A Sustainable EU-27 Single Currency?

Political Criteria for Optimum Currency Areas

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Abstract

This study tries to find which EU member states and candidate countries can sustain a currency link. I use Bayoumi and Eichengreen's procedure of two-step least squares cross-section regression analysis for estimating exchange rate variation among 26 European countries, integrating domestic political factors into an Optimal Currency Area analysis framework.

Excluding political variables a currency union is found sustainable among combinations of 2-6 countries, none including more than one major EU economy. Economically, Germany is the leading core country, followed by France and the UK. Including political variables Germany and eight other small countries are singled out, while the UK becomes an almost equal alternative core to Germany, with six potential currency partners. Considering domestic politics France and Italy are unstable Euro-zone members. The candidate countries are a long way from a sustainable currency union with the EU.

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1. INTRODUCTION

In December 2002 the European Council decided that ten new countries will join the European Union (EU) by 2004 and two more will do so by 2007.[1] As the accession of these candidates looms closer, so does their eventual adoption of the single currency. Participation in Economic and Monetary Union (EMU) in Europe in general is compulsory for all EU member states. On the other hand, participation in the Euro-zone (i.e. actually adopting the Euro) depends on fulfilling a specified set of formal economic convergence criteria and for most candidates requires in practice also a lengthy process of economic integration with the EU. There are also institutional criteria for participation in EMU, which are part of the vast pre-accession requirements.[2] As of June 2002 all twelve candidate countries had formally fulfilled these institutional criteria.[3] However, their ability to satisfy the economic convergence criteria spelled out in the Maastricht Treaty, regarding exchange rate volatility, the levels of inflation and long-term interest rates and fiscal discipline is less clear.[4]

Since the EU member states must eventually adopt the single currency, their participation in the Euro-zone is a result of their political decision to join the EU.[5] The candidate countries have, at least until recently, been very eager to join the EU and seem to have given little thought to the economic and political consequences of participating in EMU. However, the EMU project is known to have produced considerable economic and domestic political pressures on the EU member states in the 1990s. In addition, as the accession negotiations unfolded, and after a decade of slow and painful transition, domestic political pressure has been building up in the candidate countries with regard to accession and eventual membership in the Euro-zone. The purpose of this study is to find whether the candidate countries can adopt the Euro in a sustainable way, and which EU member states and candidates are more politically and economically compatible with the single currency area than others. Does an all-European currency union make sense?

In the 1990s some economists argued that monetary union among the 15 EU member states was undesirable.[6] They based their argument on the theory of Optimal Currency Areas (OCAs), according to which currency unions are sustainable among

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[1] The ten are Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic and Slovenia, and the two are Bulgaria and Romania. Turkey is expected to start accession negotiations in 2004.

[2] These include: (1) adopting EC legislation on the liberalization of capital movements; (2) the prohibition of any public financing by the central bank and privileged access for public authorities to financial institutions; (3) ensuring the independence of the central bank; and (4) making price stability the top priority of the central bank.

[3] All twelve countries have by now closed their EMU and capital movements' chapters in the accession negotiations (many were given transition periods regarding foreign purchase of real estate). The only exception is Romania, which is still lacking with regard to the liberalization of capital movements.

[4] For surveys of developments within the CEECs regarding the fulfillment of the pre-accession requirements and the economic convergence criteria, see Balcerowicz (2000); Commission of the European communities (1998, 2000); Directorate-General for Research (1999); European Central Bank (1999); Gros (2001); Secretariat Working Party Task Force "Enlargement" (1999).

[5] Currently, only three EU member states have a derogation and are not part of the Euro area. These are Denmark and the UK, which got an opt-out in the Treaty of Maastricht, and Sweden, which technically does not fulfill some criteria, but is mostly politically unwilling to adopt the Euro.

[6] See Bayoumi and Eichengreen (1993); Bofinger (1994); De Grauwe and Vanhaverbeke (1993); Eichengreen and Frieden (1994); Krugman (1992).

major trade partners with open economies, coordinated business cycles, and similar rates of inflation.[7] The more the partners trade with each other, the greater the benefit from removing the exchange rate volatility barrier.[8] The more open an economy is to international trade and investments the less potent will its exchange rate be as a policy tool. The more the partners' business cycles are coordinated the less will they want to resort to exchange rate adjustment. The higher the difference in the inflation rates between the partners the greater the pressure on their exchange rate.[9]

As the EMU bandwagon moved on, undeterred by foreign exchange turmoil and economic anti-EMU arguments, more generous judgments of EMU were made. Especially, some scholars argued that business cycles tend to get endogenously synchronized in a currency union, if enough intra-industry trade is generated among the members.[10] In addition, the analysis of exchange rate pegs has benefited in recent years from the study of domestic exchange rate politics. Scholars of domestic exchange rate politics hypothesize that interest groups, the political business cycle, the degree of stability in domestic politics in general, domestic political institutions, and partisanship affect exchange rates. As Bernhard, Broz and Clack (2002) and Hallerberg (2002) argue, a theory based purely on efficiency grounds is not a sufficient predictor of national exchange rate commitments.

To test these arguments, political economists have studied the relationships between exchange rates and different domestic political variables, representing political stability, the size of various interested sectors (such as manufacturing and agriculture), and the political business cycle (such as the timing of elections). However, in spite of controlling for different economic variables these studies have not integrated domestic politics into a thorough OCA analysis framework, leaving out important OCA criteria such as business cycle correlation and intra-regional trade. In assessing the sustainability of an all-European currency this study will take into account OCA arguments as well as domestic-political ones.

Methodologically, there are roughly three alternative approaches one could use to gauge the sustainability of an all-European currency union. The first, is to use logit, or ordered logit models, where the dependent variable is respectively, binary (to fix or not to fix), or ordinal (the values representing different levels in a scale of exchange rate commitments).[11] These models can be used to estimate the probability of a fix given a range of variables thought to be relevant to the decision. Thus, they

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[7] This list of OCA criteria is by no means exhaustive. Other conditions that could contribute to the sustainability of a currency union include high labor mobility and price flexibility among the partners. However, these criteria are less relevant to the political economy of the EU than those mentioned above. Labor mobility (Bertola, 1989; Erickson, 1995; Gros, 1996) is relatively low among EU member states, which are also determined to keep out CEECs' workers, at least for a lengthy transition period. Price rigidities remain in many sectors in the European economy too. On the classic OCA theory see Gros and Thygesen (1998, 137-55); Kawai (1987); Masson and Taylor (1993); Tavlas (1993).

[8] The 'New Theory of Optimum Currency Areas' argued that fixing a weak currency to a strong currency also improves the credibility of disinflation policies (Tavlas, 1993). This argument was advanced especially with respect to the CEECs (Balcerowicz, Blaszczyk and Dabrowski, 1997). However, this argument is relevant only for a transition period, and only for the weak currency. Anyway, the popularity of this argument has been in retreat in the wake of Argentina's recent economic collapse.

[9] OCA literature focuses on the nominal exchange rate rather than on the real exchange rate because it is interested in the efficiency of currency unions, which involve nominal commitments.

[10] See Artis and Zhang, 1995; De Grauwe and Aksoy, 1999, 13-8; and Frankel and Rose, 1998.

[11] Such studies often follow the IMF's *Exchange and Trade Restrictions*. See for example Edwards, 1996; Frieden, Ghezzi and Stein, 2001; Klein and Marion, 1997; and Savvides, 1993.

are especially compelling for the study of policy decisions. However, judgmental categorization of exchange rate arrangements conveys less information about underlying economic determinants than actual exchange rate behavior (Bayoumi and Eichengreen, 1997).[12]

Alternatively, exchange rate variation itself can be measured, and serve as an index that weighs and summarizes the different pressures that could destabilize a peg. Indeed, scholars have used different variants of Auto-Regressive Conditional Heteroskedasticity (ARCH) models to estimate the variance of exchange rates.[13] While this method is especially suited for forecasting variation, it is based on long, high frequency time series. High frequency exchange rate variation (daily, weekly or monthly data) is much influenced by short-term shocks, which impede attempts to estimate medium- and long-term influences, such as the business cycle. In addition, ARCH models focus on individual currencies, rather than on a group of currencies, a feature that makes ARCH models a rather inadequate or cumbersome tool for the purpose of this study. Thus, this study uses a third alternative approach, Bayoumi and Eichengreen's (1997) procedure of TSLS (Two-Step Least Squares) cross-section regression analysis for estimating exchange rate variation among a group of countries. The procedure is described in detail in Section 3.

The rest of the paper proceeds as follows. Section 2 offers a critique of recent OCA studies of the sustainability of a common currency for the EU and the Central and Eastern European Countries (CEECs).[14] Unfortunately the domestic exchange rate politics literature features no studies yet of the sustainability of the Euro. Section 3 first analyzes the performance of 26 EU member states and candidate countries according to exchange rate variation and each OCA criterion during 1992-1998. Then an OCA equation is estimated, with the volatility of exchange rates as a dependent variable, using a TSLS, cross-section regression analysis. Finally, the countries' OCA index levels are calculated against each of the four major EU economies, assuming that any viable currency union would necessarily include at least one of them.

Section 4 analyzes government instability in Europe and its determinants. It discusses the hypothesized relationships between this variable and exchange rate variation, and analyzes the performance of the sample countries. Then the volatility of the exchange rates is re-estimated, and the OCA index levels re-calculated. Section 5 presents conclusions.

2. A SURVEY OF EXISTING EU-CEEC CURRENCY AREA STUDIES

The study of the economic implications of CEEC membership of the Euro-zone is relatively new. Observing that EU-CEEC trade is high relative to CEEC GDPs, and that the output composition of most candidates is only slightly different

[12] For example, when using a logit model a country would be considered to be continuously on a peg even if parity realignments, or short floatation intervals take place. Similarly, a country would be considered to be continuously observing an exchange rate fluctuation band regardless of the extent of volatility within the band. More generally, in the short term a peg may disguise economic and political imbalances that are bound to destabilize the exchange rate at a later date.

[13] See for example Freeman, Hays and Stix, 2000; Leblang and Bernhard, 2000a; and Lobo and Tufte, 1998.

[14] Throughout this paper the term CEEC refers for convenience to all of the twelve negotiating candidate countries, including Cyprus and Malta.

than that of non-core EU members, Kopits (1999, 6) concludes that the CEECs and the EU member states' business cycles should be correlated. Therefore, the CEECs are expected to gain from joining the Euro area.[15]

De Grauwe and Aksoy (1999) support Kopits' conclusions. They find that growth rates were similar in the EU member states and five Central European countries (Czech Republic, Hungary, Poland, Slovakia and Slovenia) between 1993 and 1995, except for short-term deviations. Therefore, De Grauwe and Aksoy conclude that these countries enjoyed high business cycle correlation, and were closer to sharing an OCA with the EU than were the Scandinavian member states. However, De Grauwe and Aksoy leave out seven candidate countries. In addition, a three-year period might not be long enough to support their conclusions.

More problematic is the methodology that both studies employ. There is no way to determine the relative sensitivity of exchange rate stability to the different OCA criteria. Thus, it is hard to assess the costs and the benefits of adopting the Euro by the CEECs and to weigh potentially conflicting criteria. How great would the effect of fixing the exchange rate be on EU-CEEC trade? The greater the effect, the greater is the benefit of adopting the Euro. How vulnerable to asymmetric shocks would fixed exchange rates be? The stability of CEECs' membership of EMU could be undermined even if the EU-CEEC similarity of output composition is relatively high (which is debatable) if the exchange rates become highly sensitive to shocks. Indeed, many empirical studies have found it difficult to actually quantify and balance the benefits and the costs whenever fulfillment of the criteria was not vigorous.

Bayoumi and Eichengreen (1997) developed a procedure for overcoming this problem, which is described and used in the next section. They found that the EU member states' exchange rate volatility versus the DM diminished in the 1990s, and tended to be lower than their volatility versus the USD or Yen. However, France's DM exchange rate volatility was rising. Therefore, while EMU is economically desirable for most EU member states, it is not economic, and therefore, politically motivated in the case of France.

Since Bayoumi and Eichengreen used a fairly homogeneous sample of 21 industrial countries, the relevance of their estimated equation to EU-CEEC economic relations is debatable. Bénassy-Quéré and Lahrèche-Révil (2000) used a more heterogeneous sample of 49 countries (including ten CEECs) in applying the OCA index to analyze the rationale for de facto exchange rate regimes in the CEECs. They considered the behavior of the exchange rate of each country against three potential international anchors: the US dollar, the DM (as a pre-figuration of the Euro) and the yen. National OCA index values turned out lower for the CEECs against the DM than against the dollar or the yen. Hence, they argue, the Euro is economically better as an anchor currency for CEEC pegs.

However, Bénassy-Quéré and Lahrèche-Révil's sample is perhaps too heterogeneous to provide a reliable equation for the purpose of assessing the compatibility of the candidate countries with the Euro-zone. Moreover, Germany is not the sole dictator of policies in the Euro-zone, and potential pressures might arise from falling out of synchronization with any of the member economies.

Another weakness in the estimations of Bayoumi and Eichengreen and of Bénassy-Quéré and Lahrèche-Révil is, as in other studies surveyed above, their limited choice of proxy variables. While both studies account for the bilateral

[15] On the economic benefits of EU enlargement in general, see also Baldwin, Francois and Portes (1997).

correlation of business cycles and the relative size of each country,[16] the bilateral difference in long-term inflation rates is neglected, as well as domestic political factors. Bénassy-Quéré and Lahrèche-Révil also neglect bilateral trade, preferring to focus on the share of intra-industry trade in bilateral trade, a factor that is already discounted in the cycle correlation proxy. Indeed, adjusted R^2 values for the estimated equations in these studies are 0.52 and lower, suggesting that some omitted factors account for exchange rate variability as well.

3. ESTIMATING EUROPEAN EXCHANGE RATE VARIATION

This section analyzes the 14 EU member states and the twelve candidates in terms of basic OCA criteria.[17] The choice of the sample period – 1992-1998 – is constrained by the availability and the relevance of pre-1992 data for CEECs (indeed, some of these countries did not exist earlier), and by the availability of post-1998 data for EU member states (no exchange rate variability once the Euro was launched).[18] In order to integrate domestic politics with OCA analysis, and since business cycle and trade data are unavailable in higher frequency this study uses quarterly data.

The proximity of the sample period to the launching of the single currency does not impair its usefulness. Arguably, certain economic variables, such as inflation, were the subject of government manipulation designed to fulfil the Maastricht criteria, but this is true for no more than the last two years of the sample. Exchange rates, openness and trade were beyond the legal or practical ability of governments to significantly manipulate. Furthermore, while the end of the 1990s saw relative exchange rate tranquility in the case of many of the currencies in the sample, the 1992-1993 period was exceptionally volatile. Therefore, the sample period seems balanced overall.

Anyway, given that exchange rates cannot be manipulated in the long term (witness the widening of the Exchange Rate Mechanism (ERM) bands in 1993) whatever manipulation of the independent variables took place, the relationship between these variables and the exchange rate, which this paper studies, is not impaired.[19]

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16 Small economies are assumed to be highly open to trade.

17 Luxembourg was not counted in the sample for lack of an independent currency and exchange rate. On the other hand, Austria, Finland and Sweden were counted for simplicity as EU member states for the entire sample period, although they became member states only in January 1995.

18 Not all countries have complete and reliable data for all series for 1992-1998 either. Whenever necessary, calculations were based on shorter time spans. Unless otherwise specified, raw data was taken from the IMF's *Direction of Trade Statistics*, and *International Financial Statistics*.

19 Governments are known to attempt to manipulate nominal exchange rates, and during the sample period the sample countries adopted a variety of exchange rate policies.

Conventional pegged arrangements were followed by Austria until December 1994, Cyprus until June 1992, the Czech Republic until February 1996, Finland until September 1992, Hungary until March 1995, Latvia between February 1994 and 2001, Malta throughout the period, and the Slovak Republic until December 1995.

Fluctuation margins were observed by Austria from January 1995, Belgium, Denmark, France, Germany, Ireland, the Netherlands, Portugal and Spain throughout the period, Cyprus from June 1992, the Czech Republic between February 1996 and May 1997, Finland from October 1996,Greece from March 1998, Italy until September 1992 and from November 1996, the Slovak

3.a. Exchange rate variation

Table 1: SDE levels for EU member states and CEECs

FRANCE	SDE	GERMANY	SDE	ITALY	SDE	UK	SDE
DENMARK	0.84	AUSTRIA	0.05	**SLOVAK REPUBLIC**	4.44	**MALTA**	6.03
AUSTRIA	1.35	**ESTONIA**	0.12	SPAIN	4.57	IRELAND	6.80
GERMANY	1.36	NETHERLANDS	0.25	SWEDEN	5.02	**CYPRUS**	7.32
BELGIUM	1.37	BELGIUM	0.85	PORTUGAL	5.46	SWEDEN	8.98
ESTONIA	1.38	FRANCE	1.36	**CZECH REPUBLIC**	5.49	FRANCE	8.98
NETHERLANDS	1.54	DENMARK	1.48	**MALTA**	5.72	FINLAND	9.11
CYPRUS	2.43	**CZECH REPUBLIC**	2.94	GREECE	6.06	DENMARK	9.21
CZECH REPUBLIC	3.32	**CYPRUS**	3.20	IRELAND	7.92	ITALY	9.60
IRELAND	4.23	**SLOVAK REPUBLIC**	4.66	**ESTONIA**	8.55	**SLOVAK REPUBLIC**	9.66
SLOVAK REPUBLIC	4.35	IRELAND	5.12	**CYPRUS**	8.62	**ESTONIA**	9.83
MALTA	5.67	**MALTA**	6.34	UK	9.60	GERMANY	9.96
FINLAND	6.13	FINLAND	6.37	NETHERLANDS	10.51	AUSTRIA	9.97
PORTUGAL	6.61	PORTUGAL	6.94	FINLAND	10.65	BELGIUM	10.00
UK	8.98	SWEDEN	9.72	FRANCE	10.94	PORTUGAL	10.05
SWEDEN	9.11	UK	9.96	DENMARK	11.37	NETHERLANDS	10.18
SPAIN	10.29	SPAIN	10.52	GERMANY	11.43	**CZECH REPUBLIC**	11.17
ITALY	10.94	**LATVIA**	11.23	AUSTRIA	11.44	SPAIN	12.07
LATVIA	11.06	GREECE	11.36	BELGIUM	11.44	GREECE	14.06
GREECE	11.34	ITALY	11.43	**SLOVENIA**	14.34	**LATVIA**	14.66
SLOVENIA	23.54	**SLOVENIA**	23.55	**LATVIA**	16.16	**LITHUANIA**	22.12
POLAND	33.07	**POLAND**	33.13	**POLAND**	23.32	**SLOVENIA**	22.20
HUNGARY	33.41	**HUNGARY**	33.28	**HUNGARY**	28.58	**POLAND**	30.44
LITHUANIA	56.89	**LITHUANIA**	57.25	**LITHUANIA**	39.84	**HUNGARY**	36.87
ROMANIA	132.76	**ROMANIA**	133.37	**ROMANIA**	115.41	**ROMANIA**	94.62
BULGARIA	138.51	**BULGARIA**	138.15	**BULGARIA**	138.65	**BULGARIA**	141.72
AVERAGE	20.82		20.91		21.02		21.42
EU AVERAGE	5.23		5.34		9.20		9.57
CEEC AVERAGE	37.71		37.77		33.83		34.26

Note: For each two countries SDE is the standard deviation of the bilateral exchange rate, in quarterly frequency, expressed in percentage points from the average exchange rate for the sample period. Calculations are based on IMF data. Averages are simple and not weighted.

Republic between January 1996 and September 1998, Sweden until November 1992 and the United Kingdom until September 1992.

Crawling pegs and fluctuation margins were adopted by Hungary from March 1995, and Poland throughout the period.

Currency boards were adopted by Bulgaria from July 1997, Estonia throughout the period, and Lithuania from April 1994.

In all other cases a free or a managed float of some sort prevailed (see International Monetary Fund, *Annual Report on Exchange Arrangements and Exchange Restrictions*). However, only the currency board arrangements ensured long-term nominal exchange rate stability effectively. As Bayoumi and Eichengreen (1997) argued the actual volatility of exchange rates is the ultimate test for theoretical arguments (see also footnote 12). To the extent that Estonia and Lithuania were able to maintain stability for so many years, this stability needs to be explained by existing theories, not brushed aside as an anomaly.

This section proceeds by first, analyzing the performance of each country in the sample against the four major EU economies according to exchange rate variation and each OCA criterion. Next, the section estimates the volatility of their exchange rates using a TSLS, cross-section regression analysis, and finally, calculates their OCA index levels against each of the four major EU economies.

For each two countries the quarterly standard deviation of the exchange rate from its average for the sample period is calculated, and expressed in percentage points. SDE values range from a low of 0.05 percent in the German-Austrian case to a high of 141.72 percent in the Bulgarian-British case. Table 1 details SDE levels for all countries with regard to the four major EU economies, and sorts them accordingly. The CEECs are highlighted.

Table 1 reveals that as far as actual exchange rate variation is concerned, Austria, Belgium, Denmark, Estonia, France, Germany and the Netherlands formed a core with the standard deviation among them not exceeding 1.54 percent. Cyprus and the Czech Republic formed an outer core with 2-3 percent levels for SDE. Based on this performance these two countries could have joined the old ERM, has this arrangement continued. Ireland and the Slovak Republic formed a sort of inner periphery with levels of 5-6 percent. Then come Malta, Finland and Portugal with 6-7 percent SDE levels. The next six countries, including Italy and the United Kingdom (UK), were either not ERM members during the sample period, had to quit it during that period, or had to resort to realignments to stay in it. The rest of the countries in Table 1 were a far cry from any peg to the core currencies, to the Italian lira, or to the British pound. Interestingly, all four major countries have roughly the same (simple) average exchange rate standard deviation with respect to the sample countries, but France and Germany were on average more integrated with EU member states than Italy and the UK.

3.b. Openness

The average ratio of total exports and imports of goods and services to GDP serves as a proxy for an economy's openness. It is expressed in percentage points and is calculated for each economy as the average of the seven annual ratios in the 1992-1998 period. The higher the openness the lower is exchange rate variation hypothesized to be. Table 2 details the openness levels for all countries, and sorts them accordingly. The average ratio differed significantly among European states in the 1990s, from a low of 42.5 in Greece's case, to a high of 192.2 for Malta. The CEECs, which on average were more open than the EU member states, are highlighted.

3.c. Bilateral trade

Extensive trade among members of a currency area is considered an important OCA criterion. The more countries trade the more they would benefit from stability of exchange rates, and according to the endogenous OCA theory their business cycles would be more correlated as well. Thus, the more the partners trade the lower exchange rate variation is expected to be. For each pair of countries TRADE is

calculated as the simple average of their ratios of bilateral trade volume (exports plus imports) to GDP, the ratios being expressed in percentage points.[20]

Table 2: Openness levels for EU member states and CEECs

COUNTRY	OPENNESS
MALTA	192.2
ESTONIA	151.1
BELGIUM	137.3
IRELAND	134.9
SLOVAK REPUBLIC	129.4
SLOVENIA	114.8
LATVIA	114.2
LITHUANIA	113.3
CZECH REPUBLIC	111.9
NETHERLANDS	100.2
BULGARIA	99.6
CYPRUS	99.2
AUSTRIA	79.3
SWEDEN	71.1
HUNGARY	67.8
DENMARK	66.4
FINLAND	64.4
PORTUGAL	61.8
ROMANIA	59.8
UNITED KINGDOM	54.5
GERMANY	49.9
POLAND	48.5
SPAIN	47.5
FRANCE	45.0
ITALY	42.7
GREECE	42.5
AVERAGE	88.4
EU AVERAGE	71.3
CEEC AVERAGE	108.5

Note: GDP is presented in billions of current US dollars, Openness in percentage points. Calculations are based on IMF data. Averages are simple and not weighted.

TRADE values reach highs of 18-20 percent in obvious cases such as Italian-Maltese, Czech-Slovak, Estonian-Finish and Irish-British trade, but in most cases are lower than one percent. Table 3 details TRADE levels for all countries with regard to the same four major EU economies. The CEECs are highlighted. Table 3 reveals that

[20] Each bilateral trade volume and GDP are themselves averaged over the annual data for the sample period.

distinguishing core from periphery is more difficult when it comes to trade compared with the business cycle. Different countries concentrate their trade on different major economies. However, the three bottom rows in Table 3 reveal that Germany is the greatest trader among the major economies with an average TRADE value of 7.49 percent. Both in Germany and in Italy's case the average value for TRADE is higher with the CEECs than with the EU member states.

Table 3: TRADE levels for EU member states and CEECs

FRANCE	TRADE	GERMANY	TRADE	ITALY	TRADE	UK	TRADE
BELGIUM	11.98	**SLOVENIA**	14.77	**MALTA**	21.71	IRELAND	17.86
MALTA	8.24	**CZECH REPUBLIC**	14.37	**SLOVENIA**	9.72	**MALTA**	7.86
GERMANY	5.74	BELGIUM	13.92	GERMANY	5.07	BELGIUM	6.23
NETHERLANDS	5.06	NETHERLANDS	12.91	FRANCE	4.22	NETHERLANDS	5.88
SLOVENIA	4.92	AUSTRIA	12.18	**ROMANIA**	3.78	GERMANY	4.35
SPAIN	4.74	**SLOVAK REPUBLIC**	11.69	BELGIUM	3.65	FRANCE	3.67
ITALY	4.22	**HUNGARY**	11.42	**BULGARIA**	3.43	**CYPRUS**	3.59
IRELAND	4.13	**POLAND**	8.64	**SLOVAK REPUBLIC**	2.94	SWEDEN	3.28
PORTUGAL	3.71	**MALTA**	8.14	**HUNGARY**	2.91	FINLAND	2.66
UK	3.67	**LITHUANIA**	7.63	NETHERLANDS	2.87	**LATVIA**	2.60
SWEDEN	1.79	**LATVIA**	6.50	AUSTRIA	2.73	PORTUGAL	2.53
DENMARK	1.58	IRELAND	6.33	GREECE	2.71	DENMARK	2.38
ROMANIA	1.48	DENMARK	6.05	SPAIN	2.62	ITALY	2.22
CZECH REPUBLIC	1.47	FRANCE	5.74	**CYPRUS**	2.32	SPAIN	2.15
BULGARIA	1.46	**BULGARIA**	5.16	UK	2.22	**LITHUANIA**	1.78
HUNGARY	1.45	ITALY	5.07	PORTUGAL	2.08	**ESTONIA**	1.66
AUSTRIA	1.41	**ESTONIA**	5.06	**POLAND**	2.07	**CZECH REPUBLIC**	1.42
SLOVAK REPUBLIC	1.38	SWEDEN	4.84	**CZECH REPUBLIC**	2.06	**POLAND**	1.35
POLAND	1.36	PORTUGAL	4.73	IRELAND	1.87	**SLOVENIA**	1.26
FINLAND	1.28	**ROMANIA**	4.41	**LITHUANIA**	1.39	**BULGARIA**	1.17
GREECE	1.28	UK	4.35	SWEDEN	1.24	**HUNGARY**	1.16
LITHUANIA	1.24	FINLAND	3.89	DENMARK	1.22	GREECE	1.03
CYPRUS	1.24	SPAIN	3.44	**ESTONIA**	1.01	AUSTRIA	1.00
LATVIA	0.84	**CYPRUS**	3.24	FINLAND	0.98	**ROMANIA**	0.79
ESTONIA	0.74	GREECE	2.81	**LATVIA**	0.95	**SLOVAK REPUBLIC**	0.72
AVERAGE	3.06		7.49		3.51		3.22
EU AVERAGE	3.90		6.63		2.57		4.24
CEEC AVERAGE	2.15		8.42		4.52		2.11

Note: For each two countries TRADE is calculated as the simple average of their ratios of bilateral trade volume (exports plus imports) to GDP, the ratios being expressed in percentage points. Calculations are based on IMF data. Averages are simple and not weighted.

3.d. Business cycle correlation

The proxy for business cycle correlation between each pair of countries is calculated as the standard deviation of the difference in quarterly industrial production growth rates during the sample period in the two countries (Bayoumi and

Eichengreen, 1997). Thus, CYCLE is expressed in terms of percentage points of growth rate. Business cycle correlation is enhanced when the two economies are similar in their industrial specialization and are highly integrated with each other. The higher CYCLE is the less correlated the business cycle is among the partners, and the greater the exchange rate variation is hypothesized to be.[21]

Table 4: CYCLE levels for EU member states and CEECs

FRANCE	CYCLE	GERMANY	CYCLE	ITALY	CYCLE	UK	CYCLE
UK	1.20	FRANCE	1.30	**MALTA**	1.86	FRANCE	1.20
GERMANY	1.30	SPAIN	1.55	UK	1.99	**MALTA**	1.31
SPAIN	1.37	UK	1.64	GERMANY	2.06	NETHERLANDS	1.53
MALTA	1.61	FINLAND	1.85	FRANCE	2.06	GERMANY	1.64
FINLAND	1.63	ITALY	2.06	FINLAND	2.19	SPAIN	1.68
NETHERLANDS	1.75	**MALTA**	2.12	SPAIN	2.23	FINLAND	1.69
ITALY	2.06	NETHERLANDS	2.20	NETHERLANDS	2.37	ITALY	1.99
GREECE	2.21	DENMARK	2.46	IRELAND	3.03	GREECE	2.19
SWEDEN	2.29	SWEDEN	2.47	DENMARK	3.15	SWEDEN	2.26
DENMARK	2.77	GREECE	2.59	GREECE	3.22	DENMARK	2.84
IRELAND	3.12	IRELAND	2.80	SWEDEN	3.24	IRELAND	2.90
PORTUGAL	3.97	PORTUGAL	4.61	AUSTRIA	4.49	PORTUGAL	4.26
AUSTRIA	4.16	AUSTRIA	4.80	PORTUGAL	4.63	AUSTRIA	4.51
BELGIUM	4.92	**LATVIA**	5.08	BELGIUM	5.37	BELGIUM	5.03
LATVIA	5.30	BELGIUM	5.11	**LATVIA**	5.65	**LATVIA**	5.80
SLOVENIA	6.02	**SLOVENIA**	5.91	**SLOVENIA**	5.98	**SLOVENIA**	6.02
CYPRUS	6.39	**CYPRUS**	6.49	**ROMANIA**	6.01	**CYPRUS**	6.66
ROMANIA	7.00	**ROMANIA**	6.55	**SLOVAK REPUBLIC**	6.70	**ROMANIA**	6.74
SLOVAK REPUBLIC	7.02	**SLOVAK REPUBLIC**	6.81	**CYPRUS**	6.94	**SLOVAK REPUBLIC**	6.86
HUNGARY	8.55	**HUNGARY**	8.34	**HUNGARY**	8.23	**HUNGARY**	8.39
ESTONIA	9.21	**ESTONIA**	9.04	**ESTONIA**	9.11	**ESTONIA**	9.20
POLAND	10.48	**POLAND**	10.79	**POLAND**	10.00	**POLAND**	10.16
BULGARIA	10.94	**BULGARIA**	10.81	**BULGARIA**	11.22	**BULGARIA**	11.08
LITHUANIA	11.95	**LITHUANIA**	11.66	**CZECH REPUBLIC**	11.59	**CZECH REPUBLIC**	11.95
CZECH REPUBLIC	12.13	**CZECH REPUBLIC**	11.69	**LITHUANIA**	11.88	**LITHUANIA**	12.11
AVERAGE	5.17		5.23		5.41		5.20
EU AVERAGE	2.51		2.73		3.08		2.59
CEEC AVERAGE	8.05		7.94		7.93		8.02

Note: CYCLE is the standard deviation of the difference in quarterly, industrial production growth rates in each two countries. Thus, CYCLE is expressed in terms of percentage points of growth rate. Calculations are based on IMF data. Averages are simple and not weighted.

CYCLE values range from a low of 1.20 percent in the French-British case to a high of 18.32 percent in the Bulgarian-Lithuanian case. Table 4 details CYCLE levels for all countries with regard to the four major EU economies, and sorts them

[21] Industrial production is inferior to GDP as a measure of the business cycle, but was nevertheless preferred because quarterly real GDP series were either unavailable or incomplete for many of the countries in the sample.

accordingly. The CEECs are highlighted. Table 4 reveals that as far as business cycle correlation is concerned, the six major EU economies, as well as Finland and (surprisingly) Malta form a core with the difference in quarterly industrial production growth rates among them varying by no more than 2.37 percent (rows 1-7 in all columns). The second group of countries, occupying rows 8-11 in all columns, consists of Denmark, Greece, Ireland and Sweden, with CYCLE levels of 2.19-3.24. The ranking of the rest of the countries is no surprise, except for Austria, Belgium, and the Czech Republic. The three bottom rows in Table 4 show that the simple average of CYCLE values for all four major countries are almost identical. In addition, most of the EU member states seem economically well integrated, in contrast to the CEECs.

3.e. Inflation

The higher the inflation gap between the partners the greater the exchange rate variation is hypothesized to be. The average annual rate of consumer price inflation differed significantly among European states in the 1990s, from a low of 1.4 in Finland's case, to a high of 221.4 for Bulgaria. Table 5 details INFLATION levels for all countries in the sample. The CEECs are highlighted. It comes as no surprise that the EU member states formed a core, although, Malta, Cyprus and the Czech Republic did better than Greece.

3.f. Estimating a standard OCA equation

Section 2 described the problem of estimating the relative importance of the different OCA criteria. This problem can be overcome using Bayoumi and Eichengreen's (1997) method, which operationalizes OCA theory and enables to quantify and to scale the readiness of the CEECs to join the Euro area. Bayoumi and Eichengreen's (1997) procedure uses TSLS cross-section regression analysis to estimate an equation where the independent variables are proxies for different OCA criteria, and the dependent variable is a measure of exchange rate volatility. Each observation in the data relates to a certain pair of countries from a sample group of countries, and consists of proxy values calculated for these countries over the sample period.

The first step in any TSLS procedure is to clear two-way relationships among the independent variables in the equation under examination (the OCA equation in this study), and between them and the dependent variable. For each one of these independent variables an instrument equation is estimated, with that variable as the dependent variable and a few independent variables called the instrument variables. It is important that different and non-correlated instrument variables are used in the instrument equations.

The second step in a TSLS procedure is to calculate the instrumented values of the independent variables in the examined (OCA) equation. This is done in each observation for each independent variable by substituting the values of the instrument variables in the instrument equations. Then the instrumented values of the independent variables can be used to estimate the examined (OCA) equation. This completes the TSLS procedure.

Table 5: Inflation levels for EU member states and CEECs

COUNTRY	INFLATION
FINLAND	1.4
FRANCE	1.7
SWEDEN	1.8
DENMARK	1.9
BELGIUM	2.0
IRELAND	2.1
AUSTRIA	2.4
NETHERLANDS	2.4
GERMANY	2.6
UNITED KINGDOM	2.9
MALTA	3.1
ITALY	3.8
CYPRUS	3.9
SPAIN	3.9
PORTUGAL	4.7
CZECH REPUBLIC	9.4
GREECE	9.8
SLOVAK REPUBLIC	10.7
HUNGARY	21.2
POLAND	27.1
ESTONIA	34.7
SLOVENIA	35.5
LATVIA	63.4
LITHUANIA	93.4
ROMANIA	126.9
BULGARIA	221.4
AVERAGE	26.7
EU AVERAGE	1.3
CEEC AVERAGE	54.2

Note: INFLATION, in percentage points, is the average annual rate of consumer price inflation for the sample period, based on IMF data. Averages are simple and not weighted.

According to the Bayoumi and Eichengreen (1997) procedure, once the OCA equation is estimated, the instrumented values of the independent variables are substituted in it to find the implied exchange rate volatility among any two countries or currency blocs. The implied exchange rate volatility is called the OCA index. The higher it is, the more difficult it would be for the two countries concerned to form a currency union.

Thus, as a first step in the TSLS procedure, TRADE, CYCLE and INFLATION are instrumented. All instrument equations, as well as the OCA equation are estimated over 325 observations, each observation relating to a single pair of

countries out of the 26 countries in the sample. Unless otherwise specified, all coefficients turned out significant at levels below five percent.

The bilateral trade volume is estimated using the following instrument equation (corrected for heteroskedasticity, standard errors in parentheses):

$$\text{(1) TURNOVER} = 3293 + 12.41^{*}\text{GDP}_{ij} - 64.98^{*}\,\text{POP}_{ij} - 3.344^{*}\text{DISTANCE}$$
$$(1132)\quad (2.706)\qquad (36.97)^{*}\qquad (0.691)$$

Adjusted R^2: 0.45 S. E: 8747

This is a basic gravity equation with classic results. TURNOVER is the bilateral trade turnover, the sum of average annual exports and average annual imports for the sample period between the two countries in millions of current US dollars. GDP_{ij} is the sum of the nominal GDPs of the two countries (annual averages for the sample period) in billions of US dollars. Its coefficient means that the marginal propensity to trade is roughly twelve million dollars worth of trade for every one billion dollars worth of GDP. Trade grows with the size of the economy. POP_{ij} is the sum of the populations of the two countries in millions. Trade declines by more than three million dollars for every one million people in population. Populous countries are classically hypothesized to be less trade oriented because of the presumption that they enjoy both economics of scale and a variety of specialized skills. DISTANCE is the distance between the capitals of two states in kilometers. As a natural trade barrier it is expected to have a negative coefficient. Trade decreases by 3.3 million dollars for every one kilometer of distance between the partners.

CYCLE is estimated using the following instrument equation (corrected for heteroskedasticity, standard errors in parentheses):

$$\text{(2) CYCLE} = 8.531 - 0.009^{*}\,\text{insTRADE} - 0.053^{*}\text{EUinsTRADE}$$
$$(0.288)\quad (0.004)\qquad (0.025)$$

$$+ 0.024^{*}\text{CANinsTRADE} - 5.005^{*}\text{EU} + 1.399^{*}\text{CANDIDATE}$$
$$(0.011)\qquad (0.361)\qquad (0.555)$$

Adjusted R^2: 0.46 S. E: 2.715

InsTRADE is the instrumented ratio of bilateral exports and imports of goods relative to GDP. In each observation, the instrumented value of TURNOVER (the actual value of TURNOVER minus the error term for that observation) is divided separately by each of the two countries' GDPs and the two ratios are averaged to yield insTRADE. EUinsTRADE is a slope dummy, the product of insTRADE and EU, where EU = 1 for 91 observations in which both countries are EU member states, 0 otherwise. CANinsTRADE is a slope dummy, the product of insTRADE and CANDIDATE, where CANDIDATE = 1 for 66 observations in which both countries are candidate countries, 0 otherwise.

The specification of Equation (2) follows the argument of the endogenous OCA theory and the results seem to vindicate it. The more countries trade, the greater is their business cycle correlation. This is especially true for trade among EU member states (EUinsTRADE has a negative coefficient), which is mostly intra-industrial. However, among the candidate countries trade tends to hamper business cycle

* Significance level of 7.97 percent.

correlation (the sum of the coefficients of insTRADE and CANinsTRADE is positive), presumably due to greater inter-industry trade, which characterizes periphery countries.

The intercept dummy variables (EU and CANDIDATE) are meant to capture differences in the level of cycle correlation due to policy coordination. Indeed, the results show that business cycles were more synchronized among the EU member states in the 1990s than among the candidate countries even after controlling for trade.

For the purpose of regression analysis INFLATION is calculated in each observation as the absolute difference between the average annual rates of inflation in the two countries. INFLATION is estimated using the following instrument equation (standard errors in parentheses):

(3) INFLATION = 14.88 + 1.366*INTEREST
(1.498) (0.035)

Adjusted R^2: 0.83 S. E: 24.31

INTEREST is the absolute difference between national real interest rates, expressed in percentage points. For each country the average rate for the sample period of the major monetary policy instrument is used. Thus, INTEREST represents long-term convergence of national monetary policies. According to standard monetary theory real interest rates should be negatively correlated with inflation. Thus, the lower is the difference between a pair of countries' interest rates, the lower is the difference expected to be between their rates of inflation. Equation (3) supports this expectation.

It is assumed here that policy instruments are exogenous variables. While some data suggests that central banks follow pre-determined rules in their policy decisions, possibly endogenizing their instruments, none are legally or politically committed to any rule, and all maintain enough room for discretion (Judd and Rudebusch, 1998; and Taylor, 1993). Of course, between 1983 and 1992 a minority of the sample countries were members of the ERM and adjusted their interest rates to accord with their exchange rate commitment. However, that rule was broken during the sample period, when significant realignment followed and the fluctuation margins were widened.

As a second step in the TSLS procedure, Equation (4) is estimated, based on the instrumented variables and on OPENNESS, which is not instrumented as it is not suspected of being influenced by the other variables in the equation. OPENNESS is calculated for the purpose of regression analysis in each observation as the simple average of the two economies' openness ratios (corrected for heteroskedasticity, standard errors in parentheses, *ins* prefix denoting instrumented values):[22]

(4) SDE = 5.925 – 0.319*OPENNESS + 3.769*insCYCLE + 0.614*insINFLATION
(2.724) (0.045) (0.369) (0.027)

Adjusted R^2: 0.78 S. E: 19.20

According to Equation (4) a rise of one percentage point in exports and imports relative to GDP reduced exchange rate volatility in the 1992-1998 period by almost 0.3 percentage points. A rise of one percentage point in the standard deviation

[22] (REG301)

of the difference in the partners' industrial growth rates raised exchange rate variation by 3.7 percentage points. A rise of one percentage point in the long-term inflation differential raised exchange rate variation by 0.6 percentage points. The signs of all coefficients are as hypothesized.

3.g. Calculating the OCA index

Table 6: OCA index levels for EU member states and CEECs for 1995-2001

FRANCE	OCA index	GERMANY	OCA index	ITALY	OCA index	UK	OCA index
IRELAND	-6.98	IRELAND	-8.58	IRELAND	-5.59	IRELAND	-7.61
BELGIUM	-3.73	BELGIUM	-5.95	BELGIUM	-3.01	BELGIUM	-4.29
NETHERLANDS	3.35	**MALTA**	-0.98	NETHERLANDS	3.94	NETHERLANDS	2.74
MALTA	4.00	NETHERLANDS	1.24	**MALTA**	4.41	**MALTA**	4.46
AUSTRIA	5.89	AUSTRIA	3.55	AUSTRIA	6.41	AUSTRIA	5.37
SWEDEN	7.51	SWEDEN	5.21	SWEDEN	8.16	SWEDEN	6.92
PORTUGAL	8.19	DENMARK	6.31	FINLAND	8.80	FINLAND	7.45
FINLAND	8.21	FINLAND	6.71	PORTUGAL	9.13	PORTUGAL	7.75
DENMARK	8.77	PORTUGAL	6.75	DENMARK	9.52	DENMARK	8.21
SPAIN	11.21	SPAIN	10.15	UK	11.31	SPAIN	10.63
GERMANY	11.41	UK	10.79	SPAIN	11.69	GERMANY	10.79
UK	11.58	FRANCE	11.41	GERMANY	11.80	ITALY	11.31
ITALY	12.57	ITALY	11.80	FRANCE	12.57	FRANCE	11.58
GREECE	15.65	**ESTONIA**	12.08	GREECE	15.37	GREECE	14.21
ESTONIA	16.85	GREECE	14.18	**ESTONIA**	18.70	**ESTONIA**	16.54
SLOVAK REPUBLIC	18.23	**SLOVAK REPUBLIC**	15.66	**SLOVAK REPUBLIC**	18.83	**SLOVAK REPUBLIC**	17.76
CZECH REPUBLIC	19.83	**CZECH REPUBLIC**	17.70	**CZECH REPUBLIC**	20.33	**CZECH REPUBLIC**	19.26
SLOVENIA	22.04	**LATVIA**	18.54	**SLOVENIA**	22.56	**SLOVENIA**	21.61
LATVIA	22.65	**SLOVENIA**	19.49	**CYPRUS**	23.33	**CYPRUS**	22.27
LITHUANIA	23.49	**LITHUANIA**	20.18	**LATVIA**	24.12	**LATVIA**	22.32
CYPRUS	23.54	**CYPRUS**	21.37	**LITHUANIA**	24.46	**LITHUANIA**	23.07
HUNGARY	27.63	**HUNGARY**	25.99	**HUNGARY**	28.13	**HUNGARY**	27.07
POLAND	34.12	**POLAND**	33.30	**POLAND**	33.88	**POLAND**	32.46
ROMANIA	46.62	**ROMANIA**	44.37	**ROMANIA**	47.05	**ROMANIA**	46.08
BULGARIA	133.41	**BULGARIA**	130.44	**BULGARIA**	133.90	**BULGARIA**	133.07
AVERAGE	19.53		17.36		20.08		20.17
EU AVERAGE	6.69		5.25		7.15		8.22
CEEC AVERAGE	32.89		30.03		33.49		32.43

Note: For each country the index is the 1995-2001 forecast of the quarterly standard deviation of the exchange rate expressed in percentage points from an average exchange rate. Averages at the bottom rows are simple and not weighted.[23]

Equations (1)-(4) can now be used to calculate the OCA index between any pair of countries by substituting the relevant bilateral data in the equations. This index is a forecast of the quarterly standard deviation of the exchange rate from an average exchange rate, in percentage points. Table 6 lists the index values for all countries

[23] (REG301GE, REG301FR, REG301IT, REG301UK)

with regard to the four major EU countries based on data for 1995-2001, which is the most recent available data for the entire group of countries. The bottom rows calculate simple averages for each major economy. The CEECs are highlighted.

Table 7: OCA index levels for EU member states and CEECs for 1992-1998

FRANCE	OCA index	GERMANY	OCA index	ITALY	OCA index	UK	OCA index
IRELAND	-1.71	BELGIUM	-2.36	IRELAND	-0.65	IRELAND	-2.76
BELGIUM	-0.66	IRELAND	-2.19	BELGIUM	0.64	BELGIUM	-2.13
MALTA	4.44	**MALTA**	-1.32	**MALTA**	5.43	NETHERLANDS	4.27
NETHERLANDS	5.78	NETHERLANDS	3.67	NETHERLANDS	7.00	**MALTA**	5.16
AUSTRIA	9.05	AUSTRIA	6.32	AUSTRIA	10.17	SWEDEN	7.67
SWEDEN	9.09	SWEDEN	9.28	SWEDEN	10.31	AUSTRIA	7.67
DENMARK	9.51	DENMARK	9.44	FINLAND	10.77	DENMARK	8.12
FINLAND	9.94	FINLAND	9.79	DENMARK	10.88	FINLAND	8.84
PORTUGAL	11.35	PORTUGAL	11.37	PORTUGAL	11.73	PORTUGAL	10.39
UK	12.20	UK	12.70	UK	13.17	SPAIN	12.19
SPAIN	13.53	SPAIN	14.21	SPAIN	13.73	FRANCE	12.20
GERMANY	14.34	FRANCE	14.34	FRANCE	14.56	GERMANY	12.70
ITALY	14.56	ITALY	15.31	GERMANY	15.31	ITALY	13.17
GREECE	16.99	GREECE	16.89	GREECE	16.73	GREECE	16.03
SLOVAK REPUBLIC	22.07	**SLOVAK REPUBLIC**	18.81	**SLOVAK REPUBLIC**	23.30	**SLOVAK REPUBLIC**	20.84
CZECH REPUBLIC	23.10	**LATVIA**	19.35	**CZECH REPUBLIC**	24.18	**CZECH REPUBLIC**	21.60
CYPRUS	23.44	**SLOVENIA**	20.54	**CYPRUS**	24.49	**CYPRUS**	22.68
SLOVENIA	23.86	**CZECH REPUBLIC**	20.90	**SLOVENIA**	25.02	**SLOVENIA**	22.74
LATVIA	25.35	**CYPRUS**	21.09	**LATVIA**	27.95	**LATVIA**	24.97
LITHUANIA	26.96	**LITHUANIA**	22.12	**LITHUANIA**	28.82	**LITHUANIA**	26.16
ESTONIA	29.25	**ESTONIA**	22.68	**HUNGARY**	31.91	**ESTONIA**	28.94
HUNGARY	30.80	**HUNGARY**	28.07	**ESTONIA**	32.15	**HUNGARY**	29.32
POLAND	35.84	**POLAND**	33.30	**POLAND**	36.86	**POLAND**	34.27
ROMANIA	71.06	**ROMANIA**	68.20	**ROMANIA**	72.10	**ROMANIA**	69.67
BULGARIA	149.25	**BULGARIA**	145.53	**BULGARIA**	150.35	**BULGARIA**	148.28
AVERAGE	23.58		21.52		24.68		22.52
EU AVERAGE	9.54		9.14		10.34		8.34
CEEC AVERAGE	38.79		34.94		40.21		37.89

Note: For each country the index is the 1995-2001 forecast of the quarterly standard deviation of the exchange rate expressed in percentage points from an average exchange rate. Averages at the bottom rows are simple and not weighted.[24]

The three bottom rows reveal that Germany is the core of entire group of EU member states and CEECs, with an average OCA index of 17.4 percent compared with roughly 20 percent for the other three major countries. This reflects Germany's lead in economic integration with EU member states as well as with CEECs. Unsurprisingly, the EU member states feature lower OCA index values than the CEECs. The exceptions are Malta and Estonia, which is more integrated with Germany than Greece is. Ireland and Belgium could fit in any European currency

[24] (301__inx)

union, and the Netherlands, Malta, Austria and Sweden get good scores too. However, the four majors are generally less suitable as currency partners than the smaller member states.

For the 1992-1998 period all four major economies come out with higher average OCA index levels than in the later period (see Table 7). This means that in the 1990s Europe has progressed on its path to becoming an OCA. However, progress was slow. Even more interesting is the difference between the two periods in EU average OCA index levels. In the 1992-1998 period the UK lead with an 8.3 percent average index, followed by Germany with 9.1 percent index value, France coming out only third – 9.5, and Italy last – 10.3. The UK was the only one among the four majors to stagnate in its integration with the EU member states, and Germany was the most successful in integration. In other words, during the 1990s the UK has moved away in relative terms from the core of the EU.

All of the other countries made progress in their economic integration with the four majors, except for slight reversals in the cases of Cyprus with France and Germany, and Denmark with the United Kingdom. Malta, Slovenia, Latvia, Lithuania, Hungary and Poland progressed rather slowly, Estonia and Romania quite rapidly. This integration process was driven mainly by an increase in openness of all but Malta, Latvia and Lithuania, and by real interest rate convergence of most with each of the four majors. The only cases of greater real interest rate divergence are Cyprus and Denmark with France, Cyprus and Poland with Germany, and Denmark and Sweden with the United Kingdom.

In order to move from merely ranking the countries according to their fitness to join the Euro-zone, into actually identifying the countries that could form a sustainable currency union among them, it is important to interpret correctly the index values. One way to interpret the index levels is to assume that the 28 quarterly exchange rate observations in the sample for each pair of currencies are distributed uniformly around their average value.

According to this interpretation, the standard deviation of the exchange rate represents half of the distance between the average exchange rate for the seven-year period, and either of the two extreme values. Thus, the index value for each pair of currencies represents one quarter of the entire width of the band within which their potential exchange rate varies. The potential average annual depreciation rate of the weak currency of the two in percentage points of the average exchange rate for the period cannot exceed 4/7 of the index value.

Another way to interpret the index levels is to assume that exchange rates distribute normally during the seven-year period, around their average values. In this case, the standard deviation of the exchange rate represents one third of the distance between the average exchange rate for the seven-year period, and either of the two extreme values.[25] Thus, the index value for each pair of currencies represents one sixth of the entire width of the band within which their potential exchange rate varies. The potential average annual depreciation rate of the weak currency in percentage points of the average exchange rate for the period cannot exceed 6/7 of the index value. The potential annual depreciation rate can be interpreted as the potential rate of loss in competitiveness in case a union is formed between the two currencies, depressing the local industry.

[25] In a normal distribution only a negligible number of the observations fall beyond three standard deviations either way from the average.

The Maastricht treaty demands that a member-state would keep its currency within ±2.25 percent exchange rate fluctuation band against the nominal anchor for two years prior to joining the Euro-zone. This means an average annual depreciation rate of the weak currency of at most 2.25 percentage points.[26] Taking the Maastricht exchange rate criterion as a benchmark, only countries with an OCA index value of less than 3.94 percentage points can join the Euro-zone under the uniform exchange rate distribution assumption, or 2.63 percentage points under the normal distribution assumption.[27] According to Table 6 and the normal distribution assumption, each of the four major EU economies could form a currency union with Ireland and Belgium.[28] The Netherlands could fit a currency union with the UK or Germany, and Malta could only link with Germany. Under the uniform distribution assumption, France could also allow the Netherlands and Malta in, Germany could form a six-country currency union including Austria, and Italy could link up with the Netherlands.[29]

The CEECs are a long way from the level of economic integration with the EU member states that can sustain a currency union with them, in spite of the progress achieved. However, according to Equations (2) and (4) after joining the EU the CEECs OCA index levels should come down significantly.[30]

Estonia maintained a currency board with the DM throughout the sample period (see Table 1), but Table 6 shows Estonia's OCA index levels to be high (6.9 percent annual implied depreciation rate against Germany under the uniform distribution assumption). This points to the pressures and adjustments that the Estonian economy has to bear for the sake of the currency board. The figures in Table 6 also cast a shadow over Bulgaria's current currency board. On the other hand, Lithuania's currency board with the US dollar brought it twice as much exchange rate variation with the German Mark than should have been according to economic variables.

As for EU member states, as already noted Table 6 points to insufficient integration among the four major economies. OCA index values of 10.8-12.6 between the four majors are far from the zero exchange-rate fluctuation margin implied by EMU, or the 3.94 benchmark value derived out of the Maastricht criterion. Greece does even worse with values in the range of 14.2-15.7. These high OCA index values reflect the vulnerability of the euro-zone in hard times. While the CEECs may now be more integrated with the EU then they were a decade ago, the lack of sufficient integration among EU member states is alarming and has the potential to significantly destabilize EMU.

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[26] (2 sides of the band)*(2.25 percent)/(2 years).

[27] 2.25*(7 years)/(4 standard deviations) and 2.25*(7 years)/(6 standard deviations) respectively.

[28] Obviously, the standard deviation of the exchange rate cannot be negative. The negative values for Ireland and Belgium are a product of extreme figures and coefficients that are linear approximations of relationships that may not be perfectly linear.

[29] Of course, the exchange rates can have different distributions. The uniform and the normal distributions were chosen for simplicity.

[30] The product of the coefficients of insCYCLE in Equation (4) and EU in Equation (2) is –18.86, and this is exclusive of the effect of EUinsTRADE. While expecting the index levels to come down by that much would be a naive way of applying linearly approximated equations, the basic logic holds.

4. GOVERNMENT STABILITY AND EXCHANGE RATE VARIATION

This section discusses the hypothesized relationships between government stability and exchange rate variation, and analyzes the performance of the sample countries according to variables hypothesized to influence government stability. Next, government stability is instrumented with these variables, and then the volatility of the exchange rates is re-estimated, and the OCA index levels re-calculated.

4.a. Cabinet reshuffles

Scholars of domestic exchange rate politics have used a number of operational indicators of government stability. For example, Beck, et. al. (2001) measure government stability by the extent of turnover of a government's key decision-maker in any given year.[31] However, since many of the countries in this study's sample are stable democracies and the sample period rather short relative to political cycles, government turnover would not feature sufficient variation. In addition, as Bernhard and Leblang (2002b) note, variation in the length of constitutionally mandated electoral terms rule out defining government stability in terms of the number of the months that a cabinet is in office.[32] Blomberg and Hess (1997) and Freeman, Hays and Stix (2000) prefer measuring the stability of governments by the approval ratings of the top executive. However, detailed and frequent approval data is available only for a limited number of countries.

This study uses the frequency of cabinet reshuffles as an indicator of government stability. Portfolio changes are associated with reduced stability because they shorten the horizon in office of individual decision makers, and because they disrupt the orderly functioning of the government. Politicians being reluctant to give up office, portfolio changes are also often the result of changes in the standing of the top executive, and/or adjustments in the balance of power among the coalition parties and factions. The more reshuffles take place, the lower the stability. All this is true for parliamentary as well as for European presidential systems.

The cabinet reshuffles' frequency is somewhat similar to the government crises' count used by Broz (2002), but enjoys two major advantages. First, reshuffles are counted even when they do not threaten to bring the downfall of the government, thus providing this variable with greater variation than the number of crises. Second, by counting reshuffles the often-subjective interpretation of whether a situation is a crisis is avoided.

For the purpose of this study cabinet reshuffles are defined as events in which any change in government portfolio allocation occurred (including resignations) that is not related to an election brought about by the conclusion of a constitutionally mandated term of office. Thus, changes of government as a result of early elections

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[31] A similar approach is taken by Edwards, 1996; Frieden, Ghezzi and Stein, 2001; and Klein and Marion, 1997.

[32] They use in stead the ratio of the actual term of cabinet to the maximum term available when the cabinet takes office. However, this does not overcome the problem of constitutional variations. For example, a cabinet that serves a full five year mandated term would score the same as a cabinet that serves a full four year mandated term, although staying in office longer is trickier.

are counted as cabinet reshuffles. Whenever several portfolio changes occurred within one quarter, all changes are regarded as one event.

Table 8: Number of cabinet reshuffles during 1992-1998 in EU member states and CEECs

COUNTRY	Number of cabinet reshuffles
NETHERLANDS	0
CYPRUS	1
CZECH REPUBLIC	1
FINLAND	1
MALTA	1
BULGARIA	2
DENMARK	2
GERMANY	2
LITHUANIA	2
SWEDEN	2
UK	2
ESTONIA	3
FRANCE	3
IRELAND	3
POLAND	3
SLOVENIA	3
SPAIN	3
AUSTRIA	4
BELGIUM	4
HUNGARY	4
ITALY	4
PORTUGAL	4
ROMANIA	5
GREECE	6
LATVIA	6
SLOVAK REPUBLIC	6
AVERAGE	2.96
EU AVERAGE	2.86
CEEC AVERAGE	3.08

Note: Cabinet reshuffles are defined as events in which any change in government portfolio allocation occurred (including resignations) that is not related to an election brought about by the conclusion of a constitutionally mandated term of office. Averages are simple and not weighted. Source: *Keesing Record of World Events*.

Table 8 details the number of cabinet reshuffles in the 26 countries in the sample during 1992-1998. The CEECs are highlighted. The Netherlands stands out

with no cabinet reshuffles, while Greece, Latvia, and the Slovak Republic feature the least stable governments with six reshuffles each. The CEECs were just a little less stable than the EU member states with an average of 3.08 reshuffles, compared with 2.86 for the member states.

How is government instability related to exchange rates? Scholars of domestic exchange rate politics generally agree that government instability is associated with greater exchange rate variation. However, causality can run both ways. One group of empirical studies emphasizes how fixed exchange rates cause political stability, serving as focal points for policy agreement and bargaining, and helping politicians manage intra-party and intra-coalition conflicts (Bernhard and Leblang, 1999; and 2002b). This is especially so in highly open economies where the political weight of capital owners is enhanced and the effectiveness of policy on real variables is diminished. Similarly, Frieden (2002) argues that unstable governments tend to seek credibility through an exchange rate peg.[33] Hallerberg (2002, 791) makes a related argument, namely that office-seeking veto players in a multi-party government coalition may give up monetary autonomy because it is hard for each of them to target the benefits of monetary policy directly to their constituencies.

Another, rather larger group of empirical studies reverse the direction of causality, and find that stable governments are more likely do fix exchange rates, because sustaining a fixed exchange rate may require politically difficult adjustments (Frieden, Ghezzi and Stein, 2001). Decision makers with short horizons in office would be more opportunistic and less inclined to follow policies that are painful or unpopular in the short-term. Thus, unstable governments are hypothesized to increase exchange rate volatility both because they increase political and economic uncertainty, and because their members would not chose to peg the currency to an external anchor. A long list of studies supports this argument for industrial as well as developing countries, and over a variety of sample periods.[34] Since this study is interested in exogenous determinants of exchange rate variation, this second approach is adopted.

4.b. Determinants of government instability

Political scientists argue that the majority status of the government and the number of parties in it affect government stability.[35] Stable governments are associated with the existence of a dominant party in the coalition, especially a single-party majority government, and a strong majority for the coalition in parliament (Laver and Schofield, 1990; and Lijphart, 1999). Thus, Bernhard and Leblang (2002b) use dummy variables for single-party majority governments, minimum-winning coalitions, and minority governments to study the relationship between government stability and exchange rate variation. Other scholars use the combined share of the ruling coalition's seats in parliament.[36] The extent of fragmentation of the coalition

[33] Frieden argues for a negative relationship between exchange rate variation and government instability, but admits this argument is hard to support empirically (see pages 852-4). Indeed, had such a negative relationship been found in his twenty-year sample period it would have raised a puzzle: If over such a long period fixed exchange rates are associated with unstable governments, how does a fix provide credibility and stability?

[34] See Bernhard and Leblang, 2002a; Edwards, 1996; Freeman, Hays and Stix, 2000; Keefer and Stasavage, 2002; Klein and Marion, 1997; Leblang and Bernhard, 2000b; and Simmons, 1994.

[35] Alt and King, 1994; King, Alt, Burns and Laver, 1990; and Warwick, 1994.

[36] See Edwards, 1996; Frieden, 2002; and Frieden, Ghezzi and Stein (2001).

also affects its stability. Some scholars use the number of coalition parties as a measure of fragmentation.[37]

The Difficulty for the purpose of this study for the use of similar variables to explain cabinet reshuffles, and then exchange rate variation, is that coalition variables can be endogenous to exchange rates, as explained above, and in some cases even to cabinet reshuffles. The very decision of a party to join a coalition could be sensitive to both the degree of exchange rate stability and the level of legislature fragmentation. Any party in the legislature could be a potential veto player, and may figure in the top executive's calculations, even when it is in opposition.[38] Since this study is interested in the causes of exchange rate stability, rather than its effects, it is imperative to use variables that are exogenous to exchange rate variation.

For this reason, this study uses MAJORPARTY, the share in percentage points of the major party's seats in parliament, as a proxy for the strength of the governing coalition.[39] This is not a perfect variable either because sometimes the major party is not a member of the governing coalition, but such cases are rare. MAJORPARTY is hypothesized to be negatively correlated with cabinet reshuffles. In addition, the number of parties in parliament, labeled PARLNUMPARTY, is used as a proxy for potential coalition fragmentation.[40] This is also the choice of Bernhard and Leblang (2002b) and Frieden, Ghezzi and Stein (2001).[41] The greater is PARLNUMPARTY the less stable is the government hypothesized to be.

Cabinet reshuffles are presumed to have a different meaning under a presidential system, compared with a parliamentary one. On the one hand, in presidential systems the struggle to form and maintain a diverse coalition is of a lower intensity than in parliamentary systems because it is not a struggle for the top executive office. On the other hand, coalition politics do matter in European presidential systems because the president has to either appoint a prime minister that can form a governing coalition in parliament, or otherwise cohabit with a majority in parliament that is not always to her liking. Thus, the president is often forced to compromise over appointments and policies. The net effect is that presidential systems are hypothesized to feature fewer cabinet reshuffles than parliamentary systems. Therefore, a proper estimation of the effects of MAJORPARTY and PARLNUMPARTY on cabinet reshuffles requires controlling for the existence of a presidential system.

PRESIDENT is a variable that scores 1 for presidential democracies, 0 for parliamentary ones. Following Beck, et. al. (2001) the decision whether to call the system presidential or parliamentary, whenever both a president and a prime minister exist, is based on the power that the two have relative to each other. Countries in

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[37] See Frieden, 2002; Keefer, 2002; and Keefer and Stasavage, 2002, 762-3.

[38] For example, a prime minister presiding over a weak government with many cabinet reshuffles may wish to enlarge the coalition to stabilize it. An opposition party may or may not decide to join the coalition based on the prospects of the coalition given political fragmentation.

[39] Unless otherwise specified, all variables presented in this subsection are calculated based on data from *Keesing's Record of World Events* and from the *Stateman's Yearbook*. The value for each country is an average of quarterly data for the sample period. In bicameral systems the values are based on the lower chamber.

[40] See footnote 39. Every faction that had its own allocation of seats in parliament is counted as a distinct party, even if it ran to parliament together with an alignment of factions. Accordingly, independent members of parliament are each counted as one party.

[41] Beck, et. al. (2001) argue that the fragmentation level of the entire legislative could be misleading as a measure of coalition fragmentation because of the low correlation between coalition and opposition fragmentation levels. However, this may be true only if one takes the affiliation of political parties to either coalition or opposition as exogenous.

which the president is constitutionally defined as the top executive, or has the power to appoint and dismiss the cabinet are considered presidential.

Table 9: Determinants of government instability during 1992-1998 in EU member states and CEECs

COUNTRY	MAJORPARTY	PARL NUMPARTY	PRESIDENT	TURNOUT	CORRUPTION
AUSTRIA	40.3	4.6	0	83.3	7.3
BELGIUM	18.9	11.9	0	91.7	6.1
BULGARIA	50.9	4.2	1	74.5	2.9
CYPRUS	35.7	4.4	1	92.9	4.5
CZECH REPUBLIC	37.7	7.4	0	81.8	4.8
DENMARK	36.1	12.8	0	84.4	9.7
ESTONIA	36.0	7.8	0	68.5	5.7
FINLAND	29.8	9.6	0	71.9	9.4
FRANCE	42.7	27.3	1	68.2	6.9
GERMANY	39.2	6.0	0	78.8	8.0
GREECE	54.0	5.9	0	77.7	4.5
HUNGARY	48.7	10.8	0	66.3	4.6
IRELAND	42.9	10.8	0	68.4	8.4
ITALY	26.3	16.4	0	80.1	3.8
LATVIA	33.1	7.5	0	80.7	2.7
LITHUANIA	51.1	14.5	0	67.7	3.8
MALTA	51.8	2.0	0	95.9	2.8
NETHERLANDS	28.9	9.6	0	78.9	8.8
POLAND	33.5	12.1	1	49.3	4.6
PORTUGAL	54.1	4.5	1	67.6	6.0
ROMANIA	35.2	25.5	1	77.3	3.0
SLOVAK REPUBLIC	42.3	6.3	0	79.7	3.9
SLOVENIA	26.2	7.6	1	74.6	6.0
SPAIN	45.9	11.5	0	76.3	5.2
SWEDEN	43.5	7.0	0	85.9	9.2
UK	54.8	9.8	0	76.1	8.6
AVERAGE	40.0	9.9		76.9	5.8
EU AVERAGE	39.8	10.5		77.8	7.3
CEEC AVERAGE	40.2	9.2		75.8	4.1

Note: See text for sources and definitions.

Another variable that needs to be controlled for is election turnout. While a governing coalition may enjoy a strong majority in parliament, its public legitimacy may be weaker if turnout is low. Low turnout could be interpreted as protest from disillusioned potential voters, and as a signal of dissatisfaction with the entire political system. In such circumstances of alienation between voters and government cabinet members may not see themselves as envoys of public interest and internal squabbling might dominate politics and cause political instability. Thus, TURNOUT, the share in

percentage points of votes cast in total number of eligible voters, is hypothesized to be negatively correlated with cabinet reshuffles.[42]

Finally, corruption is an important cause of cabinet reshuffles. In democratic systems members of cabinet who are found guilty of, or in some case merely suspected of misconduct must step down. CORRUPTION is for each country the average level of Transparency International's *Corruption Perceptions Index* for the 1995-1998 period.[43] The higher the score, which ranges from 10 to 1, the lower is the level of corruption, and the greater is government stability hypothesized to be.

According to Table 9 MAJORPARTY ranges from a low of 18.9 for Belgium to a high of 54.8 for the UK. There was little difference in the 1990s between EU member states and CEECs, both groups featuring on average almost the same level of domination of parliament by a leading party. The parliaments of Bulgaria, Lithuania, Malta, Greece and Portugal, in addition to the UK, tended to feature a major party with more than half the seats. On the other hand, Elections in Slovenia, Italy, the Netherlands and Finland, in addition to Belgium, tend to be much less decisive, with no party earning more than a third of the seats.

PARLNUMPARTY ranges from a low of 2 for Malta, where there are only two parties for many years, and 27.3 for France, where the national assembly traditionally features many factions and independents. Again, there is little difference between the two groups of countries, although the CEECs tend to have on average fewer parties in parliament. The countries with a presidential system are Bulgaria, Cyprus, France, Poland, Portugal, Romania and Slovenia, the majority of which are CEECs.

TURNOUT is lowest at 49.3 in Poland, where voters seemed to have lost interest in domestic politics after the great enthusiasm in the wake of the downfall of Communism. The highest turnout at 95.9 is found in Malta, where the political system is no dull thing for the population. Exceptionally high scores are also found in Belgium and Cyprus. Turnout tends to be only a little higher in the EU than among CEECs. Finally, CORRUPTION is at its peak in Denmark, which is the least corrupt country in the sample, with an almost perfect score of 9.7. On the other hand, Latvia is the most corrupt country with a score of 2.7. Of all variables presented in Table 9 CORRUPTION is the single one with a clear east-west differentiation: The CEECs clearly tend to be more corrupt than EU member states.

Cabinet reshuffles are estimated using the following instrument equation (corrected for heteroskedasticity, standard errors in parentheses):

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[42] See footnote 39. TURNOUT is based on figures of elections for parliament in presidential systems as well as in parliamentary ones. For each quarter the figure for the recent election is applied.

[43] Based on the 2002 issue of *Corruption Perceptions Index*, available at www.gwdg.de/~uwvw/icr.htm. Earlier periods are unavailable, and in some cases the average is based on shorter periods. National figures are averages of annual data. In the cases of Cyprus and Malta the index is unavailable for the entire sample period, and the 2003 issue of the Black Market component of the *Index of Economic Freedom* of the Heritage Foundation, available at www.heritage.org/research/features/index, is used in stead. The two indices differ in their scale and in their direction. Therefore, Cyprus and Malta's index levels are calculated to have the same (inverted) deviation from the sample's average as they have in the Black Market reading. Cyprus and Malta's index levels are based on figures for 1999 only as this is the first year for which the *Corruption Perceptions Index* is available for all other sample countries.

(5) RESHUFFLES = 3.125 – 0.148* lnMAJORPARTY + 0.017*PARLNUMPARTY
(0.430) (0.089)* (0.004)

– 0.275* PRESIDENT – 0.008* TURNOUT – 0.660* lnCORRUPTION
(0.053) (0.002) (0.061)

Adjusted R^2: 0.31 S. E: 0.273

Table 10: instrumented cabinet reshuffles frequency for EU member states and CEECs for 1995-2001[44]

FRANCE	Reshf. Freq.	GERMANY	Reshf. Freq.	ITALY	Reshf. Freq.	UK	Reshf. Freq.
SWEDEN	0.759	SWEDEN	0.600	SWEDEN	0.822	SWEDEN	0.613
PORTUGAL	0.794	PORTUGAL	0.626	DENMARK	0.871	**CYPRUS**	0.634
DENMARK	0.807	**CYPRUS**	0.634	PORTUGAL	0.879	PORTUGAL	0.635
CYPRUS	0.810	DENMARK	0.650	UK	0.900	DENMARK	0.661
GERMANY	0.830	UK	0.677	GERMANY	0.904	GERMANY	0.677
UK	0.838	FINLAND	0.689	FINLAND	0.913	NETHERLANDS	0.695
FINLAND	0.846	NETHERLANDS	0.689	NETHERLANDS	0.922	FINLAND	0.698
NETHERLANDS	0.848	**SLOVENIA**	0.700	**CYPRUS**	0.923	**SLOVENIA**	0.699
SLOVENIA	0.870	IRELAND	0.749	**SLOVENIA**	0.974	IRELAND	0.760
IRELAND	0.911	**MALTA**	0.771	IRELAND	0.984	**MALTA**	0.772
AUSTRIA	0.937	AUSTRIA	0.773	AUSTRIA	1.015	BELGIUM	0.781
BELGIUM	0.952	**BULGARIA**	0.780	SPAIN	1.046	AUSTRIA	0.781
MALTA	0.954	BELGIUM	0.785	BELGIUM	1.056	**BULGARIA**	0.782
SPAIN	0.958	SPAIN	0.789	**MALTA**	1.080	SPAIN	0.797
BULGARIA	0.963	GREECE	0.799	FRANCE	1.080	GREECE	0.805
GREECE	0.975	FRANCE	0.830	GREECE	1.080	**POLAND**	0.833
POLAND	1.010	**POLAND**	0.832	**BULGARIA**	1.086	FRANCE	0.838
ESTONIA	1.015	**ESTONIA**	0.845	**ESTONIA**	1.113	**ESTONIA**	0.848
CZECH REPUBLIC	1.034	**CZECH REPUBLIC**	0.858	**POLAND**	1.125	**CZECH REPUBLIC**	0.857
SLOVAK REPUBLIC	1.066	**SLOVAK REPUBLIC**	0.886	**CZECH REPUBLIC**	1.150	**SLOVAK REPUBLIC**	0.883
ITALY	1.080	ITALY	0.904	**SLOVAK REPUBLIC**	1.193	ITALY	0.900
HUNGARY	1.124	**HUNGARY**	0.950	**HUNGARY**	1.227	**HUNGARY**	0.955
LATVIA	1.164	**LATVIA**	0.981	**LITHUANIA**	1.298	**LATVIA**	0.971
ROMANIA	1.169	**ROMANIA**	0.984	**LATVIA**	1.308	**ROMANIA**	0.976
LITHUANIA	1.186	**LITHUANIA**	1.008	**ROMANIA**	1.312	**LITHUANIA**	1.012
AVERAGE	0.956		0.792		1.051		0.795
EU AVERAGE	0.887		0.735		0.960		0.742
CEEC AVERAGE	1.030		0.853		1.149		0.852

Note: See note under Table 6.

For the purpose of regression analysis RESHUFFLES is the bilateral annual frequency of cabinet reshuffles. In each observation it is the number of cabinet

* Significance level of 9.51 percent.
[44] INRESH05.

reshuffles in the two countries combined during the sample period, divided by the number of years in the sample. LnMAJORPARTY and lnCORRUPTION are each the natural logarithm of the bilateral average score of respectively, MAJORPARTY and CORRUPTION. PARLNUMPARTY, PRESIDENT and TURNOUT are each calculated in each observation as a bilateral average.[45] Equation (5) supports the hypotheses made above.

The figures in Table 10 are instrumented using Equation (5) and actual values for the 1995-2001 period. Each figure is the expected annual frequency of cabinet reshuffles in the two countries combined. For example, Italy and Romania are expected to have had between them on average 1.3 cabinet reshuffle every year between 1995 and 2001, or one reshuffle in nine months. On the other hand, Sweden and Germany are expected to have seen together 0.6 reshuffles each year, or a reshuffle once in every 20 months.

Table 10 shows that in terms of domestic exchange rate politics the UK was a core country, with roughly the same average expected frequency as Germany (see third row from bottom). Both countries enjoyed high turnout rates and relatively clean politics. Germany also featured a relatively low number of parties in parliament, and in the UK politics were stabilized also by the existence of a dominant party. Cyprus, Denmark, Finland, Germany, the Netherlands, Portugal, Slovenia, Sweden and the United Kingdom formed a core with values below 0.7. On the other hand, France and Italy are not fit for the core because of their fragmented parliaments, low turnout (in France) and indecisive election results and corruption (in Italy).

4.c. Estimating a political OCA index

The second step in the TSLS procedure is now repeated, this time including instrumented cabinet reshuffles (standard errors in parentheses, *ins* prefix denoting instrumented values):

(6) SDE = – 14.84 – 0.298*OPENNESS + 2.689*insCYCLE
(5.876) (0.043) (0.527)

+ 0.614*insINFLATION + 29.39* insRESHUFFLES
(0.020) (6.174)

Adjusted R^2: 0.80 S. E: 18.58

Again, Equation (6) supports hypotheses made above. The figures in Table 11 are instrumented using Equation (6) and actual values for the 1995-2001 period. The CEECs are highlighted.

The three bottom rows reveal that France and Italy are potentially less stable than Table 6 suggests. On the other hand Germany and the UK's stable domestic politics make them better Euro members than economics alone would suggest. In fact, the UK turns out almost as good a core country as Germany is. Many countries show significant improvements versus Germany and the UK when domestic politics are considered. These are Bulgaria, the Czech Republic, Denmark, Estonia, Finland,

[45] Thus, PRESIDENT scores 1 in 21 observations in which both countries have presidential systems, 0.5 in 133 observations in which only one of the two countries has a presidential system, and 0 in 171 observations in which none of the countries has a presidential system.

Malta, the Netherlands, Poland, Portugal, the Slovak Republic and Sweden, but above all Cyprus and Slovenia. On the other hand, set back by domestic politics are Latvia and Lithuania.

Table 11: political OCA index levels for EU member states and CEECs for 1995-2001

FRANCE	OCA index	GERMANY	OCA index	ITALY	OCA index	UK	OCA index
IRELAND	-2.03	IRELAND	-8.08	IRELAND	1.20	IRELAND	-7.05
BELGIUM	1.99	BELGIUM	-4.96	BELGIUM	5.67	BELGIUM	-3.54
NETHERLANDS	5.53	**MALTA**	-3.26	NETHERLANDS	8.24	NETHERLANDS	0.51
MALTA	6.02	NETHERLANDS	-1.10	SWEDEN	9.21	**MALTA**	0.91
SWEDEN	6.79	SWEDEN	0.02	**MALTA**	10.11	SWEDEN	1.98
PORTUGAL	8.56	PORTUGAL	2.44	PORTUGAL	11.85	PORTUGAL	3.47
DENMARK	9.48	DENMARK	2.65	DENMARK	12.01	DENMARK	4.68
FINLAND	10.06	AUSTRIA	3.61	FINLAND	12.49	FINLAND	4.98
AUSTRIA	10.54	FINLAND	4.25	AUSTRIA	13.32	AUSTRIA	5.50
GERMANY	12.43	UK	7.39	UK	14.36	GERMANY	7.39
UK	12.81	SPAIN	10.09	GERMANY	15.02	SPAIN	10.75
SPAIN	15.99	**ESTONIA**	11.10	SPAIN	19.02	**CYPRUS**	12.75
CYPRUS	19.23	**SLOVENIA**	12.36	FRANCE	20.84	FRANCE	12.81
SLOVENIA	19.65	**CYPRUS**	12.40	**CYPRUS**	22.33	**SLOVENIA**	14.21
ESTONIA	19.95	FRANCE	12.43	**SLOVENIA**	23.19	ITALY	14.36
ITALY	20.84	**SLOVAK REPUBLIC**	14.21	GREECE	23.86	GREECE	14.62
GREECE	21.05	GREECE	14.71	**ESTONIA**	24.27	**ESTONIA**	14.72
SLOVAK REPUBLIC	21.79	**CZECH REPUBLIC**	14.96	**CZECH REPUBLIC**	26.01	**SLOVAK REPUBLIC**	15.97
CZECH REPUBLIC	22.13	ITALY	15.02	**SLOVAK REPUBLIC**	26.05	**CZECH REPUBLIC**	16.41
LATVIA	29.30	**LATVIA**	20.55	**LITHUANIA**	34.58	**LATVIA**	23.28
LITHUANIA	30.50	**LITHUANIA**	22.46	**LATVIA**	34.68	**LITHUANIA**	24.98
HUNGARY	32.05	**HUNGARY**	25.46	**HUNGARY**	35.52	**HUNGARY**	26.58
POLAND	34.92	**POLAND**	29.01	**POLAND**	38.06	**POLAND**	28.15
ROMANIA	52.25	**ROMANIA**	44.78	**ROMANIA**	56.89	**ROMANIA**	46.11
BULGARIA	133.64	**BULGARIA**	125.70	**BULGARIA**	137.73	**BULGARIA**	127.99
AVERAGE	22.22		15.53		25.46		16.90
EU AVERAGE	9.57		4.18		11.93		5.03
CEEC AVERAGE	35.12		27.48		39.12		29.34

Note: See note under Table 6.[46]

The EU member states are still on the whole better Euro zone members than the CEECs. However, in terms of ranking, France, Greece and Italy are pushed back when domestic politics are considered. According to Table 11 and the normal distribution assumption (the 2.63 percentage points threshold), Germany and the UK could each form a currency union with Belgium, Ireland, Malta, the Netherlands and Sweden, and Germany could also link with Denmark and Portugal. Under the uniform distribution assumption (the 3.94 percentage points threshold), Portugal could

[46] (REG301AG, REG301AF, REG301AI, REG301AU)

maintain a currency fix with the UK, and Austria with Germany. Germany could form a nine-country currency union including Austria.

5. CONCLUSIONS

The results of this study confirm the validity of OCA theory in 1990s Europe. The sensitivity of exchange rate volatility to OCA criteria such as openness, intra-regional trade, business cycle correlation and inflation was estimated and found compatible with the theory.

Based on economic variables and data for 1995-2001 Germany was found to be the core of the entire group of EU member states and CEECs, having lower potential exchange rate volatility levels with the EU member states and CEECs than any of the other three major EU economies. This reflects Germany's lead in economic integration with Europe's countries. However, a sustainable currency union was found to be possible only among a few combinations of 2-6 countries. Assuming a normal distribution of exchange rates, each of the four major EU economies could form a currency union with Ireland and Belgium. The Netherlands could fit a currency union with the UK or Germany, and Malta could only link with Germany. Under the uniform distribution assumption, France could also allow the Netherlands and Malta in, Germany could form a six-country currency union including Austria, and Italy could link up with the Netherlands. According to 1995-2001 data none of the large four EU economies can be expected to sustain a long-term currency link with each other. The lack of sufficient integration among EU member states is alarming and has the potential to significantly destabilize EMU.

These results, disappointing as they might be, represent an improvement compared with the 1992-1998 period. If the process of European integration is maintained, the sustainability of the Euro-zone could improve in a few years. Interestingly, the UK was the only one among the four majors to stagnate in its economic integration with the EU member states in the 1990s, and Germany was the most successful in integration. In other words, during the 1990s the UK has moved away in relative terms from the economic core of the EU.

The CEECs are a long way from the level of economic integration with the EU member states that can sustain a currency union with them, in spite of the progress achieved. Estonia's currency board, while strictly observed for most of the 1990s, is potentially unsustainable in the long run. Bulgaria's currency board is even less realistic. On the other hand, Malta is an exception among CEECs, being part of the core, thanks to its openness and low inflation.

This study also supports the arguments made by political economists regarding the relationship between exchange rate variation and domestic political instability. The greater is government instability the greater exchange rate variation was found to be. The Euro-zone would be more sustainable if its member states would have stable governments. This in turn was found to depend on decisive elections, low levels of parliamentary fragmentation, a presidential system, high election turnout and low corruption.

Indeed, the picture improves upon the introduction of domestic politics, as German and British OCA index levels drop for thirteen countries, especially Cyprus and Slovenia. Considering the stability of its domestic political system the UK turns

out to be a rival core country to Germany. Both countries enjoyed in 1995-2001 high election turnout rates and relatively clean politics. Germany also featured a relatively low number of parties in parliament, and in the UK politics were stabilized also by the existence of a dominant party. On the other hand, domestic instability makes France and Italy unlikely core countries because of their fragmented parliaments, low turnout (in France) and indecisive election results and corruption (in Italy). Thus, Germany could maintain a currency with eight other small countries, of which only Malta is not currently an EU member state, and the UK could maintain a fix with six countries.

Without long-term sustainability for a Franco-German currency union is EMU doomed to disintegrate? There are a few caveats to the conclusions of this study. First, it is important to note that if EMU survives its first years and integration does not stagnate, the currency union could yet become more solid. However, this depends on the ability of the EU member states to fulfill their promise to make the internal market more competitive so as to enhance both intra-regional trade and business cycle correlation. Intra-European trade hardly developed during the 1990s relative to GDP. Disinflation on the other hand is progressing rather well among the CEECs, and membership of the Euro-zone could bring a significant decline of inflation in them, as monetary policy is delegated to the ECB. In addition, EU membership will reinvigorate the CEECs regional trade. But then again, different debt levels, the natural price-equalization process[47] and the Balassa-Samuelson effect could still maintain non-negligible post-membership inflation rate differentials.[48]

The second caveat is that the results presented here are based on data averages for 1995-2001. The advantage of any average is the moderation effect, smoothing out exceptional years and quarters. The disadvantage is that the average is slow to reflect new developments. Perhaps the results merely reflect the level of integration that existed a few years ago. However, the potential exchange rate variation between the CEECs and the EU member states is so high that even if EU-CEEC economic integration is greater than this study allows for the CEECs would remain unfit for Euro-zone membership for quite some time.

Finally, as scholars have noted long ago, is that fiscal transfers can compensate to a certain extent for inadequate integration. Thus, the EU can ease tensions around EMU by putting together fiscal mechanisms to assist depressed areas. The political-economic cost-benefit balance is crucial in determining the extent of such fiscal transfers. It depends on how insufficiently integrated the members are, how big the aid recipient economies are, and how politically important to the donors is the membership of the recipients. That being said, France and Italy are too large to be paid to stay in the Euro. And however important their membership of the Euro-

[47] In any currency area with a low-income periphery and a high-income core, trade tends to bring the periphery's low prices closer to the core's high prices. The price convergence results in a higher rate of inflation in the periphery compared with the core.

[48] The Balassa-Samuelson effect is the persistence of substantial inflation differential among regions even in long-standing currency unions, due to changes in factor productivity in the different regions. Higher productivity growth in the tradable goods sector in low-income periphery countries compared with the non-tradable goods sector generates pressures for nominal appreciation of the currency. Since in a currency union appreciation is not possible the real exchange rate will be adjusted by a rise in the local price level. According to the ECB (1999, 42) this effect accounts for some 70 percent of inflation differentials in the current Euro area. Even in the US regional inflation differentials in the 1990s amounted to as much as 2 percent (Directorate General for Research, 1999, 21).

zone politically is, they are potentially loosing competitiveness at a rate of between seven and nine percent a year against the German industry.[49]

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[49] Their OCA index levels in Table 11 multiplied by the 4/7 factor under the uniform exchange rate distribution assumption.

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