OPTIMUM CURRENCY AREA THEORY:
AN APPROACH FOR THINKING ABOUT
MONETARY INTEGRATION

Roman Horvath

And

Lubos Komarek

No 647

WARWICK ECONOMIC RESEARCH PAPERS

DEPARTMENT OF ECONOMICS

THE UNIVERSITY OF
WARWICK

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

Roman Horváth
Luboš Komárek[*]
August 2002

Abstract

The optimum currency area (OCA) theory tries to answer an almost prohibitively difficult question: what is the optimal number of currencies to be used in one region. The difficulty of the question leads to a low operational precision of OCA theory. Therefore, we argue that the OCA theory is a framework for discussion about monetary integration. We summarize theoretical issues from the classical contributions to the OCA literature in the 1960s to the modern "endogenous view". A short survey of empirical studies on the OCA theory in the connection with the EMU and the Czech Republic is presented. Finally, we calculate OCA-indexes for the Czech Republic, EU, Germany and Portugal. The index predicts exchange rates variability from the view of traditional OCA criteria and asseses benefit-cost ratio of implementing common currency for a pair of the countries. We 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 considered as a benchmark country.

Outline

1. Introduction

In the paper we try to summarize the developments of the optimum currency area theory (OCA) from the early 1960s up to date and to estimate the so called OCA-indices attempting to estimate the degree of structural similarity among industrial countries. OCA indices are the outcome from regressing the long run exchange rate variability on the OCA criteria.

The OCA theory serves as an approach for thinking about monetary integration and provides an explanation for the recent monetary integration processes in Europe. This approach can help us to identify and possibly to estimate costs and benefits of adopting a common currency. Since theory has low operational precision and OCA criteria are sometimes seriously interrelated, estimation is difficult and does not always give clear answers. But some basic aspects concerning OCA theory can surely be assessed as we present in the following text, namely the ability of OCA criteria to explain exchange rate variability in the long run.

In chapter 2 we present a survey of the existing monetary unions as well as some considerations about new unions. In chapter 3 we review the early OCA theory in the 1960s, namely Mundell's model and classical contributions of Ingram, Kenen and McKinnon. It can be shown that the OCA theory has strong neo-Keynesian roots and suffers from some serious theoretical controversies such as downward sloping and stable Phillips curve in the long run. In chapter 4 we introduce more recent developments in the OCA theory, especially costs and benefits stemming from joining monetary union. The means of the absorption of modern macroeconomic theories in the OCA theory is presented, too. In chapter 5 OCA theory is discussed in connection with the EMU, a substantial part of the chapter is devoted to the review of the empirical analyses on this subject. In chapter 6 we present issues concerning the OCA theory and exchange rate regimes in the Czech republic followed by the calculation of the OCA-index attempting to measure the degree of the structural similarity of the Czech Republic and Germany in comparison to Portugal. Next, we consider EU instead of Germany as a benchmark country.

2. A Survey of Regional Monetary Unions

Regional currency areas originated from various roots such as historical, „existential“, economic and especially political reasons. The importance of political factors can be found e.g. in the process of creating an independent Germany in 1871 (as well as in 1990, when east and west part Germany were unified) and many other states (e.g. Switzerland and Italy). So-called existential reasons were characteristic of the group of geographically small countries (El Salvador, Kiribati, Liechtenstein, Monaco, Nauru and Vatican), where the acceptance and the legalization of the foreign trade partner currency were a necessity. For the sake of completeness, there are also states, where more than one currency circulates within its borders. These are e.g. Hong-Kong and Macao. The best known and economically strongest is certainly the European and Monetary Union (EMU) founded in a cashless form in 1999.[1] Figure 1 provides a survey of other non-European regional monetary unions.

Figure 1 – Monetary Unions Out of Europe

Monetary union	Currency	Central Bank
Eastern Caribbean Currency Area (1950)	Eastern Caribbean dollar (is pegged to the USD, prior to 1976 it had been pegged to GBP)	Eastern Caribbean Currency Authority (1950-1982) Eastern Caribbean central bank (1983)
Central African Economic and Monetary Community (1945)	Franc de la coopération financiére en Afrique centrale (it has been pegged to FRF and now to EUR) [(i)]	Banque des Etats de I´Afrique
West Africa Economic and Monetary Union (1945)	Franc de la communauté financiére d´Afrique (it has been pegged to FRF, and now to EUR) [(ii)]	Banque Centrale des Etats de l´Afrique de l´Auest
Note: (i) and (ii) are commonly called the CFA Franc.		

Figure 2 shows what the main directions and discussions in the terms of existence, enlargement and creation of monetary unions are. Potential monetary integration processes are considered on every continent. Masson and Patillo (2001) discuss integration efforts in West Africa in the countries of ECOWAS (Economic Community

---

[1] Cash form was introduced on 1st January 2002. Generally, it is possible to introduce common currency cash and cashless simultaneously, but it is impossible to implement the option of introducing cash before cashless transactions.

of West African States), which should introduce a common currency in near future (probably in 2004).

Figure 2 – Current Directions and Discussions of Creating New Monetary Unions

Potential Monetary Unions / Enlargement of Current Monetary Unions	Country	Further Information
Europe	Current Eurozone (12) + country out of Eurozone (3) + candidate countries (10) [(i)]	See: http://europa.eu.int
East Africa	Kenya, Tanzania, Uganda	Signed a treaty (in 1999) forming an economic block and monetary union, which is reviving their former currency union - see for example Mkenda (2001).
West Africa	Economic Community of West African States (ECOWAS, i. e.: Benin, Burkina Faso, Guinea-Bissau, Mali, Niger, Cote d'Ivoire , Senegal and Togo) + Gambia, Ghana, Guinea, Liberia, Nigeria a Sierra Leone	Declared (in April 2000) the intention to form a broader monetary union. Monetary union of ECOWAS countries would be created in 2004 – see for example Masson and Pattilo (2001).
Arabian Gulf	Gulf Co-operation Council (Bahrain, Qatar, Kuvait, Oman, Saudi Arabia and United Arab Emirates)	Announced in early 2002, a custom union by 2003 and a plan for a common currency by 2010. New currency, possibly to be called the Gulf dinnar, will be established, and is likely to be pegged to USD – see for example Jadresic (2000).
Asia	ASEAN (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand and Vietnam)	Leaders of ASEAN endorsed (in December 1988) a project to study the feasibility of their currency, "ASEAN currency" – see for example Yam (1999).
Australia and New Zealand	Monetary integration among: (a) Australia and New Zealand or (b) adopting the Australian dollar by New Zealand [(ii)]	For example Coleman (2001) provides a discussion of suggestion for an „Anzac dollar".
South America	MERCOSUR (Argentina, Brazil, Paraguay and Uruguay) + associate members (Bolivia and Chile)	Two discussed strategies: (i) the common currency adopted would be the USD or (ii) to create the regional "Mercosur" currency. Currently, due to crisis in Argentina this project is more medium term oriented.

North America	NAFTA (Canada, Mexico and USA)	Given the high proportion of Canada and Mexico's trade with US, a NAFTA dollar or "Amero" has been proposed e.g. by Grubel (1999).

Note: (i) 10 countries are officially called as the "accession countries", i.e.: Cyprus, Malta, the Czech Republic, Slovakia, Poland, Hungary, Slovenia, Estonia, Latvia, Lithuania, Bulgaria, Romania and Turkey); (ii) The economy of Australia is roughly seven times bigger than the economy of New Zealand.

3. History and Development of OCA Theory in the 1960s

It is possible to distinguish two major streams of the optimum currency area literature[2]. The first stream tries to find the crucial economic characteristics to determine where the (illusionary) borders for exchange rates should be drawn (1960s-1970s). The second stream (1970s-till now) assumes that any single country fulfills completely the requirements to make it an optimal member of a monetary union. As a result, the second approach does not continue in the search for characteristics, identified as important for choosing the participants in an optimum currency area. This literature focuses on studying the costs and the benefits to a country intending to participate in a currency area. The costs and benefits are compared and the question of participating in monetary union becomes largely an empirical problem.[3] Later on, OCA literature takes into account the "Lucas critique", endogeneity of the optimum currency area criteria and modern macroeconomic theories.

3.1 To Fix or to Float: Friedman's Influence

Theory of the optimum currency areas was fully developed during the debates of the benefits and the costs of the particular exchange rates regimes after the World War II. That time, most of the countries fixed their currency to the US Dollar. The US Dollar was convertible at a fixed rate into gold. These issues are well known and that is why we concentrate more on the literature favoring flexible exchange rate regimes, such as Friedman (1953b), because it has a relatively explicit relationship to the OCA theory.

---

[2] The distinction of both streams of the literature is not so easy. E.g. early literature already recognized the importance of the costs of OCA.

[3] However the choice to join the union is political in nature as it is the case with EMU, but economists can still attempt to assess costs and benefits.

Friedman (1953b)[4] favored flexible exchange rates, because they serve as a better mean to absorb exogenous shocks. His argumentation of the adjustment to the shock was as follows: As it is commonly observed, the country's prices and wages are relatively rigid and factors are immobile among the countries. As a result, under the negative demand or supply shock the only instrument to avoid higher inflation or unemployment is the change in the flexible exchange rate (that means appreciation or depreciation of the currency). This brings the economy back to the initial external and internal equilibrium. In the case that internal prices and wages are not rigid or factors are fully mobile, there is little economic difference between these ways and the change in the exchange rate to adjust the economy (but still it can be argued that the latter is less painful adjustment). Under the fixed exchange rate regime there would always be the unpleasant impact on unemployment or inflation.

It is also worth to notice that Friedman did not discourage using the fixed exchange rate regime at all. If there is little governmental interference to the economy or some specific relationship among the countries, the fixed exchange rate regime may be appropriate (see Friedman (1953b) p.166-167 or 193[5]).

3.2 Mundell's Model of Shifts in Demand

OCA theory originates in the 1960s and as Bayoumi, Eichengreen (1997, p.199) paradoxically noted: *"There is an irony, then, that the variables identified by Mundell, McKinnon, and Kenen have the least explanatory power for the decade in which these authors wrote"*. Eight years[6] after Friedman, Mundell published the first article on the optimum currency area (OCA) defining optimum currency area as an area with internal factor mobility (including both interregional and inter-industrial mobility) and external factor immobility. The early discussions about the OCA theory concentrated on the choice of the exchange rate regime (this idea was not central in the1970s and 1980s).

---

[4] We discuss only directly relevant parts to OCA (shorter part of the Friedman's (1953b) text). Of course, there is nothing explicit about OCA theory in Friedman's article, but one can see the influence on the following texts about OCA, see Mundell (1961).
[5] See Friedman (1953) note 16, there is implicitly described the possible difference between actual currency area and optimal currency area.
[6] See Mundell (1997) for a interesting history about how the paper was published.

Mundell (1961) challenges Friedman's (1953b) arguments about the means of cushioning shocks in a more general way. Let us briefly discuss Mundell's model of the shifts in demand between two countries. We assume two countries A and B, which are initially in their equilibrium defined as full employment and balanced trade. Both countries maintain own currencies; thus each country can alter its monetary policy[7] if necessary. Now consider the shift in demand away from the products of country A to country B as depicted in Figure 1.

If no policy is used, the result of such a shift for country A is the decline in output and the price level and likely unemployment. If domestic spending does not decline at the level of output declines, a current account deficit will occur and possibly a budget deficit, too.[8] The opposite is valid for country B. If country B prices rise at higher speed than prices in country A, then B takes partially the burden of adjustment from country A, because price increase will deteriorate its competitiveness. If country B tightens its monetary policy in order to fight inflation, then the whole burden is thrown onto country A. In the case that countries use flexible exchange rate regimes, the whole adjustment can be solved through the depreciation of the country A's currency.[9] But what if the national currency area (the area where the currency is actually used) does not geographically equal to the optimum currency area (let's say the area where could be the highest welfare of using the currency)? Let us discuss briefly the consequence.

Consider that the countries consist of western and eastern parts. If the aggregate demand falls only in the western parts of the countries and the opposite happens in the eastern parts, flexible exchange rate regime does not bring countries back to the equilibrium. Countries would be able to get rid of either inflation or unemployment, but not both problems. Thus, why should a country use flexible exchange rates?

---

[7] The country can change the price of its currency and determine the quantity of national money in circulation.

[8] Note that current account equals domestic output less domestic spending. If output went down and taxes are proportional to the output, then taxes will decrease and meanwhile the amount of social security payments increase, then budget deficit is the outcome.

[9] Till now Mundell's argumentation does not differ form Friedman (1953).

The question now is if there is any theoretical possibility of adjusting to the equilibrium.[10] Mundell (1961) offers some non-exchange rate means without considering transaction costs.

Figure 1-Asymmetric Shifts in Demand[11]
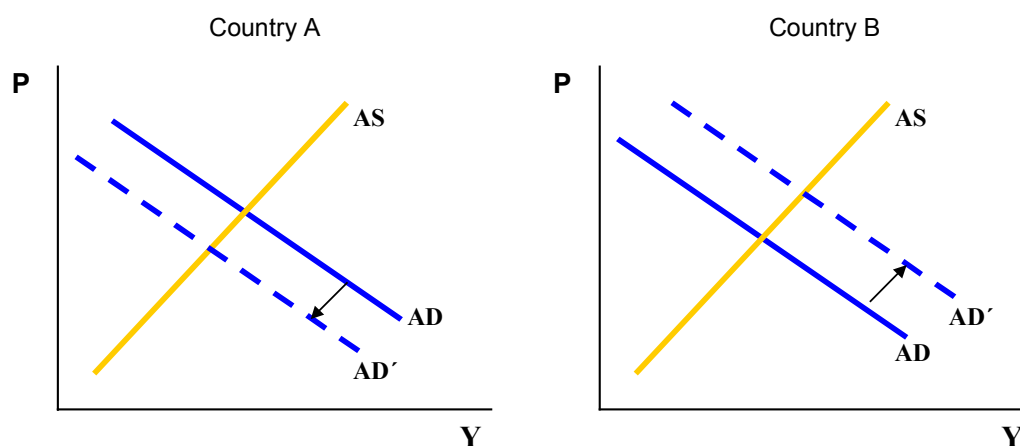
Source: De Grauwe (1997)

First, there is wage flexibility. Wage claims in the western parts are reduced and the opposite is valid for eastern parts.

Second, there is labor mobility. Workers can move form west to east in their countries. They do this in order to eliminate the excess labor demand occurring in the eastern parts of the countries. Wages remain constant. Unemployment and inflation vanish.

Third, there is a fiscal policy. In the surplus east regions authorities can raise taxes in order to decrease eastern aggregate demand and transfer the surplus to the western parts of each country. Western parts still have a current account deficit, but transfers finance it. Empirically, many countries have regional redistribution systems through a federal budget because of the centralization of the government budget. As a result, when output in western region declines, the tax revenue of federal government declines. At the same time, the social security system will increase transfers to this region. Transfers do not

---

[10] I exclude from the analysis the purely theoretical possibility of forming states according to optimality of currency areas.

[11] AD-aggregate demand, AS-aggregate supply, P-price level, Y-output.

solve adjustment problems, but make it easier to live with. If the negative shock is permanent, then either it will be necessary to send the transfers forever or to adjust "painfully" in wages.

3.3 Are There 2 Mundell's Models?

Although Mundell sets the solid theoretical basis for OCA, of course, the critique of his model soon emerged. One may criticize the means of adjustment. Economic subjects face strong information barriers such as on the length of the crisis. It is empirically known that wages are rigid downward due to trade union's restrictive bargaining. Another problem thatarises is it takes serious costs for workers to adjust to different jobs. Also fiscal policy can have a lot of problems (political cycles etc.).

The more serious criticism can be that Mundell implicitly assumed downward sloping and a stable Phillips curve in the long run.[12] This idea of the Phillips curve went under strong criticism in the late 1960s and 1970s. It was argued that there is no trade-off between inflation and unemployment, at least in the long run. Mc Kinnon (2000) notes that the whole model is full of neo-Keynesian beliefs about successful elimination of shocks by national monetary and fiscal policies. The well known "Lucas critique (the structure of the economy is endogenous to economic policy)" can be applied, too. As Kenen (1969) pointed out the production of countries is also deeply diversified, which makes it less likely for countries to encounter asymmetric shocks.

Another problem is that adjustment is often costly. Just imagine the case of labor mobility described; how huge the losses could be in accompanying investment (e.g. in infrastructure) especially under an unexpected shock.

Recent literature critiqued also some other points.[13] For example the devaluation of the currency is not effective in dealing with the shifts in demand between the countries in the long run and will likely lead to higher inflation. Devaluation increases the cost of imports

---

[12]And as we can see, OCA theory is the long run theory.
[13] See De Grauwe (1997) p. 21-51 for survey of the critique of OCA.

(output can decline) and trade unions can bargain for a higher real wage, because the rise in the cost of imports lowers the real wage of workers (price level increases).[14]

But in his two later articles, Mundell (1973a, 1973b) completely changed the argumentation about the optimum currency area. His global monetarist view on the subject was as follows: If two countries can adopt a common currency (that needs a common central bank and foreign reserves) without substantial change in their purchasing parities, they gain better allocation of capital. As a result, they will get rid of uncertainty in the evolution of exchange rates and assets will be better diversified. Foreign reserves have to increase less than proportionally with the size of the economy, too. As a result, under the asymmetric shocks in the countries with a common currency, there is no decline in output, because the costs of absorbing the shocks would be effectively spread in time. The existence of two of Mundell's models - early and recent - can explain the fact why proponents and skeptics of EMU heavily quote him.

3.4 Extensions of OCA Theory

To complete the developments of the early OCA theory, it is necessary to mention other articles. Ingram (In: Kawai, 1987) emphasized that if countries are highly integrated in financial trading, then capital flows can smooth temporary asymmetric shocks[15]. In the long run there is a wealth effect due to capital flows. Kawai (1987) points out: *"The surplus region accumulating net claims raises expenditures and the deficit region decumulating net claims lowers them, thereby contributing to real adjustment."*

McKinnon (1963) argued that the more the country is open to the world the lower the benefits of flexible exchange rates. Any exchange rates variation in a highly open country is without any impact on the terms of trade and real wages, because the change in the price of the currency will affect both the export price of domestic products and the import price of foreign products.

---

[14] In order to fight with inflation, devaluation would have to be followed with fiscal restrictions and non-accommodating monetary policy, as was the case of Belgium in 1980s. See Carlin, Soskice (1990) and De Grauwe (1997) for underlying theory.

[15] This causes imbalance in bilateral trade; there will be surplus country and deficit country.

Kenen (1969) suggested that the higher the product diversification is the lower the extent of asymmetric shocks occurrence (shock would affect a relatively small part of the economy).

There were also other criteria proposed, such as political integration, similarity of tastes (preferences) about inflation and unemployment, coordination of central banks etc. and theory of the optimum currency areas was becoming a framework for discussion about monetary integration.

4. Costs and benefits of Joining the Monetary Union

An interesting aspect of the second stream literature of identifying costs and benefits of joining the monetary union is that the relevant benefits are usually at microeconomic level, while costs at macroeconomic level. There are several issues to be discussed.

4.1 Costs and benefits – Static View

First, the loss of power to affect a national money supply is legitimately feared, since, in an integrated market, all member countries will jointly control their monetary policy. Typically, the loss of a country's ability to use the exchange rate and monetary policy for stabilization was considered to be the most important cost of joining a currency area. However, this is surely not the case for small open economies, because it is impossible to maintain free capital mobility and an independent monetary policy together. Such countries link their currencies to their main trading partners in order to gain higher exchange rate stability. This lowers the independence of monetary policy. The argument about the loss of monetary and exchange rate policy was especially emphasized in the early 1970s when lots of authors believed in a negatively sloped Phillips curve. In that case, the common currency could imply that a country with a higher unemployment rate, relative to other members of the currency area, would no longer have the option of using a monetary policy. As a result, country would not achieve the desired mix of inflation and unemployment.

Second, there are concerns about fiscal policy. It is not clear what the implication of the membership is in the currency area for an independent fiscal policy.[16] It does not need to

---

[16] For discussion of fiscal policy in EMU see Kotlan, Machacek (2001).

be expected that monetary union mean the end of the independent fiscal policy for its member states. It is likely that even in the complete monetary union countries keep their fiscal policies independent, however some centralization of fiscal policies could serve as one of the mechanisms in adjusting to the asymmetric shock. On the other hand, the centralization of budgets often leads to an increase in spending.

Third, another cost of joining a currency area is the loss of seignorage. Seignorage is the revenue the government obtains by financing its budget deficit through printing money rather than selling debt. That's why at full employment printing money would lead to inflation. Seignorage is frequently also called the 'inflation tax'. It is largely a policy question how seignorage would be distributed in the case of monetary union.[17] In Western Europe only in some southern countries seignorage was estimated to be more than one percent of GDP and the ratio is rapidly decreasing in time.[18]

Fourth, in an uncertain world risk-averse households and firms would gain welfare (after the elimination of adjustment costs) if one of the sources of uncertainty in exchange rates were eliminated. This argument implicitly assumes that exchange rates volatility has a negative effect on economic calculation. If the exchange rate reflects the movements in fundamentals, then volatility does not matter. On the other hand, if the movements of exchange rates reflect feelings, speculation etc., then high volatility could lead to misallocation of resources. But the decrease in the uncertainty of the evolution of exchange rates lowers the expected profit of investment, which could subsequently influence output; therefore the oretical outcome is ambiguous.

Fifth, the elimination of exchanging one currency for another is the most visible benefit of monetary union. It is only an empirical question how much the economic agents gain in the long run (after the adjustment of all agents to the new environment). However, there are also indirect benefits from the elimination of the national currencies, such as a decrease in price discrimination.

---

[17] See Feist, Sinn (1997) for analysis of seignorage distribution in EMU.
[18] See De Grauwe (1997) p.19.

4.2 The Endogeneity of OCA Criteria and The Modern OCA theory

Countries can benefit from higher trade integration, which leads to the more effective allocation of resources. There are two opposite views on the outcome of higher trade integration as depicted in Figure 2.

The European Commission's view[19] suggests that with higher trade integration there is further synchronization of national business cycles (if the cycle is not synchronized it is likely that there are asymmetric shocks among the countries[20]). Trade among industrial European countries is typically intra-industry trade based on economies of scale and imperfect competition. As a result, it does not lead to a higher specialization of the countries, which could cause the higher possibility of asymmetric shocks.

Figure 2- Does Trade Integration Lead to the Divergence of the Economies?
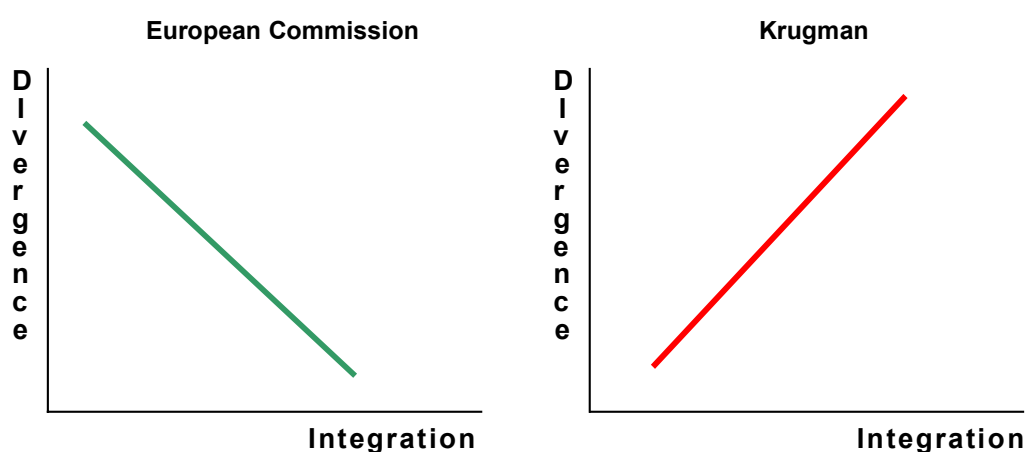
Source: De Grauwe (1997)

On the other hand, Krugman (1993) argues that higher trade integration leads to a higher specialization under the assumption of decreasing transport costs. Because of the economies of scale, higher integration leads to a regional concentration of industrial

---

[19] For discussion of these two views see De Grauwe (1997) p. 22-24.
[20] The idea behind is that various growth rates are result of asymmetric shock, but there is a critique that growth rates can differ as result of Vernon cycles and different income elasticities of exports (faster growing countries usually have higher income elasticities for their export than for their import). Fidrmuc and Korhonen (2001) find large differences between the traditional correlation of business cycles and the correlation of supply and demand shocks for OECD countries.

activity. As a result, asymmetric shocks are more likely to occur in the future (since the output is less diversified) and bring extra costs to monetary union.

The problem with Krugman's view is that it implicitly assumes that regional concentration of industry will not cross the borders of the countries that formed the union, while borders will be less relevant in influencing the shape of these concentration effects. If so, then asymmetric shock is not country specific and floating exchange rate variation could not be used to deal with asymmetric shocks anyway. Lower costs of production factors outside of the industrial centers can be expected to form, too. If monetary union is successfully implemented and considered as credible, then a further boost of convergence among countries can be expected. Eliminating trade barriers, there will be trade creation in the countries of the monetary union. Meanwhile it is possible that monetary union would be more closed to the outside world, so using flexible exchange rates can be appropriate.[21] This makes it simpler to cope with symmetric shocks. Developments of macroeconomic theory in the last 30 years (Lucas critique, rational expectations etc.) spurred a further development of OCA theory. First attempts to model OCA theory were made in the 1990s[22], too.

5. OCA Theory and EMU

In connection with the European integration dozens of studies have appeared attempting to assess the costs and benefits of adopting common currency for Europe from the view of OCA theory[23]. Most of the empirical studies[24] focus on four relationships among the members of potential monetary union testing the characteristics of OCA. They are the degree of labor mobility, the system of fiscal transfers, the extent of trade and the similarity of shocks and business cycles. These four characteristics are inter-related, which makes econometric testing difficult.

---

[21] See Mundell (1961) for argumentation that if there are OCA characteristics, OCA is the world.
[22] See e.g. Ricci (1997).
[23] Before there was almost none empirical research done on OCA
[24] See Bayoumi, Eichengreen (1996a) and also Schelke (2001) for survey.

5.1 Ex Post Even if Not Ex Ante?

There are empirical findings of Frankel and Rose (1998a, 1998b) using instrumental variables method,[25] where the authors argue that the higher trade integration the higher the correlation of business cycles among countries. Furthermore, Frankel and Rose (1998a, 1998b) argue that business cycles and trade integration are inter-related and endogenous processes to establishing a currency union. Thus, Frankel and Rose (1998a) note that countries may fulfill the OCA criteria ex post, although they did not fulfill them ex ante. EMU entry raises trade linkages among countries and this causes the business cycle to be more symmetric among the participants of union. Frankel and Rose (1998a) also note that because countries link their currencies to their most important trading partners in order to keep its exchange rates stable, they loose a certain amount of independence of its monetary policy.

Fidrmuc (2001) shows that the intensity of intra-industry trade is another variable, which has a positive impact on the synchronization of business cycles.

5.2 Methodological Problems of Measurement

The discussion on the EMU cannot come to a clear conclusion before its creation. This is partly caused that we are forced to use various proxies, which are inter-related between each other and inaccurate. For example, in the attempts to measure the symmetry of shocks, we would like to know whether we are facing demand or supply shocks and whether the shocks are transitory or persistent. Another caveat is how to distinguish between the shocks and the reactions to them.[26] Economies could have faced identical shocks, but the transmission would differ and in measuring the correlation of business cycles we could obtain correlation close to zero. By contrast, it can be argued that the difference in the speed of the transmission is caused by differences in labor market institutions or the rigidity of prices.

It is also very important to consider possibly high transaction costs and of course political issues, which can seriously lower the attractiveness of a currency union. Due to these high transaction costs, markets can understand that currency union is not successful. The

---

[25] See Rodrick (2000) for a critique of econometric methods used by Frankel, Rose (1998a, 1998b).
[26] Again Lucas critique could shed some light on it.

emerging lack of credibility because of the change in the expectations of markets could be self-fulfilling and cause the break-up of the monetary union.

Empirical studies are only able to estimate the probability of the asymmetric shock (or other OCA criteria can be considered). Such results are also incomparable with existing monetary union (USA), because of the endogeneity of OCA criteria, in other words there can be a further boost in the convergence among the countries adopting a common currency.

5.3 Other Empirical Findings

To our knowledge, there are no serious studies providing a clear answer to the adoption of the common currency.

Bayoumi, Eichengreen (1993) find relatively high symmetry of shocks in the so-called core of the EU[27] and lower for other western European countries using VAR approach.

Applying different techniques, the difference between the core and the periphery of the EU is smaller, or even vanishes. Schelke (2001) argues that the first stream of OCA theory (1960s) is not appropriate in explaining economic phenomena.

Nevertheless, there seems to be a general understanding that the probability of asymmetric shocks is higher in EMU than in USA (that means the costs of common currency are higher), but for some EMU countries the probability of asymmetric shocks can be close to that of USA[28]. The striking difference between EMU and USA can be seen in adjustment to shocks such as labor mobility[29] or rigidity of prices. It can be expected for EMU that there will be a need for coordination of fiscal policies as a means of absorbing their potential asymmetric shocks.

---

[27] Austria, Benelux, Denmark, France, Germany, Switzerland (this country is not of course member of EU, see Bayoumi, Eichengreen (1993) for argumentation why Switzerland was included in the sample).
[28] Fidrmuc, Korhonen (2001) argue that the extent of asymmetric shocks is declining in EU economies during 1990s.
[29] See Obstfeld, Perri (1998) for a comprehensive discussion and empirical comparison between EU and USA.

6. The OCA Theory and the Czech Republic

6.1 Choice of the Exchange Rates Regime – a Global View

Decision-making of the authorities on the choice of the exchange rate regime is a complex matter. In transition countries this decision-making is even more difficult due to their economic situation (relatively high uncertainty, specific stabilization issues etc.). Generally, the choice of the exchange rate regime has to consider various structural characteristics of the country, its strategic policy goals and timing. Usually, the most considered characteristics are: factor mobility, size and openness of the country, diversity of the production structure and employee skills, budget mechanisms, price and wage stickiness, financial system and the symmetry of the shocks. Next, it is important to take into account the broader economic and political context. This means issues like credibility drawn from the history of the monetary policy, preferences about economic policy or international coordination.

With some simplification it would be possible to set two basic conditions for the choice of exchange rate regime. First, a sufficient degree of freedom of the exchange rate is a necessity. This is dictated by the fact that the countries must economically transform and converge to western European economies.[30] From the beginning of 1990s we observed different economic development of the various transitive economies (candidate countries to EU/EMU) and that is why different exchange rates regimes, too. Second, a foreseeable exchange rate regime, which is one of the most important economic information given the size and the openness of the transition economies. At first glance, we can see that these two principles are inverse mutually. That is why various countries applied different exchange rates strategies (different regimes, timing etc.), because there was a difference in macroeconomic conditions at the beginning of the transition as well as a difference in short-term preferences.

Exchange rate regime of the transitive economy should create sufficient space for the natural trend of the real equilibrium exchange rate to appreciate (structural changes, higher productivity etc.)[31], on the one hand and on the other, to allow to keep the real

---

[30] See Frait, Komarek (1999) on discussion about "successful" or "unsuccessful" transformation from the view of the development of the real exchange rate.
[31] See Frait, Komarek (1999) or Komarek (1999).

appreciation in the extent for maintaining international competitiveness. From the above we can identify the following sequence of the changes in the exchange rate regimes for a typical transitive economy. Figure 3 schematically and at very general level demonstrates the process from socialist exchange rate regime to the irrevocable fixing of the currency to the Euro. There is a hypothetical development of the nominal exchange rate (E) on the vertical axis and time on horizontal axis. Set of the particular exchange rate regime periods contain[32]: *(i) initial devaluation[33] and an introduction of the convertibility of the currency (ii) step-by-step search of the nominal exchange rate level, which would correspond to the supply and demand, (iii) crawling peg period- e.g. Hungary or Poland[34], (iv) period of floating or managed floating exchange rate, (v) at least two years period in ERM2 mechanism, which end up by irrevocable fixing of the local currency to the Euro.*

Figure 3 - Global View on the Sequence of the Changes in Exchange Rates Regimes in Transition Economies
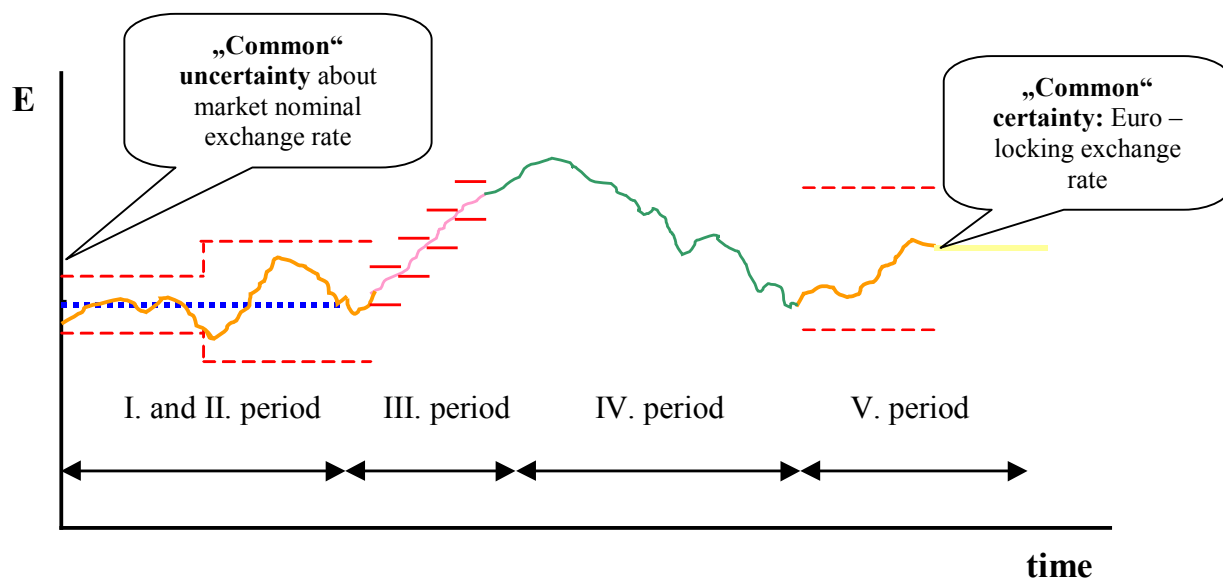
Source: Komarek (1999)

---

[32] This does not mean that all the periods had to be employed, rather it shows overall opportunities during the transition in the exchange rate area.

[33] Different strategy was performed only by Slovenia, which did not devalue in the beginning of the 1990s. Sulc (1993) provides a survey of the basic reform strategies.

[34] Further information on the exchange rates strategies of the candidate countries can be found in Pre-accession Economic Programme (2001).

The above-mentioned sequence of the exchange rate periods features general advance in economic policy preferences of the transition countries. The preferences have the common beginning and end point. There was a common uncertainty in the search of the appropriate level of the nominal exchange rate at the market at the beginning of transition as well as certainty of the aim of the exchange rate convergence. [35]

High volatility and medium term misalignment bring considerably large macroeconomic losses for a small open transition economy. The long-term defined goal of all the post-communist countries is the involvement to western European economic and currency structures. That is why it is possible to expect that there will be intensive negotiations on the finding of the socially (economically and politically) optimal Euro locking rates in the last stage before entering the eurozone. For this, it is necessary to achieve some degree of the nominal and real convergence. It is also important to stress the EU entry will spur the convergence of the candidate countries to the eurozone.

6.2 Relevance of OCA Theory to the Exchange Rate Regimes

Exchange rate regimes are closely related to the OCA theory, which attempts to give an answer to the choice of the regime (notice that the OCA theory distinguishes only pure float and pure fixed, what is not often the case for economic policy makers[36]), based on structural characteristics of the economy.

Let's discuss the problem of the choice of exchange rate regime from the view of the OCA theory in the Czech Republic in the 1990s. Horvath and Jonas (1998) show that the Czech Republic faced strong asymmetric shocks with Germany at the beginning of the 1990s and the OCA theory would suggest that the right choice is the floating exchange rate. Also, there was a strong dissimilarity in inflation rates between the Czech Republic and their trading partners deteriorating Czech competitiveness under its fixed exchange rate regime in the long run.[37]

On the other hand, low financial integration with western European trading partners and relatively high openness of the Czech economy is an argument to fix the currency in order to eliminate potentially high volatility in financial markets. As a result, we can see

---

[35] Cech, Komarek (2002) provides the discussion on the institutional framework of the EU/EMU accession.
[36] Willett and Wihlborg (1999) suggest considering other exchange rate regimes for further research.

that the OCA theory does not have operational precision for decision making in the short-term and that it is a long run theory.[38] Goldberg (1999) argues that the OCA theory is less suitable applying for transition economies due to some specific stabilization and transition problems. Often, when studying transition economies, one has to take into account their specific characteristics due to stabilization and institutional aspects.

6.3 OCA Index for the Czech Republic

Nevertheless, even if the OCA theory is not operationally precise, we can monitor OCA criteria in time as was done by Cincibuch and Vavra (2001), who find strong convergence of the Czech OCA criteria to Germany and EU[39]. In particular, Cincibuch andVavra (2001) construct the so-called OCA index[40] predicting the variability of the nominal exchange rate for the Czech Republic using regression equation estimated by Bayoumi and Eichengreen (1998a). The estimation yielded the following for the data[41] from 1983-1992 (with standard errors in parentheses):

$$SD(e_{ij}) = - 0.09 + 1.46SD(\Delta y_i - \Delta y_j) + 0.022DISSIM_{ij} - 0.054TRADE_{ij} + 0.012SIZE_{ij} \quad (1)$$
$$\quad (0.02) \quad\quad (0.21) \quad\quad\quad\quad (0.006) \quad\quad\quad (0.006) \quad\quad\quad (0.001)$$

$$n = 210 \quad R^2 = 0.51 \quad S.E. = 0.027$$

Bayoumi and Eichengreen (1998a) suggest how to calculate relevant variables: *"where SD(e_{ij}) is the standard deviation of the change in the logarithm of the end year bilateral [42]exchange rate between countries i and j, SD(Δy_i-Δy_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 two countries, and SIZE_{ij} is the mean of the logarithm of the two GDPs*

---

[37] In the short run there can be some credibility gains from fixing exchange rates for higher inflation country.

[38] See Hobza (2002) for a similar argumentation.

[39] The considered variables were: Correlation of business cycles, trade linkages, difference in commodity structure of bilateral exports and size of the economies

[40] For the OCA index for Slovakia see National Bank of Slovakia homepage, but notice that some results have to be interpreted very carefully since e.g. they measure the correlation of business cycles on the data from 1997-1998 and business cycles is surely not 2 year phenomenon.

[41] Countries included in the regression 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.

measured in U.S. dollars." These four variables represent basic OCA criteria and it is believed that the lower the volatility of exchange rates is among countries, the more they are prepared to join the monetary union.[43]

Cincibuch and Vavra (2001) show that the Czech Republic achieved a higher degree of structural convergence to Germany than Portugal or Greece during 1990s. However, the problem of this analysis can be that the stability of equation in time is assumed. The original regression equation used the data from 1983-1992. There were financial crises in Western Europe in 1992-1993 and financial flows were much more important in the 1990s than the 1980s. These facts could strongly influence the stability of equation. Another problem could arise from the fact that there are several non-European industrial economies included in the sample, namely: Australia, Canada, Japan, New Zealand and USA.

Bayoumi and Eichengreen (1997a) also estimated the regression only with European economies in the same way as described above and the regression was quite different.[44] They present regressions for the variability of the real exchange rates, too.

Table 1 - OCA Index, Structural Similarity with Germany

Exchange rate variability	Nominal	Real	Nominal	Real	Nominal	Nominal
Data/ Country	Europe	Europe	World	World	World	World
The Czech Rep.	0.022	0.071	0.193	0.194	0.023	0.035
Austria	0.006	0.057	0.185	0.187	0.003	0.008
Portugal	0.022	0.072	0.201	0.202	0.029	0.062

Source: Bayoumi, Eichengreen (1997a, 1998a), Cincibuch, Vávra (2001), own calculations.

We can compare the results of Cincibuch and Vavra (2001) with the other four regression equation estimated by Bayoumi and Eichengreen (1997a, 1998a).[45] We present the results for the data from 1993 to 1998 in Table 1 and Table 2. Structural convergence of Austria,

---

[42] Nominal exchange rates.

[43] For broader description of regression and computation of OCA index, see chapter 6.

[44] See Appendix for a comparison.

[45] Variability of nominal exchange rates and variability of real exchange rates with only European economies and the same if some other non-European industrial countries are included. This means the sample consisted of 16 European economies-that's what we mean by word Europe in the Tables 1 and 2 or 16 European economies plus 5 non-European economies- that's what we mean by World in the Table 1 and 2.

the Czech Republic and Portugal with Germany as a benchmark country is in Table 1, while the EU is considered as benchmark country in Table 2. We chose Austria, the Czech Republic and Portugal, because they represent examples for a converged (or core country), a transition and a peripheral economy.[46]

Except the last column, the results are the calculation of the authors. The first line indicates whether we consider the variability of the nominal or the real exchange rate. The second line indicates whether we deal with the sample of European economies or all industrial economies were included. The results are of Cincibuch and Vavra (2001) for the Czech Republic using data from 1993 to 1998 and the forecast of Bayoumi and Eichengeen (1998a) using the data 1971-1987 to the year 1995 in the last column. The results are not fully comparable in columns.

As can be seen in the Tables 1 and 2 OCA-index for Austria is much lower than for the other two economies. The results for the Czech Republic and Portugal look quite similar. The Czech Republic has a lower OCA-index than Portugal when Germany is considered as the benchmark country; the opposite is the case when the EU is the benchmark country.

Table 2 – OCA Index, Structural Similarity with EU[47]

Exchange Rate Variability	Nominal	Real	Nominal	Real	Nominal	Nominal
Country/data	Europe	Europe	World	World	World	World
The Czech Rep.	0.0203	0.073	0.205	0.206	0.025	0.034
Austria	0.0035	0.056	0.191	0.194	0.003	-----
Portugal	0.0127	0.065	0.198	0.199	0.014	-----

Source: Bayoumi, Eichengreen (1997a, 1998a), Cincibuch, Vávra (2000), own calculations.

6.4 Empirical Studies on OCA Theory and Transition Economies

Other empirical studies[48] such as Boone and Maurel (1998), Horvath (2001), Fidrmuc and Korhonen (2001) or Schweickert (2001) focus not only on the Czech Republic, but also on other transition economies.

---

[46] We cannot report the results for Greece (as is done by Bayoumi, Eichengreen (1998a)) since the data needed to calculate variable DISSIM were impossible to obtain.

They show that the structural convergence of the Czech Republic does not considerably differ from the convergence of other Central European countries. But the difference can be seen between the Czech Republic on the one hand, and Romania and Bulgaria on the other hand.

Schweickert (2001) compares transition economies with a reference group (Greece, Portugal, Spain) by a "comparative indicator", where he tries to catch Maastricht criteria, institutional development, development of capital markets and OCA criteria. Schweickert (2001) shows that adopting of the euro will bring more net benefits for transition economies than for the reference group from the view of the OCA theory. On the other hand, transition economies were doing worse compared by the other indicators than the reference group.

Boone and Maurel (1998) show that a large part of a variability of output of transition economies can be explained by variation of the German output or the EU output and reactions to the changes in outputs are positively correlated.

Fidrmuc and Korhonen (2001) find a much lower correlation of the Czech business cycle with the EU's cycle than the correlation of Hungarian or Estonian business cycles with the EU's.

Horvath (2002) in his empirical study argues that shocks between transition economies and EU are, to a large extent, still idiosyncratic (correlation of demand or supply shocks of transition economies and four biggest European countries is rather exceptional). As a result, the adoption of the common currency can be relatively costly.

Empirical analyses do not come to a definite conclusion concerning the structural convergence of the transition economies to EU/EMU from the view of the OCA theory (best "performers" are usually Slovenia, Hungary, Estonia and the Czech Republic). Fidrmuc (2001) argues that the most important role in convergence is attributed to the intensity of intra-industry trade, foreign direct investment, the commodity and geographic structure of exports.

---

[47] Since DISSIM for EU is unknown, at least as we know and Cincibuch, Vavra (2001) mention the same, I took Germany's DISSIM as a proxy.
[48] The problem of all empirical studies dealing with business cycles is short time series.

7. Conclusion

We argue in the paper that the OCA theory is an approach for discussion about monetary integration rather that a dead-end theory or neo-Keynesian relic. Since the OCA theory has low operational precision due to its attempt to give an answer to the question about the optimal number of currencies to be used in one region, an empirical estimation is often very difficult. That is why empirical results should be interpreted carefully. Also, it should never be forgotten that all the monetary integrations are primarily political projects, where economic arguments do not have to be considered at all. On the other hand, economic theory does not give us a precise answer to whether the benefits outweigh costs. Therefore empirical estimations can be the way to try to deal with the problem (despite the difficulties likely to be encountered). In the paper we calculated the so-called OCA-indexes for the Czech Republic, Germany and Portugal. The OCA-index tries to assess the benefit-cost ratio for implementing a common currency between the pair of the countries based on the structural characteristics of the economies. We compared 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 considered as a benchmark country. The results of the estimations are compared to those earlier of Bayoumi and Eichengreen (1998a) and Cincibuch andVavra (2001).

8. Appendix

Table 3 – The Results by Bayoumi, Eichengreen (1997a) for 21 Industrial Countries

Results for all countries using OCA variables						
	1960s		1970s		1980s	
variability	nominal	Real	Nominal	real	nominal	real
SDY	0.5**	0.45**	0.49**	0.53**	1.46**	1.41**
TRADE($*10^{-2}$)	-0.13*	-0.14**	-0.46**	-0.37**	-0.54**	-0.46**
SIZE($*10^{-2}$)	0.13	0.11	1.7**	1.68**	2.5**	2.53**
DISSIM($*10^{-2}$)	1.03**	0.81**	1.89**	1.93**	2.24**	2.8**
Observations	210	210	210	210	210	210
F-test	6.6**	6.9**	25.5**	25.6*	35.6**	37.6**
R-squared	0.15	0.17	0.4	0.41	0.51	0.54

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

Table 4 – Results of Bayoumi, Eichengreen (1997a) for European Economies

Results for all countries using OCA variables						
	1960s		1970s		1980s	
variability	nominal	Real	Nominal	real	nominal	Real
SDY	0.36*	0.37**	0.53*	0.69**	0.75**	0.97**
TRADE(*10^{-2})	-0.18*	-0.17**	-0.2**	-0.14*	-0.26**	-0.19**
SIZE(*10^{-2})	0.37	0.23	0.32	0.65*	0.31	0.71**
DISSIM(*10^{-2})	1.17*	0.91*	-2.01	-0.39	-1.3	-1.36*
Observations	210	210	210	210	210	210
F-test	4.6**	3.2*	2.8*	3.2*	4.2*	4.6**
R-squared	0.15	0.22	0.15	0.15	0.27	0.35

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

9. Literature

BAYOUMI, T. - EICHENGREEN, B. (1993): Shocking Aspects of European Monetary Integration, In: *Torres, G. - Giavazzi, F.: Adjustment and Growth in European Monetary Union.* Cambridge University Press, 1993, pp.193-229.

BAYOUMI, T. - EICHENGREEN, B. (1996): Operationalizing theory of Optimum Currency Areas, *CEPR Discussion Paper*, No.1484.

BAYOUMI, T. - EICHENGREEN, B. (1997a): Optimum Currency Areas and Exchange Rate Volatility: Theory and Evidence Compared, In: Cohen, B. (ed.): *International Trade and Finance, New Frontiers for Research: Essays in Honor of Peter B.Kenen,* Cambridge University Press.

BAYOUMI, T. - EICHENGREEN, B. (1997b): Exchange Market Pressure and Exchange Rate Management: Perspectives from theory of Optimum Currency Areas, In: *Blejer, M. I. - Frenkel, J. A. - Leiderman, L. - Razin, A. (eds.): Optimum Currency Areas: New Analytical and Policy Developments*, IMF.

BAYOUMI, T. - EICHENGREEN, B. (1998a): Ever Closer to Heaven? An Optimum-Currency-Area Index for European Countries, *European Economic Review,* 41, pp.761-770.

BAYOUMI, T. - EICHENGREEN, B. (1998b): Exchange Rate Volatility and Intervention: Implications of theory of Optimum Currency Areas*, Journal of International Economics*, 45, No.2, pp.191-209.

BOONE, L., MAUREL, M. (1998): Economic Convergence of the CEECs with the EU, *CEPR Discussion Papers 2018.*

CINCIBUCH, M. - VAVRA, D. (2001): Toward the European Monetary Union: A Need for Exchange Rate Flexibility? , *Eastern European Economics*, 39, 2001, no. 6, pp.23-64.

COLEMAN, A. (2001): Three perspectives on an Australasian monetary union, In*: Gruen, D. - Simon, J. (eds.), Future Directions for Monetary Policies in East Asia*, Reserve Bank of Australia, (www.rba.gov.au).

CECH, Z. - KOMAREK, L. (2002): Exchange Rates Convergence and Entry to the Eurozone I. – Institutional Accession Framework, *Finance a uver*, no.6, 52, pp. 323-337 [in Czech].

CECH, Z. - HORVATH, R. - KOMAREK, L. (2002): Nominal and Real Macroeconomic Convergence Process of the Czech Economy to the EU/EMU - the Management Exchange Rate Management, mimeo [in Czech].

DE GRAUWE, P. (1997): The Economics of Monetary Integration, *Oxford University Press*, 3rd edition.

FIDRMUC, J. - KORHONEN, I. (2001): Optimal Currency Area between the EU and Accession Countries: The Status Quo, *Austrian National Bank mimeo*.

FIDRMUC, J. (2001): The Endogeneity of the Optimum Currency Area Criteria, Intraindustry Trade and EMU Enlargement, *Austrian National Bank mimeo*.

FRAIT, J. - KOMAREK, L. (1999): Capital Flows and Exchange Rate in a Transitive Economy, Prague, *Foundation of Josef Hlavka and Economic Institute of Josef Hlavka*, [in Czech].

FRAIT, J. - KOMAREK, L. (2001): On the Way to EU: Nominal and Real Convergence in Transitive Economies, *Finance a uver*, 51, 2001, no. 6, pp. 314-330, [in Czech].

FRANKEL, J.A. - ROSE, A. K. (1996): Economic Structure and Decision to Adopt a Common Currency, *CIDER WP C96-073*

FRANKEL, J. - ROSE, A .K. (1998a): Is EMU more justifiable Ex post than Ex ante?, *European Economic Review,* 41, pp.563-570.

FRANKEL, J.A. - ROSE, A. K. (1998b): Endogeneity of the Optimum Currency Criteria, *Economic Journal*, 108, pp.1009-1025.

FRIEDMAN, M. (1953): The Case for Flexible Exchange Rates, In: Essays in Positive Economics*, The University of Chicago Press*.

GOLDBERG, L. (1999): Is Optimum Currency Area Theory Irrelevant for Economies in Transition?, *In: Sweeney, R. J. - Wihlborg, C. - Willett, T.D. (eds.): Exchange Rate Policies for Emerging Market Economies*, Westview Press, pp.45-60.

GRUBEL, H. (1999): The case of the Amero: the merit of creating a North American monetary union, *Fraser Institute*.

HOBZA, A. (2002): The Czech Republic and the Euro, *Centre for European Policy Studies mimeo*.

HORVATH, J. - JONAS, J. (1998): Exchange Rate Regimes in the Transition Economies: Case Study of the Czech Republic 1990-1997, *ZEI Working Paper*, Bonn.

HORVATH, J. (2001): The Optimum Currency Area Theory: A Review, *Central European University mimeo*.

HORVATH, J. (2002): Supply and Demand Shocks in Europe: Large 4-EU Members, Visegrad-5 and Baltic-3 Countries, *Central European University mimeo*.

HORVATH, R. - KOMAREK, L. (2002): Theory of Optimum Currency Areas: A Framework on Discussion About Monetary Integration, *Finance a uver,* no.7-8, 52, pp.386-407 [in Czech].

JADRESIC, E. (2000): *On a common currency for the GCC countries*, IMF memo, 6 June.

KAWAI, M. (1987): Optimum Currency Area. In: *Eatwell, J.- Milgate, M. - Newman, P. (eds.): The New Palgrave A Dictionary of Economics*, The Macmillan Press,1987.

KENEN, P. (1969): Theory of Optimum Currency Areas: An Eclectic View, *In: Mundell, R., Swoboda, A. (eds.): Monetary Problems in the International Economy,* University of Chicago Press.

KOMAREK, L. (1999): Theory and Empirics of Exchange Rate of a Transition Economy, Technical University, Ostrava (PhD. Thesis), [in Czech].

KOTLAN, V. - MACHACEK, M. (2000): Is EMU Endangered Specie? Regional Impacts of Single Monetary Policy, *Finance a uver*, 50, 2000, No.7-8, pp.386-405, [in Czech].

KOTLAN, V. - MACHACEK, M. (2001): EMU and Asymmetric shocks: A Survey of Adaptation and Insurance Mechanisms, *Finance a uver*, 51, 2001, no.10, pp. 514-527, [in Czech].

KRUGMAN, P. (1993): Lessons of Massachusetts for EMU, *In: Torres,G. - Giavazzi, F.: Adjustment and Growth in European Monetary Union.* Cambridge University Press, 1993, 241-261.

MASSON, P. - PATILLO, C. (2001): Monetary Union in West Africa (ECOWAS): Is It Desirable and How Could It Be Achieved?", *IMF Occasional Paper*, No. 204.

MC KINNON, R. (1963): Theory of Optimum Currency Area, *American Economic Review*, 4, September, pp. 717-725.

MC KINNON, R. (2000): Mundell, the Euro and Optimum Currency Areas, *Journal of Policy Modeling,* 22 (3), pp. 311-324.

MINFORD, P. (1993): Discussion, *In: Torres, G. - Giavazzi, F.: Adjustment and Growth in European Monetary Union,* Cambridge University Press, 1993, pp. 235-239.

MKENDA, B. (2001): Is East Africa an optimal currency area?, *Göteborg University Department of Economics Working Paper*, No. 41, April.

MUNDELL, R. (1961): A Theory of Optimum Currency Areas, *American Economic Review,* 51, pp. 657-665.

MUNDELL, R. (1973a): Uncommon Arguments for Common Currencies, In: *Johnson, H. G. – Swoboda, A. K: The Economics of Common Currencies*, Allen and Unwin, pp.114-132.

MUNDELL, R. (1973b): A Plan for a European Currency, *In: Johnson, H. G. – Swoboda, A. K.: The Economics of Common Currencies*, Allen and Unwin, pp.143-172.

MUNDELL, R. (1997): Updating the Agenda for Monetary Union, In: *Blejer, M.I. - Frenkel, J.A. - Leiderman, L. - Razin,A. (eds.): Optimum Currency Areas: New Analytical and Policy Developments*, IMF, pp. 29-48.

MUNDELL, R. (2000): Currency Areas, Volatility and Intervention, *Journal of Policy Modeling,* 22 (3), pp. 281-299.

NATIONAL BANK OF SLOVAKIA (2001): Open Questions on Monetary Integration, http://www.nbs.sk/BIATEC/MONIN.PDF.

OBSTFELD, M. - PERRI, G. (1998): Asymmetric Shocks: Regional Non Adjustment and Policy, *Economic Policy*, No.26, pp. 205-259.

PRE-ACESSION ECONOMIC PROGRAMME, THE CZECH REPUBLIC (2001), www.mfcr.cz.

RICCI, L. A. (1997): A Model of an Optimum Currency Area, *IMF Working Paper* WP/97/76. September 1961, Volume LI, pp. 657-665.

RODRICK, D. (2000): Comments on Frankel and Rose, Estimating the Effects of Currency Unions on Trade and Output, http://ksghome.harvard.edu/~.drodrik.academic.ksg/shortpieces.html.

SCHELKE, W. (2001): The Optimum Currency Area Approach to European Monetary Integration: Framework of Debate or Dead End*?, South Bank European Papers* 02/2001.

SCHWEICKERT, R. (2001): Assessing the Advantages of EMU-Enlargement for the EU and the Accession Countries: A Comparative Indicator Approach, *Kiel Working Paper* No.1080.

SINN, H.W - FEIST, H. (1997): Eurowinners and Eurolosers: The Distribution of Seignorage Wealth in EMU, *European Journal of Political Economy*, Vol.13, 1997, pp. 665-689.

SULC, Z. (1993): On Some Theoretical Questions of Transition, *Politicka ekonomie*, XLI, no. 3., [in Czech].

WILLETT, T. (2001): The OCA approach to Exchange Rate Regimes: A Perspective on Recent Developments, *Claremont Graduate University mimeo.*

WILLETT, T., WIHLBORG, C. (1999): The Relevance of the Optimum Currency Area Approach for Exchange Rate Policies in Emerging Market Economies, *In: Sweeney, R. J. - Wihlborg, C. - Willett, T.D. (eds.): Exchange Rate Policies for Emerging Market Economies*, Westview Press, pp.61-79.

YAM, J. (1999): Causes of and solutions to he recent financial turmoil in the Asian region, *Hong Kong Monetary Authority Quarterly Bulletin*, No. 18, February, pp. 52-60.