market mobility can also be limited because of costs associated with moving. In this respect, housing policies can be important, e.g. transaction costs for buying and selling a house. It turns out that transaction costs are sizeable in all OECD countries, but they are considerably higher in some EU Member States compared with the US, largely because of stamp duty and VAT. In Belgium and France, for example, stamp duties are close to 10% of the average property value, whereas in the US they are close to zero (OECD, 1999). In addition, there are a number of regulatory incompatibilities that limit international mobility, such as educational certificate recognition and different social systems, including pension systems (OECD, 2000a; Blanchard and Wolfers, 2000). Apart from these economic (dis)incentives, non-economic factors such as language, family dislocation and different lifestyles are also relevant determinants of the decision to relocate. Notwithstanding the many possible reasons for limited labour market flexibility, a unified framework to test their empirical relevance is still lacking. Nevertheless, improvements in all these areas should clearly benefit the functioning of the euro area as a monetary union.

4 Conclusions and policy recommendations

The theory on optimum currency areas provides a helpful framework to analyse the structural convergence that countries should attain before giving up their monetary autonomy becomes beneficial. However, a number of problems arise when applying the OCA framework to assess the suitability of the Central and Eastern European accession countries to join the euro area in the near future. Firstly, the framework is not conclusive; it is unclear what level of convergence is necessary for a monetary union to be beneficial. Using the US as a benchmark often circumvents this problem, but does not really solve it. In the particular case of the CEE countries and the euro area it is also not clear what the relevant benchmark is. Using the average of the euro area, weighted or unweighted, actually implies that some current members are not suitable members. The easiest way out is to take the 'worst performer' of the current euro area as the relevant benchmark. However, this conflicts with the dominant opinion that the EU as a whole, or a large subset, is not an optimum currency area. A related problem is that a country can do well on one criterion, but perform poorly regarding another; e.g. should an open and specialised country join or not? Secondly, methodological and data problems prevent easily interpretable criteria on relevant adjustment mechanisms such as labour mobility and especially wage and price flexibility. This is true *a fortiori* for the CEE countries where relevant time series are often lacking. Even the data on production structure and openness are not always unambiguous.

Notwithstanding the caveats presented above, it is possible to draw a few tentative conclusions regarding the structural convergence of the current EU Member States and the CEE countries. If

openness is considered a main criterion for entering a monetary union, the CEE countries generally have demonstrated considerable convergence over the last decade. If the least open of the current euro area members (i.e. Greece) is considered the relevant benchmark, all could be considered serious candidates for joining the euro. However, the euro area itself displays considerable divergence. The relatively good performance of the CEE countries is generally supported by the growth in intra-industry trade. Especially the Czech and Slovak Republics and Hungary have converged quickly and are more open than nearly all current members. Their level of intra-industry trade is also above the average for the euro area economies. Slovenia has stagnated, albeit at a relatively high level.

Some CEE countries present a less clear-cut case, in particular two of the Baltic States, Poland, Romania and Bulgaria. For Latvia and Lithuania, the relatively low openness to the euro area, combined with vulnerability to shocks emanating from outside of the euro area, could become a problem⁴⁰. In addition, trade with the euro area is largely inter-industry. However, Finland displays similar characteristics. Poland, Romania and Bulgaria are relatively closed and have a low share of intra-industry trade. Nonetheless, these countries are still more open than a number of current participants and the latter two have converged considerably over the last decade, while Poland's share of intra-industry trade increased significantly.

The output divergence indicator presents a somewhat different picture than the openness indicator. Again, overall the euro area still shows considerable divergence, but there is also a relatively large group of countries that show a high level of convergence. All CEE countries are clearly more divergent than the average for the euro area countries. Only Hungary and Slovenia have an index that is lower than at least one current euro area country. Estonia, the Slovak Republic and, to a lesser extent, the Czech Republic are still quite close to Greece and Luxembourg, but it is fair to say that these countries are clear outliers compared to the rest of the euro area. What seems more worrying from an OCA perspective is that most countries have diverged instead of converged since the mid-nineties. Moreover, the numbers will most likely look even worse when based on employment data instead of GDP figures, as the CEE countries have a much larger part of their employment in agriculture and industry than the GDP numbers suggest⁴¹. Taken together, the divergence and openness indicators suggest that convergence has mainly taken place within manufacturing, traditionally the most cyclical sector. In contrast, the service sectors, in particular professional services, have hardly converged. Even though these sectors are normally less cyclical, the differences are large.

⁴⁰ The low ratio partly reflects the strong trade relations with countries in the region; it will improve significantly if Sweden and Denmark join the euro area.

⁴¹ One of the most prominent examples is Poland, where agriculture produces less than 9% of GDP, but almost 20% of employment.

Too little is known about labour market flexibility as a relevant adjustment mechanism in response to an adverse economic shock, even more so in the CEE countries than the current euro area. However, the scant evidence there is does not suggest that the CEE countries are much less flexible than the euro area. Overall, the evidence presented in this paper suggests that there is still considerable structural divergence within Europe. This is true for the current euro area, but even more so for the CEE countries as a whole. The results can be interpreted as supporting the literature that finds the EU as a whole is not an optimum currency area. Nonetheless, if the current euro area is considered optimal for all countries involved, there is no reason for most of the CEE countries to postpone entry. As was the case with the inception of EMU, political will is just as important for successful membership of the CEE countries as the structural convergence of their economies. Nevertheless, the apparent lack of labour market flexibility of both the current EU members as well as the CEE countries could become a serious burden and unnecessarily test the political will. This is clearly an area where further research could be fruitful, not only by uncovering more and better data and developing methods to measure labour market flexibility, but also by revealing how labour market flexibility can be improved.

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