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The Role of the Euro as an International Currency

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Abstract

The creation of the euro will link an economy that is nearly as large and as open as the United States. Does this imply that the euro will rival the role of the dollar as an international currency? This paper addresses this question through an examination of the determinants of the use of an international currency. It examines both the prospects of the euro becoming an international currency and the implications for the European Union and the United States.

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Introduction

The final stage in the creation of the European economic and monetary union (EMU) will entail the replacement of the national currencies of the member states with a single currency -- the euro. This event, which is unparalleled historically, is likely to produce the greatest potential rival to the dollar in international currency markets since the dollar deposed the pound as the pre-eminent international currency. This paper examines the potential role of the euro as international currency through an analysis of the functions of an international currency.

Economists define money as anything which serves the following three functions: a unit of account, a store of value and a medium of exchange. To operate as a unit of account, prices must be set in terms of the money. To function as a store of value, the purchasing power of money must not deteriorate over time.¹ To function as a medium of exchange, the money must be used for purchasing goods and services. Clearly, an international money must also serve these three functions. For an international currency, one used outside its country of issue, these functions are generally decomposed by sector of use -- official and private, as in Table 1.²

A currency serves as an international currency for official purposes if it is used as an official exchange rate peg, if governments and/or central banks hold foreign exchange reserves in this currency, and if it is used as an intervention currency. An international currency for private transactions must function as an invoice currency, financial assets must be denominated in this

¹ This is the most difficult role for currency to achieve. Nevertheless it is a key function for determining if a currency will function as money. In countries experiencing hyperinflation there is both an increase in the use of barter and the use of a foreign currency for transactions purposes.

² This analysis of the three functions of money by sector of use, which is widely used in the literature, was first adopted by Cohen (1971).

currency and it must be used as a vehicle currency through which two other currencies are traded.

An international currency may also become a substitute currency for a domestic currency. In this case it serves all three functions: unit of account, store of value and medium of exchange.

Generally, a substitute currency is used when high inflation or political instability eliminate the store of value function of the domestic currency.

Table 1 Functions of An International Currency		
Function	Sector	
	Official	Private
Unit of Account	Exchange Rate Peg	Invoice
Store of Value	Reserves	Financial Assets
Medium of Exchange	Intervention	Vehicle

The three functions of an international currency reinforce each other. For example, if a country pegs its exchange rate to another currency, it is likely to hold reserves in that currency and conduct its interventions in exchange markets in that currency. On the private side, the use of a currency for invoicing trade and holding financial assets increases the probability that the currency will be used as a vehicle currency. The use of a currency for international private transactions also reinforces its use in official transactions.

The use of a currency in the international exchange of goods, services and assets determines its role as a global currency. Thus, the larger and more open an economy is the more likely its currency is to circulate in international markets. Size and openness in part determine a country's share of global trade and are also important in determining the size of a country's capital markets.

The convertibility of a country's currency is another important determinant of its use in international markets. Restrictions on the ability to exchange a currency for other currencies

will limit its global use. At the end of World War II almost every country, with the exception of the U.S., restricted the convertibility of its currency. This inconvertibility persisted for the first decade following the end of the war. The convertibility of the U.S. dollar prompted its use as the currency in which international trade was conducted. The overall strength and stability of the U.S. economy were also important factors in promoting the dollar's use as an international currency.

The growth of the German and Japanese economies and the relative price stability achieved by these countries has prompted the use of their currencies in international markets. As a result, the overwhelming dominance the dollar held in international markets in the 1950s and 1960s is diminishing. Nevertheless the dollar remains the most important international currency. Partly this is due to the importance of inertia in determining trends in the use of currencies in international markets. For example, the pound sterling continued to play a major role as an international currency long after its dominance of the global economy had waned. The dominant position of the U.S. dollar as an international currency in the early post-war period has in part sustained its use as an international currency as its relative economic power has declined. Another factor favoring the continued use of the U.S. dollar is the size, depth, and liquidity of U.S. financial markets relative to those in Germany and Japan.

The creation of the euro will be a major event in international financial history. If all the current members of the European Union join the EMU the single currency will link an economy that is nearly as large as the United States and significantly larger than the economy of Japan, see Table 2. Likewise the share of world exports of the European Union (excluding intra-E.U. trade) is only slightly below the share of the United States and more than double Japan's share. Do these factors imply that the euro will rival the role of the dollar as an international currency?

Table 2 Comparison of U.S., E.U. and Japanese Economies --1996			
	U.S.	E.U.	Japan
Share of World GDP (%)	20.7	20.4	8.0
Share of World Exports (%)	15.2	14.7	6.1
Source: IMF, <i>World Economic Outlook</i> , October 1997.			

This paper addresses this question through an examination of the recent trends in and the determinants of the use of international currencies for each of the functions listed in Table 1. Furthermore, it considers the prospects that the euro will play a major role in each of the functions and examines the implications of these changes for both the European Union and the United States.

The Official Uses of an International Currency

Exchange Rate Peg

Countries that peg their exchange rate to another currency most often choose the U.S. dollar. At the end of 1975, fifty-two currencies were pegged to the dollar, as shown in Table 3. The French franc was the second most popular choice.³ No currencies were pegged to the Deutsche mark or the Japanese yen. Combining all of the currencies pegged to the currencies of the current members of the European Union still left the dollar as the predominant choice for an exchange rate peg. By the end of 1996, the number of currencies pegged to the dollar had

³ The French franc is used as the currency peg for the member countries of the African Financial Community (CFA).

declined to twenty-one. The French franc was still the second most popular choice, with the Deutsche mark far behind. The Japanese yen still was not used as a currency peg.

Year	U.S. dollar	French franc	Deutsche mark	All E.U. currencies
1975	52	13	0	22
1980	39	14	0	16
1985	31	14	0	15
1990	25	14	1	15
1996	21	14	2	17

Countries currently pegging their currency to the dollar: Angola, Antigua & Barbuda, Argentina, the Bahamas, Barbados, Belize, Djibouti, Dominica, Grenada, Iraq, Liberia, Lithuania, Marshall Islands, Federated States of Micronesia, Nigeria, Oman, Panama, St. Kitts & Nevis, St. Lucia, St Vincent and the Grenadines, Syrian Arab Republic.

Countries currently pegging their currency to the franc: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Mali, Niger, Senegal, Togo.

Countries currently pegging their currency to the DM: Bosnia and Herzegovina, and Estonia.

Source: IMF, *Exchange Arrangements and Exchange Restrictions*, various years.

The decline in the number of currencies tied to the dollar since 1975 is a result of a decline in the popularity of fixed exchange rates rather than a shift away from the dollar. None of the currencies that were tied to the dollar in 1975 have chosen another currency for a peg. Moreover, while most countries no longer claim to peg their exchange rate many do limit the flexibility of their currencies against the dollar. Sixty-two countries explicitly limit the flexibility of their currencies against the dollar, far more than against any other currency.⁴

⁴ IMF (1996).

The major factors which influence the choice of a currency for an exchange rate peg are the extent of a country's trade and financial links with the country whose currency is chosen for the peg. Countries that are heavily dependent on trade in commodities are likely to choose the dollar if they peg their exchange rate since most internationally traded commodities are priced in dollars. In choosing a currency peg the stability of the prospective peg is also important. A high inflation country may choose to peg its exchange rate as a means to restrict the growth rate of its money supply.

The creation of the euro is unlikely to cause countries that currently peg to the dollar to switch to the euro, with the possible exception of Lithuania. For the most part the countries whose currencies are pegged to the dollar are countries whose economies are linked to the U.S. (countries in Latin America and the Caribbean) or oil exporting countries. Nevertheless, it is possible that a number of countries whose currencies are not currently pegged to European Union currencies may decide to peg their currencies to the euro. European Union countries that are not in the first wave of EMU are likely to peg their currencies to the euro, as are countries in the rest of Europe who hope to become members of the European Union. It is less clear that European countries that are not currently prospective E.U. members, such as Switzerland and Norway will adopt a peg to the euro. The European Union is the major trading partner of these two countries. It accounts for 77 percent of Norway's exports and 79 percent of Switzerland's exports. Likewise, 71 percent of Norway's imports and 79 percent of Switzerland's imports come from the European Union. These trade links alone may not cause these countries to adopt a peg to the euro. Canada, for instance, which sends 83 percent of its exports to the United States, and

receives 67 percent of its imports from the U.S. has not felt a need to peg its currency to the U.S. dollar.⁵

Any effect of the increase in the number of countries pegging their currencies to the euro relative to those pegging to the dollar on the European Union and the United States will occur through the effects of these pegs on the use of the euro and dollar in other functions. Countries, for example, that peg their currencies generally hold most of their foreign exchange reserves in the currency to which they are pegged.

Reserve Currency

In 1975 the dollar accounted for 79 percent of the foreign currency reserves held by the member countries of the International Monetary Fund. The Deutsche mark had a 6 percent share of foreign exchange reserves and the pound sterling had a 4 percent share. The combined share of the currencies of the current members of the European Union was 12 percent.⁶ The yen accounted for only 0.5 percent of foreign currency reserves. In 1996 the dollar's share of international foreign currency reserves had fallen to 64 percent, while the pound's share remained steady at 4 percent. In contrast, the shares for the mark and the yen had risen to 14 and 6 percent, respectively. The share of the European Union currencies rose to 20 percent.

Figures 1a-1d show the shares of the U.S. dollar, the Japanese yen, the Deutsche mark, and the combined share of E.U. currencies in official holdings of foreign exchange since 1973.

⁵ Trade data are for 1996 and are from the IMF (1997).

⁶ The only E.U. currencies for which data are reported are the DM, the French franc, pound sterling and the Netherlands guilder.

The decline in the dollar's share in foreign exchange reserves occurred primarily in the late 1970s and early 1980s, as shown in Figure 1a. While there was a further drop in the dollar's share in the late 1980s, since 1990 the dollar's share has risen and now stands at close to its share in 1985. The inverse of these trends is noticeable in the other charts.

These Figures also provide information on each currency's share in foreign exchange reserves in the industrial and developing countries. Throughout the 1970s and 1980s the developing countries always had more diversified holdings of foreign currencies than did the industrial countries. Currently, however, the dollar's share in the official foreign currency holdings is nearly identical in the developing and industrial countries. Developing countries, however, now hold a much smaller share of their reserves in Deutsche marks than do the industrial countries.⁷

The determinants of the currency composition of reserves varies across developing and industrial countries⁸. In the former trade and financial links are important factors. Reserves remain important for financing imports in developing countries, whereas in industrial countries private markets generally fulfill this role. Thus, the currencies in which imports are invoiced in developing countries is a key determinant of the composition of reserves. It was generally believed that the greater reserve diversification on the part of the developing countries was a result of the greater importance of reserves in financing trade.

⁷ Most of the Deutsche mark reserves held by industrial countries are accounted for by the European Union countries. Data in Masson and Turtelboom (1997) indicate that the European Union countries held 69 percent of the Deutsche mark reserves held by industrial countries in 1995.

⁸ See Ben-Bassat (1980, 1984) and Dooley et al (1989).

Reserves also are important for financing the foreign debt of developing countries. The currency composition of this debt will affect the currency composition of the demand for reserves. As shown in Table 4, the long-term debt of developing countries is most commonly denominated in U.S. dollars. Moreover, the percent of developing country debt denominated in the currencies of the European Union countries has declined sharply since the 1970s. Nevertheless, the dollar's share in the foreign currency reserves of developing countries outweighs its importance in financing debt.

Table 4				
Currency Composition of Long-term Debt in Developing Countries				
(percent)				
Currency	1970	1980	1990	1995
U.S. dollar	45.6	47.2	40.3	44.3
Japanese yen	2.2	5.8	9.9	11.6
Deutsche mark	8.6	6.4	8.6	7.3
French franc	5.3	5.3	5.4	4.5
Pound Sterling	11.6	3.3	2.2	1.4
All E.U. Currencies	25.5	15.0	16.2	13.2
Multiple Currencies	12.1	10.3	14.3	14.2
Source: World Bank, <i>Global Development Finance</i> , 1997.				

In both developing and industrial countries the exchange rate arrangement affects the currency composition of international reserves. Heller and Knight (1978) provided an early analysis of this effect. They showed that if a country pegged its exchange rate to a particular currency that currency's share in its reserves rose. Dooley et al (1989) argued that for industrial countries the exchange rate arrangement was the most important determinant of the composition of international reserves. In particular, countries with a flexible exchange rate had a high share

of dollar reserves and a low share of Deutsche mark reserves. The importance of the exchange rate arrangement in determining the currency composition of a country's reserves is linked to the use of these reserves for intervening in the currency markets. This is discussed in the next section.

The risk and return on currencies is also a factor in determining the currency composition of reserves. Most reserves are held in the form of government securities. Thus, changes in the relative return on these securities in conjunction with the depreciation risk, particularly if sustained over a long-period may cause shifts in a country's composition of reserves. In addition the liquidity of government securities markets is a factor in determining the choice of reserve currency since reserves may need to be sold quickly for intervention purposes.

Much of the focus on the effects of the creation of the euro on the composition of international reserves has been on changes in reserve holdings that will occur among the members of the EMU. Monetary union will have two effects on members reserves. First, any holdings of the currencies of the members of the monetary union will cease to be international reserves. This will reduce total reserves and increase (at least initially) the dollar's share in the international reserves of the EMU countries. Second, the pooling of reserves will result in a decline in the need for total reserves, as will the reduction in the need for reserves for intervention purposes.

A recent study indicates that if all fifteen members of the European Union join EMU, total reserves of the member states will decline from \$295.5 billion to \$204.7 billion as a result of the elimination of the reserve status of the European Union currencies.⁹ This reduction, as

⁹ See Masson and Turtelboom (1997).

noted above, will increase the dollar's share in the reserves of these countries. Even a further reduction in the foreign exchange reserves of the members of the monetary union will leave the dollar's share of foreign exchange reserves above its current share. Only through a diversification of the remaining reserves would the dollar's share fall.

For the euro to rival the dollar as an international reserve currency, non-EMU countries will have to significantly shift the portfolio composition of their reserves. While it is likely that other European countries may shift some of their reserves from dollars into euros, a pivotal shift in the worldwide composition of reserves will require major changes in the reserve composition on the part of Latin American and Asian countries. There is no evidence that such a large shift in reserves will follow from the creation of the euro. China for example, recently announced that it would not consider exchanging any of its dollar reserves for euro reserves until the euro had proven itself to be a "hard and stable currency after years of running".¹⁰

Certainly as the euro's use as an international medium of exchange rises, countries are likely to increase their holding of euro reserves. These actions will lead to gradual rather than sharp shifts in the composition of reserves.¹¹ This point is also made by Johnson (1994) who argues that as long as the Federal Reserve achieves an acceptable degree of price stability in the United States, changes in reserve holdings will remain gradual.

The implications of a diversification of international reserves away from the U.S. dollar and toward the euro depend on the speed at which such a change would occur. A massive sale of dollars by central banks and purchase of euros would cause a sharp drop in the value of the dollar

¹⁰ Harding (1997)

¹¹ This point is made by Kenen (1993) page 265.

relative to the euro. Such a shift should also raise interest rates on U.S. government securities since, as noted above, most reserves are held in government securities. In contrast, the euro would temporarily rise in value and interest rate in the EMU countries would drop. However, the general consensus is that any shift in reserves from dollars to euros is likely to occur gradually.¹²

As noted above, it is likely that the need for reserves on the part of the EMU member countries will decline following the pooling of reserves. While estimates of excess reserves in the European Union as a result of monetary union vary, these countries are not likely to dump these reserves in currency markets. It is even possible that the EMU countries will want to maintain a large stock of reserves for several years following the creation of the euro to respond to a possible currency crisis.

A gradual shift in international reserves toward the euro is unlikely to have much effect on the United States or the European Union. Because nearly all international reserves are invested in government securities, the reserve currency country does not gain any seignorage benefits. The most important benefit is the possibility that reserve currency status lowers the interest rate at which the government can borrow. Thus, it is argued that Europe will benefit through a reduction in the interest rate at which governments can borrow while the U.S. government will see its borrowing costs rise.

A negative interest rate effect on the U.S. would require not simply a rise in the share of reserves held in euros but an absolute decline in holdings of dollar reserves. Given the trends in the growth of worldwide reserves, the latter change will take longer (if ever) to occur than the former. In addition, the extent of the interest rate benefit to a reserve currency is not well-

¹² One writer who has argued that the shift may be immediate is Bergsten (1997).

established. Blinder (1996) is skeptical of the importance of such a link. He argues that if such a benefit were significant then there should be a larger difference between interest rates on government and corporate bonds in the U.S. than in other major countries, yet finds no evidence to support this argument.

Intervention Currency

A corollary to the dollar's role as the primary international reserve currency is its use as the main currency for intervening in foreign exchange markets. This latter role is also aided by the use of the dollar as a vehicle currency and by the liquidity of the U.S. bond market, as discussed later in this paper. Although data on interventions are limited, it is believed that nearly all intervention in the currencies markets, with the exception of those undertaken by the United States, takes place in dollars. Another exception is within the ERM, where mandatory intervention must take place in the EMS currencies.¹³ However, even here the dollar is often used for intra-band interventions.¹⁴

The most important determinants of the choice of intervention currency are liquidity and acceptability. In countries that peg their exchange rate, the currency peg will determine the intervention currency. Since countries prefer to hold their reserves in the form of interest-earning assets the liquidity of these assets is extremely important. The relative illiquidity of the

¹³ Intervention is mandatory when a currency reaches the limits of its exchange rate bands. However, intervention often occurs before a currency reaches the limit.

¹⁴ Giavazzi (1989) provides some evidence on the use of the dollar as an intervention currency in the ERM in the 1980s.

German and Japanese bond markets, gives the dollar an advantage over the use of these two currencies.¹⁵

The acceptability of an international currency is related to its role as a medium of exchange for private transactions. The more frequently a currency is used for private transactions the larger is the exchange market for that currency, which increases the ease with which a country can use the currency for intervention purposes.

The Private Uses of an International Currency

Invoice Currency

The dollar is the predominant international currency that serves a unit of account function for private transactions. The U.S. dollar is used as the invoice currency for roughly 48 percent of world exports, as shown in Table 5. The Deutsche mark is the invoice currency for approximately 15 percent of world exports, with the yen's share far behind at 5 percent. In fact, the French franc and the pound sterling are more often used to invoice trade than is the yen.

The share of the U.S. dollar as an invoice currency far surpasses the share of any other currency. However, the combined share of the 5 major currencies of the European Union, at 34 percent, does come closer to that of the dollar. Nevertheless, there is a clear distinction between the use of the dollar and other invoice currencies. Nearly all international trade that is not invoiced in the currency of one of the two trading partners is invoiced in U.S. dollars. Roughly

¹⁵ The existence of swap arrangements between central banks can offset some these liquidity problems.

25 percent of world trade does not involve the United States but is priced in dollars.¹⁶ In addition a much higher percentage of trade involving the United States is conducted in its own currency than is true for other countries. For example, about 80 percent of U.S. imports are invoiced in dollars, while 56 percent of German imports are invoiced in marks and 17 percent of Japanese imports are invoiced in yen.¹⁷

Currency	1980	1987	1992
U.S. dollar	56.1	47.9	47.6
Japanese yen	2.1	4.0	4.8
Deutsche mark	13.6	16.1	15.3
French franc	6.2	6.5	6.3
British pound	6.5	5.5	5.7
Italian lira	2.2	3.2	3.4
Netherlands guilder	2.6	2.8	2.8
E.U.-5 ¹	31.1	34.1	33.5
¹ E.U.-5 is the share of the five E.U. currencies listed in the table. No data were available for the other E.U. currencies Source: Hartmann (1996).			

Studies on the invoicing of world trade revealed the following patterns.¹⁸ Trade in manufactured goods among the industrial economies is most often priced in the currency of the exporter. If the exporter's currency is not used then the importer's currency is the most frequent

¹⁶ One reason for the use of the dollar in non-U.S. trade is the dollar pricing of internationally traded commodities.

¹⁷ Blinder (1996), page 132.

¹⁸ See for example Grassman (1973), Page (1981) and Black (1990).

choice. Only rarely is a third country's currency used. Trade between industrial and developing countries is generally priced in the currency of the industrial country or that of a third country. Trade between developing countries is often priced in the currency of a third country. When a third country's currency is used for invoicing trade, the U.S. dollar is the most likely choice. The limited use of developing countries' currencies in world trade arose in part because many of these countries restricted (and some continue to restrict) the convertibility of their currencies. Trade in primary commodities is almost always invoiced in U.S. dollars since these products are priced in dollars on international exchanges.

Another factor in the choice of an invoice currency is the expected stability of the currency. The share of a country's exports denominated in its domestic currency declines the greater is the expected depreciation of its currency.¹⁹ Thus the currencies of countries plagued by inflation are seldom used in international trade.

The creation of the euro should foster its use as an invoice currency. Replacing as many as 15 currencies with a single currency reduces the transaction costs involved in currency exchanges.²⁰ The reduction in transactions costs will facilitate the use of the euro by the smaller EMU member countries who are more likely to currently invoice their exports to the U.S. in dollars. In intra-European Union trade the use of the dollar is negligible and so the creation of the euro will have no noticeable effect.²¹

¹⁹See Black (1990) pages 185-86.

²⁰ As Hartmann (1996) notes "a deep and broad foreign exchange market" is an important determinant of the use of a currency for invoicing trade.

²¹ See Page (1981) page 62.

It is not obvious, however, that trade involving neither the E.U. nor the U.S. that is currently invoiced in dollars will be invoiced in euros following the EMU. Nor does it follow that the pricing of internationally traded commodities will shift from dollars to euros, at least not in the near term. The location of major commodity exchanges in the United States, while not a necessary requirement for dollar pricing, does increase the likelihood that these commodities will continue to be priced in dollars. While it is possible that an integrated Europe will develop commodity exchanges to rival those of the U.S. such a shift is likely to be gradual. Most importantly, any shift in pricing of these commodities is unlikely to occur until the stability of Europe's new monetary system is well-established.

What effects will the use of the euro as an invoice currency have on Europe and the United States? The biggest gain is likely to come in the reduction in transactions costs when trading in the currencies of the smaller EMU member states. However, such gains will occur even if the share of the euro in invoicing is no greater than the current combined shares of the individual EMU member currencies. A rise in the share of EMU imports invoiced in euros may reduce the exposure of its importers to short-term exchange rate variability. A decline in the share of U.S. imports invoiced in dollars would have the opposite effect. However, there exist a wide range of options for importers to hedge the risk of exchange rate changes. More importantly, there is little evidence that the use of a currency for invoicing trade reduces the pass-through of exchange rate changes on import prices.²²

A switch from dollar to euro invoicing in international trade not involving the U.S. or the EMU countries will have no effect on either. Thus, a shift in international commodity pricing

²²See Menon (1995) for a recent survey of pass-through studies.

from dollars to euros will affect the U.S. only to the extent that it increases the exposure of U.S. importers to exchange rate risk. The effect on the EMU countries will occur to the extent that exchange rate risk is reduced. These effects depend on the extent to which commodity prices are less volatile in dollars than in European currencies. Emerson et al (1992) states that in the medium to long-run the currency denomination of oil prices does not affect the real price of oil. However, they argue that because of differences in short-run volatility there may be advantages to the European Union from having oil priced in euros.

The idea that the currency denomination of oil prices does not affect the real domestic currency price of oil over time is supported by an examination of the data for the United States and Germany. The argument that the real price of oil in Deutsche marks (or any non-dollar currency) is more volatile than the real price of oil in dollars is based on the idea that exchange rate fluctuations add another source of variability to the price. That is, the real price of oil in the U.S. depends on the dollar price of oil in international markets and the U.S. inflation rate while the real price of oil in Germany depends on the dollar price of oil in international markets, the mark/dollar exchange rate and the German inflation rate. The evidence, however, indicates that there is a negative covariance between the exchange rate and the inflation rate which over time eliminates any increased variability from the exchange rate. The variances of the monthly real price of oil in dollars and in Deutsche marks over the period January 1985 through August 1997 were virtually identical.²³ Thus, a shift in oil pricing in international markets from dollars to euros will not reduce the variability of the real price of oil in European markets.

²³ An F-test indicated that the probability that the variances of the two oil price series were different was less than .01 percent.

Financial Assets

In international financial markets the dollar is the currency of choice, although once again currency diversification is rising. In the 1950s over three-quarters of the funds raised on financial markets were denominated in dollars, as shown in Table 6. The pound sterling was the second most popular currency, accounting for 8 percent of international capital market issues, and nearly 70 percent of the funds raised in the currencies of the current European Union members. The Swiss franc was the third most popular currency, accounting for 7 percent of international capital market issues. Almost 94 percent of the funds raised on international capital markets were denominated in these three currencies. The yen was not used at all in international financial markets in the 1950s and only 2 percent of funds raised in international markets were in Deutsche marks.

Currency	1950-59	1960-69	1970-79	1980-89	1990-95
U.S. dollar	78.2	69.9	76.5	63.1	50.5
Japanese yen	0	0	2.3	7.3	10.0
Swiss franc	7.1	5.4	7.2	6.6	4.0
Deutsche mark	2.0	16.3	8.6	5.3	7.8
Pound sterling	8.3	2.9	1.0	6.9	7.2
Total E.U. ²	11.9	22.6	12.3	18.4	30.2

¹ Funds raised in international markets include international bond issues (foreign bonds and Euro-bonds), syndicated loans, and other debt facilities.
² Total E.U. includes all current E.U. currencies and currency composites, such as the ecu.
Source: OECD, *International Capital Market Statistics*, 1996.

In the 1990s half the funds raised on international financial markets were denominated in dollars and 30 percent were denominated in European Union currencies with the Deutsche mark

being used only slightly more often than the pound. The yen's share rose to 10 percent while the share of the Swiss franc fell to 4 percent.

Table 7 provides information on the use of currencies in international bond markets. In these markets the share of the dollar has declined by half since the 1950s while the share of the yen and the European Union currencies have risen substantially. Nonetheless, with the exception of the rise in the use of the yen, the trends have not been smooth,

In foreign bond issues, the use of the Swiss franc has grown to rival the use of the dollar. In the 1980s the Swiss franc was clearly the currency of choice for foreign bond issues, with its share being more than double that of the dollar. The share of the European Union currencies peaked in the 1960s. The decline in the use of the mark since the 1960s is particularly noteworthy. So far this decade, no foreign bonds have been issued in Deutsche marks.

In the Euro-bond market it is the European Union currencies that currently rival the dollar. While the dollar has historically held the major share of this market, in the 1990s its share is slightly below that of the E.U. currencies. The mark currently accounts for slightly more than one-third of the combined share of the European Union currencies, but its importance is declining as a result of a sharp increase in French franc Euro-bond issues (the franc's share in the E.U. currencies rose from 5 percent in the 1980s to 18 percent in the 1990s) and the entry into the Euro-bond market of the lesser E.U. currencies. The Swiss franc is rarely used in Euro-bond issues in contrast to its strong presence in the foreign bond market.

In contrast to the trends in international bond markets, the dollar remains the clear currency of choice in the syndicated loans market, as Table 8 indicates. The share of the Japanese yen rose to nearly 7 percent in the 1980s but has fallen to less than 1 percent in the 1990s. Neither the Swiss franc nor the Deutsche mark are used frequently in international

syndicated bank lending. The pound is the predominant European currency used in syndicated lending.

Table 7					
Funds Raised in International Bond Markets					
By Currency of Issue					
(percent)					
Currency	1950-59	1960-69	1970-79	1980-89	1990-96
Total Bonds					
U.S. dollar	78.2	69.9	49.2	50.7	36.6
Japanese yen	0.0	0.0	5.2	8.9	14.8
Swiss franc	7.1	5.4	17.5	11.4	6.0
Deutsche mark	2.0	16.3	17.9	8.0	10.3
Pound sterling	8.3	2.9	0.6	6.4	7.4
Total E.U. ¹	11.9	23.4	24.8	22.6	36.5
Foreign Bonds					
U.S. dollar	78.2	65.1	42.2	19.7	32.9
Japanese yen	0.0	0.0	9.5	14.6	19.3
Swiss franc	7.1	8.5	33.4	50.1	30.9
Deutsche mark	2.0	16.4	8.3	4.7	0.0
Pound sterling	8.3	2.3	0.2	2.3	0.1
Total E.U. ¹	11.9	25.3	13.2	15.3	16.7
Euro Bonds					
U.S. dollar	--	77.9	56.1	59.7	39.6
Japanese yen	--	0	0.4	7.5	12.7
Swiss franc	--	0	0	0.01	0
Deutsche mark	--	17.8	28.4	9.0	13.6
Pound sterling	--	1.6	1.1	7.6	8.9
Total E.U. ¹	--	22.1	37.5	24.7	41.2
¹ Total E.U. includes all current E.U. currencies and currency composites, such as the ecu.					
Source: OECD, <i>International Capital Market Statistics</i> , 1996 and <i>Financial Statistics Monthly</i> , June 1997.					

Table 8 International Syndicated Loans -- By Currency of Issue (percent)					
Currency	1950-59	1960-69	1970-79	1980-89	1990-95
U.S. dollar	--	--	95.3	76.1	78.9
Japanese yen	--	--	0.3	6.8	0.8
Swiss franc	--	--	0.1	0.6	0.2
Deutsche mark	--	--	2.1	2.2	3.2
Pound sterling	--	--	1.3	7.5	7.1
Total E.U. ¹	--	--	3.7	13.9	19.1
¹ Total E.U. includes all current E.U. currencies and currency composites, such as the ecu. Source: OECD, International Capital Market Statistics.					

In other bank facilities the dollar dominance is most obvious. As shown in Table 9, 91 percent of these debt facilities are made in dollars. The pound is the only other currency that plays a significant role in this market, accounting for 4 percent of total issues and two-thirds of the issues in European currencies.

Table 9 Other Debt Facilities in International Markets ¹ By Currency of Issue (percent)					
Currency	1950-59	1960-69	1970-79	1980-89	1990-95
U.S. dollar	--	--	--	88.9	91.0
Japanese yen	--	--	--	0.02	0
Swiss franc	--	--	--	0.01	0.1
Deutsche mark	--	--	--	0.09	0
Pound sterling	--	--	--	7.5	3.9
Total E.U. ¹	--	--	--	9.4	5.9
¹ Includes other medium-term bank facilities such as underwritten facilities to back up the issue of other financial instruments as well as precautionary credit lines arranged in the context of take-over bids. ² Total E.U. includes all current E.U. currencies and currency composites, such as the ecu. Source: OECD, International Capital Market Statistics.					

The decline in the dollar's dominance in world capital markets, reflected in these tables, is a result of the emergence of other strong economies that in conjunction with the liberalization and deregulation of financial systems worldwide has increased the attractiveness of assets denominated in other currencies. This is particularly evident in the bond markets where there has been a rapid increase in the number of currencies used.

The use of a country's currency in international capital markets is determined by the size, openness and liquidity of that country's financial markets and the stability of its currency. All but the last of these factors favor the U.S. dollar over the Japanese yen and European currencies. European and Japanese markets are segmented relative to the U.S. market. While worldwide capital markets are becoming more open and integrated leading to an increased use of currencies other than the dollar in capital transactions, the U.S. market still leads the world in size and liquidity.

With the establishment of a single currency in the European Union the value of private assets denominated in euros will rival the size of the U.S. capital market.²⁴ However, the creation of the euro alone will not ensure that this market becomes integrated or more liquid. The creation of the euro will increase the range of assets in the European Union that are denominated in a single currency. This increase in the depth of the European financial market should increase its attractiveness to international investors. The establishment of a common

²⁴ If all the European Union countries join the EMU the size of the European capital market will exceed the U.S. capital market. According to Prati and Schinasi (1997), the market value of equities, bonds and bank assets issued by E.U. countries as of the end of 1995 was \$27 trillion while the market value of comparable U.S. issued assets was \$23 trillion..

system for settling inter-bank payments should aid in the development of a more liquid market further increasing its attractiveness.

The establishment of the euro will also reduce barriers to cross border investment among the members of the monetary union. For example, insurance companies and some pension funds within the European Union are restricted in their ability to issue international debt. Liabilities in a foreign currency must be 80 percent matched by assets in that same currency. With the creation of the euro this matching rule will be irrelevant for intra-EMU investments.

Despite these boosts for a more integrated, liquid and thick capital market from the creation of the euro, there will remain limitations on the European capital market. Currently, as Prati and Schinasi (1997) note, the European markets for debt and equity securities retain distinctly national orientations. The establishment of a single currency will not end these distinctions. Furthermore, while some writers note that the government bond market in a full-membership EMU will equal the size of the U.S. government bond market, there is a key distinction. In the U.S. there is a single issuer -- the U.S. Treasury. The European government bond market under EMU will be more similar to the bond markets for the U.S. states, both in terms of the existence of risk difference among issuers and the lack of a wholly integrated market.

In the United States, the Federal Reserve also plays a role in promoting the liquidity of the government bond market. Prati and Schinasi (1997) argue that the use of open market operations as the primary tool of monetary policy by the Federal Reserve "has fostered the development of efficient money and securities markets in the United States." Whereas, the infrequent interventions by European central banks in securities markets "has tended to discourage the development of private securities markets and foster the predominance of bank-

intermediated finance.”²⁵ The extent to which this occurs in Europe depends on the still to be finalized operating procedures of the European Central Bank. The current proposal, however, does not differ much from the current operating procedures of the major European central banks.²⁶

The euro will provide an opportunity for the development of a European capital market to rival the advantages of the U.S. market, but it does not guarantee the creation of such a market. The movement to a common currency should give an initial boost to European capital markets but it is not likely to cause significant shifts in the currency composition of private portfolios. Given the uncertainty likely to surround the euro in its early years, it is even possible that there may be an initial shift of private portfolios away from euros toward the dollar or other non-EMU European asset markets, such as Switzerland.²⁷

Vehicle Currency

Currently, the dollar is by far the primary international medium of exchange. While there is no direct data on vehicle currencies, this information can be gleaned from the shares of currencies in all foreign exchange transactions. As shown in Table 10, the dollar is involved in

²⁵ Prati and Schinasi (1997), pp. 16-17. Prati and Schinasi argue that the daily Fed interventions in the securities markets occurs not simply from a monetary policy objective but the desire to promote “the smooth functioning and stability of financial markets.”

²⁶ Prati and Schinasi (1997), page 17.

²⁷ Laxton and Prasad (1997) examine the implications of a shift away from E.U. assets to Swiss assets as a result of uncertainty surrounding the EMU.

83 percent of all currency exchanges.²⁸ The Deutsche mark is the second most frequently traded currency, appearing in 36 percent of all exchanges. The yen is the third most frequently traded currency taking part in 24 percent of all currency trades. Nevertheless the yen rarely serves as a vehicle currency as 88 percent of all of these trades are with the dollar.²⁹ The dollar and the Deutsche mark are the only currencies that are “traded in large quantities against a wide range of other currencies.”³⁰ The dollar’s dominance is especially clear in forward and swap transactions. The dollar is involved in 79 percent of all forward trades compared to the Deutsche mark’s and yen’s shares of 31 of 29 percent, respectively. In swaps the contrast is even greater. The dollar is involved in 95 percent of all swaps, with the Deutsche mark and yen taking part in 21 and 25 percent, respectively, of all trades,.

Table 10
Foreign Exchange Market Transactions Involving Select Currencies
 (Percent of total)
 April 1995

Category	US dollar	Japanese yen	Deutsche mark	Pound sterling	French franc	Other E.U.	All E.U. ¹
Spot	71	22	54	9	8	13	84
Forwards	79	29	31	10	7	17	66
Swaps	95	25	21	9	8	19	56
Total	83	24	36	9	8	15	69

1. All E.U. includes the currencies of the 15 members of the European Union and the ecu.
 Source: Bank for International Settlements, *Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1995*, Basle: May 1996, Table 1-A.

²⁸ Since there are always two currencies involved in an exchange the total share of all currencies traded on international exchanges will equal 200 percent. However, a single currency can at most be involved in 100 percent of all exchanges.

²⁹ In contrast, 56 percent of all trades involving the Deutsche mark are with the dollar.

³⁰ Bank for International Settlements (1996).

In the spot market, the total share of the European Union currencies exceeds that of the dollar. However, much of this activity involves intra-E.U. currency trades which will disappear after the creation of the euro. In the forward and swap markets the E.U. currencies are used less frequently than the dollar, but maintain an notable presence.

The emergence of a currency as a vehicle currency is determined primarily by transactions costs. Transactions costs are inversely proportional to volume in each bilateral currency market.³¹ This volume, is in turn determined by a currency's share in international trade and capital flows. Thus, the use of a currency in invoicing international trade, in international capital markets and as a reserve currency all lower the transactions costs associated with the use of that currency.

A vehicle currency emerges whenever the indirect exchange costs through the vehicle are less than direct exchange costs between two non-vehicle currencies. For example, given the depth of the exchange market for dollars it may be less costly to exchange Mexican pesos for U.S. dollars and then exchange U.S. dollars for Malaysian ringgit then to exchange pesos directly for ringgits. Indeed, the existence of transaction costs may reinforce the use of the dollar as an invoice currency.

The extent of liquidity in asset markets also affects the development of a vehicle currency. Banks, like countries, prefer to hold most of their foreign currencies in the form of interest-earning assets rather than cash. The liquidity of these assets is a key determinant of the transactions costs involved in switching from one currency to another. Liquidity is determined

³¹ The use of transactions cost theory to explain the rise of a vehicle currency was developed by Krugman (1980) and Chrystal (1984).

not simply by the size of a country's capital markets but by the depth of its markets, i.e. the extent to which secondary markets operate.

The prospects of the euro becoming an important vehicle currency thus depend primarily on the transactions costs associated with euro exchanges. Clearly the size of the euro market relative to the markets for individual E.U. currencies will result in lower relative transactions costs for the euro. These transactions costs will also depend on the extent to which the euro is adopted as an invoice currency, a reserve currency, and its use in international capital markets. Since any changes in these uses are expected to occur gradually, the use of the euro as a vehicle currency should also occur gradually.

Initially the development of the euro is apt to increase the use of the dollar as a vehicle currency regardless of the policy environment surrounding the euro's development. This is because the euro will eliminate intra-EMU trading. Table 11 looks at the use of currencies in foreign exchange market transactions excluding the transactions between the Deutsche mark and other European Union currencies (including ecus). Although data on intra-European currency transactions not involving the Deutsche mark are not available, the numbers in Table 11 provide a rough estimate of the initial effects of the creation of the euro on currency trades. The shares of the European currencies fall while those of the dollar and the yen rise, most notably in the spot market. Accounting for all intra-E.U. currency trades will further raise the shares of the dollar and the yen. The euro, however, will be the second most frequently traded currency with a share well above that of the yen.

Unless markets become highly segmented, as argued by those who foresee the development of a bipolar (euro/dollar) or tripolar (euro/dollar/yen) world, the transactions costs from the use of a primary vehicle currency, rather than competing vehicle currencies, are likely to

be lowest. It is more likely that a period of multiple vehicle currencies would give way to a new primary vehicle currency, much the same way as the dollar superseded the pound as the primary vehicle currency. Such a change, however, will not come about simply because of the creation of a single currency, or even because of the further integration of European capital markets. Thus, while in the medium-term the use of the euro as a vehicle currency should surpass the current usage of individual E.U. currencies, the euro is not expected to supplant the dollar as the primary vehicle currency.

Table 11
Foreign Exchange Market-- Excluding Deutsche mark/E.U. Currency Transactions
 (Percent of total)
 April 1995

Category	US dollar	Japanese yen	Deutsche mark	Pound sterling	French franc	Other E.U.	All E.U.¹
Spot	85	26	45	7	3	7	61
Forwards	85	31	26	9	6	14	56
Swaps	97	26	19	9	7	18	53
Total	91	26	30	8	5	13	56

1. All E.U. includes the currencies of the 15 members of the European Union and the ECU.
 Source: Author's estimates using data from Bank for International Settlements, *Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1995*, Basle: May 1996, Tables 1-A and 1-C.

Substitution Currency

Another role that an international currency may play is a substitute for domestic currency transactions. Uncertainty surrounding the purchasing power of a domestic currency can lead to the use of a foreign currency as a unit of account, store of value and medium of exchange in the

domestic economy. This generally occurs as a result of hyper-inflation and/or political instability.

The dollar and the Deutsche mark are the only currencies that are used extensively outside their borders, with the dollar being the predominate substitution currency. In part the predominance of the dollar is a result of the links between the United States and countries using a substitute currency. Nevertheless, the ease with which the dollar is available, which is determined by its other uses as an international currency, facilitates the use of the dollar as a substitute currency.

Measures of the extent to which the dollar and the mark are used as substitute currencies are not easily obtained. However, the best estimates indicate that 55 to 70 percent of the U.S. currency stock is held outside the country while 35 percent of Deutsche mark holdings are abroad.³²

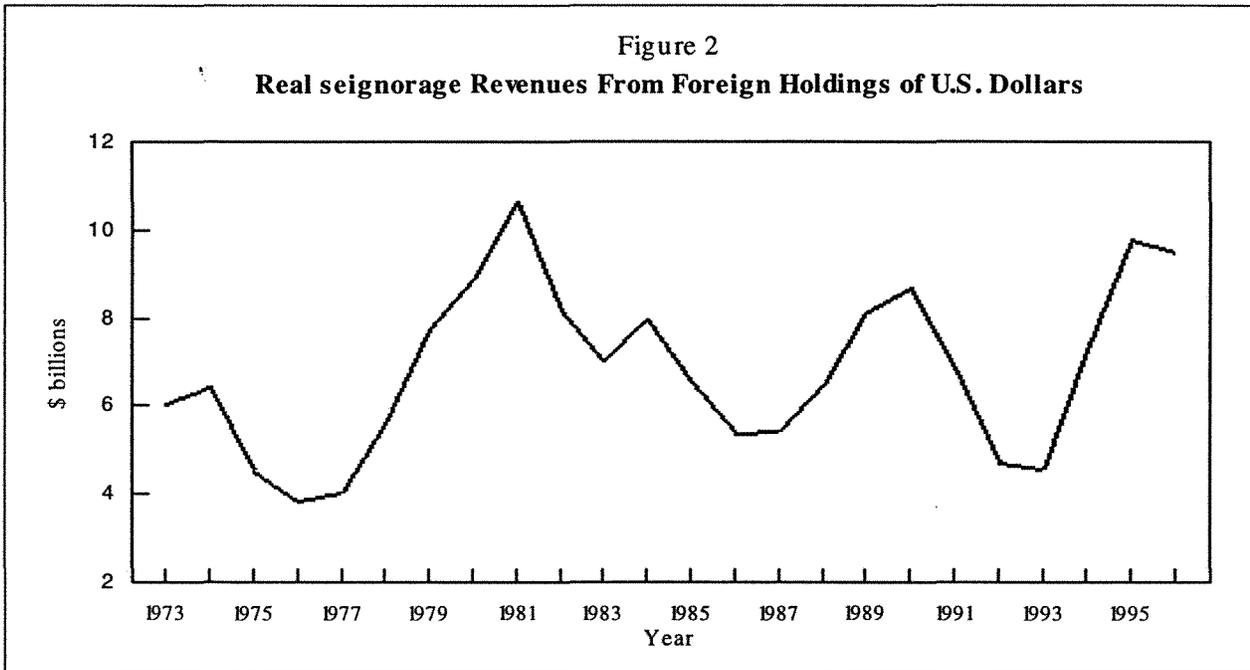
The use of the dollar as a substitute currency provides a direct benefit to the United States through seignorage earnings. Figure 2 provides a rough estimate of the real seignorage earned by the U.S. as a result of foreign holdings of U.S. currency during the period 1973-1996.³³ In real terms seignorage revenues have averaged \$6.9 billion over the 24 year period.

The seignorage benefits must be weighed against the problems the foreign holdings of currency create for monetary policy. As Porter and Judson (1996) note if foreign demand for a country's currency is unrelated to domestic demand, then the interpretation of movements in monetary aggregates becomes more difficult. While the persistence of hyperinflation and

³² Porter and Judson (1996). These data are solely for cash and exclude dollar or Deutsche mark denominated assets or demand deposits held abroad.

³³ These seignorage revenues are estimated using the interest rate on 3-month Treasury bills and adjusting nominal revenues using the GDP deflator.

political instability throughout the world has sustained the use of the dollar as a substitute currency, foreign demand is difficult to predict.



The euro is not likely to rapidly replace the dollar as the substitute currency of choice. In fact, the use of the euro as a substitute currency is likely to lag behind its use as an international currency. Foreign holders of a substitute currency want a stable, secure currency. Uncertainty surrounding the euro and indeed the monetary union itself will limit the attractiveness of the euro. Furthermore, given the monetary control problems caused by the use of a currency outside its borders, the new European Central Bank may be reluctant to promote the use of the euro as a substitute currency in the early years of the monetary union.

In the medium to long-term, however, the euro is the natural substitute currency for use throughout Europe. It may also become used more frequently in the Middle East but the euro is not likely to replace the dollar as the substitute currency in Latin America.

The use of the euro as a substitute currency will raise the seignorage earnings of the ECB. It is difficult to predict how large these revenues might be as they depend on the world demand for substitute currencies, the shares of the euro and the dollar, and interest rate conditions. Emerson et al (1992) estimated that these seignorage revenues would at most amount to \$2.5 billion a year for the ECB.

The effect on the seignorage revenues of the Federal Reserve also depend on the three factors mentioned above. If the world demand for substitute currencies rises seignorage revenues for both the European and U.S. central banks could rise. The unpredictability of the demand for a substitute currency makes it difficult to count on seignorage from these earnings as a source of revenue.

Conclusion

The use of a country's currency as an international currency is determined by the size and openness of its economy and financial markets as well as its macroeconomic policy environment. A low inflationary environment promotes high growth and a stable currency. In the post-war period these factors have favored the use of the U.S. dollar as the predominant international currency. The emergence of other strong economies, particularly Germany and Japan, however, has reduced the dominance of the dollar. The dollar may still be the currency of choice in international markets but it is not the only choice.

The impending creation of the euro as the single currency for the European Union will have a certain effect on international markets. If the euro is adopted by all fifteen members of the European Union it will serve an economy nearly as large as the United States, with a European Central Bank committed to maintaining a low inflation environment.

Initially, however, the emergence of the euro is likely to increase the dollar's role in international markets. First, from an accounting viewpoint, the replacement of the currencies of the European Union with a single currency will eliminate the use of these currencies as foreign reserves for the members of the monetary union and will eliminate foreign currency transactions in intra-E.U. currencies. The former will raise the dollar's share in international reserves and the latter will raise the dollar's share of foreign currency transactions. Second, uncertainty surrounding the euro will favor the use of the dollar in international markets. The policies of the European governments and the European central bank are the most important factors in determining the extent of this uncertainty. Concerns about the attachment of European governments and the public to monetary union will undermine the use of the euro in international markets. A monetary union fraught with conflict will be detrimental to the use of the euro.

The use of the euro as an international currency, and indeed the rate at which the euro becomes adopted for international transactions will also be affected by the decision of the United Kingdom to join or opt-out of monetary union. The international role of the pound sterling has diminished in the post-war era but the pound is still a key currency in private financial market transactions. Furthermore, the role of London as a major financial center will provide benefits to the euro. The inclusion of the U.K. in a monetary union should boost the international presence of the euro.

While the short-term outlook for the euro is uncertain in the medium to long-term its use as an international currency will surely increase. One fact in determining the long-run use of the euro is the development of a highly integrated, liquid European financial market. This will not only increase the use of the euro for private financial transactions but also aid its use as a reserve currency and even as a vehicle currency.

Nevertheless, the decline in the dollar's share and the rise in the euro's share in international transactions is likely to occur gradually. In part this is because the more often a currency is used in international transactions the lower are the costs associated with using that currency and hence the more attractive is the currency for conducting international exchanges. Thus, there is much inertia in the choice of an international currency.

The ultimate determinants of the continued use of the dollar as an international currency are the economic policies and conditions in the United States. As the Deputy Secretary of the U.S. Treasury, Larry Summers noted "In the end, the dollar's relative standing in the international financial system will always depend more on developments here than on events overseas."³⁴ In the absence of an economic crisis in the United States, the dollar is not likely to lose its standing as the most popular international currency.

Any shifts in the roles of the dollar and euro will affect both the United States and the European Union. The extent to which a country benefits from having its currency used internationally is not clear. The use of a currency for invoicing may reduce the costs borne by that country's importers, although these costs may be small at best. The use of a currency as a reserve currency may reduce the borrowing costs of that country's government, but again the extent of this benefit is not known. The use of a currency as a substitute currency does provide seignorage benefits but also complicates monetary policy.

As long as the shift in the international role of the dollar is gradual the U.S. is unlikely to be negatively affected. Moreover, the creation of a monetary union in Europe has the potential to produce benefits to both the United States and the European Union which could far outweigh the

³⁴ Summers (1997).

effects of shifts in international currency holdings. Developments in European financial markets alone should increase the investment options available to consumers as well as reduce the costs of borrowing for businesses. These developments will benefit those on both sides of the Atlantic.

References

- Bank for International Settlements. *Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1995*, Basle: May 1996.
- Ben-Bassat, Avraham, "The Optimal Composition of Foreign Exchange Reserves," *Journal of International Economics*, vol. 10 (May 1980), pp. 285-95.
- _____, "Reserve-Currency Diversification and the Substitution Account," *Princeton Studies in International Finance*, # 53, 1984.
- Bergsten, C. Fred. "The Dollar and the Euro," *Foreign Affairs*, vol. 76, (July/August 1997), pp. 83-95.
- Black, Stanley W. "The International Use of Currencies," in Yoshi Suzuki, Junichi Miyake and Mitsuaki Okabe, eds., *The Evolution of the International Monetary System*. Tokyo: University of Tokyo Press, 1990.
- Blinder, Alan S. "The Role of the Dollar as an International Currency," *Eastern Economic Journal*, vol 22 (Spring 1996), pp. 127-36.
- Chrystal, K. Alec. "On the Theory of International Money," in John Black and Graeme S. Dorrance, eds., *Problems of International Finance*. New York: St. Martin's Press, 1984.
- Cohen, B.J., *The Future of Sterling as an International Currency*. London: Macmillian Press, 1971.
- Dooley, Michael P., J. Saul Lizondo and Donald J. Mathieson. "The Currency Composition of Foreign Exchange Reserves," *IMF Staff Papers*, vol. 36, (June 1989), pp. 385-434.
- Emerson, Michael, Daniel Gros, Alexander Italianer, Jean Pisani-Ferry and Horst Reichenbach. *One Market, One Money*. Oxford: Oxford University Press, 1992.
- Giavazzi, Francesco. "The European Monetary System: Lessons from Europe and Perspectives in Europe," *The Economic and Social Review*, vol. 20 (January 1989), pp. 73-90.
- Grassman, S. "A Fundamental Symmetry in International Payments Patterns," *Journal of International Economics*, vol. 3, pp. 105-16.
- Harding, James. "Foreign Exchange Reserves: Beijing Will Not Convert to 'Soft Euro'," *Financial Times*, October 13, 1997.
- Hartmann, Philipp. "The Future of the Euro as an International Currency: A Transactions Perspective," London School of Economics, *Financial Markets Group Special Papers*, November 1996.

- Heller, H. Robert and Malcom Knight. "Reserve-Currency Preferences of Central Banks," *Princeton Essays in International Finance*, #131, (December 1978).
- International Monetary Fund, *Direction of Trade Statistics Yearbook 1996*, Washington: IMF, 1997.
- International Monetary Fund, *Exchange Arrangements and Exchange Restrictions, Annual Report 1996*. Washington: IMF, 1996.
- Johnson, Karen H. "International Dimension of European Monetary Union: Implications for the Dollar," Board of Governors of the Federal Reserve System, *International Financial Discussion Papers*, # 469, May 1994.
- Kenen, Peter B. "EMU, Exchange Rates and the International Monetary System," *Rescherches Economiques de Louvain*, vol. 59 (1993), pp. 257-81.
- Krugman, Paul. "Vehicle Currencies and the Structure of International Exchange," *Journal of Money, Credit and Banking*, vol. 12, August 1980, pp. 513-26.
- Laxton, Douglas and Eswar Prasad. "Possible Effects of European Monetary Union on Switzerland: A Case Study of Policy Dilemmas Caused by Low Inflation and the Nominal Interest Rate Floor," *IMF Working Paper # 97/23*, March 1997.
- Masson, Paul R. and Bart G. Turtelboom. "Characteristic of the Euro, the demand for Reserves, and Policy Coordination Under EMU," *IMF Working Paper # 97/58*, May 1997.
- Menon, Jayant. "Exchange Rate Pass-Through," *Journal of Economic Surveys*, vol.9 (June, 1995) pp. 197-231.
- OECD, *International Capital Market Statistics 1950-1995*, Paris: OECD, 1996
- OECD, *Financial Statistics Monthly, Section I*, Paris: OECD, June 1997.
- Page, S. "The Choice of Invoicing Currency in Merchandise Trade," *National Institute Economic Review*, vol 85, pp. 60-72.
- Porter, Richard D. And Ruth A. Judson. "The Location of U.S. Currency: How Much is Abroad?," *Federal Reserve Bulletin*, vol. 82 (October 1996), pp. 883-903.
- Prati, Alessandro and Garry J. Schinasi, "European Monetary Union and International Capital Markets: Structural Implications and Risks," *IMF Working Paper # 97/62*, May 1997.
- Summers, Larry H. *Testimony Before the Senate Budget Committee*, October 21, 1997.
- World Bank, *Global Development Finance, volume 1*, Washington: IBRD, 1997.

Figure 1a
Share of the U.S. Dollar in Foreign Exchange Reserves

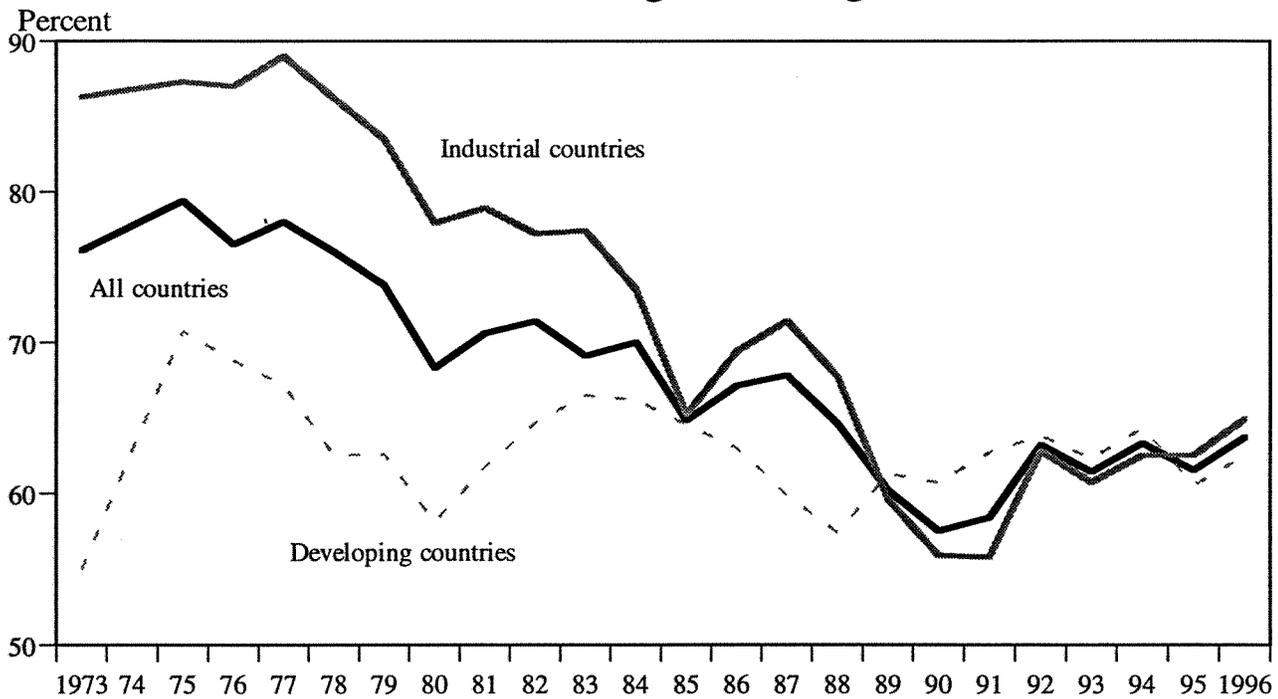


Figure 1b
Share of the Japanese Yen in Foreign Exchange Reserves

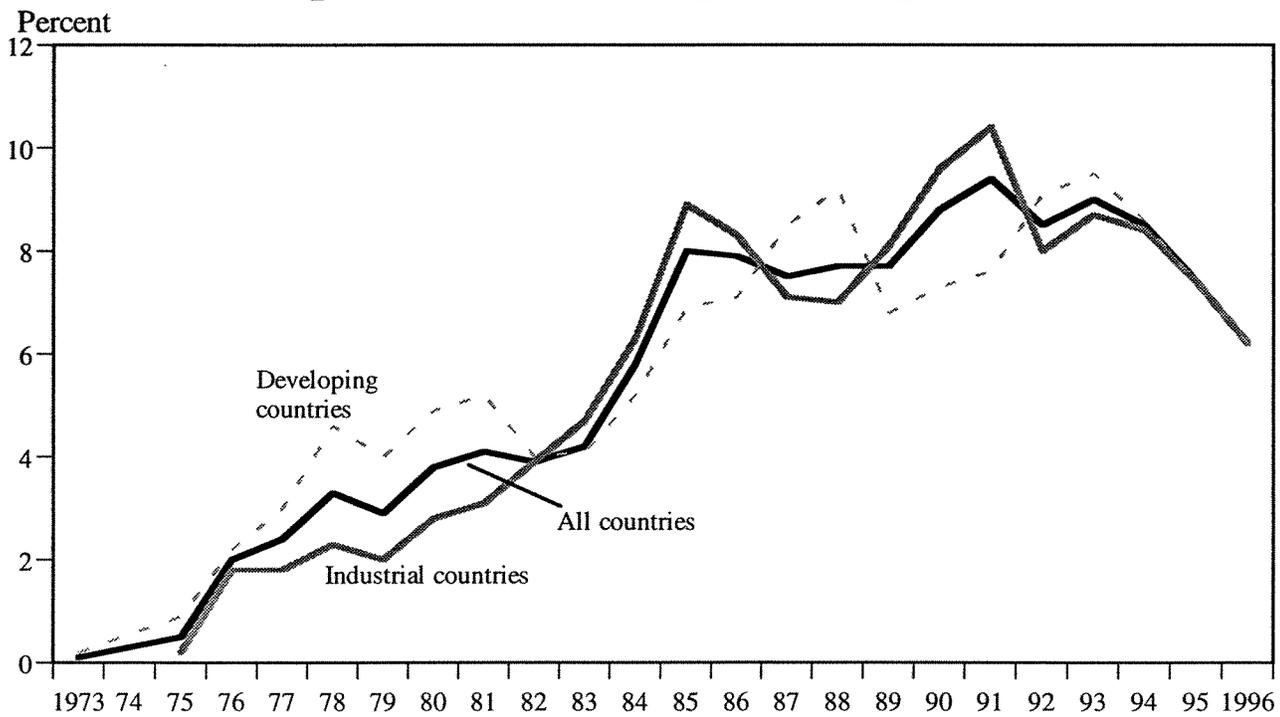


Figure 1c
Share of the Deutsche Mark in Foreign Exchange Reserves

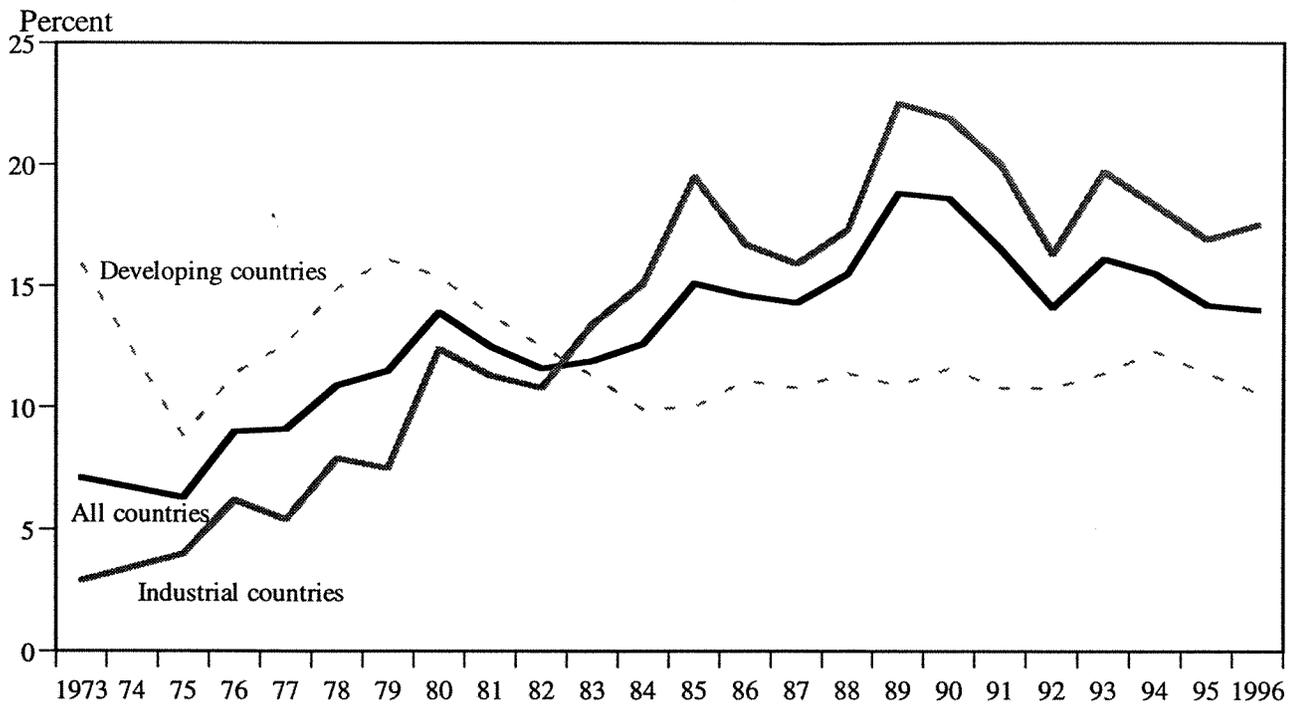


Figure 1d
Share of the E.U. Currencies in Foreign Exchange Reserves

