

European Monetary Union, Convergence and Sustainability.

A Fresh Look at Optimum Currency Area Theory.

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With respect to European Monetary Union (EMU) the question of sustainability is quite simple: Will it last? As far as the Treaty on European Union is concerned, the single currency will be forever. In the public debate Eurosceptic warnings about impending disaster are not infrequent, but few (Lascelles, 1997) have spelled out, how EMU could become undone. Others, like the Bundesbank (Tietmeyer, 1995), have insisted that "ultimately a monetary union is an undissolvable community of solidarity" and this requires that only countries with a sufficient degree of convergence ought to join. A large body of the economic literature on EMU has been based on cost-benefit evaluations of the desirability of a single currency and under what conditions a country might wish to participate. Little has been written under what circumstances a country may wish to leave¹. However, if EMU is meant to last, it might be worthwhile to consider the case of failure in order to avoid it.

The decision to join a Monetary Union is typically addressed in terms of Optimum Currency Area (OCA) models which focus on static, steady-state alternatives. From this point of view, a country should opt for the Euro if the expected benefits of currency unification exceed its costs or disadvantages. Otherwise it should stay out. However, if the net benefits are not static, the

logic of this argument must be inverted: If the costs from being a member of the currency union were to increase beyond the perceived advantages, a country should wish to leave. Some amount of inertia would be provided by the transitional changeover cost of moving back to a national currency, but if the total balance of pros and cons is narrow and uncertain, membership in EMU could become volatile. An example for unstable participation in European institutional arrangements is monetary co-operation in the 1970s: between 1972 and 1978 there were 12 withdrawals and rejoinders to the Basle Agreement, known as "the snake" (Collignon et al., 1994). This might not qualify as a reference for EMU, given that the degree of institutional commitment between participants was low and cannot be compared with the later European Monetary System (EMS), let alone EMU. But from the perspective of OCA-analysis one would have to explain why the net balance of advantages from EMU would be more stable.

In what follows, I will first take a fresh look at the factors determining costs and benefits of a single currency and then assess their potential volatility. Based on this we can finally work out some criteria for a sustainable EMU.

1. The optimum currency area: static net benefits from a single currency

Commonly it is argued that the benefits of a single currency are derived from its use over a wider area, while the costs are related to the loss of the exchange rate in stabilisation policies. The larger use of a common currency provides three distinct advantages: a reduction in

¹ An exception is Goodhart, 1995.

transaction costs, welfare gains from more efficient use of reserve assets and a reduction of exchange risk. The assessment of costs depends on the structure and flexibility of the economy, the efficiency of exchange-rate variability as an adjustment tool and the nature of potential shocks.

The benefits

On the benefit side we observe, *first* of all, gains from reduced transaction costs. It is clear that abolishing the costs of exchange from one currency to another eliminates inefficiencies and distortions in the single market. These costs are not negligible. The European Commission (CEC 1990) has estimated the total transaction cost savings from a single currency at 0,2 - 0,5% of EU-GDP per year. This was a rather low, although realistic, estimate especially when compared with some estimates for the stabilisation benefits of independent currencies (Gosh and Wolf, 1994) and keeping in mind the benchmark of a stable EMS to which the single currency was then compared. Others have calculated the foreign exchange management cost amounted to 1% of EU-GDP per annum between 1986-95, out of which 0,8% could be saved by a single currency (Dumke, Hermann, Juchems and Sherman, 1997). However, aggregate figures do not reflect the barriers to trade which result from the high costs of cross-border payments. The share of cross-border payments in the total depends on the degree of integration, i.e. the share of intra-community trade. It varies in Europe from a low of 0,5% in Germany to a high of 10% in Greece (CEPS, 1994). Costs also vary between wholesale and retail transactions. Since the average charges of transferring an amount of 100 ECU are 16% of the principal in the EU, coming down to 0,4% for an amount of 10,000 ECU, only large-value payments are highly efficient and cost-competitive. Consequently, without a single

currency making cross-border payments into a different currency area can be compared to a distortionary tax in the single market. They are discriminating against small transactions and prevent fully integrated consumer markets. They reduce welfare unproportionally for small countries. A single currency, although not automatically eliminating all cross-border payment charges, will wipe out bid-offer spreads and improve payment technology. Therefore a single currency causes a clear gain from greater market efficiency. The marginal utility of extending the size of the currency area is larger for small countries with a high degree of integration, but it is positive for all. Consequently it is also diminishing with the size of the currency area. In a similar vein, a single currency will increase market transparency and this translates into a benefit by reducing the cost of information gathering. To summarise, this first group of advantages resulting from the reduction of transaction costs are related positively to the size of the union and the degree of integration of the participating countries, although there are diminishing returns to scale.

Secondly, a large currency area has liquidity advantages over a small zone. A single European currency will immediately become the second most important international currency for transaction purposes (Hartmann, 1996). It will also increase the size of financial markets: for example the Euro area will have the second largest bond market in the world. Even if only a small core group of six countries formed EMU at first, it would amount to half the size of the dollar-bond market well in excess of the Japanese market. Other markets, including the stock markets will benefit from overcoming present-day segmentation. The overall effect will be better liquidity and price efficiency. This gives the single currency a liquidity value that increases with the size of the area and exceeds the transactional benefits related to the internal

degree of integration. As a consequence, domestic users will benefit from lower financing costs. Furthermore, exporters and importers with the rest of the world will be able to invoice and settle in a currency which can be bought at low transaction costs in the foreign-exchange market. It will also allow economies in holding foreign-exchange reserves by companies, banks and central banks as is well known from inventory theory (Artis, 1994). In addition, an international currency yields seignorage revenue when the Euro is held by non-EU-members. On a political level, a potential competitor to the US dollar may induce co-operation and greater macroeconomic stability between leading economies in the world which would reduce potential risk premia (Collignon, 1997). All these are benefits that come with the depth of financial markets and therefore the overall size of EMU², although we would again expect diminishing returns to scale.

However, as McKinnon (1963) has emphasised, the liquidity value of a currency depends on its internal and external stability. The larger a currency area, the more important becomes price stability in order to give money liquidity-value in the eyes of the inhabitants. A small country can maintain this value by pegging it to an outside currency, i.e. by stabilising the exchange rate to a currency with internal stability. Therefore, provided the purchasing power of the single currency is maintained, and this is the "primary objective" of EMU according to art. 2, 3a and 105 (1) of the Treaty on European Union (TEU), the benefits from Monetary Union will increase with size. In contrast, if price stability is not maintained, this would impose a loss and reduce the (net) benefits. We will deal with this argument in the next section.

² For a comprehensive assessment see Funke and Kennedy, 1997

Thirdly, a single currency abolishes by definition exchange risk within the single market and this improves allocative efficiency of corporate locations. Removing exchange-rate uncertainty will also reduce risk premia in real interest rates of countries with less than perfect credibility in their exchange-rate peg to the DM. For the Union as a whole, this should improve the macroeconomic policy-mix. The consequential reduction in risk and uncertainty in the single market will increase investment and growth (Collignon, 1997). To the degree that this development also raises investment in human capital, a monetary union would lift the permanent growth rate (Mankiw, Romer and Weil, 1992). In the long run this advantage should therefore dominate all other considerations, although in the short run it might be overshadowed by stabilisation issues. Empirical studies on the impact of exchange-rate volatility are ambivalent. Early studies on the correlation of exchange risk and foreign trade were not conclusive, possibly because they used short-term volatility indicators although companies can hedge this risk. More recent studies using medium-term volatility seem to detect the expected link. Studies on the impact on direct foreign investment also do not find a negative correlation with volatility, but again this might be biased by DFI itself fulfilling a hedging function (Molle and Morsink, 1990). The negative impact of exchange rate volatility on investment and employment, however, may be more evident. According to some studies (Gros, 1996; Belke and Gros, 1997) a 1%-point increase in the standard deviation of monthly exchange rate variations reduces investment by 4 to 5% in Germany and employment by 0,6% in the following year.

The advantages from EMU increase with the size of the currency area and the degree of integration between participating countries, although not in a linear fashion but rather with

diminishing returns to scale.³ From an individual (*i*) country's point of view, the benefits are a function of its own degree of openness (*m*) and of the size (*S*) of the monetary union to be joined:

$$(1) \quad B_i = B(S, m_i) \quad , \quad B_s > 0, B_m > 0 \quad , \quad B_{ss} < 0$$

As proxies for size we may take GDP and for the degree of integration the import share from other EU-member countries (see table 1). The degree of external openness is an indicator for the benefit derived from the international role of the Euro. Given that small European countries are correlated with high degrees of openness, they are likely to be more favourably inclined to join EMU than large countries. Inversely, large countries may be less sensitive to arguments about advantages. Thus, all should have an interest to make EMU a large currency area, unless the size has an impact on the potential disadvantages.

The costs

On the cost side, arguments focus on the real costs imposed on a country's economy which may result from giving up the option of devaluing its currency if it is hit by a shock. This is reflected in the optimum currency area literature since Mundell's (1961) path-breaking article. A currency area is considered optimal if it does not increase its members' vulnerability to real shocks or their ability to deal with them (Kenen, 1969 und Kenen, 1995). The OCA literature has emphasised that if the shocks are mainly idiosyncratic or asymmetric, then the case for a single currency is weakened as it may be useful to alter the exchange rate for stabilisation

³ Textbook economics on EMU usually show benefits from a monetary union as a rising linear function of the degree of openness. See e.g. de Grauwe 1992, Meltzer 1997.

purposes. The asymmetry can be due to shocks (impulses) or economic structures responses (Buiter, 1997).

The cost of not having-exchange rate flexibility available might depend on the size and nature of the shocks, including their persistence. If they are large, real costs will be high. Structures matter with respect to factor and product markets. In particular, if labour is mobile, a negative shock could be compensated by regional labour migration which would help to re-establish regional full employment, although at a lower level (Mundell, 1961).

Alternatively, movements of goods can substitute for the mobility of labour (and capital) in correcting demand or supply imbalances. In an open economy with a high degree of interdependence this fact reduces the usefulness of the exchange rate as a shock absorber. If the import ratio to GDP is high, a devaluation translates into price increases and if workers resist real wage reductions, nominal exchange-rate variability ceases to be an adjustment tool. Instead, exchange risk and uncertainty increases with negative consequences for investment and growth. If production structures are highly specialised the same effect would take place (Crawford, 1996).

An abundance of studies have tried to assess the empirical size and nature of shocks and asymmetries in Europe and elsewhere.⁴ It appears from the literature that not all shocks would require exchange-rate flexibility. The negative consequences resulting from financial shocks

would better be held in check by fixed rates. The same is true for demand shocks originating in monetary and fiscal policies - provided EMU remains an area with reasonably stable prices. Persistent real shocks, on the other side, would benefit from exchange-rate adjustments. However, the frequency and probability of such shocks is fairly low in Europe (Ochel, 1997). Knowledge about the nature of shocks does help to assess the potential for losses from EMU, provided the variation of nominal exchange rates is indeed an adjustment tool. This, however, depends on a specific set of conditions.

The condition for being able to achieve a real devaluation by changing the nominal exchange rate can be derived from the following equations:

$$(2) \quad p = (1 - m) p^d + m (p^* + e)$$

$$(3) \quad p^d = w - l + z$$

$$(4) \quad q = e + p^* - p^d$$

p_t^d indicates the GDP deflator (the "domestic" price level), p_t is the consumer price index - a weighted average of domestic and imported goods prices. w , l , z are nominal wages, productivity and the mark-up. All these variables are in log form. m is the expenditure share on foreign-produced goods, i.e. an indicator of the degree of openness. By inserting (3) in (2) we obtain the real wage

$$(5) \quad \bar{w} = w - p = l - z - mq$$

⁴ The classic references are Melitz, 1991; de Grauwe and Vanhaverbeke, 1991; Masson and Taylor, 1992; Eichengreen, 1990a,b; Bayoumi and Eichengreen, 1992; Bayoumi, 1995; von Hagen and Hammond, 1995 and Muet, 1995

Thus, a real devaluation (a rise in q_t) is equivalent to a fall in real wages. The question is therefore, if a nominal devaluation will be able to have this effect, i.e. if $d\bar{w}/de < 0$.

From the definition of the real wage ($\bar{w} = w - p$) we obtain:

$$(6) \quad \frac{d\bar{w}}{de} = \frac{\eta_w}{\eta_p} \cdot \frac{\eta_p}{\eta_e} - \frac{\eta_p}{\eta_e} = \left(\frac{\eta_w}{\eta_p} - 1 \right) \cdot \frac{\eta_p}{\eta_e} = \left(\frac{\eta_w}{\eta_p} - 1 \right) \cdot m$$

The short-term effect of a nominal devaluation will depend on the degree of openness and on the expression for real wage resistance which is written in brackets. $\frac{\eta_w}{\eta_p}$ is the wage-price elasticity by which nominal wages respond to inflation. With unit elasticity, i.e. wage indexation of 100%, the term in brackets is zero and the nominal exchange rate variation has no real effect.⁵ In this case we have real wage rigidity and (upward) nominal wage flexibility.⁶ However, the exchange rate variation always has a nominal short term effect: it raises prices according to (2) by $\eta_p / \eta_e = m$. Thus, the larger the degree of openness, the larger is the welfare loss resulting from inflation in response to the nominal exchange rate depreciation - ceteris paribus.

The alternative case of high or perfect nominal wage rigidity $\frac{\eta_w}{\eta_p} \rightarrow 0$ makes the flexible exchange rate an efficient adjustment tool, particularly for very open countries. If the nominal wage is perfectly rigid, the real wage will fall at the rate at which prices increase due to the

⁵ Under the neutrality of money hypothesis η_w / η_p would always converge to one. Although this might be true in the long run, the use of the exchange rate as an adjustment tool implies that nominal wage elasticity is less than 1 in the short term.

⁶ The case of « sticky wages », i.e. the absence of downward nominal wage flexibility, is of greater relevance for countries with appreciating currencies. Given that our analysis focuses on negative output shocks we can neglect this phenomenon here.

devaluation, depending on the degree of openness: $\frac{d\bar{w}}{de} = -\frac{\eta_p}{\eta_e} = -m$. In this case, the devaluation has the real effect of stabilising output and the nominal effect of imported inflation. Finally, if wages were flexible downward $\left(\frac{\eta_w}{\eta_p} < 0\right)$ the adjustment process would benefit from accommodating negative wage behaviour. Thus we can conclude that the existence of nominal rigidities is a sufficient condition for making the exchange rate an efficient adjustment tool.

New classical economics has emphasised that nominal rigidities are hardly compatible with rational behaviour of economic agents in the long-run, although this does not exclude short-term effects from policy actions (McCallum, 1979). However, more recently new Keynesian Economics have produced models in which optimising agents choose to create nominal rigidities (Ball, Mankiw and Romer, 1988). Thus, it is no longer necessary to simply assume nominal rigidities as in the early Keynesian models of the 1970s, but one can also provide sound microeconomic foundations.

Empirical studies for Europe seem to conclude that η_w/η_p is between 0 and 1. Different estimates indicate values of 0.3 for Germany (1977-1990) and 0.07 (1985-1991) to 0.6 (1979-1984) for France, 0.46 (1972-1990) for Spain, 0.58 and 0.48 for Belgium and the Netherlands (1971-1990).⁷ Muet (1997) has estimated coefficients of 0.68 and 0.70 for the EU15 between 1963-94. Price and wage behaviour after the 1992/93 currency crisis in the EMS indicates that nominal rigidities have increased in line with higher price stability in recent years. Thus, we may safely assume that there is a positive adjustment effect, i.e. that $\eta_w/\eta_p - 1 < 0$, when nominal

exchange rates are altered in Europe. Hence, by giving up the exchange rate tool, a country would, indeed, incur a cost.

However, this variable-rate-benefit comes at the price of higher inflation. If the authorities of a potential member country are totally committed to price stability (at least at the level expected to prevail under monetary union), then keeping flexible exchange rates does not provide a gain, nor giving them up would constitute a loss. If, however, they are concerned with both price stability and employment, then the utility of the exchange rate instrument can be described by the authorities' objective function of the form:⁸

$$(7) \quad -\left[\frac{A}{2}(y^* - y)^2 + \frac{dp^2}{2}\right], \quad y^* - y \geq 0$$

where y^* and y are desired and actual output levels and dp is the rate of inflation. A is a positive parameter reflecting the authorities relative preference for output and price stability.

The higher A , the greater is their concern for keeping output at the desired level. Because of (6) we know that there is a short-run trade-off between output and inflation:

$$(8) \quad y - y_s = a(dp - dp^e), \quad \alpha > 0$$

a is the slope of the Lucas supply curve. It would equal zero with a vertical (long term) Phillips curve and be high for countries with monetary stability (Lucas, 1973). y_s is the output level subsequent to the shock, i.e. the level that obtains in the absence of a devaluation. dp^e is the expected rate of inflation (from (2)), provided foreign prices remain constant ($dp^* = 0$):

$$dp^e = (1-m) E(dp^d) + mE(de)$$

⁷ See different chapters in P. de Grauwe, S. Micossi, G. Tullio (1996)

We will also assume that domestic prices remain constant in the short run ($dw - da + dz = 0$) so that we get

$$(8a) \quad y - y_s = am[de - E(de)]$$

Substituting (8a) into (7), the objective of the authorities becomes:

$$(7a) \quad \max_{de} - \left\{ \frac{A}{2} [y^* - y_s - am(de - E(de))]^2 + \frac{de^2}{2} \right\}$$

The first order condition for the maximisation problem in (7a) implies:

$$(9) \quad de = \frac{A 2m}{1 + A a^2 m^2} (y^* - y_s) + \frac{A a^2 m^2}{1 + A a^2 m^2} E(de)$$

Thus, given that the output objective is higher than the post-shock level (i.e. $(y^* > y_s)$), the authorities will devalue, even if this measure is not expected ($E(de)=0$). However, under rational expectations we have $E(de)=de$ and we obtain the equilibrium rate of devaluation:

$$(9a) \quad de = A a m (y^* - y_s) > 0.$$

Thus, the utility of the exchange rate as a potential adjustment instrument depends on the preferences of the authorities for output stabilisation over price stability ($A > 0$), the short run effect of the devaluation on output ($am > 0$) and the size of the output shock ($y^* - y_s$). At a given wage/price effect on output (a), the total cost of joining EMU is higher the larger the concern for stable output (higher A) and the higher the degree of openness (m), i.e. the smaller a country. Yet, given that this implies $de > 0$ in the steady state⁹, i.e. a permanent rate of depreciation, such constellation will cause domestic prices to rise as well, unless nominal rigidities are perfect. However, because a is normally higher for countries with price

⁸ We follow Cukierman, 1994

⁹ $de > 0$ is a policy rule and not a policy action. See McCallum, 1979.

stability,¹⁰ there is a negative trade-off between A and a at least in the medium to long run. This will erode the usefulness of the devaluation option and create a depreciation/inflation bias. We may call this tendency the "soft currency bias". Therefore, the marginal cost of giving up the exchange rate as an adjustment tool may be initially high, but is diminishing with a rising preference for output stability. Over time the gains from joining the monetary union would increase, provided domestic price stability within the union is assured. Finally, given that a larger m also implies a larger inflation impact (because of (6)), A should normally be negatively correlated with m . As McKinnon (1963) pointed out, this trade-off should prevent the cost of abandoning the exchange rate from growing in a linear fashion and a diminishing marginal cost curve in relation to the degree of openness is to be expected¹¹.

We can now summarise the cost of abandoning the exchange rate instrument in monetary union as

$$(10) \quad C_i = c(A_i, m_i), \quad C_A > 0, \quad C_m > 0, \quad C_{AA} < 0, \quad C_{mm} < 0, \quad C_{Am} < 0.$$

Provided the Phillips curve is not vertical, joining a monetary union can impose real costs to a country, if its authorities care for more than only price stability. But, the benefits of a devaluation come at the price of higher inflation. Only the net costs are relevant for the decision of joining or leaving a currency area. *Ceteris paribus*, a persistent preference for output stabilisation over price stabilisation will create a "soft currency bias" (accelerating rates of devaluation and inflation) which sooner or later would turn the cost of joining a low-

¹⁰ For a discussion see Lucas, 1973 and Ball, Mankiw, Romer, 1988.

¹¹ In discussions with the author, Peter Bofinger has pointed out that it is wrong to assume that monetary authorities have stable preferences for inflation (or output stability) like consumers have preferences for spaghetti. Their policy decisions depend on time preferences. This is true. However, our analysis does not

inflation monetary union into a benefit. Thus, the long run, steady-state benefits from EMU depend on the commitment to price stability. The short-run decision to join will, however, depend on maximising net benefits by forming an optimal currency area.

Net benefits

The net benefits for country i from joining EMU are

$$(11) \quad Nb_i = NB(S, A_i, m_i) = B(S, m_i) - C(A_i, m_i)$$

The assessment of net advantages depends on the variables of the degree of openness, the size of the envisaged currency union and the degree of inflation-aversness. Of these m_i is given by the economic structure of a country (large for small countries), A by the structure of political preferences and the S by the selection process in art. 109j of the TEU. Equation (11) brings to light an interesting trade-off between the optimal size of EMU and its political orientation. The total differential of (11) yields

$$(11a) \quad dNb_i = B_s dS + (B_m - C_m) dm_i - C_A dA_i$$

The net benefit from a monetary union for country i is maximised when $dNb_i = 0$.¹² Whether such a maximum is attained or not depends on the policy variables dS , dm_i and dA_i . The size of the currency area can be increased by including an additional member (j) or by economic growth. Although we have seen that reducing exchange risk will improve the permanent

assume a stable A . It changes over time and structural factors in the economy. But with a given time horizon, our argument remains valid.

¹² In fact, if we assume m_i to remain stable, the second order condition for (11) to be a maximum is:

$$B_{ss} dS^2 - 2B_{sA} dA dS - C_{AA} dA^2 < 0$$

Provided that the returns from larger size or larger concern about output stability are diminishing ($B_{ss}, C_{AA} < 0$), a maximum is always guaranteed if the cross-partial derivative $B_{SA} = C_{AS} \leq 0$. However, this latter condition is exactly the case if adding one member reduces (or at least leaves unaltered) the cost of giving up the

growth rate and therefore have a positive effect on the net benefits in the long run, we will abstract from this aspect here and focus on the short-term effects of enlarging it by one additional country j (hence: $dS = dS_j$). The impact from increasing economic integration (m_i) depends on the balance between marginal benefits from reduced transaction costs, liquidity advantages and the elimination of exchange risk minus the marginal costs of giving up the exchange rate. As long as $B_m > C_m$, a growing interdependence in the single market would raise net benefits. In view of our previous analysis of benefits and costs, and given that the long-run Phillips curve is vertical, this condition should in general hold. Observers expect the degree of integration to increase with a single currency, so that net benefits would grow over the long run. In the short run, however, we may take m_i as given and set $dm_i = 0$ ¹³. That leaves us with the variations of political preferences (dA_i). We will first deal with once-for-all shifts of preferences in a comparative-static approach; in the next section we will incorporate reversible and stockastic preference shifts. Provided everything else remains unaltered, a larger preference for output stabilisation over price stability will reduce net benefits in the short run. Over the long run an increase in A_i will, of course, reduce α , thereby eroding the utility of a devaluation and consequently increase the long-term benefits of the single currency.¹⁴ From this analysis we derive a first proposition: *if the sustainability of EMU depends on the balance*

exchange rate tool because it reinforces the price stability preference of the union. We will call this a Pareto optimising currency area.

¹³ One notable exception relates to the selection of union members. If a large country with low m joins small countries with high m 's, this affects their average degree of integration, which might fall. However, for each individual country it will increase. This is relevant in the hypothetical case of a large country withdrawing from the union ($dS < 0$) which would increase the degree of integration ($dm > 0$) for the remaining countries.

¹⁴ Obviously, this argument is based on the assumption of domestic price stability in the currency area, i.e. $dp^d = 0$. If imported inflation accelerates domestic inflation, then the advantages of the exchange rate tool are even more short lived.

*of net benefits, it is the stability of the purchasing power of the new currency which will be decisive for the union's success.*¹⁵

Two sorts of OCA

However, everything else will not necessarily remain unaltered. In particular, there may be a link between the size of the currency area and its political preferences. In principle, after the start of EMU the European Central Bank takes over responsibility with the "primary objective of maintaining price stability" (art. 2, 3a, and 105 TEU). Thus A will be close to zero and the cost of giving up the exchange rate will be minimal. But if individual countries have higher preferences for output stabilisation, joining EMU could imply a short-term shift in preferences, reducing the union's A and thereby increasing the short-term net benefits from the single currency. Alternatively, if country (i) had a higher preference for price stability than the ECB, joining EMU could lower its welfare under certain conditions.

On the other hand, governments may have preferences different from central banks (Rogoff, 1985; Cukierman, 1994; Eijffinger, 1997). If they decide to realise these preferences they can only choose between being "in" or "out" of the common currency - given that the central bank is politically independent.¹⁶ This could make the decision to join or leave EMU a potentially volatile political process. There exists, however, a different possibility: although politically independent, the members of the Governing Council of the ESCB may culturally reflect the

¹⁵ In reality what matters is stability relative to the value of alternative forms of liquidity.

¹⁶ As the example of the French insistence on employment objectives shows, there are also other ways of establishing a safety value than opting-out of EMU (coordination of structural, including labour market, policies).

political preferences of their countries of origin.¹⁷ This could lead to a higher A for the union compared to the individual preferences in some individual country. Consequently, admitting country j with the stability commitment $A_j > A_i$ into EMU could lower the net benefit for country i . This is why the convergence criteria in the Maastricht Treaty have gained such a political prominence: convergence to monetary stability (the inflation, interest and exchange rate criteria) without "excessive deficits" reflect a convergence in A -preferences. However, equation (11a) shows that there is a potential trade-off between size and "philosophical convergence".

Formally, we wish to evaluate the impact of admitting country j on the net benefits of country i . Dividing (11a) by dS_j we obtain:

$$(11b) \quad \frac{dNB_i}{dS_j} = B_s - C_A \frac{dA_i}{dS_j} + (B_m - C_m) \frac{dm_i}{dS_j}$$

If we assume the degree of integration to remain constant ($dm_i = 0$), the impact of a larger currency area depends essentially on the preference shift dA_i/dS_j . If preference convergence has been perfect, dA_i/dS_j will be zero and country i benefits unambiguously from j joining the currency area ($B_s > 0$). If the stability culture in country j is even higher than in i , net benefits are even greater ($dA_i/dS_j < 0$). If, however, convergence is imperfect and policy preferences are changed for country i because country j has become a member of EMU, then i 's net benefit would be lower, unless this disadvantage is compensated by the gains from a larger currency area. The condition for the net benefits of i not to change when country j is added would require:

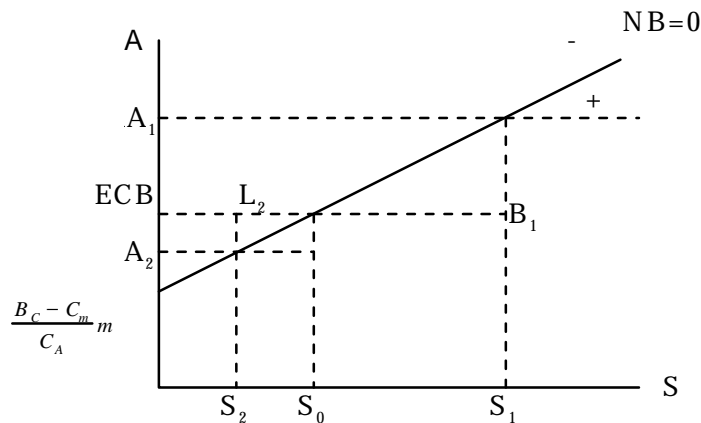
¹⁷ The idea that national central bank governors might implement orders from their governments, despite

$$(11c) \frac{dA_i}{dS_j} = \frac{B_S}{C_A}$$

Thus the ratio of the marginal benefits from size to the marginal costs of abandoning the exchange rate adjustment tool determines the margins of policy preference diversity in EMU. Consequently, if B_S is higher for small countries than for large countries, the large country would insist on most restrictive interpretation of admission criteria. On the other hand, the higher the preference convergence between countries, the larger the margins of interpretation for accepting new members. Yet, if the soft currency bias ultimately reduces C_A close to zero, then the long-term perspectives of EMU sustainability are higher than expected over the short-term.

The trade-off between size of the currency area and policy preferences is illustrated in figure 1.

formal independence, has been rejected by Sievert (1997) who referred to peer-pressure within the central bank's Governing Council as the mechanism by which philosophical convergence will take place.

Figure 1: Net benefit of a single currency for country *i*

The $NB=0$ -line shows the locus of combinations of A and S at which net benefits are zero¹⁸. Above the line, net benefits are negative and the country i would prefer not to join or to leave the monetary union. Below the line, net benefits are positive. S_0 indicates the size of a currency area where net benefits are equal to zero given the stability preferences of the union. A_1 reflects the loose pre-EMU stability commitment which would require a large union to compensate for the loss of stability by the economies of scale from a big market if preferences would not change. Yet, if this country's preferences converged to the union standard, its net benefits will be positive at B_1 . The opposite applies to the stability prone country with preference A_2 . Unless it accepts less price stability, it will incur losses (L_2) at the existing size. However, by increasing the union size to S_0 , the disadvantages from a reduced price stability commitment (higher A) are compensated by the benefits of a larger currency area¹⁹. The slope

¹⁸ For clarity, the figure was drawn with the assumption of fixed marginal cost and benefits. The $NB=0$ -line is then: $A = \frac{B_S}{C_A} S + \frac{(B_m - C_m)}{C_A} m$.

¹⁹ German obsession with the question: « Will the euro be as hard as the DM » is therefore short-sighted - it overlooks the benefits from size.

of the NB=0-line is $\frac{B_S}{C_A}$.²⁰ Therefore, any additional member j which increases A_i by less than

$\frac{B_S}{C_A}$ creates a net benefit for country i .

From our previous discussion we know that B_S is low for large countries and C_A is high for countries with traditionally high price stability. Thus, the inflation criterion in the Maastricht Treaty must be decisive for the selection of EMU members. Given that in Europe the largest country has the highest reputation for price stability, it is not surprising that it will set the terms for the selection of EMU-participants.

Our discussion has so far focused on the net benefit for one isolated country i . This may be relevant for the decision to join or leave a currency area, but it does not determine what an optimum currency area is. In fact, we can distinguish two concepts of optima. A Benthamite OCA maximises the aggregate net benefits of all member countries:

$$\text{BOCA: } \max_{(i=0,1,2\dots)} \Sigma NB_i$$

What matters here is the sum of all benefits, but this implies the possibility that adding country j may reduce the net benefit in some other country i , although this loss is more than compensated by the gain of j . In other words, a Benthamite optimum currency area requires altruistic behaviour by some countries.²¹ Basically, such a BOCA implies a large monetary union where anyone wishing to join can, as long as the externalised losses for others do not

²⁰ Changes in the degree of integration and openness (m) are considered as a shift parameter.

²¹ This does not exclude some reward for such behaviour, either in terms of loyalty or on the level of other policy considerations - such as national security.

exceed the benefits of the participating country. The selection criteria of such an unconstrained optimum currency area can be summarised by a statement, like: « the only real qualification for joining a monetary union is to want to do so and to be willing to accept the rules of the club. » (Masson, 1996).

Alternatively, a Pareto-optimal currency area²² maximises the aggregate net benefits of its members subject to the condition that no member's net benefit is reduced by accepting an additional participant.

$$\text{POCA: } \max W = W(NB_i, NB_j)$$

subsequent to the constraint

$$(11c') \quad \frac{dA_i}{dS_j} \leq \left(\frac{B_S}{C_A} \right)_i$$

We can now use this distinction as a criterion for the sustainability of a unified currency area. The argument is that monetary union will last as long as net benefits can be reasonably expected to be positive. This implies that what matters are steady state benefits and not, as we will see in the next section, short-term welfare benefits. A strong definition of sustainability requires that no entrant will ever leave the union so that expected net benefits are always positive for all members. A weaker definition requests that the currency area continues as an effective grouping, even if there could occasionally occur some withdrawals. Thus, apriori strong sustainability seems more compatible with a POCA and weak sustainability with a BOCA.

A Pareto-optimal currency area is likely to be smaller than the Benthamite OCA. *Ceteris paribus*, it would be politically more robust, because the question of "paying a price for the benefit of others" would not be raised and altruistic behaviour would not be required. Therefore, a POCA is likely to be politically more sustainable than a BOCA.²³ This analysis shows that the assessment of costs and gains from a single currency is an eminently political question. There is no hard evidence. There are good reasons to believe that if all participating member countries share the same commitment to price stability, EMU is going to yield significant net benefits. However, politics is to remain the Archilles-heel. For if the political consensus in one country changed significantly compared to the community consensus, its perceived net benefits could turn negative and that country might seek to leave the union. This, at least, must be the conclusion from our OCA-theory. A serious analysis must look at the marginal benefits and costs that each country would obtain for itself and contribute to the welfare of the others. Clearly this implies that a greater degree of convergence in policy views and in economic performance or structures would increase the net balance of benefits. But perfect convergence is not necessary to form an optimal currency area, not even in its Pareto-form.

One objection to this line of argument makes a distinction between the conditions for the choice of new members and the conditions for the sustainability of the existing group.²⁴ A large country may insist to keep the size of the union small on grounds of concern for price stability. But given that the benefits are then likely to be small as well, it may more easily be tempted to

²² Strictly speaking Pareto-improving currency area.

²³ However, one must not completely discard the consequences for a country j that is rejected on POCA grounds. If such a rejection affected the POCA-countries via m or C_A , it might actually reduce the net benefits from monetary union for its members.

withdraw again. Consequently, the sustainability of the union may be low over time. This argument is valid: If the benefits are low, there is little attraction to stay in EMU, if things turn sour. The disintegration of the currency union between Malaysia and Singapore in the mid 1960s may be an example of this kind. The same is probably also true in the case of Czechoslovakia, where the scale-effect of the currency could yield only very low benefits. As we will see in the next section, if the benefits of EMU are subject to stochastic shocks, a "critical mass of benefits" is required to make a currency union sustainable.

On the other hand, if the government taking the decision to join has different preferences from the Treaty commitment, say because its A is high, then its expected net benefits are low or even negative. It may then prefer to remain outside EMU. This may be the case in the UK or Sweden. Similarly, if a country's political preferences changed significantly in this direction while being a member, our theory would recommend that the country should leave the monetary union. However, as Goodhart (1995) pointed out, the traditional theory of optimum currency areas has relatively little predictive power. For example, it has had little to contribute in explaining why monetary separation has usually followed political disunity in Central and Eastern Europe in the 1990s. This is because in most models size and political preferences are not explicitly included: they rely simply on the degree of integration. By including our policy variable A , we may explain monetary disruption following a profound political crisis. What is, however, still missing is a theory why monetary unions are not more volatile at the margins.

2. Joining or leaving EMU as an investment decision

²⁴ I thank Charles Goodhart for raising this point.

In the last section we defined an optimum currency area by the net benefits it provides to its members in the steady state. We will now look at the consequences of variations in net benefits. We might separate them analytically into a steady-state balance, largely dependent on institutional arrangements and economic fundamentals, and in transitory shocks.

The creation of an OCA is then a function of the short- and long-term dynamics of expected future benefits. This can best be formalised not by viewing the participation in EMU as a simple welfare-maximising operation, but as an investment decision, where investment is defined as the act of incurring an immediate cost in the expectation of future rewards (Dixit and Pindyck, 1994). In this respect, the immediate costs are the transitional costs in moving from one currency to another, while the future rewards are the steady-state net benefits from sharing the single currency. However, investment decisions are taken in an environment of uncertainty. The decision to join or leave a currency union is then characterised by three considerations:

1. Transitional costs, once incurred, are irreversible - they are sunk costs. A country that left a currency area and then returned because the balance of expected benefits has changed, would incur such sunk cost twice.
2. Uncertainty over future rewards. As we have seen, they vary with policy preferences, economic shocks, union size and the degree of integration. In part this explains the large preoccupation with institutional arrangements in the Treaty on European Union (TEU), for the purpose of institutions is to reduce uncertainty. Yet, the structure of the institutional arrangement determines also partly the size of future rewards.

3. Flexibility about the timing of investment decisions, which allows to gather more information about potential rewards. This reduces uncertainty and therefore makes "waiting" a valuable option.

Thus, the choice of participation in EMU becomes a risky decision in an uncertain environment.

By taking into account uncertainty we can borrow from option theory to assess the decision for or against a single currency. With the Maastricht Treaty, EU-member states effectively signed a forward contract for the delivery of a single currency, while the UK and later Denmark took a call option. Therefore, for 13 EU-countries, the decision to join EMU can no longer be viewed as an "option"²⁵ - it is an obligation, although the value of this forward contract may be subject for debate. However, the decision not to honour the commitment, either by not joining or by leaving EMU remains always a possibility, even if a costly one. As Dixit and Pindyck (1994) point out, when a firm is exercising an option to invest, it gets a project in place and an option to abandon. The same is true for the decision to join EMU. The value of this exit option might vary over time, depending on perceived level of benefits and disadvantages and on the volatility of expectations, but also in view of externalities such as the political fall-out resulting from breaking a contract.

Transitory instability in net benefits

²⁵ More precisely, it is a combination of European style put-call option which is equivalent to a forward contract.

Whether EMU will last therefore poses the question, under what circumstances a member-state might exercise its "option of defection" from EMU. A simplistic approach would compare the potential net present value of future benefits of *not* being part of EMU with those of being a member minus the transitory cost of currency disruption resulting from a change. But the uncertainties of the future include the possibility that the temporary disadvantages resulting from EMU (say a negative output shock) might revert. If output shocks are transitory, adjustment through exchange rate variability would translate into persistent price shocks without great benefit from flexible exchange rates at least as long as wages are downward sticky. Yet, the net benefit from a single currency (or a flexible exchange rate) can not be asserted with certainty unless the transitory or persisting nature of a shock is perfectly clear from the beginning. If a country left EMU, as soon as the balance turned negative, it would lose the advantages from the single currency after the situation has improved again. The "critical mass" of net benefits that is required to maintain the expectation of long-term steady state benefits, i.e. to make the currency union sustainable, depends on the factors discussed in the last section, but also on the sunk cost of currency changeover and the variance of benefit shocks.

A similar argument can be made with respect to the political process of disruption. Let us assume that after the start of EMU the collective preference for output stabilisation changes within one country. Elections may have taken place and the new government follows a different "economic philosophy" from the community-wide consensus. For example, it might

prefer 4% inflation over 4% unemployment,²⁶ while the community consensus sets 2% equal to price stability. Under a deterministic OCA-model, the new government might be inclined to leave the monetary union as net benefits turn negative with the new preference order. Exit is particularly likely if the slope of the NB=0-line is flat because the marginal benefit of devaluing is considered to be high and the economies of scale are low (i.e. $\left(\frac{B_S}{C_A} \rightarrow 0\right)$).

In a stochastic model, however, defection is less likely. First of all, if there are some exit costs (sunk costs) involved, they must be deducted from the potential benefits of having a separate currency. This reduces the incentive to leave, for the decision to leave monetary union would require to incur irreversible sunk costs, while the expected net benefits might revert back. Under these circumstances, it is more likely that "exit" will be transformed into "voice", to use Hirschman's (1970) famous model. The new government will complain ("voice") in the hope of improving matters, while continuing as a member country of EMU. This can cause an "integrative crisis" (Hirschman, 1981, p. 283) that impels members to look for some concerted action. As a consequence, the net gains would increase for the "voicing" country and the option value of "exit" would fall. But if this country had abandoned the single currency, it would not only have lost the right to influence the union's decision (which might have some impact on its future development even after quitting), but it would also have abandoned the intangible capital of benefiting from the loyalty among the members of a club. It would be left only with the option of investing again - including the renewed expense of transitory costs if it wished to rejoin. Thus, an optimal investment and exit policy has to price the two options of "exit" and "return" simultaneously.

²⁶ This was a famous formula employed by the German Chancellor H. Schmidt in the 1970s. It proves that even

The "voice"-option is then the most efficient choice to return to positive net benefits.²⁷ The new government can direct its energies to the adoption of whatever reforms it believes are called for by the group as a whole. In addition, the efforts of obtaining gains through the use of "voice" will benefit from the fact that the government can threaten to exercise its exit-option as this would reduce net benefits for all (see equation (11)). But by actually quitting, the dissatisfied government would lose the benefit of having the exit-option. Thus, keeping the exit-option without using it adds to the net gains of being part of a union, if policy preferences vary.²⁸ From the days of de Gaulle's "empty chair" to the British opt-out from the Maastricht Treaty or Germany's hard-nosed poker about the Stability Pact in Dublin 1996, Europe has witnessed the value of an exit-option when bargaining for better political terms of trade.²⁹

Thus, in a stochastic world with sunk costs, uncertainty about the future (which includes the possibility that the causes of dissatisfaction might disappear) would have a stabilising effect on the status quo because they increase the value of the exit option. As we know from option theory, the opportunity cost of the in/out decision must be a significant component in the decision itself. Furthermore, the higher the degree of uncertainty of future benefits, the higher the option value of "waiting", i.e. of not changing the existing currency arrangement.

in a stability-prone country, output considerations are not always absent.

²⁷ Obviously, in the case of *transitory* economic shocks, not even the voice-option is required.

²⁸ Alternatively we may say, the uncertainty about future benefits lowers the value of the expected national currency benefits.

²⁹ However, the UK-opt-out to EMU did not really modify actions by other EU-member states. But this is because the "opt-out" was understood to be in reality a non-participation with an option to join.

By exercising the option to leave, a country incurs costs which need to be taken into account when assessing the cost-benefit balance. These costs relate to the loss of size and possibly economic integration, as discussed in the last section. But they also include the giving up of the exit-option (an option exercised is no longer an "option", but a "fact") and the possibility of influencing the other members of the group. Obviously, these costs are larger, the higher the degree of uncertainty about the future level of net benefits. Consequently, with high uncertainty, the barriers to move to a different currency regime (whether into or out of EMU) are high. High uncertainty includes conservative behaviour, i.e. reluctance to join or to leave a monetary union. This may explain why in some of the larger EU member countries the debate about EMU is so hesitant, for the marginal net benefits derived from the single currency are lower for large countries and uncertainty about the future reduce the the expected value of net benefits. In smaller countries the benefits are more obvious, given that they would benefit from belonging to a currency area of significantly larger size. This analysis implies that for the two countries with an opt-out, the UK and Denmark, the decision to join EMU will be facilitated by a successful realisation of the Euro as this would reduce uncertainty ("seeing is believing").

We may summarise these arguments into our second proposition: *if transitory sunk costs of changing currency are high, a country would be reluctant to change in an uncertain environment, unless the expected net benefits from the new currency are high. The higher the uncertainty, the larger the reluctance to change.*

The long-term evolution of net benefits

A long-term concept of net benefits from monetary union has to take transitory costs in account. The longer EMU lasts, the lower will be the cost of the changeover to the new currency relative to the gains. At a given degree of uncertainty, the sustainability of EMU will depend on the transitory sunk cost of changing currency and on the long-run, steady-state net benefits from the single currency around which rational expectations will oscillate.

First, transitory exit costs arise from the destruction of information about existing monetary units and the cost of learning about and adjusting to the properties of the new currency system (Meltzer, 1997). Some of these are simply the mirror image of the change-over to the Euro, such as designing, printing and delivering new bank notes, changing monetary laws (including the status of the central bank), altering machines, software, payment systems etc. Then there are the not insignificant "menu costs" imposed by new pricing arrangements³⁰, although they could be avoided or reduced by starting the new national currency at par with the Euro. More important, however, may be the institutional costs associated with a withdrawal from EMU. Given that Monetary Union is an essential part of the Treaty on European Union and given that it makes no provisions for retiring from EMU, re-imposing a national currency would imply a breach of Treaty and cause a loss of "loyalty". It is likely that this would happen in a hostile environment. Consequently, other advantages related to being part of the EU, such as free access to the single market, eligibility for structural funds, subsidies from the Common Agricultural Policy and many other features (Artis and Lee, 1994) could be disrupted. This makes the transitory costs of leaving the single currency area much more expensive than those related to joining it. Furthermore, the reduction in size is reducing benefits from large currency

use for all, although normally more for an individual withdrawing country than the rest. Because of this natural asymmetry, EMU has good chances to last, once it has started - provided, of course, the steady state benefits do not deteriorate. Transitory shocks increase the uncertainty and therefore the "option-value of waiting". Therefore they are not a threat to EMU sustainability, but rather a support. On the other hand, this explains also that the dissolution of a currency union should only be expected when profound disturbances and systemic malfunctions have undermined the expected steady state net benefits.

Secondly, because a monetary system is primarily a device for organising information (Goodhart, 1995) we may evaluate the steady state variation of net benefits from EMU from disturbances to monetary information sets, i.e. the internal and external stability of the value of money. If the information or liquidity value of the shared currency diminished permanently this would lead to a "disintegrative crisis". The expected net benefits from EMU would permanently turn negative and members would be better off by leaving. "Voice" would be transformed into "exit". Individual countries would exercise their option to split and the monetary union would dissolve. For this to happen, the expected long-term benefits from a national currency must exceed the transitory exit costs related to the break up. However, given our long list of advantages from size and degree of integration, this would require a serious deterioration in the quality of the currency. Not surprisingly, the latter has frequently occurred when hostilities between regions and/or very high rates of inflation had already undermined the

³⁰ For theoretical proof that small menu costs can have significant impact see Mankiw, 1985, and Akerlof and Yellen, 1985.

information value of the old currency, as can be seen in the split-up of the Austrian-Hungarian Empire, or more recently of the Soviet Union and Yugoslavia.³¹

For the sustainability of EMU, this second feature is ultimately the most important. Only long-term, steady-state characteristics determine the stability of the system and not transitory shocks, whether symmetric or asymmetric. Short-term volatility of shocks and preferences creates uncertainty, and increases the value of the exit option. The cost of giving it up by excising it would therefore also be high ("once you are out, you cannot come back"). Consequently, the lower the volatility of disturbances, the higher will be the need for steady-state advantages from EMU. However, provided that the single currency's value remains stationary over time, low disturbance volatility implies high systematic information stability. In other words, in the long run the benefits from the single currency will be high if price stability is maintained in the union. Therefore, even with variable net benefits our first proposition is confirmed: *Sustainability of the Euro ultimately boils down to the question whether the system of Monetary Union tends to a long term equilibrium with stable prices, or whether there are endogenous tendencies which would disrupt the stability of the monetary information sets.*³²

This proposition is somewhat surprising. It implies that monetary stability is a sufficient condition for making EMU sustainable. By contrast, critics have concentrated on real economy arguments against EMU. The most common are lack of flexibility in labour and product

³¹ The case of Czechoslovakia is less obvious.

³² Sensitivity to this proposition is also reflected in the decision by the German Constitutional Court of October 1993.

markets, low factor mobility, differences in tastes, technology, rates of income growth and domestic institutions (Feldstein, 1992).

As we have seen, flexible exchange rates are no long-term solution to real disturbances. In fact they turn out to be destabilising by creating a "soft currency bias" if they are seen as a tool to achieve output stability.³³ There is, however, a good theoretical argument for our conclusion. If money is neutral, it has no effect on the real economy. The nominal exchange rate is then unsustainable for output stabilisation purposes. But if money is not neutral in the short-term, so that there is a "cost of giving up the exchange rate", then the slope of the short-run trade-off between output and inflation determines the efficiency of monetary policy. Yet, if this slope varies with the mean of inflation, as Ball, Mankiw and Romer (1988) have shown, then the efficiency of monetary policy for output stabilisation purposes is dependent on the central banks' success in maintaining price stability. As a consequence, there is a positive relationship between output and inflation variability (Fischer, 1994). This fact is a double-edged sword: as Walsh (1995) points out, a high commitment to price stability increases the cost of inflation reduction, but it also leads to larger output effects of monetary surprises. This can give rise to the paradox that "both the incentive to inflate and the cost of reducing inflation may increase with greater central bank independence" (Walsh, 1995: p. 33). But it could also mean that the instruments of monetary policy (the exchange and interest rate) are sharper in a low inflation environment, so that output stabilisation becomes easier. EMU may have greater real effects than previous discussions have suggested.³⁴

³³ For a large currency area with high commitment to price stability ($A=0$) this does, of course, not apply.

³⁴ Walsh, 1995. This would also be the conclusion from Ball, Mankiw, Romer, 1988: « our finding that average inflation affects the short-run output-inflation trade-off is important for policy... It is likely that the trade-off

In other words, the costs of disinflation rise in low inflation environments but the utility of disinflation disappears. Therefore, it is not really a cost.³⁵ By contrast the efficiency of demand management improves, if price stability is maintained, and this is a potential long-term benefit. Therefore, in a stable monetary union the supposed "advantage" of flexible exchange rates has been replaced by the much more tangible advantage of more efficient monetary (interest rate) policies. It is precisely this increased efficiency of monetary policy which gives rise to the rational expectation of an output shock reversal. Therefore, the option of reaping future benefits despite today's output losses increases the utility of being a member of the monetary union. Alternatively, if the union would not maintain price stability, the efficiency of monetary policy for output stabilisation would be lost and the benefit from staying in the union would gradually disappear. Therefore, there are good reasons, why EMU member countries would have an incentive to maintain price stability over the long-term, once they have joined. We may conclude that the convergence path to EMU is likely to be significantly more painful than life with the euro.

3. Criteria for a sustainable monetary union

Our two propositions lead to a simple recommendation for long-term sustainability of EMU: maintain price stability! This, of course, is the unambiguous objective of the Maastricht Treaty.

facing policy-makers in the United States has changed as a consequence of disinflation in the 1980s. Our estimates imply that a reduction in average inflation from 10 to 5 percent substantially alters the short-run impact of aggregate demand ».

Realising this objective requires a high preference for low inflation over output stability, i.e. low A 's in equation (7). But at the same time this implies that EMU is more easily sustainable in a Pareto-optimal currency area. Hence, the selection of the members of EMU is crucial for its long-term sustainability.

The TEU defines the selection procedure in art. 109j: first, reports by the European Commission and the European Monetary Institute shall examine the "degree of sustainable convergence" achieved by each Member State with reference to certain convergence criteria. Second, on the basis of these reports the Council shall decide with qualified majority which Member State fulfils the necessary conditions for adopting the single currency. If we interpret the "high degree of sustainable convergence" as a requirement for a Pareto-optimal currency area, then the necessary condition for a country joining EMU is given by (11c'). Thus, the purpose of the convergence criteria is to evaluate, if this condition is fulfilled or not.

However, the decision making in the selection of participants is not strictly compatible with a Pareto-optimum. In fact, whether a country conforms to the necessary conditions is subject to a vote with qualified majority. Figure 2 shows the weighted votes of each country of the EU. A qualified majority requires 62 votes out of 87 (i.e. 71,3%) (Arrowsmith, 1995). Thus, no single country has a blocking majority - nor even two large countries. A strict Pareto-optimum would require a veto for each member. However, the TEU also does not envisage an unconstrained optimum currency area, given that a minority of 26 votes (29,9%) can block a

³⁵ The same applies, of course, to the utility of devaluations. Thus, in the long-run with stable prices in the monetary union the margin expressed by equation (11c) tends to become very large and the selection of EMU-members depends on the time horizon applied to the selection procedure.

potential member. Therefore, the Maastricht Treaty defines EMU as a modified POCA with a small degree of altruistic solidarity.³⁶ For the selection process this implies that the POCA

constraint $\frac{dA_i}{dS_j} \leq \left(\frac{B_S}{C_A} \right)_i$ must hold at least for three countries « *i* », and not only for one.

Nevertheless, it is likely that the three countries with the highest commitment to price stability have fairly similar preferences, so that EMU resembles more a Pareto-optimal than an unrestricted currency area.

As a consequence, the convergence criteria listed in art. 109j derive their sense from making sure that reality reflects "philosophical convergence", i.e. to prevent that accepting one additional country into EMU could harm the others. As we have seen, this necessitates sufficient convergence to similar preferences for price over output stability prior to joining. From this point of view, it is not surprising that the convergence criteria focus on monetary rather than real convergence³⁷. Nominal convergence is a necessary and sufficient condition for EMU to start as a POCA. Interpreting the convergence criteria in this way eliminates some of their contradictions and the arbitrariness which are often cause for criticism (see: Buiters, Corsetti and Roubini, 1993). It also establishes a clear hierarchy of the criteria in TEU art. 109j which should be read as a lexicographic ordering.

A hierarchy of convergence criteria

³⁶ It is likely that this is less a matter of intent but rather the consequences from the need to avoid that one country (the UK at the time) could block the project because it had a "consistently negative » attitude, responding « with a centuries-old, political reflex of fear and aversion" (Bini-Smaghi, L., T. Padoa-Schioppa and F. Papadia, 1994).

³⁷ For a discussion of these concepts see Brittan, A., and D. Mayes, 1992, and Collignon S., 1996.

The following order of priority seems to reflect optimally the contribution of the convergence criteria for the assessment of policy preferences of potential EMU member countries.

1. Price stability.

This criterion is in the centre of all considerations because price stability is what EMU is all about (TEU art. 2, 3a, 105, 109, 109j and protocol of the statute of the European system of central banks art. 2). Art. 109j stipulates that "the achievement of a high degree of price stability will be apparent from the rate of inflation which is close to that of, at most, the three best performing member states in terms of price stability". However, in order to ascertain the sustainability of inflation convergence it may also be appropriate to examine "the development of unit labour costs and other price indices ». In fact an excessive rise in labour costs would reflect a relative preference for output over price stabilisation in society at least as clearly as an « excessive deficit.

2. Interest convergence.

According to art. 4 of the protocol of the convergence criteria convergence of interest rates means that "observed over the period of one year before the examination the Member State has had an average nominal long-term interest rate that does not exceed by more than two percentage points that of at most the three best performing member states in terms of price stability". This criterion was introduced by the German delegation into the intergovernmental conference before the conclusion of the Maastricht Treaty; the Germans argued that the durability of convergence achieved should be reflected in the verdict of the market (Bini-

Smaghi, Padoa-Schioppa and Papadia, 1994). In addition, this criterion lessens problems of currency conversion for otherwise there would be important capital gains for those who had contracted a high interest rate in a weak currency only to be repaid in a strong one (Masson, 1996).

3. Exchange rate stability.

According to art. 3 in the protocol this means "that a Member State has respected the normal fluctuation margins provided for by the exchange mechanism of the European Monetary System without severe attentions for at least two years before the examination. In particular, the Member State shall not have devalued its currency's bilateral central rate against any other Member State currency on its own initiative for the same period". This criterion reflects both: a guarantee that economic agents and policy authorities have become familiar with the constraints of a fixed exchange rate system in advance of the union and that the authorities in participating Member States are willing to play by the rules of institutional co-operation.

4. Budgetary convergence.

The TEU art. 109j also refers to the "sustainability of the government financial position" which will be "apparent from having achieved a government budgetary position without a deficit that is excessive as determined in accordance with art. 104c (figure 6)". This criterion is not entirely on the same level as the other three criteria. The purpose here is to "avoid excessive government deficits" which could lead to "gross errors" in the development of the budgetary situation and in the stock of government debt in a Member State. Therefore, the Commission

shall monitor the situation on the basis of two criteria: "a) whether the ratio of the planned or actual government deficit exceeds the reference value of 3% unless either the ratio has declined substantially and continuously and reached a value that comes close to the reference value or alternatively the excess over the reference value is only exceptional and temporary and the ratio remains close to the reference value; b) whether the ratio of government debt to gross GDP exceeds the reference value of 60% unless the ratio is sufficiently diminishing and approaching the reference value at a satisfactory pace".

Hence, clearly, the fiscal convergence criteria allow a substantial margin of interpretation. By interpreting them from the point of view of a Pareto-optimum currency area we can, however, give greater precision to their significance. In fact, while the three first monetary convergence criteria refer to monetary policy, the fourth refers to the political authorities in member countries. Inflation convergence is certainly the most visible indicator that central banks' preferences have converged and the interest and exchange rate criteria indicate the degree of credibility that this convergence has obtained in financial markets. An (excessive) budget deficit could be an indicator that political authorities in a potential member country have different preferences with respect to output and price stabilisation than the central bank. If this gap persisted over a long time, it could create pressures for the European Central Bank to shift its preferences away from price stability.

If EMU is to start as a Pareto-optimum currency area, then the convergence reports by the Commission and EMI submitted to the European Council early in 1998 should not only report on the facts of economic performance with respect to the different reference values mentioned

in the Treaty. They should also give an assessment of marginal costs and benefits that the inclusion of each country into EMU would have for itself and its partners. This alone would help to take a decision which is compatible with the sustainability of monetary union. Of course, such an assessment is difficult; the conceptual issues addressed in this paper are hardly measurable empirically. Nevertheless, in the following papers we will try to sketch out some elements which would point in the direction of such an assessment.

However, a sufficient degree of convergence before joining EMU is required not so much as a technical requirement for long-term stability, but in order to ensure that political preferences are not interfering with the long-term objective or causing short-term disruptions at an early stage. This should always be kept in mind when the progress of convergence is evaluated. In practical terms it means that the movement in the convergence indicators is often more important than their absolute level.

Conclusion

This paper has aimed at establishing a conceptual framework for assessing the sustainability of European Monetary Union. It has focused on two propositions:

- if the sustainability of EMU depends on the balance of net benefits derived from a single currency, price stability will be decisive for the union's success.
- If the transitory sunk costs of changing currency are high, a country would be reluctant to change in an uncertain environment, unless the expected net benefits from the new currency are high.

Consequently, the sustainability of EMU depends on the long-term steady state benefits from a large, low inflation currency area. Temporary shocks and policy preference volatility are no threat to the union's sustainability. However, the selection of member countries does have consequences for the political stability of EMU.

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