THE EMERGENCE OF THE EURO
AS AN INTERNATIONAL CURRENCY

Richard Portes
Hélène Rey

Working Paper **6424**

THE EMERGENCE OF THE EURO
AS AN INTERNATIONAL CURRENCY

Richard Portes
Hélène Rey

The Emergence of the Euro as
an International Currency
Richard Portes and Hélène Rey
NBER Working Paper No. 6424
February 1998
JEL Nos. F3, F4, G1

ABSTRACT

The European Union will enter Stage Three of Economic and Monetary Union (EMU) in
1999. The development of euro financial markets and thickness externalities in the use of the euro
as a means of payment will be the major factors determining the importance of the euro as an
international currency. As euro securities markets become deeper and more liquid and transactions
costs fall, euro assets will become more attractive, and the use of the euro as a vehicle currency will
expand; the two effects interact, as we demonstrate. We use a three-region world model as a
framework for alternative steady-state scenarios.

With forex and securities market data, we assess the plausibility of those scenarios and the
implications for economic efficiency (welfare). We find that the euro may take on some of the
current roles of the dollar. The welfare analysis reveals potential quantitatively significant benefits
for the euro area, at the cost of the US and (to a lesser degree) Japan.

Richard Portes
Department of Economics
London Business School
Sussex Place
Regent's Park
London NW1 4SA
UNITED KINGDOM
and NBER
rportes@lbs.ac.uk

Hélène Rey
Center for Economic Performance
London School of Economics
Houghton Street
London WC2A 2AE
UNITED KINGDOM
h.m.rey@lse.ac.uk

1. Introduction

The euro will be created as the currency of the European monetary union on 1 January 1999. This will have substantial implications for the international monetary system; for the currency composition of portfolios; for exchange rates, and hence monetary policies; and for economic efficiency and welfare. The key determinant of the extent and speed of internationalisation of the euro will be transaction costs in foreign exchange and securities markets. There has been extensive discussion of the potential international role of the euro, most without any underlying analytical framework. We propose a new analytical basis for this discussion and offer specific estimates of the consequences, using new data.

1.1 American views

Some observers, particularly economists in the United States (but not Bergsten, 1997), may underestimate the importance of these developments. Thus Jeffrey Frankel, now on the Council of the Economic Advisers, argued recently (1995, p.9) that "there is little likelihood that some other currency will supplant the dollar as the world's premier reserve currency by 2020. One national currency or another must occupy the number-one position, and there is simply no plausible alternative". Similarly, Deputy Treasury Secretary Lawrence Summers said, "The dollar will remain the primary reserve currency for the foreseeable future .... We expect the impact of the euro on the monetary system to be quite limited initially and to occur only gradually ... (speech to Euromoney Conference, New York, 30 April 1997)".

Perhaps the wish is father to the thought, or this assessment is influenced by scepticism about the likelihood or desirability of monetary unification in Europe. We believe that if the euro does go ahead, it will become 'plausible' long before 2020, based on the fundamentals: the EU's economic size, the liberalisation and

3

integration of its financial markets, and confidence in its international creditor status and stability-oriented monetary policy. Moreover, we find that the 'number-one position' could actually be shared, and this might be the most likely outcome.

The American authorities may disregard any future challenge to the dollar because they believe that the limited decline in its dominance after the break-up of the Bretton Woods exchange-rate regime came mainly from relatively high US inflation, now apparently conquered. There is another macroeconomic source of long-run dollar weakness, the US current account deficits that have led to massive accumulation of external debt. Even disregarding both of these factors, however, the euro zone will be a competitor to the dollar zone simply because of a size effect, which will be more than proportional to the sum of the currencies that will go into the euro.

1.2 Hegemony

Even if the euro does achieve the status of an international currency rivalling the dollar, does it matter? International currency hegemony has long been regarded as bringing political and economic benefits to the hegemon. We do not analyse or measure most of them here, but we do assess the likelihood of alternative scenarios in which hegemony shifts partly to the euro zone. Policy-makers may care more about the international status of their currency and its determinants than our quantitative estimates of some of the consequences. We have something to say about both, and it is important to understand why they care. Kunz (1995), writing in *Foreign Affairs*, says: "Geopolitical power depends on financial power, each of which supports the other. To ignore the real benefits of controlling the international currency system is [unfortunate]...The death of the

4

dollar order will drastically increase the price of the American dream while simultaneously shattering American global influence."

Some observers of the recent East Asian currency crises (and the demise of dollar pegs) interpret them as an alarming example of precisely this decline of the 'dollar order' (*Los Angeles Times*, 22 July 1997). American officials may have become more sensitive to this view in the Korean financial crisis, when 'the prospect of Europe demonstrating its will to evolve an international policy for the euro appears to have aroused some concern in the US' (*Financial Times* 5 December 1997*).

According to Cohen (1997), monetary supremacy "confers substantial political benefits on the hegemon. At home, the country should be better insulated from outside influence or coercion in formulating and implementing policy. Abroad, it should be better able to pursue foreign objectives without constraint as well as to exercise a degree of influence or coercion over others. The expansion of its currency's authoritative domain, in principle, translates directly into effective political power." Frankel (1995) also notes the "benefits to political power and prestige" which, though "nebulous", reflect the association between the loss of the key currency status and the historical decline of great powers.

Currency hegemony is supposed to bring specific economic advantages to the hegemon: the benefits of international currency status to the financial markets and institutions of the issuing country; the advantages for trade of having other countries peg their exchange rates to one's own (elimination of exchange-rate uncertainty); and the ability to finance balance-of-payments deficits with liabilities denominated in the international money, which other countries will accept without effective limit. This does weaken a constraint on economic policy, although the possible resulting overhang of liquid liabilities may ultimately pose problems.

De Gaulle went too far in claiming that the power of the dollar "enabled the United States to be indebted to foreign countries free of charge" (quoted by Kunz 1995) - if only because foreigners hold most of that debt in interest-bearing U.S. Treasury securities - but there was some substance in his basic insight. Under the Bretton Woods exchange-rate regime, other countries had to accumulate dollars or threaten to break up the system. With a floating dollar (and flexible exchange rates, in general), the nature of the external constraint has changed (see the Introduction to Alogoskoufis, Papademos and Portes, 1991). A solvency constraint does apply to the United States, but in the short and medium run, it can nevertheless build up international liabilities in dollars (and at a lower interest rate than it would otherwise have to pay - see below and Artus 1997a). Moreover, it has the option to eliminate some of that debt with a surprise inflation. McKinnon (1993, p. 28) states that "The 'privilege' of going into international debt so heavily in your own currency is one that is open only to the center...country".

1.3   Seigniorage, welfare and policy

Some of the debt is indeed "free of charge" - foreign residents hold U.S. currency in large quantities (the conventional estimate is 60 per cent of the total stock outstanding, but Rogoff 1997 puts it closer to 50 per cent). This is the source of seigniorage to the issuer of the international currency, the ability to obtain real resources (net imports) in exchange for almost costless notes. The flow of this international seigniorage to the United States is around 0.1 per cent of GDP (Alogoskoufis and Portes, 1991; European Commission, 1990; Frankel, 1995; Rogoff, 1997).

There is another, often neglected source of seigniorage accruing to the issuer of the international currency: a liquidity discount. Non-resident holdings of US

6

government securities are 25% of the total stock, compared with 17% in other major markets (J.P. Morgan, 1997b), and the volume of transactions in US government bonds is an even more disproportionate share (relative to the size of stocks outstanding) of the global bond markets (see Table 7, Sec. 3.2). This international currency effect reduces the real yields the United States government has to pay. From J.P.Morgan (1997a) estimates, we calculate that this is worth 25-50 basis points; applied to non-resident holdings of US government debt of approximately $2,000 bn., this $5-10 billion annual flow is of the same order of magnitude as international currency seigniorage.

There are also efficiency consequences of the switch from one to another (or more than one) international currency, and these may bring real gains or losses in economic welfare. Our analysis yields estimates of these welfare implications, and we find that they are of the same order of magnitude as both sources of seigniorage (Section 4). These results provide a new economic argument for policy-makers who wish to promote the international role of the euro.

We assume that the euro will be launched on 1 January 1999. Indeed, we go further and assume that not long thereafter, the euro area will cover the entire existing EU, and in particular the United Kingdom (important because of London's financial markets), although it will take longer to bring in the countries expected to join the EU from 2002-2003 onwards. We assume also that the European Central Bank (ECB) will quickly establish its credibility and reputation and that it will conduct a neutral monetary policy relative to the initial exchange rate of the euro. Its monetary policies will have far more important international spillovers than those of any of the existing EU central banks. These spillovers will affect exchange rates and the process of international policy coordination. International institutions such as the G-7, the IMF and the OECD will have to adapt (see Alogoskoufis and Portes 1991, Begg et al. 1997, Henning 1997).

7

More important, however, is the likely status of the euro as a major international currency. In Section 2, we propose alternative 'steady-state' scenarios for the roles of the euro as an international means of payment and store of value, and we discuss the process that generates each scenario. In Section 3, we use forex and securities market data to assess the plausibility of those scenarios. As euro securities markets become deeper and more liquid and transactions costs fall, euro assets will become more attractive, and the use of the euro as a vehicle currency will expand; the two effects interact. We find that the euro may take on some of the current roles of the dollar, but the extent to which it does will depend on policy decisions and on the beliefs of market participants. In Section 4, we evaluate the implications for economic efficiency (welfare). The welfare analysis reveals potentially significant benefits for the euro area, at the cost of the US and Japan.

Our analysis then shifts to the transition from the current configuration towards the new role of the euro and the implications of that process for the exchange rate between the dollar and the euro, both in the short and in the medium run (Section 5). Private asset shifts into the euro (supplemented by some rebalancing of official reserves) may initially outweigh the expansion of new liability issues in euros, which will also be encouraged by the development of euro financial markets. Such excess demand for euro-denominated assets would favour an appreciation of the new currency vis-à-vis the dollar (and the yen).

Finally, we consider the policy implications of these developments. First, if the European authorities wish to promote the emergence of the euro as an international currency, as suggested by the welfare analysis in Section 4, they must focus on making the domestic euro financial markets more efficient, more integrated, and cheaper for participants. Second, if the authorities do face pressures for appreciation of the euro, they can only be moderated if monetary policy can respond to those pressures, i.e. if there is no rigid monetary or

8

inflation targeting. Third, if the euro does challenge the dollar's hegemony, this is likely to create instability in the international monetary system, which appropriate policy coordination could mitigate.

2. Scenarios for the internationalisation of the euro

Within national borders, the sole use of one currency is usually imposed by government fiat. Only in exceptional circumstances, such as very rapid inflation, is a national currency replaced in one or more of its functions by other currencies or commodities. In the international economy, demand factors play a much more important role in the determination of which currencies are used. The view that public (state) use of a currency precedes and dictates private use (Goodhart, 1996) is not valid in the international domain. Since there is no supranational authority that can impose the use of a single currency, these issues are decided in the market place, by the behaviour of private and public agents of all countries. But here the market may not function well: because of economies of scale and externalities in the use of currencies, as well as considerable uncertainty and asymmetric information, there is no guarantee that the world will end up with the best monetary system, let alone a single international currency. There is, however, an important lesson from the models of international money: history will matter. Once an exchange structure is established, it will persist unless the system experiences a shock large enough to shift it from one equilibrium to another (Krugman 1980, Rey 1997a).

History does indeed suggest that many of the institutions and modes of behaviour from previous regimes do not change overnight, or do not change at all. We observe inertia and hysteresis. There has been considerable continuity in the international monetary system, even after the breakdown of coordination

9

following shocks to the fundamentals or the preferences of governments (Yeager 1976, Kindleberger 1984). In a world with many possible equilibria and likely threshold effects, history and institutions influence which equilibrium will prevail and the transition path from one equilibrium to another. Moreover, if the shocks are big enough to overcome inertia, expectations will be important in determining which equilibrium will prevail, and that may create considerable instability.

Here we propose a framework for estimating the potential for internationalisation of the euro using foreign exchange and securities market data. It rests on a general equilibrium model where the use of vehicle currencies and demand for financial assets denominated in different currencies are driven by and themselves affect the liquidity of the different bilateral foreign exchange and bond markets. This same framework enables us to assess the consequences of such shifts for economic welfare. First, however, it is helpful to review the existing characteristics of the current system of world payments and to discuss the trends. We draw selectively from the existing, voluminous literature that tries to make informed guesses (without support from any formal analysis) about potential changes in the pattern of world payments. In Section 2.1 we use mainly well-known data to set the scene; in Section 3 and 4 we use new data to assess the scenarios we develop in Section 2.2.

2.1. The current configuration and potential changes

2.1.1 Foreign exchange markets

The dollar is currently used in 83% of two-way transactions in foreign exchange markets, while the DM is used in only 37%; other EMS currencies are used in 21% of transactions, and sterling in 10%; the yen is used in 24% of transactions (BIS 1996).

10

This is despite the fact that the EU accounts for a higher proportion of world trade than the US (even netting our intra-EU trade): in 1992, the EU accounted for 17% of the world exports, the US 12%, and Japan 9%. But the dollar intermediates in the financing of trade between the EU and third countries, as well as trade of third countries among themselves, partly because of lower transaction costs in the inter-bank market. The lower transaction costs in all markets involving the euro will make some substitution likely (Kenen 1996, p. 24, reaches a similar conclusion).

We do not believe that changes in invoicing practices are driving forces behind internationalisation of currencies; rather, they are accompanying phenomena. Still, invoicing could introduce some additional inertia when we switch to the euro, but could then strengthen the externality[1].

Whereas European firms invoice a very large proportion of their exports in their own currencies, the proportion of their imports invoiced in other currencies, and especially dollars, is significant. Japanese firms invoice mainly in dollars, while LDCs invoice overwhelmingly in dollars. The share of Japanese exports invoiced in dollars has been falling over time, while the share denominated in yen is rising; and the share of US trade denominated in foreign currencies is rising (Black 1985, 1989). In 1992, according to the ECU Institute (1995), 48% of world exports were invoiced in dollars, 15% in Deutsche marks, 18% in other major European currencies, and still only 5% in yen. Meanwhile, the Japanese and European shares of world exports have also been rising, while the share of US exports seems to have been stagnant (see Tavlas (1990), Tavlas and Ozeki (1991)).

EMU is likely to bring almost exclusive invoicing in euros by EU firms. Economies of scale in use of the euro will induce firms from other areas that trade mainly

11

with the EU to start invoicing in euros (e.g. Central and Eastern Europe, Middle East and North Africa), as will many multinational Japanese and US firms. Some imports from the US and Japan will remain exceptions, as will some primary commodities. But there will be an initial once-off 'arithmetic' effect raising the share of dollar-denominated trade, when intra-EU trade becomes domestic. Hartmann (1996a) estimates that the initial post-EMU position would see 59% of world trade denominated in dollars and, on his 'euro-optimistic' scenario, 28% in euros.

The euro's role will grow at a rate determined by its ability to capture more of the dollar's vehicle currency position in non-US trade. The process will also depend on the stability of exchange rates between the dollar, the yen and the euro. If the dollar were to display high volatility against the yen and the euro, while their bilateral exchange rate was relatively stable, it would boost the chances of the euro (and the yen) to substitute for the dollar as an international unit of account. Tavlas (1997) argues that firms will seek to invoice in a currency that has relatively low inflation risk and real exchange rate risk.

If trade relations become concentrated in regional blocs (e.g. Europe-Africa-Middle East, Japan-Southeast Asia, US-Latin America), we might end up with at least three vehicle cum unit-of-account currencies. But insofar as trade is more uniformly distributed geographically and multilateral, there will still be powerful forces behind the use of a single dominant currency for these roles. In that case the change in the fundamentals will favour the euro, but history (inertia) will favour the dollar.

2.1.2 Securities markets

---

[1] We are grateful to Seppo Honkapohja for this insight.

12

The share of US dollar bonds in the international bond market has fallen substantially since the early 1980s: from 62% of the stock of bonds outstanding in 1985 to only 38% at end-1996 (of a total stock amounting to $3,200 billion), with a corresponding sharp rise in the share of yen-denominated bonds to 16% (BIS 1997, p.11).

According to McCauley and White (1997, p. 11), the euro money market is likely to prove a very liquid market from its inception (see also European Commission 1997a). Even a 'narrow' monetary union (essentially France and Germany) would have a market in derivative transactions larger than that for the yen and a larger market than the dollar for futures on longer-dated government securities (Prati and Schinasi, 1997).

The domestic market in Europe for private bonds is already fairly unified, close to having a common reference yield curve (McCauley and White, 1997, p.9), and with outstanding stocks of $2948 billion, it is two-thirds the size of the American market. The segmentation that one does observe in this market appears to derive primarily from the effect of different currencies. In the pricing of government debt, prospects for integration in the trading of the most creditworthy governments look brighter than is generally acknowledged (McCauley and White 1997). Total public sector domestic debt in the EU15 amounts to $4618 billion, two-thirds of that in the US (BIS 1997, p. 47). Moving to the euro will promote the integration of the EU15 government debt markets, so that their breadth, depth and liquidity will become comparable - if not for some time equal - to those of the United States[2]. This will be partly the consequence of policy and institutional changes in the markets (see Sec. 6), partly an endogenous response, arising

---

[2]Robert McCauley suggests (in correspondence) that there is evidence from derivatives markets that the prices of bonds from smaller European countries should be more integrated with valuations elsewhere under a single currency. The data suggest that the purchase by non-residents of bonds denominated in 'lesser' European currencies is inhibited by the costs of managing exchange-rate risk and by the greater difficulty of managing duration and volatility of the portfolio in these countries. Moving to the euro will eliminate these cost differentials.

13

from the inverse relation between transactions volumes and costs that is the key to our argument.

Major European institutional investors are currently very little diversified into foreign assets, except those in the UK and the Netherlands (Artus 1996; Miles 1996; PDFM 1997). But they may initially prefer to diversify across countries, in the newly integrated European capital markets, without incurring exchange risks. Meanwhile US institutional investors - who also show very high home preference currently - are likely to find the new euro financial market attractive as they diversify (Artus 1997b), especially if euro bond interest rates are less correlated with US bond yields than are current European government bond rates. We might expect this, if the ECB is a more independent actor - if only because of the size of its economy - in monetary policy.

2.1.3 The Official Sector

We have focused so far on private-sector behaviour, because we believe that financial market use of an international currency takes the lead, that use as a vehicle currency is the main determinant of use by the monetary authorities as an intervention currency (Kenen 1995, p.110), and that this in turn determines use as a reserve currency (Krugman 1984, p.273). But reserve-holding and currency pegging by governments deserve some attention. Pegging too, we believe, either follows the establishment of a currency as an international currency or is dictated by international politics (e.g. the CFA franc zone, the prospective incorporation of at least some of the 'Associated Countries' of Central and Eastern Europe in the Exchange Rate Mechanism Mark 2).

The share of the US dollar in official reserves, although declining, is overwhelmingly higher than the share of any other single currency.[3] From 76.1% of total official currency reserves in 1973, the dollar fell to 63.3% in 1994. The share of major European currencies shows a steady increase, from 14.3% in 1973 to 21.9% in 1994 (the share of the DM has risen from 7.1% to 15.5%). The Japanese yen rose from almost zero in 1973 to 8.5% of the total in 1994.

Despite significant efforts (e.g. Dooley et al., 1989), we do not have a satisfactory empirical account of the determinants of reserve-holding behaviour and these observed trends.[4] Nevertheless, the trend decline in the share of dollar reserves in the portfolios of central banks is likely to be somewhat reinforced by the EMU process (McCauley, 1997, carefully assesses the arguments). But this will not necessarily make the euro a major reserve currency outside the EU, unless foreign exchange intervention by non-EC countries is also in euros; that, we suggest, will follow trends in the financial markets.

The unit of account role of an international currency, in regard to the official sector, is related to whether there are countries that peg their own currency against it. Of the 47 countries that either pegged their currency or maintained limited flexibility against a single other currency in March 1994, 25 did so against the US dollar and 14 against the French franc. All these economies are small, however, and even jointly they do not amount to a significant share of the world economy. The growing integration of the Central and East European economies with the EU will enhance the euro's role as an international unit of account. (Bénassy-Quéré1996 stresses the potential anchor role for the euro, going beyond pegging strictly defined, at the regional level.)

---

[3]See Alogoskoufis and Portes (1991, 1992), Bénassy-Quéré (1996), Frenkel and Sondergaard (1996), Ilzkovitz (1996),

[4]Most recently, Eichengreen and Frankel (1996) find that the elasticity of a currency's share in official reserves with respect to the corresponding country's share in world output is in the range 0.5-1.33.

15

2.2. Synergy between the medium of exchange and store of value functions

The use of the euro in financial services will depend on transaction costs, i.e., how efficiently those services are provided. Transaction costs (typically measured by bid-ask spreads) in financial markets are normally very low for liquid assets, but the volumes to which they apply are huge (e.g., well over one trillion dollars daily in the foreign exchange markets), so their incentive effects are considerable. Moreover, the pattern (ranking) of transaction costs gives a qualitative differentiation among markets that drives choices in the international market place.

Whereas international transactions in goods markets are arranged between importers and exporters, eventual payment is intermediated through commercial banks. In monetary transactions, 'network' or 'thickness' externalities are very important. The more agents who use a given money, the more attractive it will be for other agents to use it. The more transactions in that currency, the easier and quicker, the less resources needed to find a match for any given supply or demand. The entry of any trader into the market therefore confers a positive externality on all other traders. The 'thickness' externalities may cause dealers to prefer indirect exchange, through a vehicle currency, to direct exchange of one currency for another. If there are many dealers prepared to exchange dollars (the dollar market is "thick"), then a dealer wishing to exchange pesetas for rupees finds it less costly to go through two exchanges, one of pesetas for dollars and one of dollars for rupees, than to go through a direct exchange of pesetas for rupees (see Hartmann, 1996b, for a recent discussion with full references).

16

The key parameter in our analysis is the elasticity of transaction costs with respect to volumes. "Numerous studies have related bid-ask spreads to trading activity and price volatility for a variety of financial markets. These studies generally find a negative relationship between volume and bid-ask spreads and a positive relationship between price volatility and bid-ask spreads. The volume-spread relationship probably reflects decreasing order-processing costs, decreasing inventory-carrying costs, and increasing market maker competition as volume increases" (Fleming, 1997, p. 21). We assume that volatility on the different markets will remain of the same order of magnitude as before the introduction of the euro, so that liquidity is the main driving force behind change in the pattern of transaction costs.

There is a synergy between the vehicle currency role on the foreign exchange markets and trading of financial assets denominated in this currency. An efficient domestic financial system encourages capital inflows, which increase the liquidity of the bilateral foreign exchange markets involving that domestic currency, so making it more likely that the currency becomes a vehicle. Conversely, being a vehicle currency enhances foreign exchange market liquidity and lowers the cost of portfolio substitution, which feeds back into foreign exchange market turnover. These 'circular' forces leave scope for multiple equilibria, which, we believe, are a necessary feature of any convincing model of the medium of exchange function of money.

We find that the internationalisation of the euro will depend mainly on the liquidity of the euro financial markets (the analysis is made under the assumption that the ECB has established its anti-inflationary credentials and that monetary policy is 'neutral' in all the countries). The driving force towards internationalisation will come from the financial market side and then will expand the vehicle currency function.

17

If financial transactions inside the new euro zone enhance the liquidity of the euro securities markets above a critical level, then the "old" equilibrium, where the dollar is the international currency both for financial assets and foreign exchange market transactions, becomes unsustainable. There is a shift towards a new equilibrium where either the euro replaces the dollar completely in its major international roles or where it replaces it only in some dimensions. In the latter case, the economic links between the 'dollar bloc' and the 'Asian bloc' would still be dominated by the dollar. But if transaction costs on euro securities markets remain higher than on dollar securities markets, only very limited changes in the pattern of world payments will occur.

The internationalisation of the euro therefore hinges critically on the speed of integration of euro financial markets, on the willingness of the ECB not to hinder internationalisation, and on the number of participants in the monetary union, especially on UK participation. Since the turnover on the UK bond market is high by European standards, the participation of the UK in EMU can tilt us from one equilibrium to another.

2.3. A simplified story of the pattern of world payments

Consider a three-country world with a European, an American and an Asian bloc. The demand for a currency comes from two sources: money is needed to buy financial assets and to buy goods. Demand for financial assets denominated in a given currency derives from the pattern of cross-border bond and equity flows and from savings. Suppose that sellers of goods and financial assets are paid in their own currency predominantly but that a fraction of the denomination of the transactions depends on the international status of the currency. This is the best first-order assumption for the relevant set of countries, as suggested by the table below.

18

Table 1. Share of exports invoiced in domestic currency (per cent)

	1980	1992
US	96	92
Germany	82	77
Japan	29	40
UK	76	62
France	60	55

Source: Ecu Institute (1995).

Purchases and sales of financial assets as well as foreign exchange transactions involve the intervention of financial intermediaries. These financial intermediaries choose on which foreign exchange and bond markets to operate by minimising transaction costs. Exchange rate and interest rate volatility are assumed to be of the same order of magnitude before and after the introduction of the euro, so that changes in transaction costs reflect only changes in the liquidity of the different markets. Risk-return trade-offs which, in theory, also affect portfolio investment decisions are not modelled. We assume, for example, that the switch to the euro will not affect real return on equities. Another way of saying this is that the demands for equities and for some bond transactions are invariant with the currency regime.

Some other bond transactions, however, such as the ones made for hedging purposes, will vary with the international status of the currency and will be affected by the switch to the euro. For example, a financial intermediary who carries some cash in currency j at date t and who wants some currency i at date $t+1$ has several possibilities. He can change his currency j against currency i on

19

the spot foreign exchange market at date t and then buy bonds denominated in currency i which will be redeemed in currency i at date $t+1$. He can also buy bonds denominated in currency j at date t and go to the spot foreign exchange market at date $t+1$. But he could also go to the spot foreign exchange market at t, exchange currency j against currency k, buy bonds denominated in currency k and change currency k against currency i at $t+1$. His choice will depend on the structure of the transaction costs on the different markets, which will depend on the strategies of all the other agents through the thick market externalities.

The levels of turnover on the different markets are therefore partly determined by the underlying real trade fundamentals, equity and bond trading, savings behaviour, and partly by history. Strictly speaking, the transaction costs reflect the liquidity of the different markets. But it is possible that they pick up other effects as well: more liquid markets also tend to be institutionally better organised.

The discussion below is based on the model presented in Appendix 1.

2.4. The present situation: the dollar as international currency (graph 1)

Our view of the current world system of payments is the following:

The dollar dominates in the transactions linked to trade in goods and financial assets between the three blocs. Note that our view would have been different if we had considered *intra-European* trade (between Germany and France for example); but here we focus on *inter-bloc* exchanges. Inside each bloc, savings are invested in domestic financial assets: there is a huge home portfolio bias. For example, for the pension funds, foreign assets amount to only 9.6% in the US,

6.6% in Japan, 4.9% in Germany (Miles 1996; PDFM 1997 estimates 13% for the US, 10% for Japan).

Data on foreign exchange market turnover by currency pairs (Table 2) show that there are virtually no direct transactions on the bilateral foreign exchange markets between the yen and EU currencies. The exception is the DM/yen market, but even this market has a low turnover compared to the major markets and compared to the size of the trade and financial flows between Japan and Europe (see next section).

Table 2. Average daily foreign exchange market turnover ($bn)

	Spot, forward and swaps 1995	Spot 1995	Swaps 1995
DM/$	254	143	93
$/yen	242	88	133
Yen/DM	24	19	2
DM/EU	99	82	14
Yen/all others[5]	8	2	2
DM/all others[6]	1.5	1	0.2
FF/all others[7]	5	1	2

Source: BIS 1996

Take the example of Japanese importers dealing with EU countries. Data on invoicing and on turnover presented above mean that, even though Japanese

[5] excluding $ and DM
[6] excluding $, yen, EU and Swiss Francs
[7] excluding $ and DM

21

importers normally pay German exporters in DM or French exporters in French Francs, say, they will tend to use dollar-denominated assets for intermediate financial transactions such as hedging. Therefore some of the transactions which should enter in the Yen/DM market turnover (or in the Yen/FF market turnover) are actually performed on the Yen/$ and $/DM markets (respectively Yen/$, $/FF or Yen/$, $/DM and DM/FF markets).

2.5. The emergence of the euro zone: alternative scenarios

EMU represents a shock to the fundamentals of our world economy. We will replace a set of EU currencies with the euro. Is this shock big enough to induce a shift in the equilibrium structure of payments we have just described?

The model shows (see Appendix 1) that the key element for the internationalisation of the euro will be the depth of the financial markets denominated in euro. Therefore, the number of countries joining EMU as well as the speed of financial market integration in the euro zone will play major roles. The future of the euro will be determined on the financial markets rather than on the goods markets.

If transaction costs in euro-denominated securities remain higher than those in dollar-denominated securities, then the dollar keeps most of its prerogatives. Here two subcases can realistically arise. One is strictly the *status quo* (graph 1), where no shift occurs. EMU has no impact on the international monetary order, and the euro is nothing but a big DM.

In the other subcase, the *quasi status quo*, the euro replaces the dollar as the dominant currency for exchanges between Europe and the Asian bloc, but the

22

dollar is still the vehicle currency on the foreign exchange markets. This case is represented in graph 2.

On the contrary, if transaction costs in euro-denominated securities fall below those in dollar-denominated securities, then three types of "new" equilibria could realistically emerge, which we shall denote by *pan euro*, *big euro* and *medium euro*.

The Pan Euro Scenario

Here the euro replaces the dollar as the currency used for financial asset transactions between blocs and as the vehicle currency on the foreign exchange market, so all transactions between the dollar and the yen are intermediated through the euro.

In this equilibrium, the use of the euro in all financial transactions leads to its use as a vehicle on the foreign exchange markets, and there are no direct transactions between the dollar and the yen. Transaction costs are low on the euro/$ and euro/yen markets since these markets are swollen by the vehicle currency use of the euro. This scenario is self-enforcing: assessing rigorously its plausibility would involve looking at the dynamics along the transition paths, which is beyond our means. It seems, however, that this scenario is unlikely to happen, since we expect the post-euro $/yen market to be at least as liquid as the pre-euro yen/DM market. So our numerical estimates as presented in Section 3 exclude this scenario.

The Big Euro Scenario (graph 4)

The euro replaces the dollar as the main international currency for financial asset transactions, but the transactions between the dollar bloc and the Asian bloc are

still dominated by the dollar. The euro has taken the role of vehicle currency on the foreign exchange markets.

The transaction cost on the $/yen market is high compared to transaction costs on the $/euro and euro/yen markets, since the vehicle currency use of the euro has raised volumes in these two markets. Contrary to the previous case, not all transactions between the yen and the dollar are intermediated by the euro; some are direct and some are indirect. The latter use the euro as the vehicle currency. Indirect transactions are necessary because of the 'double coincidence of wants problem' on the bilateral foreign exchange markets (see Krugman [1980]).

The Medium Euro Scenario (graph 3)

In the final alternative scenario, the euro replaces the dollar as the main international currency for financial asset transactions, but transactions between the dollar and the Asian bloc are still dominated by the dollar. The euro, however, has not taken the role of vehicle currency on the foreign exchange markets. But again, that does not mean that all the transactions between the euro and the yen are intermediated through the dollar; some are direct and some are indirect.

Which of the *big* or *medium euro* scenarios is more likely depends mostly on the degree of symmetry of the trade relations between the blocs. From the structure of transaction costs, it is apparent that the less integrated are Europe and Asia (the higher the transaction costs on the euro/yen market), the more the dollar is likely to keep its vehicle currency role.

Note that we do not consider here the existence of other equilibria in which the yen could be a competitor for the dollar or the euro. Given the present data, this

24

seems unlikely, although major institutional changes could enhance the prospects of the yen in the long run.

3. Numerical Estimates

What can we say about the likelihood of the five alternative scenarios - two status quo (or quasi) and three different degrees of internationalisation of the euro?

We use data on fundamentals (real trade, equity and bond flows) for each of the bilateral foreign exchange and bond markets and estimates of the elasticity between transaction volumes and transaction costs to derive jointly equilibrium transaction costs and turnovers for the different scenarios. We will see that the data reject some scenarios but that for sensible elasticity values, multiple equilibria are likely.

3.1. Foreign exchange estimates

Foreign exchange market turnover can be divided into inter-dealer and customer-dealer transactions. The shares of inter-dealer transactions are remarkably similar on all the bilateral markets and show a huge predominance of inter-dealer transactions over customer-dealer transactions. This feature differentiates the foreign exchange markets from all other financial markets.

Table 3. Share of inter-dealer trading, spot forex, 1995 (per cent)

	DM	yen	Pound	FF	Swiss F	Can $
$	85	81	85	80	83	79

DM		90	92	88	88	84

Source: Authors' computations based on BIS (1996)

Following Lyons (1995, 1997a), we interpret these inter-dealer transactions from the perspective of the "hot potato" approach. If customer order flow changes unexpectedly, a foreign exchange dealer will pass on to other dealers the resulting inventory imbalances. Suppose there are ten risk-averse dealers, each currently with a zero net position. A customer sale of $10 million worth of Deutsche marks is accommodated by one of the dealers. The dealer, who does not want to carry the full open position, calculates his share of the inventory imbalance - say one-tenth of $10 million - calls another dealer and unloads $9 million worth of Deutsche mark. And so on. This very simple example would produce an inter-dealer share of 90% of the transactions, which roughly matches the observed shares. The global volume traded on a given foreign exchange market is a multiple of the customer order flow. This multiplier, resulting directly from the optimising behaviour of risk-averse traders, should be stable across regimes. All the shares given in Table 3 were virtually the same in 1992 (previous BIS survey).

We now decompose customer-dealer transactions on the foreign exchange market into four different components:

i) real trade T, ii) cross-border equity flows E , iii) cross-border bond flows B, iv) international use of a currency (vehicle) I

$$v = T+E+B+I$$
$$V = v^*m$$

where v is the volume of customer-dealer transactions on a given market, V is the global turnover on the same market, and m is the multiplier.

26

$$m = 1/(\text{share of customer-dealer transactions})$$

Global turnovers V on foreign exchange markets by currency pairs (Table A1) are available from BIS (1996).

i) Bilateral currency flows due to real trade have been computed with the Direction of Trade Statistics import and export data pairs (Table A2).

ii) Bilateral cross-border gross equity flows (which include Mergers and Acquisitions as well as portfolio investment) are taken from Cross Border Capital (Table A3).

iii) Bilateral cross-border gross bond flows were given by BIS (1997b and private communication) and own estimates based on global cross-border gross transaction volumes and bilateral shares for equity transactions pairs (Tables A4 and A5).

The first two components T and E account for a small fraction of the global turnover on each bilateral market. We will assume that all the real trade transactions and equity transactions are pure customer-dealer transactions (even though they will of course generate afterwards a cascade of inter-dealer transactions through the inventory adjustment process described above). Real trade flows and equity flows will be invariant with the currency regime. This is why we call them "fundamentals".

Cross-border bond flows can be decomposed into two parts, inter-dealer transactions on the one hand and customer-dealer transactions on the other,

each of which account for roughly 50% of the total[8]. The "customer-dealer" part of the bond flows (just like the real trade and equity flows) will be invariant with the currency regime, whereas the inter-dealer part will vary with the scenarios and the international currency. This choice is made because there is ample evidence that the most liquid bonds (such as the 5 or 10-year US Treasuries) are widely used by financial intermediaries for hedging practices. This is why the turnover ratio of these bonds is much higher than for the other securities. And we consider that this function is a direct consequence of the dollar's dominance as the international currency. In our perspective, the more liquid markets are therefore the ones which are the most likely to be affected by the switch to the euro.

By definition, we have:

$$Fundamentals = T+E+B$$

where B is only 50% (the customer-dealer part) of global cross-border bond flows.

We then isolate the proportion of customer-dealer transactions due specifically to the international use of a currency (vehicle currency use). Unlike the 'fundamentals' which remain the same across the different scenarios considered, the transactions due to international currency use vary with the scenario.

Therefore:

$$I = V/m - T - E - B$$

---

[8] We find that interdealer transactions represented 47% of the global transactions of both the US and UK bond markets in 1994 (another remarkable similarity). The remainder is customer-dealer transactions.

Note that *I* can be positive or negative[9]. If *I* is positive, it means that the currency considered is used beyond what the real fundamentals would give: the currency is internationalised. For example, the turnover of the $/DM market is likely to exceed what would have been predicted by the fundamentals of the US and Germany. This is so because some Central European economies, for example, use the DM for international trade settlements. If *I* is negative, on the other hand, it means that the currency is less used than fundamentals would predict. For example, the major part of Japanese exports are invoiced in dollars.

In our estimations we ignore speculation. Recent empirical papers (Lyons 1997, Ammer and Brunner 1997) argue that the share of speculative profits is negligible compared to the profits generated by financial intermediation.

For Japan, the US and Europe, the matrix of fundamentals we find is presented in Table 4 below, and the corresponding observed customer-dealer transactions are presented in Table 5.

Table 4. Fundamentals (monthly average, $billion, 1995)

	Japan	EU15
US	160	570
Yen		167

Source: Authors' computations.

---

[9] *I* is likely to overstate the international use of a currency since we have omitted some variables such as real estate transactions; but the volumes involved are small.

Table 5. Foreign Exchange Transactions between Customers and Dealers
(monthly average, $billion, 1995).

	Yen	EU15
US$	333	595
Yen		38

Source: Authors' computations.

It is apparent that the turnover on the yen/DM market is smaller than suggested
by the fundamentals, and on the contrary, turnovers on $/DM or $/yen markets
are higher. This suggests indeed a strong vehicle currency role of the dollar. We
shall now derive joint estimates of volumes exchanged and transaction costs
under the alternative scenarios.

Suppose we are in a given scenario, e.g., the *big euro*. Then we know
which financial assets are used when Europe deals with Japan (euro financial
assets), when the US deals with Japan ($ financial assets), when Europe deals
with the US (euro financial assets) and we also know that the euro is the vehicle
currency. Therefore, the transactions due to the international role of a currency
will occur on the euro/yen and euro/$ markets (no longer on the $/yen and $/DM
markets). Moreover, there will be fewer bond transactions involving some
operations on the $/yen market and more on the euro/yen market. From the
"fundamentals", the international use and the corresponding multipliers, we can
derive the volumes exchanged under this scenario on the different bond and
bilateral foreign exchange markets (see Appendix 1). We can then derive the
transaction costs corresponding to these volumes and check that the pattern of
transaction costs is compatible with the way financial exchanges are performed
in the economy.

30

For that, we need to use data on current transaction costs and empirical estimates on the elasticity of transaction costs with respect to volumes for foreign exchange markets. Hartmann (1996b) provides a careful estimate of such a parameter. He stresses "the apparent stability of [his] parameter estimates, not only between the different estimators but over time." (1997, p.16). We use his value of -0.03 as a benchmark but will perform sensitivity analyses.

Presented below are the existing transaction costs on the different foreign exchange markets. These are derived from the observed transaction cost data and the regression in Hartmann (1997), where transaction costs depend on transaction volumes and on market price volatility; to obtain comparability across markets, the volatility level has been set to 0.

Table 6. Current unit transaction costs (x$10^4)

$/DM	4.06
DM/Yen	4.37
$/Yen	4.16
FF/$	4.61
£ /$	4.27

3.2. Bond market estimates

To decide between *status-quo* (or *quasi-status quo*) on one hand and *big, pan* or *medium euro* on the other, the key criterion is the depth of the European bond market compared to the US bond market. As we see from Tables A2-A4, trading in bonds dominates equities and real trade (*B* >> *E* >> *T*).

31

Do we believe that the financial markets of the euro bloc will be more liquid than those of the dollar bloc?

To have a good measure of the liquidity of the different markets we are considering, we should look primarily at turnover, not at new issues or outstanding stocks. We have data on turnover for the different government bonds. It is evident that US government bonds are much more traded than others, relative to their underlying stocks.

Table 7. Government bond markets, 1995 ($billion).

	US	Europe	Japan
Annual turnover domestic bonds	35843	45635	20625
Stock outstanding	2547	4618	3303
Ratio turnover/outstanding	14.0	9.9	6.2

Source: McCauley and White (1997) and Salomon Brothers (1997).

We use as a proxy for a 'global' transaction cost average bid-ask spreads on 10-year government bonds for each of the currencies considered. These securities are used as a benchmark because they are usually the most widely traded, and they account alone for a very big part of the turnover.

Table 8. Bid-ask spreads on the benchmark bonds (10-year) x$ 10^4

US	1.56
Germany	4
Japan	3.5
UK	3.12
France	4

Source: Salomon Brothers[10].

Today data on transaction costs favour the dollar as currency of denomination for financial assets. The above table shows that transaction costs in dollar-denominated benchmark bonds are significantly lower than for any other

currency. From the model we know that the turnovers and therefore these transaction costs are endogenous and depend on which currency is international. But even if we control for this effect and bring in additional turnover in euro-denominated bonds stemming from foreign demand, the transaction costs we compute using the elasticity estimate still favour dollar financial markets. The gap is such that in the absence of institutional changes or market participants' initiatives on the European bond markets, the dollar-denominated securities market will remain the most efficient one.

So the most likely scenarios seem to be either the *status quo* or *quasi status quo*. Estimates of the transaction costs on the foreign exchange market (see below) then discriminate in favour of the *quasi status quo* scenario. The euro will be more widely used than any European currencies for transactions involving Europe and the Asian bloc, but the dollar will keep its preeminence for all the other types of transactions and in particular as the main vehicle currency.

One could object, however, that there are important institutional differences between US and European corporate bond markets and that in the end transaction costs on the euro market will depend also on policy decisions and regulations. US firms tend to rely much more on debt financing than their European counterparts. This is of course partly due to the greater liquidity of the US bond markets, and one can expect a process of financial disintermediation in Europe with the arrival of the euro.

---

[10]Since most of the trade in bonds is done OTC, a dealers' survey is the most reliable source for transaction costs. We are grateful to Kermit Schoenholtz and Zoeb Sachee for providing this information.

34

Table 9. Stock market capitalisation + debt securities + bank assets end-1995
($billions)

	End-1995
EU15[11]	27,270
EU11[12]	21,084
UK	4,658
US	22,865
Japan	16,375
US+Canada+Mexico	24,711

Source: Schinasi and Prati (1997)

It is apparent from these figures that the introduction of the euro could have the potential for creating the largest domestic financial market in the world, but this outcome is partly a policy decision. If we believe that within a time horizon of five to ten years, financial market integration will be completed within Europe, then euro transaction costs may indeed fall below the dollar transaction costs. This is all the more likely if the UK joins EMU, because of the size of the UK financial market. Thus if policy makers encourage the internationalisation of the euro (see Section 6 below), then we have to turn to foreign exchange estimates to determine which of the *medium euro* or *big euro* scenario is the more likely.

We will work here under the assumption that because of institutional changes such as those discussed in Section 6, the costs of trading in euro financial assets become equal to the costs of trading in dollar-denominated financial

---

[11] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.
[12] Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

35

assets. We find that the fundamentals then support both the *medium euro* and the *big euro* scenarios but exclude the *pan euro* scenario.

For the case of the *medium euro*, where the dollar keeps the vehicle currency role but there is some additional turnover on the euro/yen foreign exchange market and less turnover on the $/yen foreign exchange market, we find the following transaction costs (x 10^4):

euro/$	4.02
euro/Yen	4.33
$/Yen	4.17

For the case of the *big euro*, where the euro has taken up the vehicle currency role and there is some additional turnover on the euro/yen foreign exchange market and less turnover on the $/yen foreign exchange market, we find the following transaction costs (x 10^4):

euro/$	4.02
euro/Yen	3.43
$/Yen	4.27

There is a decline of the transaction cost on the euro/$ market compared to the DM/$ because of a mere size effect. In both cases there is also a decrease of the transaction costs on the yen/euro market compared to the DM/yen market. This decline is very pronounced if the euro becomes the international currency. There is in both cases, however, an increase of the transaction cost on the $/yen market due to a lower liquidity of that market. Since there are multiple equilibria, which equilibrium would prevail depends on the beliefs of the agents.

36

Sensitivity analysis

We perform some sensitivity analysis on the elasticity parameter. The frontier between *quasi status-quo* and *medium* or *big euro* is independent of the foreign exchange market elasticity. It depends only on the transaction costs on bonds markets. But the frontier between *big euro* and *medium euro* varies with the elasticity parameter. For a very high elasticity, the *medium euro* cannot emerge and only the *big euro* is plausible. For a low elasticity, the *medium euro* is the only possibility.

elasticity η	$\eta \leq -0.16$	$-0.16 \leq \eta \leq -0.006$	$\eta \geq -0.006$
	big euro	medium or big euro	medium euro

Intuitively, the bigger the elasticity (in absolute value), the bigger the economies of scale and therefore the bigger the incentives to pool transactions. If transaction costs in euro-denominated assets fall to levels comparable to dollar asset markets, then the fundamentals of the world economy will support the existence of a *big euro* or a *medium euro* for a wide range of parameter values: in particular, for the elasticity value pinned down by Hartmann (1997), whose estimate was in the range -0.03 to -0.045 (with t-statistics around 1.7).

4. Welfare Analysis

It may be argued that since the size of the transaction costs on the foreign exchange and bond markets is small and declining (in particular with the introduction of EBS, Electronic Brokerage Service), welfare estimations are pointless. We hope to have demonstrated by now that even if in absolute values transaction costs are small, their patterns have been shaping international monetary relations from sterling to the dollar and beyond.

37

But one can also ask for a crude evaluation of the efficiency gains (or losses) accompanying the potential shifts in the world structure of payments due to the introduction of the euro, as described in the different scenarios presented above. In the European Commission's study *One Market, One Money* (1990), the micro-economic efficiency gains accompanying EMU were estimated by setting to zero all the foreign exchange transaction costs within EU countries.

These estimates did not take into account monopolistic margins (now falling) nor the impact of EMU on the foreign exchange transaction costs between EU countries and the American and Asian blocs. Efficiency gains were found to be between 0.1% and 1% of GDP per year depending on the size of the countries. The estimates performed here are based on the model presented above. The benchmark scenario is the *status quo*, where the euro is nothing more than a big DM which is not internationalised.[13] The model embodies a direct relationship between economic welfare and global transaction costs. This is so because transacting involves real resource costs in terms of labour. The more efficient the transaction technology, the less labour it requires, and the bigger the share of labour in production, with consequent higher consumption. To do welfare computations, it is therefore enough to compute for each country the real resources going into financial intermediation. This is estimated by multiplying transaction costs by volumes exchanged on each market and by summing across markets.

Using the transactions costs and volumes exchanged calculated in Section 3, one can rank the different possible scenarios (*quasi status quo, big euro* and *medium euro*). From the point of view of Europe alone, the welfare-maximising scenario is the *big euro*, which dominates the *medium euro* and then the *quasi*

38

status quo. For the US the ranking differs from Europe: welfare is maximised in the *quasi status quo* case and decreases with the *medium euro* and the *big euro* scenario, in that order. For Japan, welfare is maximised in the *medium euro* scenario and decreases with the *quasi status quo* and the *big euro* scenario. From an aggregate point of view, world welfare is maximised in the *medium euro* case, which is better than the *big euro* scenario and the *quasi status quo*, in that order.

These results are fairly intuitive. Welfare gains and losses are mainly determined by bond market transactions. Dollar and euro bond markets are both very efficient in the *big* and *medium euro* cases. However, in the *quasi status quo* case, euro bond markets are far less efficient than their dollar counterpart. For Europe, the more people use the euro, the better, since there are micro-economic efficiency gains in transactions. Therefore the welfare rankings are straightforward: *big euro* is the best and then *medium euro* and *quasi status quo*, in that order.

For the US, the situation is symmetric: the more people use the euro, the less people use the dollar. Therefore the welfare rankings are reversed. The US does not suffer from higher transaction costs on the euro bond market in the *quasi status quo* case, because its residents use mainly financial assets denominated in dollars. But Japan does. This is why Japan is made better off by the *medium euro* case compared to the *quasi status quo* case. However, since Asia is more integrated with the US than with Europe, there are increasing returns in using the dollar as a vehicle currency for exchanges involving Asia and Europe. This explains why Japan is made worse off by a shift to the euro as international currency (*big euro* compared to *medium euro* or *quasi status quo*).

---

[13]The internationalisation of the euro does not necessarily mean efficiency gains for EU countries. Indeed, depending on which of the degrees of internationalisation is actually realised, the fragmentation of the currency system into different poles can decrease the efficiency of the global payments mechanism.

For the world as a whole, either the *big* or *medium euro* scenario is better than the *quasi status quo*, since transaction costs on the euro bond market are significantly smaller (they are equal to the transaction costs on the dollar markets in the first case, significantly bigger in the latter). Given the pattern of integration of the three blocs, however, there are increasing returns in using the dollar as the international currency.

These qualitative results are insensitive to the elasticity used for bond market transactions for any reasonable values (between -0.0001 and -1). The only known paper estimating its value is Takagi (1989) for the Japanese government bond market. He finds a value of –0.11 which falls well within that range. The numerical results given below will be based on that unique value, however, and should therefore be taken with caution.

How big are the micro efficiency gains and losses?

When we compare the *quasi status quo* case and the *big euro* case, our estimates indicate between 0.2% of GDP gain (as a flow) for Europe, a loss of 0.04% of GDP for the US, and a loss of 0.07% for Japan. The gains for Europe come mainly from decreasing costs on the bond markets. The losses for the US and Japan come from foreign exchange market transactions: both countries are better off when the dollar is the vehicle currency.

These results suggest that Europe would gain by promoting the use of the euro as a rival international currency to the dollar, but such a policy would go against the interests of both Japan and the US.

40

5. The transition: the euro and the dollar

From our analysis of the alternative scenarios, it appears that the euro will partly displace the dollar. Understanding the transition to this new equilibrium of the international monetary system is very important. The tendency to substitute the euro for the dollar in international transactions and international portfolios will initiate dynamic processes that can be studied with standard macroeconomic models. These will have implications for the process of accumulation of euro balances and the likely trends in the euro/dollar exchange rate. These issues have been discussed exhaustively by McCauley (1997), who considers a wide variety of influences on the euro/dollar exchange rate at various horizons. As our brief discussion suggests, there are conflicting considerations, and McCauley is agnostic.

One of the important questions that arise is how the higher demand for euro-denominated assets after the creation of the new currency will be translated into a higher supply of such assets internationally. Euro-denominated assets will be supplied even before the year 2002, as banks and financial intermediaries will be allowed to issue liabilities denominated in euros. No later than the first half of 2002, the stock of financial assets denominated in the existing EU currencies will be denominated in euros. Most government debt stocks are likely to be redenominated on 1 January 1999. These stocks will of course include assets held by the rest of the world.

The initial share of international assets denominated in euros will be much lower than the size of the EMU bloc in world GDP and trade. A private sector portfolio shift to bring the share of euro asset holdings close to parity with the economic size of the EMU bloc might involve increasing euro asset stocks by on the order of $700 billion (McCauley and White, 1997, pp. 23-24), i.e., 15-20% of the total

41

outstanding stock of international assets. Henning (1997, p. 22) estimates a private portfolio shift between $400 bn and $800 bn as well as a shift in official reserve holdings of $75-150 bn.

Bond suppliers will respond endogenously to the increase in demand - liability managers will increase their offerings denominated in euros. But the likely shift in stock demand will be large relative to the flow of new issues. For illustration, *total* new dollar issues of international bonds averaged $140 billion annually during 1990-95. In the most unlikely event that *all* were to shift to euros, that would still require *five years* to absorb a stock increase in demand of $700 billion.

There are two possible cases here.

Case 1: Immediate Quantity Adjustments

The additional demand for euros will arise slowly enough to be met by a corresponding increase in supply, through the creation of euro liabilities in sufficient quantities by commercial banks and other financial intermediaries. In such a case, the creation of the euro need have no exchange rate implications. Private financial markets, with a little help from central banks, will ensure a smooth transition to a new equilibrium, in which assets denominated in dollars and yen will be replaced by assets denominated in euros. Quantities will adjust without price adjustments.

Case 2: Slow Adjustment in Quantities

A second case is that of slow adjustment in quantities. In such a case, the shift in the demand for euro assets in international financial markets will not bring a matching supply of euro liabilities immediately. For equilibrium, there will need to be a rise in the price of the euro against the dollar, i.e. a real euro revaluation.

In the extreme case of no supply adjustment, how much euro appreciation relative to the initial position vis-à-vis the dollar might we expect? Again for illustration, note that the $700 billion stock shift suggested above would convert about 20% of existing dollar assets into euro assets - if the initial levels of the two are about the same, and if the values of the two debt stocks and of interest rates were held constant, the dollar would have to depreciate by 40%!

The euro revaluation will in due course bring the euro area into current account deficit. The excess demand for euros would then partly be met through the capital account, just as the United States has created dollar liabilities to finance its current account deficits. By supplying additional euros or disposing of dollar holdings through the capital account, the European Union would facilitate the process of establishing the euro as an international currency. The increased inflow of capital into the European Union will create higher euro holdings internationally. European real interest rates will fall, as the euro will start weakening towards long-run equilibrium.

This process may not start immediately, however, because of the J-curve. The immediate reaction of the current account to a revaluation could be sluggish and even perverse. Thus, in the short term we may see a narrowing rather than a widening of the current account of the European Union following a revaluation of the euro. This possibility suggests that the euro may have to overshoot its long-run revaluation in the short run, causing expectations of a future devaluation that will cause European real interest rates to rise temporarily. A model that can be used to analyse such shifts is Krugman (1989), a variant of a portfolio balance model of the exchange rate, which is presented in Appendix 3.

In any event, the euro should not be expected to be chronically strong on this analysis. As the excess demand for euros is reduced through the accumulation

43

of euro assets, the euro appreciation will be reduced and the current account deficit of the EU will be reduced as well. In the new equilibrium the real euro/dollar rate may not be too different from the initial real exchange rate. Moreover, the monetary authorities may always choose to moderate the appreciation, although this may conflict with the new ECB's efforts to establish its anti-inflationary reputation.

6. Conclusions

Our first conclusion is that scenarios in which the euro does share international currency status more or less equally with the dollar are indeed plausible scenarios. Moreover, they could generate substantial increases in European Union real incomes (welfare). But are there countervailing arguments that might dissuade policy-makers from pursuing this actively as a policy objective?

In the past, central banks outside the United States have sought to avoid internationalisation of their currencies. Henning (1994, pp. 317-319) underlines that "both Germany and Japan vigorously and systematically resisted the international use of their currencies - particularly as a currency for private assets and official reserves - during most of the post-war period...Both governments...wanted to avoid the conflict between the provision of liquidity and the preservation of confidence that had plagued the dollar, and in a different sense, the pound sterling. Because the Bundesbank and Bank of Japan might have to adjust monetary policy in response to capital movements, monetary control would be impaired under both fixed and flexible exchange rate regimes...The Bundesbank remains acutely concerned that the volume of outstanding foreign D-Mark assets and liabilities could destabilise exchange markets." To these considerations one might add a reluctance to act as lender of

last resort in international financial crises - as indicated in European resistance to the US-led bailout of Mexico.

The uncertainties highlighted by the exchange-rate scenarios in Section 5 arise from uncertainties regarding the supply of and demand for euro-denominated assets. From the viewpoint of monetary control and monetary and exchange rate policy, one must distinguish between effects on the demand for euros as money and on the demand for euro-denominated claims. As Peter Kenen has argued, the "introduction of the ECU [euro] may reduce the demand for the ECU [euro] as money. By helping to unify capital markets within the EC, however, EMU may produce a long-lasting increase in the demand for ECU-denominated claims. That is why the ECU [euro] is likely to appreciate after Stage Three begins...The ECB can readily offset a once-and-for-all reduction in the demand for ECU [euro] balances by reducing the supply. It will be harder to offset the exchange-rate effects of an ongoing capital flow. (1995, pp. 116-118)."

Suppose that the ECB does accept, indeed - with other EU and national authorities - wishes to promote the internationalisation of the euro: take the welfare gains, plus some seigniorage, and whatever other more "nebulous" benefits that international currency status provides; and mitigate insofar as possible any undesired pressures for exchange-rate appreciation.

What policy measures could the authorities use? Primarily, those directed towards integrating the European capital markets. Our analysis highlights the key role of transactions costs - and hence of liquidity, breadth and depth of financial markets. We expect transaction costs in euro financial markets to fall with financial market integration. The extent to which they will fall will depend in part on the success of financial deregulation in bringing down the cost of banking in the EU (Giovannini and Mayer 1991) as well as on the effects of the heightened banking competition that currency unification is likely to bring (McCauley and

45

White, 1997). It will also depend on central bank and regulatory policies determining the costs of using the euro payments mechanism (Folkerts-Landau and Garber, 1992).A working group under the auspices of the European Commission has investigated in detail policies for "creating a euro securities market as broad, liquid, deep and transparent as possible (European Commission 1997b, p. 14)", among which they stress: (i) redenomination of all existing debt; (ii) harmonised market rules and conventions; (iii) continuity in price sources (e.g. benchmark interest rates); (iv) informal coordination of government debt issuing procedures. To these we might add unifying payments systems in the most efficient manner and not imposing unnecessary taxes or other burdens that would make European financial institutions less competitive (e.g. unremunerated reserve requirements).

We note that private market initiatives are already underway in several of these areas: the coordination efforts of ISDA and ISMA; the decision by DTB and MATIF to bring some aspects of derivatives trading under "one roof" (which is partly intended to enhance their competitive position vis-à-vis LIFFE); and coordination to establish a common benchmark rate to replace LIBOR (although there are currently two separate competing efforts). On the other hand, we cannot expect that within the foreseeable future there will be a large "federal" EU budget, with major EU borrowing, and hence an EU benchmark security; the markets will have to accord this role to one or more of the individual government bonds.

If the ECB does actively promote the international use of the euro, one cannot discount the possibility of an overt tug of war between the euro, the incumbent (the dollar) and the major other contender (the yen) for international monetary supremacy. Some of the recent language of European political leaders suggests that they look forward to this prospect and that they believe the United States -

46

despite its official pro-EMU position - in fact opposes the single European currency precisely because it regards the euro as a threat, in this sense.

We regard such attitudes themselves as a threat and such a prospect as a potentially dangerous development. One might draw this lesson from the interwar experience of the rivalry between sterling and the dollar, with the French franc on the sidelines (Eichengreen 1987). Even without such a potential rivalry, if EMU were to result in large-scale substitution of euro for dollar balances and a quick appreciation of the euro against the dollar (and the yen), along the lines we have analysed, this may be a cause for concern. There may well be an increased need for better monetary policy coordination at the international level to cope with such an eventuality (Alogoskoufis and Portes, 1991, 1992, 1997; Bergsten 1997; Begg et al., 1997).

Throughout our discussion we have contrasted the influences of history, hysteresis, and inertia in the international monetary system with the instability associated with multiple equilibria and threshold effects. Continuity and instability are not necessarily contradictory. Whenever a system is on the border between two equilibria it may exhibit instability, which may be brief or prolonged. The issue here is the magnitude of the shock that EMU will bring to the international monetary system. We believe it is likely to be substantial and relatively sudden. Market participants as well as the authorities appear now to be taking this possibility more seriously - and the degree of global integration of financial markets now may make the transition to a new equilibrium much faster than in our historical examples.

47

REFERENCES

Alogoskoufis G.S., L. Papademos and R. Portes (1991), eds., External Constraints on Macroeconomic Policy: The European Experience, Cambridge University Press.

Alogoskoufis G.S. and R. Portes (1991), International Costs and Benefits of EMU, in The Economics of EMU, European Economy, Special Edition no.1, pp. 231-45.

Alogoskoufis G.S. and R. Portes (1992), European Monetary Union and International Currencies in a Tri-polar World, in Canzoneri M., Grilli V. and Masson P., Establishing a Central Bank: Issues in Europe and Lessons from the US, Cambridge, CUP and CEPR.

Alogoskoufis G.S. and R. Portes (1997), The Euro, the Dollar, and the International Monetary System, in Krueger et al., eds. (1997).

Amihud Y. and H. Mendelson (1991), Liquidity, Maturity, and the Yields on U.S. Treasury Securities, Journal of Finance 46, pp. 1411-1425.

Ammer J. and A. Brunner(1997), Are Banks Market Timers or Market Makers?, Journal of International Financial Markets, Institutions and Money 7, 43-60.

Artus P. (1996), A Strong Euro or a Weak Euro?, Document de Travail No. 1996-02/EI, Caisse des Dépôts et Consignations.

Artus P. (1997a), Comment change l'équilibre financier international s'il apparaît une seconde monnaie de reserve? Document de Travail 1997-03/EI, CDC.

Artus P. (1997b), L'euro, la diversification de portefeuille et la gestion des reserves, Document de Travail 1997-09/EI, CDC.

Bank for International Settlements (1996), Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1995, Basle.

Bank for International Settlements (1997a), International Banking and Financial Market Developments (February and August).

Bank for International Settlements (1997b), Annual Report 1996/97, Basle.

Begg D., F. Giavazzi and C. Wyplosz (1997), Options for the Future Exchange-Rate Policy of the EMU, CEPR Occasional Paper No. 17.

Bénassy A. and P. Deusy-Fournier (1994), La concurrence pour le statut de monnaie internationale, Economie Internationale 59, 107-144.

Bénassy-Quéré A. (1996), Potentialities and Opportunities of the Euro as an International Currency, Working Paper no. 96-09, CEPII.

Bergsten F. (1997), The Impact of the Euro on Exchange Rates and International Policy Cooperation, in Krueger et al., eds. (1997).

Bessembinder H. (1994), Bid-ask Spreads in the Interbank Foreign Exchange Markets, Journal of Financial Economics, 35:3, 317-348.

Black S. (1985), International Money and International Monetary Arrangements, in Kenen P.B. and R.W. Jones (ed), Handbook of International Economics, Volume 2, Amsterdam, North-Holland.

Black S. (1989), The International Use of Currencies, in Suzuki Y., J. Miyake and M. Okabe (eds), The Evolution of the International Monetary System: How Can Stability and Efficiency be Attained?, Tokyo, University of Tokyo Press.

Cohen B.J. (1971), The Future of Sterling as an International Currency, London, Macmillan.

Cohen B.J. (1997), The Political Economy of Currency Regions, in Milner H. (ed.), The Political Economy of Regionalism, Columbia University Press, pp. 50-76.

Commission of the European Communities (1990), One Market, One Money, *European Economy* 44.

Dooley M.P., J.S. Lizondo and D.J. Mathieson (1989), The Currency Composition of Foreign Exchange Reserves, IMF Staff Papers, 36, pp. 385-434.

ECU Institute (1995), International Currency Competition and the Future Role of the Single European Currency, Kluwer Law International.

49

Eichengreen B. (1987), Conducting the International Orchestra: Bank of England Leadership under the Classical Gold Standard, Journal of International Money and Finance, 6, pp. 5-29.

Eichengreen B. and J. Frankel (1996), The SDR, Reserve Currencies, and the Future of the International Monetary System, in M. Mussa et al., eds.,The Future of the SDR in the Light of Changes in International Financial System, IMF.

European Commission (1997a), External Aspects of Economic and Monetary Union, Directorate General II.

European Commission (l997b), The Impact of the Introduction of the Euro on Capital Markets, Directorate General II.

Fleming M. (1997), The Round-the-Clock Market for U.S. Treasury Securities, Federal Reserve Bank of New York Economic Policy Review, July, pp. 9-32.

Fleming M. and E. Remolona (1997), Price Formation and Liquidity in the U.S. Treasury Market, manuscript, Federal Reserve Bank of New York.

Folkerts-Landau D. and P. Garber (1992), The ECB: A Bank or a Monetary Policy Rule?, in Canzoneri M., Grilli V. and Masson P., Establishing a Central Bank: Issues in Europe and Lessons from the US, Cambridge, Cambridge University Press and CEPR.

Frankel J. (1995), Still the Lingua Franca: The Exaggerated Death of the Dollar, Foreign Afffairs 74:4, pp. 9-16.

Giovannini A. and C. Mayer (eds) (1991), European Financial Integration, Cambridge, Cambridge University Press and CEPR.

Goodhart C. (1996), The Two Concepts of Money and the Future of Europe, manuscript.

Hartmann P. (1996a), The Future of the Euro as an International Currency: A Transactions Perspective, Special Paper No. 91, Financial Markets Group, London School of Economics.

Hartmann P. (1996b), Foreign Exchange Vehicles before and after EMU: From Dollar/mark to Dollar/Euro?, manuscript.

Hartmann P. (1997), Do Reuters Spreads Reflect Currencies' Differences in Global Trading Activity? LSE FMG DP 265, April 1997.

Henning R. (1994), Currencies and Politics in the United States, Germany, and Japan, Washington DC, Institute for International Economics.

Henning R. (1997), Cooperating with Europe's Monetary Union, Washington DC, Institute for International Economics.

Jones R.A. (1976), The Origin and Development of Media of Exchange, Journal of Political Economy, 84, pp. 757-75.

J.P. Morgan (1997a), Valuing Bonds in a Low-Inflation World, London.

J.P. Morgan (1997b), The Euro, FX Reserves and Vehicle Currencies, London.

Kenen P. (1995), Economic and Monetary Union in Europe: Moving Beyond Maastricht, Cambridge, CUP.

Kenen P. (1996), Sorting Out Some EMU Issues, Reprints in International Finance No. 29, International Finance Section, Princeton University.

Kindleberger C. (1984), A Financial History of Western Europe, Allen and Unwin, London.

Kiyotaki N. and R. Wright (1989), On Money As a Medium of Exchange, Journal of Political Economy, 97, pp. 927-54.

Krueger T., P. Masson and B. Turtleboom, eds. (1997), EMU and the International Monetary System, IMF.

Krugman P. (1980), Vehicle Currencies and the Structure of International Exchange, Journal of Money, Credit and Banking, 12, pp. 513-26.

Krugman P. (1984), The International Role of the Dollar: Theory and Prospect, in Bilson J.F.O and R.C. Marston (ed), Exchange Rate Theory and Practice, Chicago, University of Chicago Press (for NBER).

Krugman P. (1989), The J-Curve, the Fire Sale and the Hard Landing, American Economic Review, Papers and Proceedings, 79, pp. 31-35.

Kunz D. (1995), The Fall of the Dollar Order: The World the United States is Losing, Foreign Affairs 74:4.

Lyons R. (1995), Foreign Exchange Volume: Sound and Fury Signifying Nothing? in J. Frankel et al. (eds.), The Microstructure of Foreign Exchange Markets, University of Chicago Press.

Lyons R. (1997a), A Simultaneous Trade Model of the Foreign Exchange Hot Potato, Journal of International Economics 42, 257-298.

Lyons R. (1997b), Profits and Position Control: A Week of FX Dealing, Journal of International Money and Finance, forthcoming.

McCauley R. (1997), The Euro and the Dollar, BIS Working Paper No 50.

McCauley R. and W. White (1997), The Euro and European Financial Markets, BIS Working Paper No. 41.

McKinnon R. (1993), International Money in Historical Perspective, Journal of Economic Literature 31.

Matsuyama K., N. Kiyotaki, and A. Matsui (1993), Towards a Theory of International Currency, Review of Economic Studies 60, 283-320.

Miles D. (1996), The Future of Savings and Wealth Accumulation: Differences within the Developed Economies, Merrill Lynch, September.

Pagano M. (1988), Trading Volume and Asset Liquidity, Quaterly Journal of Economics

PDFM (1997), Pension Fund Indicators.

Prati A. and G. Schinasi (1997), European Monetary Union and International Capital Markets: Structural Implications and Risks, IMF Working Paper WP/97/62.

Rey H. (1997a), International Trade and Currency Exchange, Discussion Paper No. 322, Centre for Economic Performance, London School of Economics.

Rey H. (1997b), Inflation and the Moneyness of Currencies, manuscript.

Rogoff K. (1997), Foreign and Underground Demand for Euro Notes, paper for Economic Policy Panel, October.

52

Takagi S. (1987), Transaction Costs and the Term Structure of Interest Rates in the OTC Bond Market in Japan, Journal of Money, Credit and Banking 19, pp. 515-527.

Tavlas G. (1991), On the International Use of Currencies: The Case of the Deutsche Mark, Essays in International Finance no. 181, International Finance Section, Princeton University.

Tavlas G. (1997), The International Use of the US Dollar: an Optimum Currency Area Perspective, manuscript, IMF.

Tavlas G. and Y. Ozeki (1992), The Internationalization of Currencies: The Case of the Japanese Yen, IMF Occasional Paper no. 90, Washington D.C., International Monetary Fund.

Yeager L. (1976), International Monetary Relations, New York, Harper and Row.

Appendix 1

We base our estimates on a simplified static version of a general equilibrium model with thick market externalities. For a full exposition of the model and its technicalities see Rey [1997a] and [1997b]. The key feature is to represent the medium of exchange function of money through a transaction technology whose costs decreases with the liquidity of the market. In equilibrium, patterns of transaction costs, prices and volumes exchanged are determined jointly[14]. For our purposes, we will assume here only that: 1) transaction costs on each market are a decreasing function of the volumes exchanged, 2) volumes exchanged can be decomposed as in Section 3.1.

The different scenarios are the ones presented in Section 2.4 and pictured in graphs 1 to 4. On each side of the triangles appears the preferred currency of denomination of financial assets in which exporters or investors store their wealth when they have to acquire the currency of the other bloc one period hence. In the middle of the triangle appears the international currency.

First, we will make an assumption regarding the scenario we are in. Second, we will compute the volumes exchanged under this scenario. Third, we will derive the various transaction costs from the volumes and the elasticity parameter. Fourth, we will check that the transaction cost structure we have just derived is compatible with the scenario we assumed initially.

Notation:

In the following, S stands for the US with s for the dollar, E for EU countries with e for the euro, Y for Japan with y for the yen.

---

[14] When preferences of the three blocs are Cobb-Douglas, price and output effects cancel out so that computing volumes exchanged become easier.

We denote by Tij the transaction costs on bilateral market ij, i.e. the cost of exchanging one unit of currency i into currency j (Tij=Tji). Tii is the transaction cost on the bond market ii, i.e. the cost of exchanging currency i against a bond denominated in currency i.

In all the scenarios considered the following inequalities hold, reflecting the home bias in domestic savings:

Tee ≤ Tes + Tss + Tse
Tee ≤ Tey + Tyy + Tye

These equations mean simply that it is cheaper for Europeans to save in euro assets than to save in foreign assets and therefore to go (at least) twice on the foreign exchange market. Similar equations are verified for the US and Japan.

The structure of fundamentals is shown in Table 4 in the paper while the observed structure of transactions between customers and dealers is shown in Table 5.

Quasi status quo scenario (graph 2)

Transaction costs structure

Tes +Tss ≤ Tee + Tes ⇔ Tss ≤ Tee
Tys + Tss ≤ Tyy + Tys ⇔ Tss ≤ Tyy

These two equations state only that the markets involving US dollar-denominated financial assets are the most liquid ones (more liquid than those involving the yen or the euro) so that when a financial intermediary holds euros

55

or yen and needs dollars for a future date, he will use dollar-denominated assets rather than euro or yen securities.

Tes +Tss + Tsy > Tee + Tye

Tye ≤ Tes + Tsy

Tes ≤ Tye

Tsy ≤ Tye

These equations state that the euro has replaced the dollar as the dominant currency for exchanges between Europe and the Asian bloc. But the dollar is still the vehicle currency on foreign exchange markets.

Volumes exchanged on foreign exchange markets

Volumes are the same as those shown in Table 5 (current structure of world payments) except that interdealer bond transactions between Japan and EU are no longer on the y/$ and $/e markets but on the y/e market. Bo is the interdealer share of the cross border bond flows between Japan and EU. So Bo=274*50%. The m_s are the corresponding multipliers (they multiply the customer dealer transactions to get the global volumes exchanged, as explained in Section 3).

	euro	yen
dollar	594*m - Bo	333*m - Bo
euro		38*m + Bo

Estimation of the transaction costs ($\times 10^4$)

These estimates are computed very straightforwardly using volume data and elasticity= -0.03.

Foreign exchange market:

e/$	4.02
e/y	4.33
$/y	4.17

Bond markets:

$	euro	yen
1.57	4	3.5

Transaction costs on the $ market are computed very straightforwardly using data on volumes and an estimate of the elasticity (-0.11). They increase a bit compared to the status quo because of a small decrease in turnover. Euro bond markets are by assumption not integrated in this case, so the transaction costs remain at their DM level. Yen markets are not affected by cross border transactions.

These transaction costs verify the above set of inequalities. In particular, they verify Tes +Tss + Tsy > Tee + Tye.

Note that the status quo scenario cannot be an equilibrium: if it were an equilibrium, the reverse inequality Tes +Tss + Tsy < Tee + Tye would have to hold. But if we take the data on current volumes and transaction costs applying to the DM (as presented in Section 3), it does not hold. A fortiori, it cannot hold for the euro either. So this case is excluded by the fundamentals.

Medium euro scenario (graph 3)

Tee ≤ Tss ≤ Tyy

Tse +Tee +Tey ≥ Tss +Tsy

Tse ≤ Tey

Tsy ≤ Tey

Tse + Tsy ≥ Tey

The third equation states that the dollar is the vehicle currency on the foreign exchange markets.

Volumes exchanged on foreign exchange markets

Volumes are the same as those shown in Table 5 (current structure of world payments) except that interdealer bond transactions Bo between EU and Japan no longer appear on the y/$ and $/e markets but appear on the y/e market.

	euro	yen
dollar	594*m - Bo	333*m - Bo
euro		38*m + Bo

The difference between the *medium euro* and *quasi status quo* case comes from the bond markets.

Estimation of the transaction costs ($\times 10^4$)

Foreign exchange markets:

These estimates have been obtained with an elasticity parameter of -0.03.

e/$	4.02
e/y	4.33
$/y	4.17

Bond markets:

$	euro	yen
1.57	1.57	3.5

These estimates have been obtained with an elasticity parameter of -0.11 for the $ market. Transaction costs on the euro markets are equal to those on the $ market by assumption (institutional change). Transaction costs on yen markets are unaffected.

It is apparent that these transaction costs support the set of inequalities characterising the medium euro case. Therefore this scenario is an equilibrium scenario.

Big euro scenario (graph 4)

Transaction costs structure

Tee ≤ Tss ≤ Tyy

Tse +Tee +Tey ≥ Tss +Tsy

Tse ≤ Tsy

Tey ≤ Tsy

Volumes exchanged on foreign exchange markets

For the big euro case, we have the same change in the pattern of inter-dealer bond trading as for the quasi status quo and medium euro case. However, the international currency is no longer the dollar but the euro. Therefore, there is some additional turnover on the e/y and e/$ markets and fewer transactions on the y/$ market. Transactions on the y/$ market now reflect only the fundamentals (F=144) and some of the turnover (I=128) is lost to the other two markets involving the euro (the international currency). Symmetrically, the y/e market now reflects the fundamentals (F=166) and the additional turnover brought by the international role of the euro (I=128). I = 128 is the difference between fundamentals and actual turnover (as explained in Section 3).

	euro	yen
dollar	333*m - Bo	(F-I)*m - Bo
euro		(F+I)*m + Bo

Estimation of the transaction costs (x10^4)

Foreign exchange markets

e/$	4.02
e/y	3.43
$/y	4.27

Bond markets:

$	euro	yen
1.57	1.57	3.5

Bond markets are the same as in the medium euro case.

60

These transaction costs verify the set of inequalities defining the big euro scenario. Therefore, the big euro scenario is also an equilibrium scenario.

Pan euro scenario (graph 1 with e replacing s)

Transaction costs structure

Tse +Tee $\leq$ Tss +Tse $\Leftrightarrow$ Tee $\leq$ Tss

Tye +Tee $\leq$ Tyy +Tye $\Leftrightarrow$ Tee $\leq$ Tyy

Tye +Tee +Tes $\leq$ Tyy +Tys

Tse +Tee +Tey $\leq$ Tss +Tsy

Tes + Tey $\leq$ Tsy

Provided that the post euro $/yen market is at least as liquid as the pre euro DM/yen, it is possible to show that this last inequality cannot be verified. Therefore, we can exclude this equilibrium.

61

APPENDIX 2

Table A1. Foreign Exchange Turnover (April 1995, $billion).

	Yen	EU15
US$	1753	3966
Yen		377

Source: BIS 1995

Table A2. Spot Real Trade Transactions (monthly average, 1995 $billion).

	US	Japan	EU15
US		5.287	11.017
Japan	11.482		6.018
EU15	11.089	4.179	

Source: DTS

Table A3. Cross-border Equity Transactions (monthly average, 1993, $billion).

	US	Japan	EU15
US		8.0	28.6
Japan	3.4		1.9
EU15	25.3	10.8	

Source: Cross Border Capital

Table A4. Cross-border Bond Transactions (monthly average, 1995, $billion).

	US	Japan	EU15
US		132	445
Japan	116		49
EU15	497	225	

Source: BIS, personal communication, and authors' estimates.

Table A5. Cross-Border Transactions in Bonds and Equities (annual, $billion).

	US	Japan	Germany	UK
1992	6658	2674	1677	5396
1993	8440	3326	3258	6485
1994	9088	2814	3244	6777
1995	9812	3357	4142	10318

Source: BIS

63

APPENDIX 3

To analyse the effects of the introduction of the euro on its real exchange rate
and the balance of payments of the EU, we use a version of the Krugman (1989)
model, which is a real, full employment, portfolio balance model.

We begin with the savings-investment identity for Europe.

$$S(r)-I(r) = X(E_p)-M(E_p)/E_s \tag{1}$$

S is savings, I investment, r the real interest rate, M is imports and X is exports.
Savings and investment are assumed to depend on the real interest rate, while
trade volumes are assumed to depend on the permanent real exchange rate E_p.
The permanent real exchange rate is a distributed lag of past real exchange
rates:

$$\dot{E}_p = \lambda(E_S - E_p) \tag{2}$$

where $1/\lambda$ is the mean lag. It is assumed in (1) that the current real exchange
rate E_s has a perverse short-run effect on the trade balance, i.e. that there is a
J-curve.

Finally we assume that expectations are rational and that covered interest parity
holds.

$$r(E_s,E_p) + \frac{\dot{E}_s}{E_s} = r^* + \rho \tag{3}$$

ρ is the risk premium on European assets, and r^* is the US real interest rate. We
have written the European real interest rate as a function of the current and
permanent real exchange rate that satisfy savings and investment balance. A
rise (appreciation) in E_s raises (X - M), so (S - I) must rise, i.e. r must rise. But
(subsequent) appreciation of E_p will reduce (X - M) and will be accompanied by a
fall in r.

The dynamic system of (2) and (3) is depicted in Figure 1. We assume that the introduction of the euro will cause a portfolio shift in its favour, which can be represented as a reduction in the risk premium. From the original equilibrium at 1, the euro will appreciate following the portfolio shift. Subsequently there will be convergence to the new steady state, with the euro depreciating towards the new equilibrium, and the current account in the EU deteriorating.
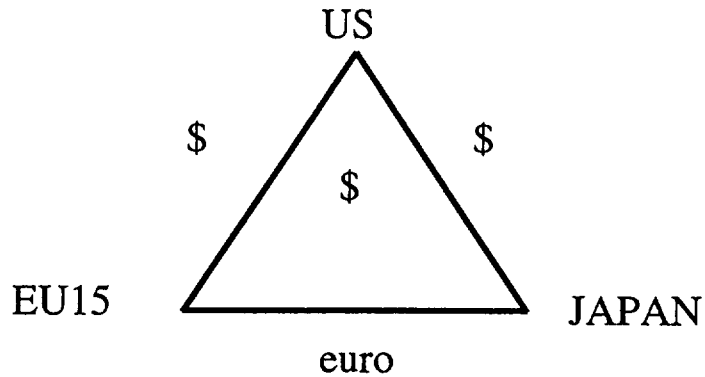
Figure A.2

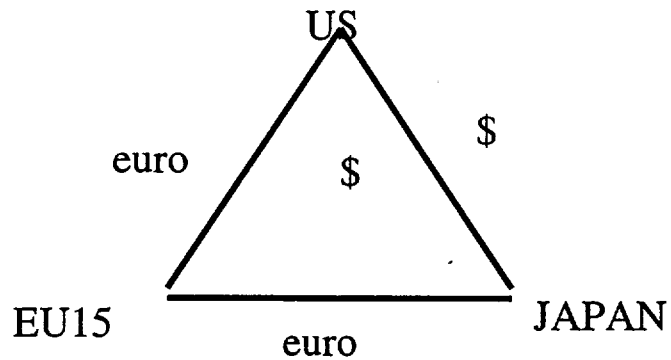**A portfolio shift in favour of the Euro**
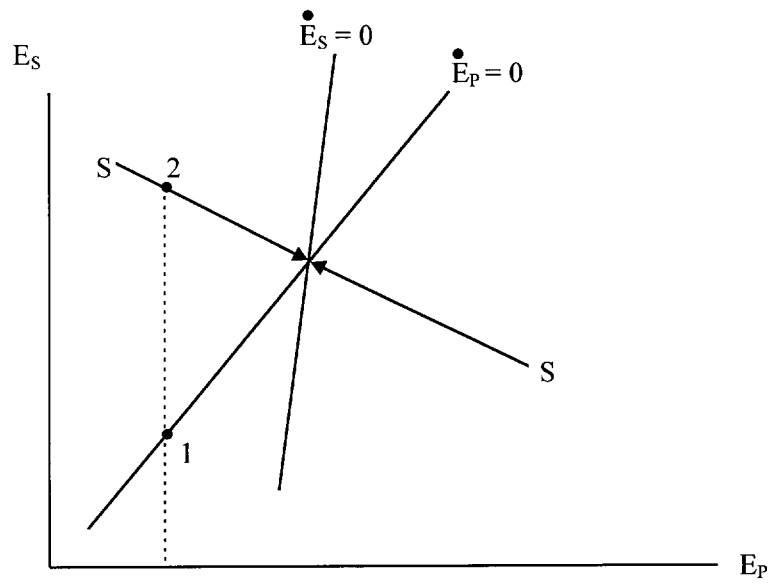
Graph 1
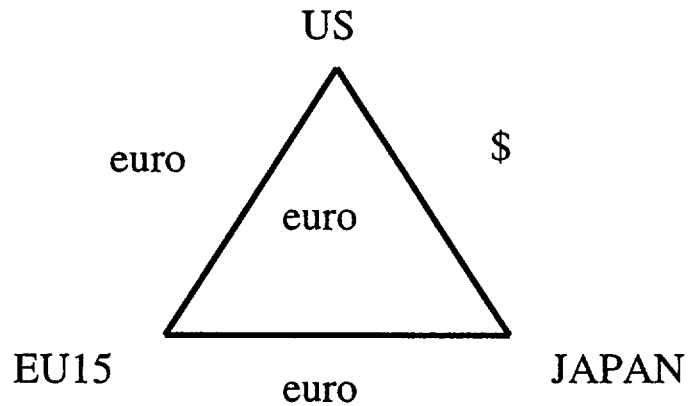**Present situation,**
Status Quo:
dollar vehicle

```
                    US
              $           $
                    $
       EU15                    JAPAN
                    $
```
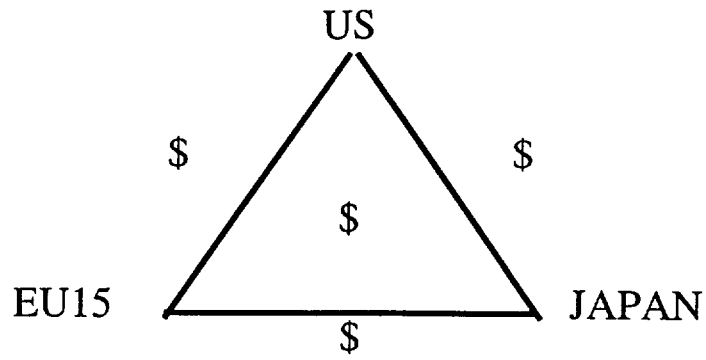
Graph 2
Quasi Status Quo:
dollar vehicle

```
                    US
              $           $
                    $
       EU15                    JAPAN
                  euro
```

Graph 3
Medium euro:
dollar vehicle

```
                    US
           euro           $
                    $
       EU15                    JAPAN
                  euro
```

Graph 4
Big euro:
euro vehicle

```
                    US
           euro           $
                  euro
       EU15                    JAPAN
                  euro
```

The vehicle currency is shown in the middle of each triangle. The dominant currency used for financial exchanges between two blocs appears on the sides of the triangles.