OPTIMUM CURRENCY AREA INDICES: EVIDENCE FROM THE 1990s

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Optimum Currency Area Theory: A Framework for Discussion about Monetary Integration

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Abstract

In this paper the authors calculate OCA-indexes for industrial countries in an effort to estimate the benefit-cost ratio of adopting a common currency. The results correspond to the estimation of Bayoumi and Eichengreen (1997b) and show that the ranking of the economies suitable to form a monetary union stays the same in the 1980s as well as in the 1990s. In other words, the economies, which were structurally close to each other in the 1980s, remain close in the 1990s and the opposite is valid for the structurally different economies. This empirical estimation also does not provide evidence for views, which emphasise the seemingly striking difference between the core and the periphery of the European Union. The authors perform also an estimation of the same index by including the Czech Republic and find no support for the view that the economy of the Czech Republic could possibly structurally differ more than

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the EMU member countries between each other. Then they conclude that if the EMU is sustainable, the accession of the Czech economy should not change it.

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Optimum currency area – EMU – monetary policy – convergence – core and periphery

1. INTRODUCTION

The optimum currency area (OCA) theory arises from the debates about the exchange rate regimes and adjustment under balance of payments disequilibria. Mundell (1961) in his seminal work on OCA theory challenged Friedman's (1953) view on floating exchange rate regime as means to the adjustment under balance of payments disequilibria due to exogenous shocks. Mundell (1961) in his model of an asymmetric shift in demand of two countries stressed that optimum currency area can differ from the actual currency area. Such difference could cause inability of the floating exchange rate regime to cushion the shock and bring the countries back to equilibrium. That is why Mundell (1961) offered some non-exchange rates means for adjustment, as labor mobility, nominal flexibility and fiscal transfers. Later, Ingram (In: Kawai, 1987), McKinnon (1963) and Kenen (1969) extended the list of non-exchange rate means for adjustment by considering financial integration, openness and national product diversification.[1]

According to McKinnon (2000) Mundell presents a neo-Keynesian model, still in a belief that it is possible to eliminate the effect of shocks by national monetary and fiscal policies. There is also another neo-Keynesian relic: Mundell's implicit assumption of the downward sloping and stable Phillips curve.

However, there are two other later articles of Mundell (1973a, 1973b), which bring completely different argumentation concerning the optimum currency area. This is his monetarist view on the subject: if countries can adopt common currency without substantial change in their purchasing parities, then they gain better allocation of the capital, since they will get rid of the uncertainty in the exchange rates. Foreign reserves will have to increase less than proportionally with the size of the economy. Then, under asymmetric shocks in countries with common currency, there will not be the decline in output, because the costs of absorbing the shocks would be effectively spread in time. The existence of two Mundell models - early and recent - explains why he is heavily quoted both by proponents and skeptics of the European Monetary Union (EMU).

This paper instead of looking for the crucial economic characteristics to determine where the (illusionary) borders for exchange rates should be drawn we concentrate on benefits and costs of the common currency. That means that we assume that by definition no single country fulfills completely the attributes to make it an optimal member of a monetary union.

Moreover, it is a relevant question – in this context – how much the trade integration matters. There are at least two views on this issue. First, countries can benefit from higher trade integration because it leads to more effective allocation of resources. With higher trade integration there will be further synchronization of national business cycles because trade among European countries is typically intra-industry trade based on economies of scale and

[1] This search for optimum currency area characteristics is not exhausted by these examples. For survey see Horvath (2001).

imperfect competition. Thus, it will not lead to higher specialization and – above all – it will not lead to higher possibility of asymmetric shock occurrence.

Proponents of the second view[2] argue that higher trade integration will lead to higher specialization. Because of the economies of scale, higher integration will lead to the regional concentration of the industrial activity. Thus asymmetric shocks are more likely to occur in the future (since the output is less diversified) and this will bring extra costs to monetary union.

Frankel and Rose (1998a, b) show that the higher the trade integration, the higher the correlation of business cycle among countries.[3] Furthermore, they emphasize that business cycle and trade integration are inter-related and endogenous processes to establishing a currency union. Thus, they demonstrate that countries may fulfill the OCA criteria ex post, although they did not fulfill them ex ante. Monetary union entry raises trade linkages among the countries and this causes the business cycle to be more symmetric among the participants of the union.[4] The arguments of Frankel and Rose (1998a,b) lead to a conclusion that the costs of implementing common currency are relatively low. However, there are some doubts on the validity of the endogenous OCA criteria. In a theoretical model Hallett and Piscitelli (2001) show that the validity of endogenous OCA hypothesis is uncertain and dependent to a large extent on the structural convergence in the beginning phase of the monetary union. Without the sufficient structural convergence, implementing common currency would cause greater divergence.

Maybe the interesting question is not the search for the optimal exchange rate regime, but the search for the optimal variability of the exchange rate. Bayoumi and Eichengreen (1997a,b and 1998) suggest an approach for modelling exchange rate variability, which takes into account the multiple interdependency of the economies. This paper follows the line, which Bayoumi and Eichengreen begin. Thus, the purpose of this paper is to estimate to what degree the exchange rate variability may be explained by the traditional OCA criteria, as defined in the classical OCA literature in the 1960s. Also, this paper attempts to determine the so-called OCA-indexes, which for given pairs of countries assess the benefit-cost ratio for adopting a common currency.

The paper is structured in the following manner. In section 2 we provide the methodology of estimation, in section 3 we present the results. Finally, we summarise and conclude.

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[2] Krugman (1993). De Grauwe (1997) discusses the limitations of Krugman’s view. He shows that Krugman assumes that the regional concentration of industry will not cross the borders of the member countries, while borders will be less relevant in influencing the shape of these concentration effects. If so, then asymmetric shock will not be country specific and floating exchange rate could not be used to deal with asymmetric shocks anyway. In addition there will be trade creation among the monetary union countries.

[3] See Rodrick (2000) for a critique of econometric methods used by Frankel and Rose (1998a, 1998b).

[4] According to Fidrmuc (2001) the intensity of intra-industry trade is another variable with positive impact on the synchronization of business cycle.

2. METHODOLOGY

Countries experiencing symmetric shocks or high trade linkages tend to have stable exchange rates. In other words the more the OCA criteria among the countries are fulfilled, the lower should be the exchange rates variability among considered countries. Under this assumption we estimate the equation:

$$SD(e_{ij}) = a + b_1 SD(?y_i\text{-}?y_j) + b_2 DISSIM_{ij} + b_3 TRADE_{ij} + b_4 SIZE_{ij} \qquad (1)$$

$SD(e_{ij})$ measures the volatility of bilateral nominal exchange rates, $SD(?y_i\text{-}?y_j)$ captures the asymmetric shocks at national level, $TRADE_{ij}$ is the proxy for intensity of trade linkages, $DISSIM_{ij}$ assesses the asymmetric shocks at industrial level and $SIZE_{ij}$ measure the size of the economy and assess utility from maintaining own currency.[5]

The proxies are computed as follows: $SD(e_{ij})$ is the standard deviation of the change in the logarithm of the bilateral exchange rate between countries i and j on monthly basis, $SD(?y_i\text{-}?y_j)$ is the standard deviation of the difference in the logarithm of real output between i and j, $DISSIM_{ij}$ is the sum of the absolute differences in the shares of agricultural, mineral, and manufacturing trade in total merchandise trade, $TRADE_{ij}$ is the mean of the ratio of bilateral exports to domestic GDP for the given two countries, and $SIZE_{ij}$ is the mean of the logarithm of the two GDPs measured in U.S. dollars.

The data sample contains twenty-one industrial countries for the period from 1989 to 1998. These are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Greece, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the USA. For convenience we label these data as representing the 1990s. When calculating variable $SD(e_{ij})$ we used the data from IFS-IMF, the data for $SD(?y_i\text{-}?y_j)$ were calculated from World Bank, $TRADE_{ij}$ was calculated using the data from Directions of Trade – IMF and World Bank, variable $DISSIM_{ij}$ was calculated with the use of the data from Monthly Statistics of Foreign Trade-OECD and $SIZE_{ij}$ from the World Bank data. When putting together the data matrix we follow the advice of Bayoumi and Eichengreen (1997a,b and 1998), this allows me to compare the results for different time periods.

Since we are interested whether the exchange rate variability is explicable by traditional OCA criteria, we consider the variables with the impact across the borders in all the equations. Bayoumi and Eichengreen (1997a,b and 1998) find little evidence that more open economy tends to fix its currency. But since the openness is also one of the traditional OCA criteria, we include the proxy for openness, too.[6] This means that we estimate the following equation:

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[5] The lower the size the lower the relative utility of maintaining its own currency. $SIZE_{ij}$ can possibly capture the effect of adjustment costs, too. The bigger the countries are in economic terms, the higher the costs of transition to adopting of common currency.

[6] The proxy was calculated as an arithmetic mean to the i-th and j-th country ratio of trade (export + import) to its GDP.

$$SD(e_{ij}) = a + b_1 SD(?y_i - ?y_j) + b_2 DISSIM_{ij} + b_3 TRADE_{ij} + b_4 OPEN_{ij} \qquad (2).$$

The analysis takes into account all the relationships between each of the economies. There is a pair of countries in each row of the data matrix. Given 20 industrial countries we obtain 190 observation.[7] The expected signs of explanatory variables are as follows: the exchange rate volatility is expected to depend positively on business cycle, dissimilarity in the commodity structure of export, and negatively on the trade linkages. The expected sign of the openness is theoretically indeterminate.[8]

We are aware that there is a possibility that the independent variable influences the dependent variable, i.e. there is a potential influence of exchange rates variability on growth or volume of trade. However, taking the standard deviation of output and volume of bilateral trade considerably reduces this influence.

[7] The relationship of the first country with second one is the same as the second one with the first. That's why the number of observation equals 20!/18!2!. Since the data for calculation of the variable DISSIM were not available for Greece except the year 1997, we finally excluded Greece from the analysis. At first, we took the data for the year 1997 as an average measure of Greece's $DISSIM_{ij}$ for the period 1989-1998, but the tests on outliers using studentized residuals showed that many observations on Greece are outliers even at p-value lower than 0.01. If this was caused by the lack of the data or for another reason is uncertain.

[8] See Isard (1995).

3. RESULTS

We begin by exploring some basic descriptive characteristics of the data set. As it is seen in Table 1 there is a tendency towards increasing volatility in the exchange rate data. Low variability in the 1960s is due to Bretton-Woods system, while higher volatility in 1970s maybe the consequence of the failure of the Bretton-Woods and the oil shocks. In the 1980s there was a slow return to equilibrium and exchange rate variability was again declining. The high volatility of the exchange rates in the 1990s is caused by numerous financial crises and more generally by the rising financial flows among the countries and its spillover effects. However, variability in the second half of the 1990s is decreasing; quite understandably as a consequence of institutional arrangements of EU[9] and the advance in the EU monetary integration. This conclusion is supported both by monthly and yearly data as depicted in Table 1 and 2.

Table 1 **– Exchange Rates Volatility, Based on Yearly Data**

Exchange Rates Volatility	
1960s	0,033
1970s	0,086
1980s	0,076
1990s	0,094
1989-93	0,082
1994-98	0,048

Note: Volatility in this table means average of the standard deviations of the change in the logarithm of the bilateral exchange rate, based on monthly data.

Table 2 **– Exchange Rates Volatility, Based on Monthly Data**

Exchange Rates Volatility	
1990s	0,1039
1989-93	0,0857
1994-98	0,0662

Note: Volatility in this table means average of the standard deviations of the change in the logarithm of the bilateral exchange rate, based on monthly data.

One can expect that the OCA criteria will explain less of the exchange rates variability in the 1990s than e.g. in the 1980s due to the advances in monetary integration in the EU and also due to EMS financial crisis in 1992-1993.

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[9] See Cech and Komarek (2002) on survey of the institutional arrangements of EU concerning exchange rate issues.

Table 3 **– Exchange Rate Volatility for Selected Countries of the EU, in the 1990s**

	Austria	Belgium	Germany	Denmark	Switzerland	Ireland
Belgium	0,012					
Germany	0,006	0,008				
Denmark	0,012	0,011	0,010			
Switzerland	0,043	0,039	0,042	0,038		
Ireland	0,048	0,050	0,048	0,047	0,083	
Netherlands	0,007	0,007	0,003	0,011	0,041	0,050

Note: Volatility in this table means the standard deviation of the change in the logarithm of the bilateral exchange rate between countries i and j; based on monthly data.

Very low exchange rate volatility persists in the core EU countries. However, it is difficult to find the criteria, which would clearly distinguish the core from the remaining countries as it is presented in the paper below. We present the exchange rate variability in Table 3.[10]

Another concern is symmetry of the shocks (variable $SD(?y_i - ?y_j)$) as Table 4 depicts. If the national business cycle is fully synchronized, the value would reach zero. Again, the shocks in the EU core are relatively low, but here the difference between the core and other EU countries is not so striking as was for the exchange rate volatility.

Table 4 **– Symmetry of the Shocks for Selected Countries, in the 1990s**

Germany	France	0,0053
France	Italy	0,0059
Germany	Italy	0,0071
Belgium	France	0,0076
Belgium	Italy	0,0091
Denmark	Great Britain	0,0100
Belgium	Germany	0,0113
Austria	Germany	0,0120
Spain	Portugal	0,0128

Note: Symmetry of shocks in this context are measured as the standard deviation of the difference in the logarithm of real output between countries i and j.[11]

[10] We present in Table 3 only the countries having lowest volatility of exchange rate. Full table available for all possible pairs of twenty countries in our sample is available upon request from the author.

[11] Ireland has relatively high asymmetric shocks with most of EU countries. E.g. asymmetry of the shocks with Germany was one of the highest in our data sample and reached 0,1311. This is partially caused by the high growth rates in Ireland. The shocks of the Czech Republic with Germany are below European average with value 0,0298. The European average was 0,046. However, the asymmetry of shocks between Czech Republic and Austria is very high of value 0,1344, roughly three times higher than European average.

The results for trade linkages ($TRADE_{ij}$) are straightforward. Clearly, the countries like Austria, Belgium, Germany or Netherlands have strong bilateral trade within each other. The Czech Republic is also closely tied to Germany by trade. However, the dissimilarity of exports ($DISSIM_{ij}$) of the countries presented in Table 5 is around European average. The trade linkages of Czech economy with other EU countries are not as strong as with Germany e.g. the value for another geographical neighbor Austria is 0,016, slightly twice above European average.

Table 5 **– Trade Linkages and Dissimilarity of Exports for Selected Countries**

		a	b
Belgium	Netherlands	0,0689	0,287
Belgium	Germany	0,0687	0,129
Germany	Netherlands	0,0676	0,416
Germany	Czech Republic	0,0665	0,131
Belgium	France	0,0646	0,078
Austria	Germany	0,0529	0,052
Germany	Ireland	0,0426	0,304
Average in EU		0,007	0,293

a **-** *the mean of the ratio of bilateral exports to domestic GDP for the given two countries*
b **-** *the sum of the absolute differences in the shares of agricultural, mineral, and manufacturing trade in total merchandise trade*

The descriptive statistics results for the Czech Republic are an evidence of strong linkages with Germany and one may put forward the view that its economy should not encounter difficult problems when adopting euro. However, as showed in Horvath – Komarek (2002) the results can be different when the whole EU instead of Germany is considered as benchmark. Horvath – Komarek (2002a) compare the structural similarity of the Czech Republic and Portugal to the German economy and find that the Czech economy is closer. The results are reversed when the EU economy is taken into account as a benchmark country. The estimation of the equation (1) yields the following:

Table 6 **– Results of Estimation of Equation (1)**

	Coefficient	t-Statistic
Variability of output	0,089	0,78
Trade ratio	-0,121	-5,6
Size of economy	0,016	4,15
Dissimilarity of exports	0,016	1,9
Number of observations	190	
R-squared	0,2	
S.E.E.	0,04	
F-Statistic	11,47	

Bayoumi – Eichengreen (1997a) point out that the equation (1) has the more significant power the lower the government interference in the exchange rate market. The data from 1960s to 1980s support their hypothesis. Our estimation does not either contradict this hypothesis.

The value of R^2 is not high, which may support the hypothesis that traditional OCA criteria explain less of the variability of the exchange rates in the 1990s than 1980s as measured by Bayoumi, Eichengreen (1997a).[12] All variables are jointly significantly different from zero suggesting that the OCA criteria do explain some of the variability of the exchange rates. The assumptions for classical linear model were fulfilled.[13]

The estimation of the equation (1) without the independent insignificant variable $SD(?y_i-?y_j)$ yielded the following:

Table 7 **– Results of Estimation of Equation (1) without Considering the Variable Describing the Symmetry of Shocks,** $SD(?y_i-?y_j)$

	Coefficient	t-Statistic
Trade ratio	-0,121	-5,57
Size of economy	0,015	4,15
Dissimilarity of exports	0,016	2,03
Number of observations	190	
R-squared	0,2	
S.E.E.	0,04	
F-Statistic	15,12	

[12] Compare with Table 13 in Appendix, e.g. their resulting R^2 from equation (1) for the data sample from the 1980s was 0.51.

[13] Even heteroskedasticity was not the case as one may wonder because of the institutional arrangements of exchange rate regimes in the EU. We tested it by White general test. The results are upon request from the authors.

Table 8 **– Results of Estimation of Equation (2)**

	Coefficient	t-Statistic
Variability of output	0,177	1,63
Trade ratio	-0,084	-4,13
Openness	-0,001	-6,45
Dissimilarity of exports	0,007	0,85
Number of observations	190	
R-squared	0,29	
S.E.E.	0,04	
F-Statistic	18,42	

Note: Exclusion of the variable SD(?yi-?yj) changes only minimally the results.

As the last step, we include the proxy for openness. The results of the estimation of the equation (2) are in Table 8. Contrary to estimations of Bayoumi and Eichengreen (1997a,b), this variable is significant and explain a large extent of the exchange rate variability suggesting that more open economies tended more to fix their currencies in the 1990s. It seems that openness is better proxy for explaining the exchange rate volatility in the 1990s by traditional OCA criteria measured by R^2 or by joint significance of the variables rather than the size of the economy. Also, R^2 increased from 0,2 to 0,29 and F-Statistic from 15,12 to 24,36. Since the variable $DISSIM_{ij}$ was not significant we also present the estimation of the equation (2) without this variable. The output is in Table 9.

Table 9 **– Results of Estimation of Equation (2) without Considering Shocks at Industrial Level,** $DISSIM_{ij}$

	Coefficient	t-Statistic
Variability of output	0,2	1,86
Trade ratio	-0,08	-4,31
Openness	-0,001	-6,57
Number of observations	190	
R-squared	0,28	
S.E.E.	0,04	
F-Statistic	24,36	

All our estimations can be compared with former results of Bayoumi and Eichengreen (1997a) on the data from 1960s to 1980s reported in Appendix – Table 13 for 21 industrial countries.

From the above regression equations we calculate OCA-index, which is the predicted value of exchange rate variability. The lower the OCA-index is, the higher is the benefit-cost ratio for monetary integration for the pair of the countries. The resulting ranking of the economies as well as joint significance and satisfactory high R^2 of all of the regressions strongly supports the idea that OCA-indices have some explanatory power.

It is interesting to have a look what are the OCA-indices for the recent EMU members. EMU countries are closer to each other than to the remaining industrial countries. We present OCA-indexes calculated using the estimation results from Table 9, i.e. from estimation of equation (2) because of this provide the highest value of F-statistic. OCA-indexes resulting from the other tables, i.e. from estimation of equation (1) and (3) differ only to a small extent and therefore are not reported. The exception was OCA-index for Australia with New Zealand, which was very sensitive to the inclusion of the variable $OPEN_{ij}$. These two countries are relatively closed, that may explain why their OCA-index is on average level. Using variable $SIZE_{ij}$, instead of variable $OPEN_{ij}$ change (lowers) the OCA-index for Australia and New Zealand suggesting relatively low costs for implementing common currency from the view of the OCA theory.

Table 10 **- OCA Indexes versus Germany**

Belgium	0,0179
Netherlands	0,0376
Austria	0,0622
Ireland	0,0673
Switzerland	0,0819
Czech Republic	0,0862
Denmark	0,0906
Sweden	0,0961
Portugal	0,0986
France	0,1014
Italy	0,1036
Norway	0,1055
Finland	0,1080
Great Britain	0,1084
Spain	0,1157

Note: OCA index represents the predicted value obtained from estimating equation (2).

We present the OCA indices versus Germany since obviously we need a metric, and Germany is the most straightforward one. The data available for the Czech Republic are only for the period 1993-1998. The applicability of the OCA theory in the early stages of transition, e.g. in 1990-1992, is rather low since there are specific transitional problems which are not considered in the OCA theory. See Goldberg (1999), Horvath and Jonas (1998), Horvath and Komarek (2002), and Schweickert (2001) for discussion of specificity of the transition processes concerning the OCA theory. However, the inclusion of the Czech Republic to data sample changed the estimations minimally.

Table 11 - **OCA Indexes for Specific Relationships**

Belgium	Netherlands	-0,0071
Belgium	France	0,0233
Great Britain	Ireland	0,0233
Canada	USA	0,0271
Belgium	Ireland	0,0489
Austria	Netherlands	0,0714
Netherlands	Portugal	0,0747
Austria	Ireland	0,0857
Austria	Czech Republic	0,0905
Average of the sample		0,1039

Note: OCA index represents the predicted value obtained from estimating equation (2).

There is a significant difference between the values of OCA-indexes for Austria, Belgium, Germany and Netherlands and other European countries. The value of its OCA-indices was often less than one standard error for the regression and clearly, there are no doubts about the beneficial consequences of the adoption of the common currency from the view of the structural characteristics of these economies. The resulting OCA-indexes for Ireland with these economies are also relatively low reflecting the fact of sufficient convergence of Irish economy. Portugal do not have high values of OCA-indices with these countries suggesting that there is no evidence on the sorting out the countries on core and periphery.[14] The results for Germany vis-a-vis France imply that Euro adoption can potentially be relatively costly based on the view of the OCA theory. High values of OCA-index and the size of the economy for Great Britain not only with Germany offer the arguments not to join the eurozone immediately after its creation.

The other results are intuitively appealing, too. The values for Canada vis-a-vis USA, Great Britain vis-a-vis Ireland and Australia vis-a-vis New Zealand are very low indicating that these pairs of the countries are structurally very similar as expected. The considerations for these economies to adopt common currency largely occur in literature in the 1990s. Willett (2001) discusses the option of the common currency for USA and Canada and Grubel (1999) for NAFTA countries. Coleman (2001) considers the implementing common currency in Australia and New Zealand. Horvath and Komarek (2002) provide a short summary of the current integration processes throughout every continent. Bayoumi and Eichengreen (1996) provide survey on operationalizing OCA theory. The most important variables for determining OCA-index are trade linkages, variability of output and also openness for the very open economies. If we compare the OCA-indexes versus Germany from our results with the results of Bayoumi and Eichengreen (1997b), we find out that the ranking of the economies changed a little from 1987 (compare Table 11 and Table 14).[15] This is true also for

[14] See e.g. Bayoumi - Eichengreen (1993). Our finding corresponds to results of Fidrmuc - Korhonen (2001).

[15] We cannot compare the values of OCA-index from 1987 with ours since we have different data matrices. However, it is not the case for the ranking of the economies.

the OCA-indexes of the Czech Republic and Portugal with Germany in the 1990s. Horvath and Komarek (2002) find out lower OCA-index for Czech Republic by somewhat different approach.

The resulting OCA-indexes for the Czech Republic cannot show that there are substantially bigger structural differences between Czech Republic and Germany than are the differences among EMU member countries. We can argue that the costs of implementing common currency for eurozone countries and the Czech Republic should be relatively low from the view of OCA theory. However, for the decision-making it is necessary to consider all the accession countries potentially adopting euro together and not separately due to its interdependence and economic size as also our analysis suggests.

Finally, we provide evidence for importance of considering the international monetary system. We include the proxy $DOLVAR_{ij}$ for international regime, which captures the influence of the variability of U.S. dollar exchange rate on the exchange rates volatility in the remaining countries. The estimated equation then is:

$$SD(e_{ij}) = a+b_1SD(?y_i-?y_j)+b_2DISSIM_{ij}+b_3TRADE_{ij}+b_4SIZE_{ij}+b_5OPEN_{ij}+b_5DOLVAR_{ij} \quad (3)$$

where $DOLVAR_{ij}$ is calculated as arithmetic average of the variability of the U.S. dollar exchange rates for each country pair. The proxy takes on zero value when USA is one of the pair of the countries. We expect that the higher the variability of U.S. exchange rate, the higher the actual bilateral exchange rate for all the countries in the sample. The results are reported in Table 12. All the variables yield the expected signs and are jointly significantly different from zero. R^2 is relatively high. Our results correspond to the findings of Bayoumi and Eichengreen (1997a, p.201) for the period of the 1960s (the sign was opposite for their estimation for the sample from 1970s and 1980s).

Table 12 **– Results of Estimation of Equation (3)**

	Coefficient	t-Statistic
Variability of output	0,238	2,30
Trade ratio	-0,079	-3,85
Openness	-0,001	-4,00
Size of economy	0,013	2,63
Dissimilarity of exports	0,012	1,54
Variability of U.S. dollar	0,093	5,17
Number of observations	190	
R-squared	0,38	
S.E.E.	0,04	
F-Statistic	18,45	

4. CONCLUSION

In this paper the authors calculate OCA-indexes for industrial countries in an effort to estimate the benefit-cost ratio of adopting common currency between two countries. The results correspond to the estimation of Bayoumi and Eichengreen (1997b) and show that the ranking of the economies suitable to form a monetary union stays the same in the 1980s as well as in the 1990s. In other words, the economies, which were structurally close to each other in the 1980s, remain close in the 1990s and the opposite is valid for the structurally different economies. This empirical estimation also does not provide evidence for views, which emphasize the seemingly striking difference between the core and the periphery of the European Union. The authors perform also an estimation of the same index by including the Czech Republic and find no support for the view that the economy of the Czech Republic could possibly structurally differ more than the EMU member countries between each other. Then we conclude that if the EMU is sustainable, the accession of the Czech economy should not change it.

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APPENDIX

***Table 13* – The Results of equation (1) by Bayoumi, Eichengreen (1997a)**

Results for all countries using OCA variables			
	1960s	1970s	1980s
SDY	0.5**	0.49**	1.46**
TRADE($*10^{-2}$)	-0.13*	-0.46**	-0.54**
SIZE($*10^{-2}$)	0.13	1.7**	2.5**
DISSIM($*10^{-2}$)	1.03**	1.89**	2.24**
Observations	210	210	210
F-test	6.6**	25.5**	35.6**
R-squared	0.15	0.4	0.51

*Source: Bayoumi, Eichengreen (1997a), **, * - indicates significance at 5%, respectively 1%*

***Table 14* – OCA index versus Germany in 1987**

Belgium	0.003
Netherlands	0.003
Austria	0.008
Switzerland	0.038
Ireland	0.043
Denmark	0.063
France	0.068
Portugal	0.068
Sweden	0.068
Italy	0.07
Norway	0.078
Spain	0.088
Finland	0.098
U.K.	0.099

Source: Bayoumi, Eichengreen (1997b)