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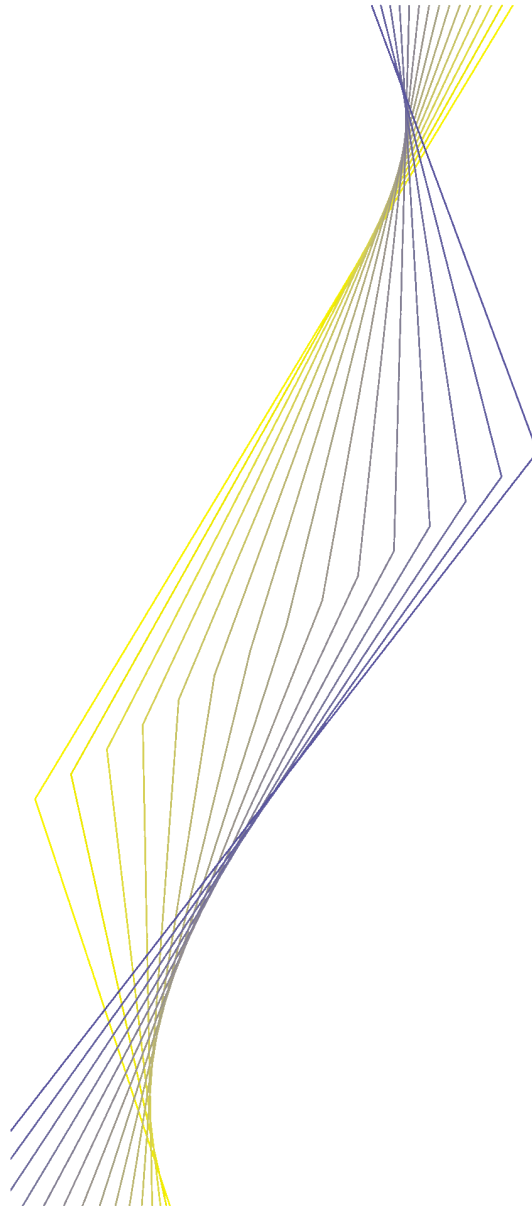# THE EURO AND INTERNATIONAL CAPITAL MARKETS

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WORKING PAPER NO. 19

THE EURO AND INTERNATIONAL CAPITAL MARKETS

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APRIL 2000

Contents

Abstract

This paper provides a broad empirical examination of the major currencies' roles in international capital markets, with a special emphasis on the first year of the euro. A contribution is made as to how to measure these roles, both from the viewpoint of international financing as well as from the one of international investment activities. Time series of these new measures are presented, including euro aggregates calculated up to five years back in time. The data allow for the identification of changes in the role of the euro (or other main currencies) during 1999 compared to the aggregate of euro predecessor currencies, net of intra-euro area assets/ liabilities, before stage 3 of EMU. A number of key factors determining the currency distribution of international portfolio investments, such as relative market liquidity and relative risk characteristics of assets, are also examined empirically. It turns out that for almost all important market segments for which data are available, the euro immediately became the second most widely used currency for international financing and investment. For the flow of international bond and note issuance it has even slightly overtaken the US dollar in the second half of 1999. The data also suggest that this early supply of euro bonds by non-euro area residents, clearly exceeding the euro-predecessor currency aggregate, is actually absorbed by euro area residents and not by outside investors so far.

JEL CLASSIFICATION: G15, F32, G11, F21

KEY WORDS: international capital markets, international currencies, euro, dollar, yen, EMU, capital flows, international monetary system, portfolio selection, money markets, bond markets, equity markets, bank lending

1   Introduction

Long before the official introduction of the euro on 1 January 1999 an intensive debate picked up about what the potential consequences of European Monetary Union (EMU) could be for the international monetary and financial system (European Commission/Emerson et al., 1990; Alogoskoufis and Portes, 1993; Bénassy et al., 1994; ECU Institute/Thygesen et al., 1995; Frankel, 1995; Kenen, 1995, chapter 5; Hartmann, 1996; Leahy, 1996; Bergsten, 1997; Henning, 1997; International Monetary Fund/Masson et al., 1997; BIS, 1997a/McCauley, 1997; OECD/Funke and Kennedy, 1997; Cohen, 1998; Eichengreen, 1998; Wyplosz, 1999). Considerable diversity of views on numerous aspects notwithstanding, many participants' opinion in that debate converged towards the view that the currency choices in international capital markets would be key for the issue at stake (Bergsten, 1997; McCauley, 1997; Hartmann, 1998c; Portes and Rey, 1998). By some it was pointed out that the evolution in financial markets might be quicker than could be expected regarding other dimensions of the international monetary and financial architecture, such as international trade invoicing, central banks' official foreign exchange reserve holdings or the reform of the corporate structures of the main international organisations. Also, if the euro gained an important share in those markets, then – due to their size and linkages with those other dimensions – this could influence and accelerate the developments in the rest of the international monetary and financial system. Therefore, the present paper measures the roles the euro, the dollar, the yen and some other main currencies play in the various segments of international capital markets and discusses several important factors that determine those roles in the long term. Although it would be premature to interpret recent developments as evidence for strong long-term trends, it appears nevertheless useful to undertake a first broad assessment of the euro's role in international capital markets after one year of experience.

Given the importance of capital markets for the structure of the international monetary system, we feel that carefully derived data and a number of clarifying economic points need be contributed to the discussion mentioned above. First, during the first months of EMU's stage 3 the international financial press and market researchers entered a vivid discussion of tremendous growth figures for the euro in "international bond markets" (see e.g. Financial Times, 1999a,b,c,d; Bishop, 1999a,b,c, 2000; among others). Detached from the excitement of the market, we study more from an academic research perspective where significant changes have occurred and where not, carefully distinguishing the different segments of international capital markets (money markets, bond markets, bank markets), primary and secondary markets, supply and demand effects. The conceptual distinction between financing and investment currencies is introduced in the literature on international currencies. Second, following the approach taken in Hartmann (1996 and 1998c) we present a way how available data about international capital markets can be adjusted for the statistical ("arithmetic") changes through EMU, i.e. how the domestic component of euro capital markets has to be carved out from available raw data to measure the "truly" external, i.e. international, dimension of the euro's development. The use of data not properly adjusted for the new currency area has often been a major source of confusion in market, policy and academic circles. In order to identify significant changes around and after the changeover date, we present new adjusted data series comprising both 1999 figures and historical figures of euro-predecessor currency aggregates, adjusted backwards for several years. Third, we identify the main long-term factors determining the distribution of currency denominations in international capital market investments. Based on Hartmann (1998c, chapters 2 and 3) we argue that size and liquidity factors, already prominent in the previous academic literature, have to be complemented by risk factors, such as monetary stability, financial market volatility and cross-country asset correlations, which can play a significant role in international investors' portfolio choices. These aspects are firmly grounded in the financial market microstructure and international asset market equilibrium literature. An empirical analysis of changes in these factors

around the euro changeover date is used to check the reliability of the results found on the evolution of the euro as an investment currency.

The remainder of the article is organised as follows. On the basis of time series for the new measures developed, section 2 discusses in depth the currency distributions of both international financing and international investment activities. Section 3 briefly reviews the theoretical factors influencing the competition between currencies in international capital markets and presents empirical evidence on some key factors. The last section provides a brief summary and draws the main conclusions for the structure of the international monetary and financial system. Three annexes contain a description of the data sources (annex 1), an analytical derivation of the new measures of currencies' (external) roles in international primary debt securities markets (annex 2) and the tables and chart referred to in the text (annex 3).

2 The international financing and investment roles of the euro

There is a widely accepted definition of international money in the literature starting from the classical functions currencies fulfil in relation to transactions including at least one external private or public agent (see Cohen, 1971; Tavlas, 1991; and Hartmann, 1998c, for detailed discussions of this conceptual framework). The developments of international capital markets enter this mainly, but not exclusively, through the international investment currency function, referring to international private holdings of assets for store of value purposes. Second, there is a transactions view referring on the one hand to turnover in secondary securities markets and on the other hand to the network of open and closed bilateral spot foreign exchange markets through which currency transactions are channelled sometimes in an indirect fashion via a vehicle currency. We start the discussion of international capital markets by arguing that in order to understand the evolution of international capital markets in general and the developments around the euro changeover date in particular, a refinement of the international store of value function is advisable.

2.1 Financing versus investment use of an international currency

This refinement has some similarities to the potential differences in international trade denominations regarding the invoicing of exports and imports. In fact, one question is in which currencies companies, private individuals and governments finance themselves, i.e. in which currency they issue their debts. For this we introduce the term *finance currency* function. Another question is in which currencies companies, private individuals and governments invest their wealth, i.e. in which currencies they compose their saving or investment portfolios. This is the traditional *investment currency* function in the literature. Financing currency use implies a supply of bonds, loans or similar or a demand for credit. Investment currency use relates to the demand for bonds, loans etc. or the supply of credit. Notice that *international* financing and investment use of a currency must not be the same in equilibrium, since some of the related supply can be matched by *domestic* asset demand and vice versa.[1] So, in principle, a currency could have a larger share in international bond issuance than it has in international investors' bond portfolio holdings or vice versa. In fact, we will argue below that such a differential occurred for the euro during the first year of its existence.

The second main reasons for introducing the distinction between the financing and the investment function is that changes in currencies' uses for either of the two functions can have

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[1] This distinction between investment and financing currency use is not entirely new though, since some authors have already referred to international assets and liabilities in this context (e.g. Emerson et al., 1991, p. 179, Table 7.1; McCauley, 1997). Whereas there are several widely known theories of the currency composition of international investments, which we will look at briefly in section 3, we are not aware of any comparably deep analysis of the currency composition of financing.

different economic interpretations and consequences. For example, in an otherwise unchanged world economy, an exogenous increase in international investment demand of a currency would have the opposite effects on interest rates and exchange rates from an exogenous increase in the international financing role of that same currency. Assuming that domestic and foreign assets are imperfect substitutes and that the domestic interest rate elasticity of money demand and the wealth elasticity of foreign bond demand are relatively high compared to the interest rate elasticity of foreign bond demand, the second scenario would from a portfolio balance perspective lead ceteris paribus to a relative depreciation of the respective currency and a widening (narrowing) of a positive (negative) interest rate differential with the outside world in the short to medium term.[2]

Changes in financing and investment currency uses can be related to capital in- and outflows in terms of the balance of payments, but they need not be identical since the balance of payments is based on a residency concept alone for both sides of a transaction and international currency use also on a currency concept. Assume the Argentinean government is issuing a bond denominated in euro, which it sells entirely to the domestic private sector. This means that euro financing and investment currency use increases by the same amount, but neither the Argentinean nor the euro area balance of payments are affected. In contrast, if all the bonds were sold to euro area residents, then the international investment currency effect would disappear and, besides the increase in external euro financing, Argentina would face a capital inflow and the euro area a capital outflow.[3]

The rest of this part has four sub-sections. The first describes the data used and the adjustments needed to account for EMU. It is quite important for the right interpretation of the empirical analysis undertaken later on. 2.3 then describes the development of international financing currencies in the last 6 years, and 2.4 the developments of international investment currencies. The remaining sub-section 2.4 draws some interim conclusions.

2.2   Measures of international currency use in capital markets and data adjustments to EMU

In the following parts of this section, we present historical and current evidence on the financing and investment currency use of the dollar, the euro, other European Union currencies (primarily reflecting the English pound sterling), the Japanese yen and the Swiss franc. Since the Deutsche mark was the only currency among the euro's predecessor currencies with a significant international role on its own before the third stage of EMU, the largest part of the historical international euro aggregates are composed of mark items. This is shown in tables 1A and 1B in annex 3 (left columns of "aggregate of all euro area currencies" and "DEM" columns) for both measures introduced in 2.2.1 below. The share of international Deutsche mark debt securities financing is on average only slightly smaller than half of the share for the aggregate of euro predecessor currencies. The mark's dominant role among European currencies would be even clearer, when euro-area internal cross-border financing were excluded from the aggregate in table 1A.

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2   *This specific reasoning is based on the portfolio balance model of exchange rate determination by Branson (1977), but similar arguments would also apply to other stock- or stock-flow theories of the exchange rate with imperfect international asset substitutability. As the argument is presented, domestic investment and financing are held constant, but no qualitative changes of it would occur, if domestic investment and financing would move in the same direction as international investment and financing.*

3   *Of course, these are only first-round effects. The overall impact will also depend on what the cash flows related to these transactions are intended to be used for. For example, if the Argentinean government made most expenditures in domestic currency, a good deal of the euros raised would be sold against pesos in the foreign exchange market.*
    In a previous version of the paper we also included a discussion of the euro area balance of payments comparing 1998 portfolio flows with 1999 portfolio flows. However, due to the traditional netting of purchases and sales for both resident and non-resident-issued securities in balance of payments figures and because of the lack of currency breakdowns for them, little robust insights for the international use of the euro could be gained, so that for the sake of saving space we decided to eliminate that discussion.

The data are constructed from two sources. Most come from the Bank for International Settlement's (BIS') international financial statistics database (see e.g. BIS, 1999) and a small part from The Economist portfolio poll of global fund managers (see e.g. Economist, 2000). A detailed description of the data and their sources is given in annex 1. The length of the historical series is determined by the most extended period for which synthetic euro data could be constructed backwards from the information of its 11 predecessor currencies (and the ECU).[4] For international debt securities issuance this was from the first quarter of 1994 to the fourth quarter of 1999 (24 quarters in total); for international bank assets and liabilities it turned out to be from the first quarter of 1994 to the third quarter of 1999 (23 quarters); and for fund managers' investments data from the third quarter of 1997 to the fourth quarter of 1999 could be made available (10 quarters).[5]

2.2.1 International capital market segments and measures of currency use

The BIS international financial statistics contain ample information about *financing currency* use (but somewhat less about international investment currency use). More precisely, it provides currency breakdowns of issuance in international primary bond and note markets (flows and stocks of private sector and government securities), of international money markets (flows and stocks) and of international bank markets (liabilities/stocks). International bonds include straight fixed rate issues, floating rate issues and equity-related issues. International notes comprise "Euro" commercial paper, "Euro" medium-term notes and other short term paper.[6] For bonds and notes usually only securities with maturity of one year or above are covered. Their coverage can be regarded as fairly complete on a world-wide level. The international money market data include issuance of "Euro" commercial paper and other short-term paper, mainly certificates of deposit (CDs), whose maturity are usually below one year. Coverage for money market instruments is high as well. (See annex 1 for a more detailed description of these data.)

The traditional BIS definition of *international* bond and money market issuance in a given country encompasses non-residents' issuance in domestic and foreign currencies, residents' issuance in foreign currencies and residents' issuance in domestic currencies that target external investors (BIS, 1997b). This targeting in the last category is a qualitative judgement made on the basis of a number of criteria, such as whether a foreign bank was part of the issuing consortium, or the issuer's own assessment whether she *wants* to target foreign investors.[7] Because of this last component, measures based on that definition would to some extent combine financing and investment currency use. We include such a "broad" measure, as regularly published by the BIS

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4   In general, the ECU is treated as a predecessor of the euro. Since the UK pound, the Danish kroner and the Greek drachma also have some weight in the ECU basket, the ECU's treatment might lead to minor underestimations of these currencies' international roles in the data before the start of stage 3.

5   We also examined whether more about international or external financing currency use could be learned from foreign equity listings. In fact, the Fédération Internationale des Bourses de Valeurs (FIBV) publishes some data about market capitalisation of foreign shares on 32 major stock markets world-wide (http://www.fibv.com). However, first, only end 1997 and end 1998 data are currently available, so that changes of foreign currency/market equity financing after the introduction of the euro cannot be studied with this data. Second, data for some major markets, such as the Amsterdam Exchanges, the Chicago Stock Exchange, the Deutsche Börse AG (Germany), the Schweizer Börse and the Tokyo Stock Exchange, are not available. Finally, since the data are not broken down according to the country of origin of the listed company, the arithmetic adjustment for the euro area described in 2.2.2 below cannot be undertaken, so that the euro figures would be very biased. For completeness we nevertheless mention the numbers that can be derived from the available data, keeping in mind the three shortcomings. At the end of 1998 (1997) the total capitalisation of foreign listings in euro/euro area countries amounted to US$ 5,105 (3,504) trillion or 47 (41) percent of the total foreign listings reported by the FIBV. For the other EU currencies/countries, mainly the UK pound/London market, the figure is US$ 4,708 (4,020) trillion or 44 (47) percent. For the dollar/United States total foreign listings reach US$ 626 (558) trillion or only 6 (7) percent of the total. This very low number of foreign listings in dollar/the US is most likely explained by the much more demanding publication requirements and accounting implications of a listing in the US compared to other countries. For an international comparison of equity market capitalisations for listings in domestic shares, see ECB (1999).

6   In order to avoid confusion with the euro as a currency, we adopt the convention in this article to write "Euro" with capital E and in quotation markets when we mean the offshore markets.

7   Another criterion referred to and adopted by the BIS is whether a bond is issued outside the domestic regulatory, fiscal and legal environment. Important aspects in this regard are, for example, whether the issuance is exempt from domestic withholding tax and in bearer form or whether special trading and clearing methods are used. Overall, there appears to be a fair degree of discretion in the categorisation of a bond as international on the basis of the targeted investor.

(1999), in the discussion below (tables 3, 5 and 7), but for the specific purpose of the present article we focus more on a "narrow" measure for which all issuance in home currency of the issuer are deducted. The reason for concentrating on the "narrow" measure is that it is precise in covering international financing currency use, whereas the "broad" measure (combining financing and investment use) is likely to be very imprecise in measuring the investment component. (An exhaustive discussion of these measurement issues in international debt securities markets, including the full definitions of both measures, is given in annex 2.) For this reason we prefer to base most assessments of investment currency use on direct measures of portfolio holdings rather than indirect information through targeted investors.

The financing currency dimension of international bank markets relates to banks' external liabilities and their domestic liabilities in foreign currencies, including own securities, bank deposits and non-bank deposits. Banks reporting to the BIS are from the 18 most important industrialised countries and six major offshore banking centres. For these countries coverage is extremely high, although in some cases currency breakdowns have to be estimated. However, there is some overlap between these liabilities and the stock measures of international debt securities referred to above. (The international debt securities issued by banks are included in both statistics.)

The BIS international financial statistics cover a smaller amount of information about *investment currency* use. Apart from the "broad" measure of international debt securities mentioned above that can be interpreted as covering some of it indirectly, it is limited to the asset side information of the international banking market statistics (stocks). Analogous to liability-side reporting, it includes currency breakdowns of reporting banks' assets held externally and of their domestic assets in foreign currencies (interbank loans, loans to non-banking operators, international debt securities, foreign equities).

In order to also cover investment currency use beyond banks' proprietary portfolios we further study the data included in a portfolio poll of The Economist magazine undertaken quarterly with 8 to 9 leading global fund managers. The data contain currency or country shares of aggregate positions of all reporting fund managers for both bonds and equities, as compared to the Salomon Smith Barney world government bond market index weights and to the Morgan Stanley Capital International world equity market index weights. Due to their very limited coverage of institutions, these portfolio poll data cannot be regarded as representative for the whole international investment community. They have nevertheless been included, since they reflect the overall currency preference of "truly" international investors, hardly affected by home bias, and also include some non-bank financial institutions.[8] In other words their behaviour can also be regarded as much more mobile geographically, and therefore as a source of short-term capital flows. Moreover, they are considered since they give a separate account of bond and equity investments, which is not available from other sources also containing currency breakdowns.

2.2.2 "Arithmetic" adjustment for EMU

Many existing statistics are based on the definition of a domestic currency area according to national borders. For the purposes of this article and with the occurrence of EMU this definition would not be satisfactory. As shown in Hartmann (1996) for foreign exchange market transactions and trade invoicing, an "arithmetic" adjustment is required to remove the cross-border issuance or holdings within the euro area from the "international" dimension. Since we are interested in deriving historical series of currency uses for the period before the start of EMU stage 3 in order to compare them with the data after the introduction of the euro, we can

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8   The "home bias" phenomenon in global investment portfolios is briefly addressed in section 3.

reason in terms of the euro predecessor currencies while treating them backwards in time as its component currencies. Accepting this type of "thought experiment", from the perspective of currencies' roles outside their home currency area, a bond issued by a French resident in Italian lira, should not count as financing in an external currency. Similarly, a loan made by a German bank in Spanish peseta would qualify only for domestic or internal currency investment. Hence, both items should be deducted from the hypothetical historical external euro financing and investment aggregates.[9]

The relevance of this "arithmetic" adjustment is well illustrated by tables 1A and 1C (columns "exceeding EMU adjusted series") in the statistical annex 3. Announced issues of intra-euro area "international" bonds and notes denominated in euro at the end of the fourth quarter of 1998 amounted to US$ 24 bn. In fact, by comparing the adjusted series in table 2 to the unadjusted series in table 1A, an "arithmetic" downward adjustment of the euro share in world issuance by 13 percentage points becomes apparent. The corresponding figures for flows in money market instruments are US$ 10 bn or 8 percentage points and for stocks aggregating bonds and money market instruments US$ 371 bn or 10 percentage points (tables 1A, 4 and 6). In other words, these "arithmetic" effects are large! Since we want to avoid these considerable biases, most data presented in this paper are corrected for intra-euro area items in euro.

2.3   The international financing roles of the main currencies

We can now turn to the main discussion of the empirical evidence on the major currencies' financing roles in international capital markets during the last 5 years. Tables 2 to 7 in annex 3 show the developments for international debt securities denominated in euro, other EU currencies, US dollar, Swiss franc and other currencies. It should be pointed out that before 1 January 1999 the largest part of the "euro" aggregates were effectively composed by Deutsche mark issuance and only to a smaller part by the currencies of the other countries' currencies joining EMU. Since this article mainly focuses on the current role of the euro and its prospects for the future, its predecessor currencies are not explicitly detailed in the historical series. Similarly, most of the "other EU" item effectively represents UK pound issuance. For each currency absolute dollar levels, percentage shares of the total at current exchange rates as well as percentage shares of the total at constant first quarter (Q1) 1994 exchange rates are presented. Tables 2, 4 and 6 show our "narrow" measure for international financing currency use and tables 3, 5 and 7 the traditional BIS (or "broad") measure of currencies' roles in international debt securities markets. Tables 2 to 5 detail flow data, i.e. announced (or "gross") issues, and tables 6 and 7 stock data, i.e. outstanding amounts. (Net issues (gross issues minus redemptions) are not reported, since they have a strong backward looking element through the redemption of very old bonds.)

Focussing on the data for 1999, as compared to pre-stage 3 data, a marked increase of euro instruments issued by non-residents of the euro area in both international bond and money markets can be identified, irrespective of the type of measure considered. Across the board most of that increase occurs right after the changeover date, i.e. already in the first quarter of 1999, suggesting that traditional cyclical factors alone, such as relative interest rate and exchange rate developments, cannot provide satisfactory explanations. This observation is insensitive to whether the comparison is made to the last quarter of 1998, where new issuance was unusually low, or to some longer historical average.[10] For example, for the "narrow" measure, that we

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9   If this adjustment was not made, historical comparisons of the euro's external role compared to that of the dollar or the yen would be biased. For example, a bond issued by a resident of California and held by a resident of New York would not count for the dollar, but a similar case for Belgium and the Netherlands would count for the euro.

10   Interestingly, low "euro" bonds and notes issuance in Q4 1998 coincided with extraordinarily high pound sterling issuance, suggesting that debt managers used the British currency as a proxy for the euro at the time of high uncertainty right before the changeover date. However, Q4 1998 was also a generally "quiet" quarter in international primary bond markets.

regard as more reliable for the questions we are interested in in this paper, international bond issuance in euro increase by US$ 25 bn in Q1 1999 compared to the average quarterly issuance in 1998. Again compared to the 1998 average, the Q1 share of euro issuance jumped by about 11 percentage points at constant 1994 exchange rates (about 10 percentage points at current exchange rates; see table 2). On the same scale, for money market instruments the euro share of the total over all currencies immediately increased by 12 (11) percentage points in Q1, and the average quarterly amount in 1999 was about 2.5 times the size in 1998 (table 4). This means that for these flow figures the euro has already roughly made up the "arithmetic" adjustment through EMU (carving out intra-euro area flows, as illustrated in table 1A) in the first quarter of stage 3. In the second half of 1999 euro denominated international bonds and notes issuance exceeded dollar issuance for the first time. At constant exchange rates the euro share reached 37 percent in Q3 and 32 percent in Q4 as compared to 31 percent for the dollar in both quarters (table 2). Despite the euro's early dynamic development in international money markets its shares in the last two quarters of 1999 amounted to 25 percent and 22 percent at constant exchange rates respectively, which is still clearly below the dollar's share of 62 percent.

In relative terms the euro's growth early in stage 3 came at the detriment of the US dollar and the Swiss franc, although the latters' absolute issuing levels were not particularly low. In international money markets the dollar's relative decline is already under way for a number of years (tables 4 and 5), but not so in the international bond markets, where the currencies' relative financing roles in terms of flows can exhibit relatively wide swings. For example, the dollar's Q4 1999 low in this segment is comparable (in relative terms) to its situation in Q3 1994 and Q1 1995. Even more strikingly, the Japanese yen's share at that time exceeded the dollar's share before falling back again (tables 2 and 3). The same does not hold true for the money market segment (tables 4 and 5). Lately, the yen won some market share in bond markets (reaching 22 percent in Q4 1999) but also lost some in money markets in 1999, and the distance to the euro's role increased in relative terms. Overall, although the euro's rise as a financing currency was significant and, by the time of writing, sustained, based on the available information and historical experience it would still be premature to speak of definite signs of a regime change in international debt securities markets.

This is all the more true when one looks at the stocks in international debt securities markets, where changes are obviously much more sluggish.[11] In the course of 1998 and 1999 a small but continuing increase of euro-denominated stocks could be observed (+5 percentage points at constant exchange rates in 1999) and some decline for the dollar (-2.5 percentage points; see table 6). However, this increase was way below the EMU-typical "arithmetic" reduction (about 10 percentage points) for the euro (table 1A), and international debt securities outstanding denominated in dollar were still more than twice as large as those in euro in the latest available data. As an aside, one might observe a very slow relative increase of the pound sterling and a slightly more marked relative reduction of the Swiss franc over the last couple of years.

It is instructive to further extend this discussion of the financing side of international capital markets with information about foreign currency liabilities of banks reporting to the BIS (table 8). Notice first that outstanding amounts on bank balance sheets exceed the total stocks in international debt securities (according to the "narrow" definition) by a factor larger than three. Similar to debt securities stocks, currencies' shares in bank liabilities do not change very much over time. However, until the latest data (Q3 1999) and compared to the same period of the previous year, an increase in the euro's relative share in international bank liabilities can be discerned (+3.4 percentage points at constant exchange rates, rising its share to 21 percent). In

11   We do not distinguish the bond and the money market segments for stocks. The outstanding amounts in money markets are extremely low, due to the instruments' short-term character. Therefore, almost all of the information provided in tables 6 and 7 reflect international bond stocks.

contrast to the debt securities stocks, also the dollar share rose (+3.7 percentage points, to reach 56 percent), whereas the yen slowly but steadily lost some of its financing role for reporting banks. In sum, the banking evidence is consistent with the picture drawn above for debt securities financing, except that the gains in the euro's share are smaller and did not come about at the expense of the US dollar. These results and the ones discussed further below on asset holdings have to be taken with a grain of salt though, since continuing statistical adjustments may lead to revisions in the future. Therefore, the results for banks still have to be regarded as somewhat exploratory.

2.4   The international investment roles of the main currencies

For the international investment side the available information is much more limited than for the financing side. We first investigate the currency distribution of international assets of banks reporting to the BIS (table 9), keeping in mind the exploratory character of these data. As already pointed out for the liability side discussed above, total international assets of those banks are of considerable size (about US$ 9,800 bn in the latest available data, Q3 1999). It turns out that external euro stocks on the asset side of bank balances sheets developed in a less dynamic way in 1999 than the outstanding amounts (stocks) of international debt securities (liabilities) discussed above (table 6). Whereas the dollar value of outstanding external debt securities in euro has grown by almost one quarter over the year up to Q3 1999 in absolute terms (table 6), external euro bank assets have grown by less than 6 percent (table 9). In relative terms, the euro's share in total debt securities outstanding over the year to Q3 1999 increased by 4 percentage points compared to a decline in the dollar's share of 2 percentage points (both at constant exchange rates; table 6). In contrast, the relative roles of euro and dollar in total external bank assets developed almost in step for the same period (euro +3 percentage points, dollar +2 percentage points; table 9). With over half of international bank assets being denominated in dollar, the euro's share of 20 percent (at current exchange rates) and 21 percent (at constant Q1 1994 exchange rates) is larger than any other third currency. The yen faces already a longer downward trend in this segment, even in absolute terms, lately reaching 10 percent of the total.

As a second, more narrow source of investment currency use we examine the evidence by a portfolio poll undertaken quarterly by The Economist magazine with a small sample of leading global fund managers. This poll details separate data for fund managers' holdings in both bonds (table 10A) and equities (table 10B). It rather reflects the currency preference of geographically very mobile investors that can and do shift funds much more quickly than other investors. In fact, around the euro changeover date an "in-and-out" investment wave occurred for the euro, partly at the expense of the dollar and also somewhat at the expense of the yen (in particular for equities). For bonds the euro became attractive a little bit later (Q1 1999) than for equities (already 1998). But for the newest information available, the euro (dollar) levels are down (up) again, with the euro covering 28 percent of the total for bonds and 27 percent for equities and the dollar 49 and 45 percent. With 14 and 15 percent of the total the yen remains on levels similar to 1997/98, although some increase during 1999 was visible. The pound sterling shares for bonds and equities have recently declined slightly to 4 percent and 9 percent respectively.[12]

As an indicator of international investor sentiment about a currency's more short-term potential, it appears also interesting to observe the allocated shares in comparison with benchmark indices.

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12 Notice that these figures include fund managers' asset holdings in their home currency. Although one might argue that these investors are fully international actors, which do not have any domestic monetary habitat any more, we also conducted an "arithmetic" adjustment carving out home currency holdings as a safety check. Only very minor differences to the raw figures reported above occurred. Euro shares were marginally lower and dollar shares marginally higher. May be the only noteworthy change is that stage 3 euro bond holdings turned out to be consistently above the pre-stage 3 aggregate euro-predecessor currency level.

While for 1997/98 the euro was consistently overweighted in the fund managers' portfolios, the overweight turned into an underweight for European bonds in the course of 1999.[13] Similarly, the continuous overweighting of European equities during 1997/98 has nearly completely disappeared by Q3 1999. So what the poll seems to indicate is that apart from a short-lived "honeymoon" with euro area currency denominated assets in 1998 (lasting until Q1 1999 for the bond market), during 1999 the international investors polled remained somewhat pessimistic about euro assets' short-term potential. This should not taint the fact, however, that since its introduction the euro has firmly established its role as the second most important international investment currency.

2.5   Summary and interim conclusions

The available evidence on the evolution of the main currencies' financing and investments roles in international capital markets since the inception of EMU can be summarised as follows. There was a marked increase of the supply of international debt securities by non-euro area residents denominated in euro right after 1 January 1999, but obviously both international euro debt security stocks and euro bank liabilities grew much slower. For the bond flow data the euro has now reached the dollar's share, but not for the money market flow data or any of the two stock data. In contrast to these international financing developments, - on the basis of the information available – the arrival of the euro has not had any lasting effects on the currency structure of international investments so far. Preliminary data about the large bank asset stocks reported to the BIS show modest growth for the euro, whose relative position to the dollar developed much slower than for bank liabilities. Any discernible demand effects for euro-denominated bonds and equities by major international fund managers turned out to be very short-lived so far.

These findings lead to three interim conclusions and one hypothesis. First, as predicted by some observers, the euro has become the second most important currency in virtually all segments of international capital markets right from the start of stage 3 (Hartmann, 1996, p. 22 and tables 9 and 10; 1998c, p. 129; Henning, 1997, table 5.3). Second, to the best of our knowledge not expected by any observer except McCauley (1997, p. 42), it established a significantly increased international debt financing role early in stage 3 of EMU, relative to the dollar and the yen, in the second half of 1999 reaching the former's level for new issuance (but not for stocks outstanding) in the important segment of the international bonds and notes markets. Third, contrary to the expectations of various other observers, no sustained surge in external euro investments took place, at least not until this article went to print.

In fact, our "broad" and "narrow" measures of currencies' roles in international debt securities markets provide also some evidence that (euro area) liability managers overestimated the external demand potential for the euro. To see this, look at tables 2 and 3 and compare the relative developments of both measures during 1998 and 1999. Remember that the "broad" measure includes also home currency bonds that target outside investors, whereas the "narrow" measure excluded those. According to the "broad" measure the euro's role grew by 91 percent over this period, while it only grew by 62 percent according to the "narrow" measure. Since external investments did not seem to have picked up in proportion to the difference of the two measures, at least part of the investors targeted were not hit, supporting the (temporary) excess supply story advanced above.[14]

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13 Note that there is a break in the series for the euro bond holdings in table 10A, because up to Q3 1998 the euro only "consisted" of French franc and Deutsche mark. The Salomon Smith Barney benchmark index was adjusted in Q1 1999, so that one should not compare deviations from benchmark for Q4 1998.

14 However, a word of caution is also in order since part of the "targeted investor" category also includes simple offshore activities (see annex 1), so that the effect described could be somewhat smaller than the raw figures suggest.

All this suggests that most of the euro bonds and notes supplied, in excess of the pre-stage 3 euro-predecessor currency aggregate, via the international primary debt market – to the extent that they were absorbed at all – are effectively held by euro area residents and not by external investors so far. The relative balance between the increased international euro asset supply through an expanding financing role and the relatively constant international euro asset demand through investment suggests the hypothesis that, in the short-to-medium term, the relative exchange rate (and interest rate) developments between the three major currencies could in part be causally related to the peculiar way in which the euro's role in international capital markets developed.[15] More precisely, it suggests that part of the euro's depreciation in the first months of stage 3 might have been associated with a (temporary) international excess euro asset supply. Assuming for a moment that the increased bond issuance had the character of an exogenous shock, euro area external issuers of euro denominated bonds and notes, who in most cases will have the largest part of their expenditures in their home currency, needed to convert the acquired euro balances in their home currency, using the foreign exchange market.

Before suggesting a framework that could shed more light on the links between the relevant variables, it should be noted that 1999 witnessed simultaneous changes in international interest rate differentials and exchange rates that are not compatible with uncovered interest rate parity. More specifically, according to the parity condition the stronger rise in euro area long-term interest rates between June and October, when compared to US rates, and for the whole of 1999, when compared to Japanese rates, should ceteris paribus have been accompanied by a euro appreciation and not the observed depreciation. Under certain assumptions about the relative asset demand elasticities the portfolio balance approach to the exchange rate can explain such a pattern of inverse co-movements of exchange rates and interest rate differentials in the short-to-medium term as a consequence of a domestic-currency bond supply effect like the one described above (Branson, 1977; Branson and Henderson, 1984).[16] On the other hand, the causal effect could also work the other way round, namely the depreciating exchange rate of the euro during

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15 This is not to say that this bond supply effect is the only or even the major factor having affected exchange rates (and interest rates) during this period.

16 The reasoning is relatively complex and therefore "banned" in a footnote. According to the portfolio balance model by Branson (1977) an increase in the supply of bonds denominated in domestic currency and absorbed by domestic residents would increase domestic relative to foreign interest rates, as the expected return on domestic bonds will have to become more attractive. Obviously, a depreciation of the domestic currency could achieve the same by reducing the risk premium on foreign bonds and thus lowering the expected foreign bond return. But in general the effect on the exchange rate is ambiguous. The higher supply of home currency bonds raises wealth and creates excess demand in the money and the foreign bond markets, while the resulting higher domestic interest rate reduces demand in these markets. The relative size of wealth elasticities and interest rate elasticities will determine the sign of the exchange rate adjustment. Note also that a change in the exchange rate affects domestic wealth, because the value of foreign bonds measured in domestic currency is altered. If the interest rate elasticity of money demand is relatively large, the interest rate increase can reduce money demand to such a strong degree that despite the initial wealth increase a depreciation becomes necessary to equilibrate the money market by re-strengthening money demand. The depreciation becomes the more likely the smaller is the wealth elasticity of money demand, as the initial bond supply effect creates a smaller excess demand, which turns into an excess supply more easily through the higher interest rate. Also, if the (domestic) interest rate elasticity of foreign bond demand is relatively small, the higher domestic interest rate hardly reduces excess demand in the foreign bond market, so that the exchange rate has to depreciate to increase the supply of foreign bonds in the domestic market. The higher the wealth elasticity of foreign bond demand, the larger is the initial excess demand for foreign bonds and, thus, the more likely becomes a situation in which the domestic currency has to depreciate in order to increase the foreign bond supply. To summarise, according to the portfolio approach an increase in the supply of bonds denominated in domestic currency, which is being absorbed by domestic residents, will trigger ceteris paribus an increase in the interest rate differential between the domestic and the foreign country. At the same time the exchange rate effect is ambiguous. A depreciation of the home currency would occur when the interest rate elasticity of money demand and the wealth elasticity of foreign bond demand are relatively large in comparison to the interest rate elasticity of foreign bond demand and the wealth elasticity of money demand. (Estimating the relevant interest rate and wealth elasticities for the euro area is beyond the scope of the present paper.)
This story, based on the short-to-medium term version of the portfolio balance model (without a real sector), seems to fit the data reasonably well, although not perfectly. Euro area 10-year bond yields increased continuously over the year 1999, indeed, (starting at 4.3 percent and finishing at 5.3 percent) and the Japanese yields came down (from 2.1 percent to 1.7 percent). Most likely because of parallel business cycle developments US yields also increased and the negative differential with the euro area only narrowed in the second half of the year, whereas the positive differential with Japan increased all the way.
However, in the long run the portfolio balance approach extended by a real sector predicts that the initial exchange rate depreciation should be reversed, because in the steady state the current account balance needs to reach zero. More precisely, since in the scenario suggested by the data euro area residents hold most of the additional bonds, there is an accumulation of net foreign assets. Since in the steady state net foreign assets need to be constant, the resulting improved investment income account balance needs to be offset by a worsened trade balance, and therefore the exchange rate has to appreciate in real terms in the long run.

1999, given lower interest rate levels than in the US, could have further encouraged borrowers to issue in euro (but not so much in the appreciating yen). In fact, both sides of the causal relationship could have been mutually reinforcing, at least temporarily.

3   Evidence on the factors determining the euro's international investment role

The debate before the start of Stage 3 about how EMU will affect the international monetary and financial system placed a lot of emphasis on international portfolio investment, because the related capital flows tend to be much larger than any other cross-border activities like goods trade or foreign direct investment. However, portfolio investment is also important, since savers' and investors' trust in putting their money in a specific currency or market signals the confidence the financial community has in the stability of that currency or country. In the present section we look at several main determinants of international portfolio investments before and after the euro changeover date. The purpose is to check whether these factors are in line with the developments in international portfolio investments reported above, particularly regarding the interim conclusion that overall investment currency use of the euro after one year broadly reflects the aggregate of the uses of its predecessor currencies, net of intra-euro area holdings/ transactions. If the main factors determining the structure of currency choices in international investment had changed substantially, we would have to rethink the interpretation of the data presented in the previous section. We also want to draw attention to some main variables that could be monitored by parties interested in identifying signs of any structural change in the functioning of the international monetary and financial system. The factors considered are derived from the results of the theoretical and empirical literature about international portfolio investments. The main emphasis is on identifying any structural developments that can be expected to survive in the long term and not on cyclical factors like short-term interest rate or exchange rate developments.

A careful reading of the theoretical literature leads to the identification of two main groups of factors affecting the optimal asset portfolio allocation over different currencies. The first group, addressed in greater detail in 3.1 below, encompasses factors related to the size and sophistication of the domestic financial markets and of the respective currency's foreign exchange markets. It includes the liquidity of domestic and foreign exchange markets and the associated levels of transaction costs. Only if those markets are well integrated, for example across domestic regions or countries, can the benefits of size in terms of liquidity make a currency attractive for external investors. It also includes the breadth of those markets, i.e. the number and quality of instruments available. In more complete markets risks can be managed more effectively. Broad financial markets exhibit, for example, different types of borrowers and equity issuers, ranging from low risk (e.g. government bonds, shares of "blue chip" companies) to high risk (e.g. junk bonds, shares of new and innovative "high-tech" companies) and liquid derivatives markets for hedging purposes.[17] The second group, discussed in 3.2, encompasses factors related to asset price behaviour, determining the price risk characteristics of assets in different countries. For example, they determine the attractiveness of a currency's assets as a diversification tool for international investors. These two groups of factors have somewhat opposite effects on the structure of the international monetary and financial system. Large sizes of a currency's markets will lead to the concentration of holdings and transactions in this currency because of scale economies associated with liquidity, whereas risk factors tend to favour multiplicity of holdings in various currencies to achieve optimal risk-return combinations through diversification.

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17   The consequences of the breadth of markets for asset trading are discussed in Martin and Rey (1999).

Both types of factors are well founded in one branch of the finance and international economics literature, but to our knowledge they have not been successfully integrated yet in one theoretical model.[18] *Size and liquidity* effects have been studied in the financial market microstructure literature, in particular focussing on the relationship between financial market trading volumes and trading costs. Theoretical models underpinning a negative relationship between trading volume and bid-ask spreads for various types of market and trading structures include, for example, Stoll (1978), Black (1991), Easley and O'Hara (1992), Hartmann (1998c, chapter 3), or more from a macro perspective Rey (1999). The main channels identified are reductions of various cost components for trading or market making institutions, which lead in a competitive environment to narrower differentials between (quoted and traded) bid or ask prices and equilibrium prices. 1) More trading volume can degress any fixed costs or help realise other sources for economies of scale. 2) In a market with more active trading search costs to find counterparties will also be lower. 3) If volume comes in many statistically independent orders, then – by the law of large numbers – dealers' inventory costs will decrease, since they are on average pushed less far away from their preferred portfolio. Similarly, the more traders are in a market, the less price adjustments a given disturbance will cause, the less gains from trade are impaired by that disturbance and the higher the "liquidity value" of the market (Pagano, 1989). It has been successfully tested that, in the long run, this relationship holds empirically by Bessembinder (1994), Jorion (1996), Fleming (1997) and Hartmann (1998a, 1999).[19] In order to check whether any size effects have already materialised through the establishment of a common currency in 11 European Union (EU) countries, we therefore examine in the next sub-section 3.1 below the evolution of bid-ask spreads for various euro markets, comparing 1998 figures to 1999 figures.

The *price risk* factors are the subject of the equilibrium theory of international capital markets. Models by Solnik (1974), Stulz (1981), Adler and Dumas (1983) and others show theoretically the benefits of diversification, if the international correlations between assets are not too high. The widespread use of asset pricing models by the international investment banking industry manifests the high relevance of this argument for actual portfolio selection in the market place. For example, adding an asset with low (or negative) correlations to other assets in a portfolio can improve the risk-return combination of the total portfolio. In this regard, the co-variability of euro area assets with outside assets and its change with respect to past experiences with national constituent currencies are important factors in determining the euro's role as an international investment currency. On the other hand, considerable unexploited international diversification opportunities highlighted by the empirical "home bias" literature (French and Poterba, 1991; Cooper and Kaplanis, 1994; Tesar and Werner, 1995), point to the relevance of additional factors, such as information disadvantages for foreign investors, capital controls, taxes and the high costs of cross-border payment and settlement services. As argued in Hartmann (1998c, chapter 2), the size factors mentioned above will also lead to deviations from the optimal portfolio selections suggested by a "pure" international capital asset pricing model. However, even in general equilibrium models explicitly addressing the origin of biases in international portfolio selection (such as e.g. Uppal, 1993), the diversification incentives through lower correlations are always a major factor. In the subsequent sub-section 3.2 below we shall look at the evolution of international asset price correlations during the last years, to see whether with the start of EMU any significant changes of co-movements suggest a structural change in international portfolio investments.

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18   We believe though that one could probably develop such a model within the framework of the modern general equilibrium theory of international macroeconomics (see Obstfeld and Rogoff, 1996).

19   In the short run volume may also reflect the arrival of news whose interpretation is initially not fully homogenous among traders, so that a series of transactions is required until the new equilibrium is found. In such a situation the uninformed traders or dealers will increase bid-ask spreads in response to the turnover, since they are afraid of being dragged into a transaction with a better informed trader (Copeland and Galai, 1983; Glosten and Milgrom, 1985). The empirical tests by Bessembinder, Hartmann and Jorion imply that these information costs are of short-term nature.

Monetary conditions are one important underlying factor for the behaviour of those asset prices. In particular, monetary instability will usually lead to asset market volatility and greater financial instability that deter risk-averse international investors. Conversely, it is widely accepted that price stability is an important pre-condition for the development of a currency's international role (see e.g. Tavlas, 1991; Maehara, 1993; Frankel and Goldstein, 1998), since it is a necessary condition for outside investors' confidence that their purchasing power will be preserved. Thus, we also look at further important risk factors, such as the development of inflation rates and inflation variabilities across currencies and countries/areas as well as exchange rate volatilities. Exchange rate volatility has been shown to significantly increase transaction costs in the foreign exchange market, potentially countering any size effects on bid-ask spreads discussed above (see e.g. the different econometric studies by Agmon and Barnea, 1977; Glassman, 1987; Boothe, 1988; Black, 1991; Bollerslev and Melvin, 1994; Wei, 1994; Jorion, 1996; and Hartmann, 1998a, 1999). This originates in the inventory loss risk caused by asset price volatility. A risk-averse dealer or trader will want to protect herself against acquiring new inventories in her portfolio when volatility is high. Or alternatively, from the point of view of optimal portfolio choice theory, for risk-averse investors, the increase of an asset's volatility will, ceteris paribus, lead to a reduction of that asset's weight in the optimal portfolio.

3.1   Factors related to market sizes, integration and liquidity

A classical measure of market liquidity is the bid-ask spread. In the long term, higher market size and liquidity are associated with lower transaction costs, as measured by financial market dealer spreads. Quoted spreads at a daily frequency are available from a number of market sources. However, more precise traded spreads at an intra-day frequency are not available at the time dimension required for this paper, so that the quoted spreads we briefly discuss now, have to be interpreted with caution. We first look at the domestic component of transaction costs an international investor faces, particularly for money markets, and then at the international component in terms of foreign exchange bid-ask spreads.

Table 11 shows average daily fractional bid-ask spreads for unsecured three-month money market deposits in the largest three euro area economies, the United States and Japan. Due to differences in the relative importance of this instrument in different countries and differences in data collection, some pre-cautions should be taken before comparing levels between countries/ areas. Instead we focus on spread changes between 1998 and 1999 within each of the three large currency blocks. It turns out that three-month money market spreads did not change much in the US. However, after an initial period of still higher spreads, euro area quoted spreads came down to a level of around 9 basis points in the second half of 1999. This compares to a weighted average of spreads of almost 10 basis points for the three markets in France, Germany and Italy before stage 3. Market participants report a stronger increase in liquidity and reduction of spreads for shorter maturities, in particular for the overnight contracts. In the overnight segment cross-border turnover has picked up significantly, due to the common monetary policy and intra-euro area cross-border arbitrage activities.

The developments in the domestic unsecured short-term money market can be explained by the strong impact a common currency and area-wide payment systems have on the integration of money markets. However, in contrast to the unsecured segment, the secured segment of the euro money market has not experienced the same development. In spite of some volume growth, the repo market is as yet still considerably smaller and not as well integrated. The main reasons are relatively fragmented and therefore expensive settlement systems for repo collateral, the multiplicity of repo contract types related to different legal systems and the different risk and liquidity premiums across countries for important types of collateral, such as government

bonds.[20] Although at the present stage we do not have any direct evidence on external money market instrument holdings in euro, the stronger size effect through a relatively quick integration of the unsecured euro area money market may well translate or have already translated into increased external short-term investments in these instruments.

In the case of EMU, where monetary union is combined with co-ordinated but still separate national budgets, a similar strong and quick integration effect of a common currency cannot be expected for the secondary government bond markets. Again the main reasons are the existence of differential credit and liquidity risk premiums between countries and the absence of efficient area-wide securities settlement systems that realise economies of scale. Accordingly, secondary government bond market liquidity in the euro area countries seems to have stayed broadly unchanged since 1 January 1999. This contrasts with gradual but sustained reductions of bond market bid-ask spreads in the most important countries in the years preceding EMU. Similarly, in spite of efforts to improve international links between national equity markets and a quite widespread presumption that there are unexploited scale economies, no significant consolidation has effectively happened during 1999 (but in 2000 two important mergers have been announced, namely the one between the Amsterdam, Brussels and Paris stock exchanges ("Euronext") and the one between the Frankfurt and London exchanges). Finally, although corporate bond markets are developing swiftly in Europe (see e.g. European Commission, 1999), the high-risk end of the spectrum is still much less active than in the US for example. Hence, as pointed out by Gros (1998), the further development and integration of euro area financial markets will be a slow-moving process.[21]

Table 12 captures the developments of the international component of transaction costs when an external investor buys or sells euro area securities. The data displayed require the same word of caution as the money market data in table 11, since they are quoted spreads in the spot market, only one per business day. Apparently, no significant reduction in bid-ask spreads (increase in liquidity) can be identified when comparing 1998 averages for Deutsche-mark-to-third-currency spreads with 1999 averages of euro-to-third-currency spreads. In fact, spreads vis-à-vis the dollar, the UK pound and the Swiss franc seem to be broadly unchanged, whereas vis-à-vis the Japanese yen a somewhat surprising (so far sustained) increase of spreads emerges from the data.[22] These figures are roughly in line with reports from the forex trading community, although more recently a slight reduction of dollar/euro and Swiss franc/euro spreads is sometimes mentioned. The particularly puzzling loss of liquidity in the yen/euro spot market, as compared to the yen/mark market seems to be widely accepted among forex dealers now.[23]

These developments of forex spreads can be partly explained by the two offsetting effects a unification of currencies between different countries has, namely the elimination of intra-area turnover and the aggregation of previous national currency extra-area turnover. On the basis of pre-stage 3 data, Hartmann (1996, tables 9 and 10) estimated that, aggregated over all pairs with third currencies, the two effects should almost balance in absolute terms when comparing expected euro turnover with previous mark turnover.[24] In other words, an application of the

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20 Some developments are already under way in the area of securities settlement systems, as witnessed by the Deutsche Börse Clearing/ Cedel merger. Various more far-reaching models how to link, integrate and consolidate existing settlement infrastructures in the euro area are currently debated.

21 For more far-reaching, general discussions of the state of European financial markets before the introduction of the euro and for predictions on the possible effects EMU might have on them, see also Steil (1996), McCauley and White (1997), Prati and Schinasi (1997), Dermine and Hillion (1999).

22 In fact, over the whole sample period for 1999 the dollar/euro spreads were even slightly higher (though rather insignificantly) than dollar/ mark spreads before. This corresponds to a reduction of average daily trading volume from US$ 45 mn. to US$ 41 mn. observed by the Bank of England (1999, p. 13f./Chart H) in the private electronic brokering system EBS. The Bank of England also identified a more marked reduction in yen/euro turnover in that system from US$ 7 mn. to US$ 4 mn. These data also confirm the inverse relationship between trading volumes and transaction costs discussed above.

23 See also Killeen et al. (2000), who provide more evidence of these developments in the spot foreign exchange market.

24 For 1995 global turnover survey data, as reported by central banks to the BIS, mark spot trading amounted to US$ 54.3 bn. (1992 data: US$ 53.2 bn.) and estimated euro trading for a broad union excluding the UK US$ 56.9 bn. (US$ 54.6 bn.).

theoretical and empirical evidence on the volume-spread relationship discussed above suggests that – other things being unchanged – euro bid-ask spreads should be roughly comparable to previous mark spreads. The developments in the bilateral dollar, pound and Swiss franc markets seem to be in line with this prediction, but the liquidity loss in the yen market requires additional explanations. Providing detailed discussion of the reasons would go beyond the main purpose of this article. We just mention two possible explanations. The first is related to the vehicle-currency phenomenon in the spot forex market (see Swoboda, 1969; Krugman, 1980; Black, 1991; and Hartmann, 1998c, chapters 3 and 4, for details). It might have happened that the euro did not fully inherit the direct interbank markets against the yen from the mark, but that part of this market is now again exchanged indirectly via the US dollar (as a vehicle currency).[25] Another potential explanation, perhaps less plausible, is that a reduction in capital flows between the euro area and Asia, resulting in lower yen/euro foreign exchange turnover, has taken place.

Summing up, the evidence on size effects and liquidity, it seems that apart from the quick integration and liquidity gains in unsecured euro money markets, no immediate increase in the attractiveness of the euro as an international investment currency took place. For most domestic secondary euro markets liquidity in 1999 seems to be around the levels observed in 1998. Similarly, for several important euro foreign exchange markets the liquidity seems to closely resemble the one to be expected on the basis of the euro's predecessor currencies' aggregate turnover, net of intra-euro area transactions (roughly equal to previous mark turnover). Vis-à-vis the yen though the euro lost some liquidity compared to such an aggregate.

3.2   Factors related to portfolio risk

Tables 13A and 13B in the statistical annex show average monthly inflation rates and variabilities (standard deviations) for the euro area (and Germany), the United States, Japan, Switzerland and the United Kingdom since 1980, both in basis points per month and in percent annualised. The data underline the increasing macroeconomic convergence and stability orientation in the euro area in the course of the run-up to stage 3 of EMU. Since the mid-1980s euro area and US inflation performances appear to be closely in line, both in levels and variabilities. Since the start of stage 3, however, the internal value of the euro appears to be slightly more stable than that of the US. The difference should not be overstated though, since differences in the statistical biases in price indices could justify slightly different monetary policy targets or the difference over such a short period could just be caused by different cyclical positions. Over the sample period considered, Japanese inflation rates have always been the lowest, including even deflation during 1999. A somewhat striking feature is, however, that (with the exception of the 1989-91 period) Japanese CPI (consumer price index) inflation has always been the most variable one among the three main currencies and significantly so, until the present day. Since Japanese CPI inflation variability might be overstated by the peculiar way in which the underlying consumer survey is undertaken, we also show the data for the Japanese wholesale price index (WPI) for consumer goods.[26] In fact, for the Japanese WPI the variability seems to be lower, even though not by enough to reach the euro variability (or the US variability, except for 1999).

So it remains an issue whether this factor and any financial market volatility it might cause could be an obstacle for a further internationalisation of the yen, as compared to the other two main currencies. Euro and dollar, however, seem to be in the range of monetary stability within which relative advantages in terms of external investment for one or the other will be relatively limited. In contrast to Switzerland, which over the past 20 years closely resembles Germany in terms of monetary stability, the United Kingdom shows as high an inflation variability as Japan (in terms of

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25 *The mark/yen market was the fifth largest bilateral spot FX market in the world before the introduction of the euro (BIS, 1996).*
26 *The survey is conducted at a few days in each month that sometimes coincide with "sales" periods. Therefore the Japanese CPI sometimes exhibits sharp spikes into the negative region, artificially increasing its variability.*

CPI), while having inflation rates similar to the US during most of the 1990s. As the comparison with the retail price index (RPIX) in table 13A shows, the UK inflation volatility is not a statistical effect caused by the inclusion of mortgage interest rates. Hence, the results are consistent with the limited international investment role of the pound, in spite of the presence of large and sophisticated financial markets in London.

After looking at internal currency stability, we now turn to developments in the external stability of the main currencies. The latter was subject to an extensive debate before the start of stage 3 about whether euro exchange rates will be more volatile than previous mark exchange rates. Early on, most writers have argued that the euro is likely to be more volatile. For example, Bergsten (1997) and Alogoskoufis and Portes (1997) anticipated that a tough monetary policy of the Eurosystem combined with substantial external investments in euro early in stage 3 are likely to lead to a sharp appreciation or even over-shooting of the euro. Cohen (1997) added that the amplitude of euro exchange rate adjustments in response to symmetric macroeconomic shocks on the euro area will depend on the nature of the shock (price or demand shock) and on the degree of co-ordination between fiscal and monetary policy authorities. He shows with a simple simulation that, for example, a completely passive monetary policy could lead to much wider euro real exchange rate fluctuations than previously the case for the mark. Bénassy et al. (1997) point out that less weight on the exchange rate by the monetary authority in a relatively closed economy such as the euro area, would lead to a larger amplitude of exchange rate adjustments. The high volume-volatility correlations established in the literature on speculative financial markets (see e.g. Tauchen and Pitts, 1983; Karpoff, 1987; and Jorion, 1996) would also argue in favour of higher very short-term volatility in the euro forex markets, if they become larger than previous mark markets.

Later the discussion was basically re-balanced. Theoretical models by Martin (1998), Ricci and Isard (1998) and Coutinho (1999), for example, show that euro volatility could well also be lower rather than higher. In Martin's (1998) model a "hump-shape" relationship between the internal size of a currency area and exchange rate volatility emerges. In particular, very large countries that tend to be relatively closed have little incentive to use exchange rate policies strategically to stabilise the domestic economy, resulting in lower exchange rate fluctuations in the framework chosen. The empirical exercise undertaken seems to suggest that the euro area is within that downward sloping part of the "size-volatility curve". Ricci and Isard (1998) show that the development of euro exchange rate volatility can go either way, entirely depending on what type shocks hit the euro area economy. Coutinho (1999) adds that grouping countries with different economic structures into one currency union might be different from the increase in size of a given economy, since the combination of symmetric and asymmetric shocks might be different in both cases. In particular, even if money velocity shocks will become more uniform through the currency unification, the intra-currency area correlation of productivity shocks is not likely to increase dramatically. Therefore, a good deal of real internal shocks will be diversified away, increasing the case for greater external stability, in particular if the central bank succeeds in offsetting velocity shocks. How the joining of additional countries will affect euro exchange rate volatility will then depend on the correlations of those countries' macroeconomic shocks with both the euro area and outside countries, like the US or Japan. An empirical estimate of the model suggests that the factors considered tend to lead to lower euro volatility (vis-à-vis the dollar and the yen) compared to mark volatility.

Putting the different arguments in the literature together, there is no strong theoretical case in favour of either direction. In fact, already a simulation exercise by Masson and Turtelboom (1997) with the IMF's international macroeconomic model MULTIMOD suggested that exchange rate volatilities might change by little, even for different monetary policy approaches of national

authorities. As is shown in chart 1 in annex 3, this view is born out by the data for 1998 and 1999. After a volatile period in the foreign exchange market around the time of the Russian crisis in August 1998 and the Long Term Capital Management (LTCM) failure in September 1998, nominal euro exchange rates against the dollar, the yen, the pound and the Swiss franc settled around similar levels to those observed for the Deutsche mark in the first half of 1998.[27] In other words, it is difficult to argue that euro exchange rate volatility can have caused any changes in the behaviour of the international investment community.

Finally, there is the question of whether asset return co-movements between the euro area, the US and Japan have changed, indicating structural changes in international investment behaviour through EMU. Since the euro area is larger and more closed than any of its component countries, its economy will be more driven by domestic shocks and domestic economic polices. More particularly, the euro area will be less affected by economic developments and policies in the US, goes one main argument. This could lead, it is said, to a "de-coupling" of euro area asset returns from US asset returns with lower correlations leading to a greater attractiveness of the euro as a diversification tool. Table 14 in annex 3 summarises the changes in long-term benchmark bond and equity cross-border correlations between 1998 (or the longer average from 1995 to 1998) and 1999 from the perspective of investors based in Germany (as a proxy for the euro area; home currency mark/euro), the US (home currency dollar) and Japan (home currency yen). Average daily as well as average monthly returns are considered.

It should be pointed out first that international asset correlations tend to be relatively volatile over time (Longin and Solnik, 1995; Ramchand and Susmel, 1998), which was visible in our data too. So small changes in correlations should not receive too much emphasis. Overall, the data available so far do not provide strong evidence in favour of the "de-coupling" hypothesis, quite the contrary. Focussing on equities first, for both dollar-based and yen-based investors correlations of monthly returns vis-à-vis the euro rather slightly increased. (Only for daily returns from the perspective of a US investor, there was a small reduction between 1998 and 1999, but not when the more long-term average of correlations before stage 3 is considered.) For bond investments of US- or Japan-based agents the picture is a little bit more mixed. US-Germany 10-year government bond yield correlations (monthly) are slightly down for the more long-term comparison, whereas Japan-Germany yield correlations are down in the short term but up in the long term.[28]

In sum, on the basis of the data available so far, the risk factors – similar to the size factors discussed above – do not point to marked long-term changes in the structure of international investment. They are consistent with a normal transition of the euro to the second most widely used international investment currency, as could have been expected from pre-stage 3 data for its predecessor currencies, corrected for intra-euro area holdings, and from the current depth, breadth and liquidity of euro area domestic capital markets. This transition was documented in sub-section 2.4. However, the data so far are not indicative of any tendency for a large or abrupt increase in external euro asset holdings as a consequence of its introduction.

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27 Although it is not shown in the chart 1, the same picture emerges for longer volatility time series. We also compared the historical volatilities displayed in the chart with series containing implied volatilities from option prices, which looked virtually identical.

28   One objection against this argument that comes to mind is that the correlations themselves are endogenous to the international investments. This can without any doubt partly be the case, because international investors will act on the basis of their expectations and the realisations of real economic developments, monetary and fiscal policies etc. that may underlie the correlations. Notice, however, that this does not contradict the answer that we found for the question we are interested in, namely whether there are any changes in investment currency behaviour. Irrespective of the direction in which the causality goes or whether the two sides are simultaneously determined, when the correlations between assets denominated in different currencies have not changed, it is relatively unlikely that a substantial shift in investment behaviour has taken place. Increasing correlations between two currencies contradict the hypothesis that investors disinvested in one to invest in the other.

4   Summary and concluding remarks

This paper aimed at discussing the implications of EMU for international capital markets, more precisely the major currencies' roles in the international monetary and financial system. Starting with a contribution about how to measure currency's roles in international financial markets and how to adjust data in response to the change in currency area, we then measure the international financing and international investment roles of the most important currencies on the global level during the five years before EMU and during the first year after the introduction of the euro. We then discuss several key factors determining the capital market roles of currencies, focussing on market size/liquidity effects and asset price risk effects for international portfolio choices.

We find that – even after careful correction for intra-euro area developments – there occurred a clear and, by the end of 1999, sustained increase in the issuance of international debt securities in euro by non-residents of the euro area, lifting the euro's external *financing* currency use way above the aggregate euro-predecessor currency financing use (outside the then not yet existing euro area) before stage 3 of EMU. In fact, the latest available data for the third and fourth quarter of 1999 show new euro-denominated issuance of bonds and notes exceeding the US dollar for the first time. At current exchange rates the euro reaches a peak share of 35 percent of the global total in Q3 (29 percent in Q4) compared to 32 (31) percent for the US dollar and 17 (22) percent for the Japanese yen. At constant 1994 exchange rates the new advantage of the euro reaches 6 percentage points in Q3 and falls back to 1 percentage point a quarter later. The situation is different in international money markets, where at the end of 1999 euro issuance reached 20 percent of the global total, despite considerable growth during the first year of EMU, compared to 62 and 3 percent for the dollar and yen respectively (at current exchange rates). In contrast to these flow figures, the total stocks of debt securities outstanding obviously change much less, exhibiting an end of 1999 euro share of 24 percent (a share up by 5 percentage points to a year earlier) as well as shares of 45 (down by 3 percentage points) and 16 percent (down by 3 percentage points) for the dollar and yen respectively (at constant exchange rates). The same applies to banks' international liabilities (at end 1999: euro 21 percent (+3 percentage points), dollar 56 percent (+4 percentage points), yen 8 percent (-4 percentage points); all at constant exchange rates).

Data about *investment* currency use are much more limited, and also the quality of the available data is lower. On the basis of available information, no developments comparable to the debt issuance activity could be identified so far, although euro-denominated asset holdings by non-euro area residents seem already larger today than external Deutsche mark holdings before stage 3 of EMU, roughly approximating the aggregate of euro predecessor currencies. For a small sample of global fund managers early increases in euro investments above that level turned out to be short-lived though, both for bond and equity markets. First data about the large stock of assets held externally by banks reporting to the BIS show a gradual increase of the euro's share of about 3 percentage points over the first three quarters of 1999, which is less than the development of euro stocks on banks' liability sides and about the same as the dollar's growth over the same horizon in that segment. For the latest data (Q3 1999) the euro reaches 21 percent of the total, compared to 54 percent for the dollar and 10 percent for the yen (at constant exchange rates).

Hence, for all financing and investment segments of international capital markets for which data could be made available, except the bond issuance mentioned above, the dollar shares are the largest, followed by the euro and then by the yen. The difference between the development of the euro's external financing role in comparison to its external investment role implies that most of the demand for the euro debt securities supplied by non-residents is still domestic, i.e. by euro

area residents. There is also some evidence that (euro area) liability managers might have overestimated the euro-area external demand potential for euro-denominated bonds. The initial strong supply of euro-denominated debt securities might be causally related to the euro's depreciation immediately after its introduction, although it is difficult to say how important it was compared to other factors and in which direction any causal effect worked. In any case, portfolio balance considerations suggest that the on-going accumulation of foreign assets by euro area residents, which is expected to persist, creates a potential for the euro to appreciate over time.

An analysis of factors influencing international portfolio choices shed some further light on the relatively "static" development of the euro on the external investment side (compared to its growth on the liability side). With the exception of money markets, the *liquidity* effects of the *size* advantage of the euro area compared to the constituting countries take time to materialise in domestic financial markets. In the spot foreign exchange market the euro currently exhibits liquidity levels comparable to the Deutsche mark before stage 3 of EMU, except vis-à-vis the yen, where turnover went down noticeably. Among the *risk* factors influencing portfolio investments, monetary and exchange rate stability do not favour either of the two main currencies, the dollar or the euro, over the other. International bond and equity market correlations in external investors' currencies did not seem to exhibit any marked and sustained changes during 1999 that would have indicated a significant increase in the euro's attractiveness as an international diversification tool compared to the dollar or the yen. In sum, the factors analysed confirm and support the findings in the data on international (external currency) asset allocations.

Overall, the picture that emerges from the data compiled is that the euro established a significant role in all important segments of international capital markets, although EMU did not cause a regime change during the first year. Apart perhaps from the surprisingly strong growth of bonds and notes issued in the new currency by non-residents of the euro area, the emergence of the euro's international role can be regarded as "normal" from what could have been expected before its introduction (see Hartmann, 1996, 1998b,c and McCauley, 1997). It is reassuring that most of the figures for financing (except new bond issuance that are higher) and investment relatively closely resemble what is known so far about the euro's role for other functions of a currency in the international monetary and financial system, including its role in exchange rate pegging and official reserve holdings. However, taking a broader perspective on the experiences with the euro or applying more rigorous analytical tools to test some of the hypotheses advanced above has to be left for future research papers. It is also still much too early to make any definitive judgement as to whether the euro will confirm or contradict the previous historical experience that changes in the dominant international currencies tend to occur only slowly.

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Annex 1: Data sources and descriptions

Bank for International Settlements international financial statistics database
Parts of it are published and commented on in the BIS quarterly "International Banking and Financial Market Developments" (see e.g. BIS, 1999). Broader descriptions and detailed definitions are provided in BIS (1995a,b). The database provides currency breakdowns of issuance in international primary bond and note markets (flows and stocks) as well as of international money markets (flows and stocks). For international bank markets currency breakdowns of assets and liabilities are reported (stocks). The frequency is quarterly, with the bank statistics lagging the debt securities statistics by one quarter.

International debt securities statistics
The international bond and note data provided by the BIS are derived from market sources, such as Capital Data Bondware and Thompson Financial Services (both particularly for bonds), Euroclear and Cedel (both particularly for notes). Multiple sources are used either for cross-checking or for filling gaps in reporting. International bonds include straight fixed rate issues, floating rate issues and equity-related issues. International notes comprise "Euro" commercial paper, "Euro" medium-term notes and other short term paper. Usually, only maturities of one year or above are covered. At the end of 1994 the BIS database on international bonds (notes) stored 33,150 bond issues (2500 facilities and more than 50,000 drawings), of which 13,300 (15,600) were still outstanding (BIS, 1995b).[29] Because of the wide international coverage of the sources used, reporting of bonds and notes can be regarded as fairly complete on a world-wide level.

The international money market data are retrieved from Euroclear and completed by information received from Cedel.[30] They include issuance of "Euro" commercial paper and other short-term paper, mainly certificates of deposit (CDs). [31] Maturities are usually below one year. The BIS reckons that coverage for money market instruments is high as well. However, it excludes CDs issued in London from the international money market statistic, since they would create a large overlap with the BIS international banking statistic discussed below.

International banking statistics
These statistics include currency breakdowns of reporting banks' assets and liabilities held externally and of their domestic assets and liabilities in foreign currencies (see tables 8 and 9). Assets are composed of interbank loans, loans to non-banking operators, international debt securities, foreign equities. Liabilities cover own securities, bank deposits and non-bank deposits. Banks reporting to the BIS are from 18 industrialised countries and six other countries, hosting major offshore banking centres. For the great majority of these 24 countries reporting banks account for well over 90 percent and often practically 100 percent of the international assets and liabilities (BIS, 1995a). The reporting industrial countries are the European Union countries (excluding Greece and Portugal), Canada, Japan, Norway, Switzerland and the United States. The reporting off-shore centres are the Bahamas, Bahrain, the Cayman Islands, the Dutch Antilles, Hong Kong and Singapore. Some countries (the US and the six offshore centre countries) do not provide complete currency breakdowns, so that they have to be estimated by the BIS. For the

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29 *Medium term notes are negotiable debt instruments with maturity usually between 1 and 5 years. Upon request by the issuers or the investors, they are issued under facility agreements, and distributed via dealers. The facility agreements allow for "drawings" of securities up to some limit..*
30 *Euroclear and Cedel are the two most important international central securities depositories (ICSDs) in the G-10 countries, clearing and settling a large part of cross-border securities transactions.*
31 *"Euro" commercial paper is defined as an unsecured discounted debt instrument, having a maturity ranging from a few days up to one year. They are issued in more than one country under a facility agreement upon request of the issuer or the investor and sold by an international syndicate. CDs or any other negotiable notes, are usually issued with a maturity of below one year and with a fixed rate. They are issued under a facility agreement upon request of the issuer and placed in more than one market through so-called tender panel agents..*

present study it was not yet possible to report the data of the 18 industrial countries and the data of the 6 offshore centre countries separately. Since at least part of the international debt securities referred to above are issued by banks, the liabilities covered in the international banking statistics overlap with the stock measures of international debt securities.

Exchange Rates
The daily exchange rate series used for calculating the constant exchange rate shares in tables 2 to 9 and the currency returns for the return correlation analysis depicted in table 15 are composed of end-of-day exchange rates from the general BIS database. The base period was chosen to be the first quarter of 1994. For debt security flows average period exchange rates and for the debt security and banking asset and liability stock data end-of-period exchange rates are used. ECU exchange rates were used for the synthetic euro aggregates before 1999. Note that for lack of sufficiently deep currency breakdowns "other currencies" had to be left unchanged at current exchange rates.

The Economist portfolio poll of global fund managers
This poll summarised in tables 10A and 10B is conducted and published on a quarterly basis by The Economist magazine, covering 8 to 9 leading global fund managers (see e.g. Economist, 2000). There can be small changes in the institutions polled from one quarter to the other. The entirety of institutions covered over the years include Julius Baer, Commerz International, Crédit Agricole, Credit Suisse, Daiwa, Indocam, Lehman Brother, Merril Lynch, Nikko Securities, Phillips & Drew, Rabobank International, Robeco Group, Standard Life and Union Bank of Switzerland. The data contain currency or country shares of aggregate positions of all reporting fund managers for both bonds and equities, as compared to the Salomon Smith Barney world government bond market index weights and to the Morgan Stanley Capital International world equity market index weights. Since the absolute portfolio sizes of each institution is not known (only percentage shares for currencies/countries are reported), only unweighted averages can be calculated for the total currency shares. In contrast to the BIS international banking statistics, this poll covers several important non-bank financial institutions and also details currency/country breakdowns for bond and equity investments separately. There is nevertheless some overlap.

Other data sources
Financial data providers
The daily money market and spot foreign exchange bid-ask spreads are retrieved from Reuters and Bloomberg, as indicated in tables 11 and 12. The return correlation analysis in table 14 uses Datastream 10-year maturity benchmark government bond price indices for Germany, Japan and the US, which are all total return indices, available from February 1995. The stock price indices are taken from Bloomberg (Nikkei 225 for Japan and Standard & Poors 500 for the US) and Datastream (DAX 100 for Germany). All three share indices are price indices, i.e. adjusted for dividend payments.

OECD main economic indicators database
The comparison of inflation rates and variabilities for various countries in tables 13A and 13B has been conducted with data from the OECD Main Economic Indicators database. The consumer price indices (CPIs) are the series labelled all items, publication index. For the UK we also report the retail price index (all items, excluding mortgage payments (RPIX)) from the BIS database, to check whether the relatively high variability of the CPI series is caused by the volatility of mortgage rates, which other countries' CPIs do not contain. For Japan we also show a wholesale price index (WPI) for all consumer goods from the BIS database, because the Japanese CPI is known to be very volatile, due to the specific way the underlying consumer survey is conducted.

Annex 2: Measuring the international roles of currencies in debt securities markets[32]

In this annex we discuss in a stylised and simplified fashion some methodological aspects of the "broad" and "narrow" measures of international currency uses in debt securities markets presented in section 2 of the main text. This discussion will both clarify our favourite choice of "narrow" measure and the logic of the data on debt securities traditionally provided by the BIS. In this latter respect it is important to point out that BIS data are provided for users with many different needs, so that our perspective focussing on measuring the international role of currencies is only one angle from which one can look at this data. Another angle, that is more likely to have been the driving force when this database was designed, is to measure offshore or "Euro" markets.

As pointed out in section 2, the international role of a currency in debt securities markets entails two aspects, the role of the currency in international financing (supply of bonds or demand for credit in a currency other than the home currency of the issuer or borrower) and the role as an international investment currency (demand of bonds or supply of credit in a currency other than the home currency of the investor or provider of credit). We first focus on the <u>financing role</u>. There are n countries, each issuing a single currency, so that countries and currencies can be denoted by the same index i=1,…,n. For a given country debt securities can be issued by its residents or by non-residents in domestic or in foreign currency, as illustrated in figure A3.1 below.[33] To keep the exposition simple, the figure ignores an additional dimension, namely the possibility that a non-residential issuer can chose between his own and another foreign currency.

In fact, B in the figure stands for what traditionally is denoted as a "foreign" bond and C and D for the traditional "Euro"/offshore bonds (not to be confused with bonds denominated in euro). Then total international debt security issues denominated in, for example, currency 1, which is the currency of country 1, is given by the sum of three parts described in the formula below: all domestic issuance by non-residents in domestic currency 1, B_1^1, plus all other countries' residents' issuance denominated in currency 1 within their respective countries, $\sum_i C_i^1$ and all other countries' residents' issuance in currency 1 outside their own country and outside country 1, $\sum_i D_i^1$. Subscripts denote the location and superscripts the currency of denomination of the issuance.

Figure A3.1: The financing role

	Resident Issuer	**Non-Resident Issuer**
Domestic Currency	A	B
Foreign Currency	C	D

Source: *BIS (1997b), p. 15.*

International financing in currency 1:

$$B_1^1 + \sum_{i=2}^{n} C_i^1 + \sum_{i=2}^{n} D_i^1 \tag{A3.1}$$

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32   *This annex draws and expands on the analysis of the BIS quarterly review of "International Banking and Financial Market Developments", February 1997 (BIS, 1997b).*

33   *We are using a residency concept here. Alternatively, one could apply a nationality concept to distinguish national (internal) from international (external) financing or investment.*

Formula (A3.1) summarises the "narrow" measure of international currency use in capital markets employed in section 2 and the data annex 3. The item denoted by A in figure A3.1 is purely home currency financing by locals and therefore not included in formula.

A similar figure as A3.1 can be drawn for the <u>investor side</u> (figure A3.2).

Figure A3.2: The investment role

	Resident Investor	**Non-Resident Investor**
Domestic Currency	E	F
Foreign Currency	G	H

The international investment role of, for example, currency 1 is again described by the sum of three parts: the domestic currency denominated securities *held* by non-residents, F_1^1, plus all other countries' residents' investment holdings of securities denominated in 1 within their country, $\Sigma_i G_i^1$, and all other countries' residents' holdings of debt securities denominated in currency 1 outside their own country and outside country 1 $\Sigma_i H_i^1$.

International investment in currency 1:

$$F_1^1 + \sum_{i=2}^{n} G_i^1 + \sum_{i=2}^{n} H_i^1 \tag{A3. 2}$$

The item denoted by E in figure A3.2 is pure home currency investment by locals and therefore not included in (A3.2).

There are now two options to assess a currency's role in international capital markets, either looking at the investment (formula (A3.2)) and financing (formula (A3.1)) roles separately (since a currency's role can be different on both sides) or constructing an aggregate measure incorporating both sides. The following measure (A3.3) simply sums the financing and the investment measures, thereby counting twice a bond that is both issued in a currency other than the issuer's home currency (here 1) and held by an investor whose home currency is not 1 either.

International financing *and* investment in currency 1 (simple sum):

$$B_1^1 + \sum_{i=2}^{n} C_i^1 + \sum_{i=2}^{n} D_i^1 + F_1^1 + \sum_{i=2}^{n} G_i^1 + \sum_{i=2}^{n} H_i^1 \tag{A3. 3}$$

Traditionally, the BIS also followed an aggregate measure of financing and investment. However, this measure is different from (A3.3) in that it was chosen not to count any bond twice. Since the origin of the BIS debt securities database is information provided by issuers (see annex 1), the BIS measure of international financing and investment (A3.4) starts from the financing measure and adds to it an estimate of international investment currency use (denoted by lower case f, g and h), where only those bonds are included in f, g or h that are not already an international financing issue (see also figure A3.3).

BIS definition of international financing *and* investment in currency 1 (without "double-counting"):

$$B_1^1 + \sum_{i=2}^{n} C_i^1 + \sum_{i=2}^{n} D_i^1 + f_1^1 + \sum_{i=2}^{n} g_i^1 + \sum_{i=2}^{n} h_i^1 \qquad (A3.\ 4)$$

This is the "broad" measure of international currency use employed in section 2 and the data annex 3.

Figure A3.3: The BIS joint financing and investment role

	Resident Issuer/Non-Resident Investor Targeted	**Non-Resident Issuer**
Domestic Currency	A' A, f, g, h	B
Foreign Currency	C	D

The major problem is that, in general, information on international asset holdings, $F_1^1 + \sum_i G_i^1 + \sum_i H_i^1$ or the subset $f_1^1 + \sum_i g_i^1 + \sum_i h_i^1$, is not available. The BIS decided to solve this problem pragmatically by relying on a variety of criteria indicating whether liability managers *target* non-resident/international investors. Criteria mentioned and adopted by the BIS include: 1) Statements in the documentation of the issuance indicating whether foreign investors are targeted (e.g. global bonds). 2) The involvement of at least one foreign financial institution in the issuing syndicate, 3) The fact that the issuance of the bond is outside the domestic regulatory, fiscal and legal environment. Important sub-criteria in this regard are whether the issuance is exempt from withholding tax on investment income and in bearer form or the trading and clearing methods used. However, the targeting of outside investors is by no means identical to actual holdings by these investors. We therefore decided to focus on the "narrow" measure of international financing use (A3.1) and look for other data sources for international investment, measuring asset holdings directly rather than relying on a "targeting criterion" in relation to liability managers' behaviour. The "narrow" measure (A3.1) can be derived from the BIS measure (A3.4) by deducting from the latter all issuance in home currency of the issuer ($f_1^1 + \sum_i g_i^1 + \sum_i h_i^1$). Therefore, tables 1A, 2, 4 and 6 are said to "exclude home currency issuance".

Annex 3: Tables and chart

Table 1A

International debt securities in aggregated euro area currencies and DEM, series not adjusted for EMU (excluding home currency issuance, i.e. "narrow" measure)

	Bonds and Notes announced issuance						Money Market Instruments announced issuance						Debt Securities outstanding amounts					
	aggregate of all euro area currencies		exceeding EMU adjusted series in table 2 by		DEM		aggregate of all euro area currencies		exceeding EMU adjusted series in table 4 by		DEM		aggregate of all euro area currencies		exceeding EMU adjusted series in table 6 by		DEM	
	bn USD	share in %	bn USD	p.p.	bn USD	share in %	bn USD	share in %	bn USD	p.p.	bn USD	share in %	bn USD	share in %	bn USD	p.p.	bn USD	share in %
1994Q1	25.7	25.2	13.1	11.0	11.1	10.9	6.1	8.3	1.9	2.4	2.2	3.0	412.3	25.4	154.6	7.9	219.9	13.5
1994Q2	21.2	26.3	10.3	10.8	6.6	8.2	6.3	9.4	2.0	2.8	2.6	3.9	437.9	26.0	164.9	8.0	230.5	13.7
1994Q3	19.0	19.7	7.9	7.1	7.9	8.1	8.0	10.8	2.6	3.2	3.5	4.7	457.1	25.9	174.9	8.1	239.7	13.6
1994Q4	21.7	23.6	9.1	8.3	8.8	9.6	8.4	11.8	1.9	2.5	4.9	6.9	468.8	26.1	178.8	8.2	243.4	13.5
1995Q1	35.1	38.3	13.4	10.6	15.2	16.6	10.8	14.0	3.1	3.6	6.4	8.3	535.0	27.6	206.7	8.6	280.6	14.5
1995Q2	29.1	28.5	13.2	10.6	19.4	19.0	11.7	15.2	3.2	3.7	7.0	9.1	553.8	27.6	218.3	8.8	292.2	14.6
1995Q3	28.0	24.3	8.4	6.0	16.1	14.0	10.9	13.5	3.8	4.3	5.8	7.2	560.2	28.0	220.0	8.9	295.4	14.8
1995Q4	28.4	28.5	10.6	8.5	18.8	18.8	10.9	13.3	3.3	3.7	6.7	8.1	572.9	28.2	225.4	9.0	304.0	15.0
1996Q1	52.8	34.4	20.9	10.3	27.2	17.7	12.2	14.4	3.1	3.3	7.1	8.3	588.6	28.4	233.4	9.1	310.1	15.0
1996Q2	34.1	23.7	12.8	7.4	14.8	10.3	11.1	11.8	4.5	4.4	6.0	6.3	597.5	27.9	238.0	9.0	307.9	14.4
1996Q3	38.4	24.8	13.7	7.3	17.9	11.5	13.5	14.3	4.0	3.8	7.9	8.3	614.8	27.8	246.9	9.1	314.3	14.2
1996Q4	44.7	25.9	15.3	7.2	14.3	8.3	13.5	13.7	4.3	3.9	7.3	7.4	638.9	27.8	255.0	9.0	320.0	13.9
1997Q1	51.2	26.2	21.2	9.0	20.7	10.6	14.0	14.1	4.5	4.1	7.8	7.9	621.2	26.8	249.2	8.8	309.2	13.4
1997Q2	40.6	22.4	14.9	6.9	14.8	8.2	11.5	11.5	4.8	4.5	5.3	5.4	621.4	25.6	252.1	8.6	304.3	12.5
1997Q3	46.5	23.5	19.8	8.5	19.9	10.1	12.8	12.1	4.5	3.9	6.0	5.7	645.9	25.7	262.5	8.7	314.0	12.5
1997Q4	40.6	28.0	12.4	6.7	16.1	11.1	14.2	14.0	5.0	4.5	6.7	6.7	658.2	26.2	267.4	8.8	315.3	12.5
1998Q1	80.1	35.9	34.5	11.7	32.8	14.7	12.0	10.8	4.2	3.5	5.0	4.5	683.9	26.3	280.0	8.9	322.5	12.4
1998Q2	67.7	35.1	28.4	11.2	32.6	16.9	11.7	11.6	3.7	3.4	5.2	5.1	750.8	27.6	308.7	9.3	352.7	13.0
1998Q3	55.4	34.7	22.3	10.6	22.7	14.2	14.2	12.5	4.2	3.4	6.8	6.0	857.4	29.5	351.1	9.7	402.0	13.9
1998Q4	50.0	32.7	24.2	12.7	20.0	13.1	21.5	20.6	9.8	8.2	8.3	8.0	883.0	29.5	370.7	10.0	409.9	13.7

Notes table 1A:

The table shows international debt securities under the assumption that cross-border intra-euro area activity still counts as international (series not adjusted for EMU). The "exceeding EMU adjusted series" columns show, on the left-hand side, the absolute difference (bn USD column) between the not EMU adjusted series (reported in the present table) and the EMU adjusted series (reported in tables 2, 4 and 6) and, on the right-hand side, the corresponding difference of the shares in percentage points (p.p. column). For example, aggregating the euro-predecessor-currency amounts of outstanding international debt securities in Q4 1998 adds up to USD 883 bn or a share of 29.5% for the "euro". When the euro area is regarded as one "country", the reclassification of some euro-predecessor-currency-denominated securities as "domestic" reduces the aggregate absolute "euro" figure by USD 370.7 bn or the "euro" share by 10 p.p.

Treatment of ECU securities: The non adjusted euro series treat the ECU as a foreign currency and thus all ECU securities are included in the aggregate of all euro area currencies. The adjusted series for the euro area treat the ECU always as a domestic currency, thus euro-area residents' ECU issuance is excluded from the EMU adjusted "euro" series. The DEM columns include 32.02% of ECU securities issued by non-residents of Germany.

Data sources: BIS, ECB staff calculations.

International debt securities in aggregated euro area currencies and DEM
(including home currency issuance, i.e. "broad" measure)

	Bonds and Notes announced issuance				Money Market Instruments announced issuance				Debt Securities outstanding amounts			
	aggregate of all euro area currencies		DEM		aggregate of all euro area currencies		DEM		aggregate of all euro area currencies		DEM	
	bn USD	share in %	bn USD	share in %	bn USD	share in %	bn USD	share in %	bn USD	share in %	bn USD	share in %
1994Q1	46.4	31.0	16.9	11.2	7.6	8.4	3.0	3.3	548.4	25.4	238.6	11.1
1994Q2	31.2	28.5	9.6	8.7	8.7	9.8	4.2	4.8	588.9	26.2	252.7	11.2
1994Q3	23.5	20.0	9.2	7.8	11.3	12.0	5.3	5.7	618.7	26.2	264.8	11.2
1994Q4	29.4	25.4	12.4	10.7	12.4	14.1	6.2	7.1	638.1	26.7	271.7	11.4
1995Q1	39.5	33.5	15.7	13.3	15.1	16.4	8.5	9.3	725.0	28.1	313.0	12.2
1995Q2	35.2	26.7	21.6	16.4	17.7	18.3	9.3	9.6	747.3	28.1	325.6	12.2
1995Q3	32.8	22.2	17.5	11.9	18.3	18.2	8.1	8.1	756.8	28.4	330.8	12.4
1995Q4	35.6	26.5	21.5	16.0	15.6	15.7	8.1	8.2	772.3	28.5	340.6	12.6
1996Q1	65.0	30.4	32.8	15.4	17.3	16.8	9.3	9.0	791.6	28.4	351.4	12.6
1996Q2	48.7	23.3	17.2	8.2	15.7	13.4	8.0	6.8	801.7	27.8	349.5	12.1
1996Q3	44.6	22.0	19.4	9.6	17.3	14.8	10.2	8.7	825.6	27.6	358.0	12.0
1996Q4	53.6	22.9	16.8	7.2	24.7	19.0	8.8	6.7	856.9	27.4	362.4	11.6
1997Q1	58.5	22.6	22.2	8.6	18.6	14.8	10.3	8.2	829.3	26.2	350.1	11.1
1997Q2	50.4	19.8	17.4	6.8	16.3	12.9	8.5	6.7	829.5	24.9	346.9	10.4
1997Q3	59.7	21.4	21.1	7.6	20.0	14.8	11.5	8.5	857.9	24.8	358.1	10.4
1997Q4	50.0	23.8	17.9	8.6	19.8	15.4	10.8	8.4	879.5	25.2	360.2	10.3
1998Q1	101.2	29.9	41.6	12.3	19.2	13.5	9.1	6.4	913.5	25.0	371.8	10.2
1998Q2	82.9	26.9	38.5	12.5	19.0	14.4	10.1	7.7	1001.0	25.9	411.5	10.6
1998Q3	69.2	28.4	33.9	13.9	23.8	16.5	13.5	9.3	1140.5	27.6	477.7	11.6
1998Q4	65.9	26.1	25.2	10.0	28.3	21.5	13.6	10.3	1170.0	27.2	489.5	11.4

Note table 1B: The DEM columns include 32.02% of ECU-denominated securities.

Data sources: BIS, ECB staff calculations.

Table 1C

International bank assets/liabilities, series not adjusted for EMU

	Bank Liabilities		exceeding EMU adjusted series in table 8 by		Bank Assets		exceeding EMU adjusted series in table 9 by	
	bn USD	share in %	bn USD	p.p.	bn USD	share in %	bn USD	p.p.
1998Q1	2265.1	22.3	681.2	5.6	2325.0	22.6	819.6	6.7
1998Q2	2437.5	23.5	742.6	5.9	2550.2	24.3	919.0	7.3
1998Q3	2608.9	24.1	792.0	6.0	2779.2	25.5	971.6	7.3
1998Q4	2490.9	23.3	590.4	4.5	2642.2	24.4	886.5	6.7
1999Q1	2543.5	24.5	672.9	5.2	2840.2	26.9	1087.1	8.4
1999Q2	2423.6	23.7	623.3	4.9	2790.1	26.6	1099.9	8.6
1999Q3	2675.6	24.9	709.2	5.3	3057.0	27.9	1146.9	8.4

Notes table 1C: The table shows the amounts of international bank liabilities and assets under the assumption that cross-border intra-euro area activity still counts as international (series not adjusted for EMU). The "exceeding EMU adjusted series" shows the EMU adjustment in absolute amounts (bn USD column) and in percentage points of the total share (p.p. column). See notes of table 1A for details.

Data sources: BIS, ECB staff calculations.

Table 2

International bonds and notes excluding home currency issuance ("narrow" measure), announced issues

	Euro			Other EU			USD			JPY			CHF			Other Currencies			Total
	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD
1994Q1	12.6	14.2	14.2	6.1	6.9	6.9	45.7	51.5	51.5	14.5	16.3	16.3	7.1	8.0	8.0	2.7	3.0	3.0	88.6
1994Q2	10.9	15.5	15.3	2.5	3.5	3.6	27.5	39.2	39.9	22.9	32.6	31.9	3.4	4.8	4.8	3.1	4.4	4.5	70.3
1994Q3	11.1	12.5	12.1	3.0	3.4	3.4	26.6	30.0	31.7	38.0	43.0	41.8	6.7	7.6	7.2	3.1	3.5	3.7	88.5
1994Q4	12.6	15.2	14.5	2.8	3.3	3.3	32.6	39.3	41.3	28.0	33.8	32.7	4.5	5.5	5.1	2.4	2.9	3.1	82.9
1995Q1	21.6	27.7	26.6	3.6	4.7	4.8	21.5	27.5	29.8	23.2	29.8	28.9	6.1	7.8	7.3	1.9	2.4	2.6	78.0
1995Q2	15.9	17.9	17.3	1.5	1.7	1.8	29.3	32.9	37.8	35.1	39.5	35.5	6.1	6.8	6.2	1.1	1.2	1.4	88.9
1995Q3	19.6	18.3	17.2	3.3	3.1	3.2	33.9	31.8	34.8	35.7	33.4	32.1	10.2	9.6	8.5	4.1	3.8	4.2	106.7
1995Q4	17.8	19.9	18.2	3.1	3.5	3.6	30.4	34.0	36.4	27.7	31.0	31.3	7.6	8.5	7.2	2.7	3.0	3.2	89.2
1996Q1	31.9	24.0	22.1	5.7	4.3	4.4	50.4	38.0	40.0	29.5	22.3	23.0	10.8	8.1	7.0	4.3	3.2	3.4	132.7
1996Q2	21.4	16.3	15.0	5.2	4.0	4.0	64.2	49.0	50.3	29.6	22.6	23.2	6.8	5.2	4.6	3.8	2.9	2.9	131.0
1996Q3	24.7	17.5	15.9	4.5	3.2	3.1	62.6	44.3	45.6	35.7	25.2	26.3	8.4	6.0	5.2	5.4	3.8	3.9	141.4
1996Q4	29.4	18.7	17.0	12.8	8.2	7.6	70.7	45.0	45.9	34.6	22.0	23.6	5.2	3.3	3.0	4.4	2.8	2.9	157.1
1997Q1	30.1	17.3	16.4	18.0	10.4	9.4	76.9	44.1	43.8	35.1	20.1	22.5	7.5	4.3	4.2	6.6	3.8	3.8	174.2
1997Q2	25.7	15.5	15.0	9.1	5.5	4.9	87.3	52.5	51.8	30.8	18.5	20.3	6.0	3.6	3.5	7.5	4.5	4.4	166.5
1997Q3	26.7	15.0	15.2	9.5	5.4	4.8	94.6	53.2	52.3	33.6	18.9	20.4	4.9	2.7	2.8	8.4	4.7	4.6	177.6
1997Q4	28.2	21.3	20.8	7.0	5.3	4.6	62.3	47.0	45.8	26.5	20.0	22.7	5.4	4.1	3.9	3.1	2.4	2.3	132.5
1998Q1	45.6	24.2	24.5	15.0	8.0	7.0	91.8	48.7	47.7	20.1	10.7	12.4	9.8	5.2	5.1	6.2	3.3	3.2	188.5
1998Q2	39.3	23.9	23.9	11.6	7.0	6.2	87.6	53.2	52.1	13.3	8.1	9.9	7.4	4.5	4.5	5.5	3.4	3.3	164.6
1998Q3	33.1	24.1	23.5	13.4	9.8	8.5	59.0	43.0	41.6	18.3	13.3	16.8	7.3	5.3	5.2	6.2	4.5	4.4	137.3
1998Q4	25.7	20.0	19.4	22.1	17.2	15.5	52.2	40.7	41.3	18.9	14.7	16.6	6.6	5.2	4.9	2.9	2.3	2.3	128.4
1999Q1	61.2	33.3	34.0	9.0	4.9	4.4	82.4	44.8	44.3	15.8	8.6	9.2	10.2	5.5	5.4	5.2	2.8	2.8	183.7
1999Q2	61.1	32.5	33.5	14.4	7.6	6.9	75.8	40.4	39.1	23.7	12.6	13.7	7.0	3.7	3.7	5.9	3.1	3.0	187.8
1999Q3	67.0	35.3	36.7	16.6	8.8	7.9	60.8	32.0	31.1	32.3	17.0	17.4	6.4	3.4	3.4	6.7	3.5	3.4	189.8
1999Q4	43.5	29.4	31.5	14.9	10.1	9.1	45.9	31.1	30.7	33.3	22.5	21.6	4.0	2.7	2.9	6.3	4.3	4.2	147.9

Notes tables 2, 4 and 6:
For detailed descriptions of the data and the definitions of the different measures, see annexes 1 and 2.

The definition of international debt securities excluding home currrency issuance *considers all issues denominated in a currency other than that of the country in which the borrower resides.*

Share cur *is the percentage share at current exchange rates.* Share con *is the percentage share at constant Q1 1994 exchange rates. When keeping the exchange rate fixed all other EU currencies were treated as GBP denominated (which they are to about 95%) and by using the current exchange rate values for all other currencies (thus implicitly assuming that on (weighted) average those exchange rates remained constant against the USD) over the period considered.*

The euro series are adjusted for the "arithmetic" EMU effect for the whole sample period shown. Thus the whole euro area is treated as domestic for euro assets/ liabilities.

Data sources: *BIS and ECB Staff calculations.*

Table 3

International bonds and notes including home currency issuance ("broad" measure), announced issues

	Euro			Other EU			USD			JPY			CHF			Other			Total
	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD
1994Q1	46.4	31.0	31.0	16.5	11.0	11.0	55.1	36.7	36.7	16.4	11.0	11.0	7.3	4.9	4.9	8.2	5.4	5.4	149.9
1994Q2	31.2	28.5	28.2	8.2	7.5	7.6	34.6	31.6	32.3	25.9	23.6	23.2	3.4	3.1	3.1	6.1	5.6	5.7	109.4
1994Q3	23.5	20.0	19.3	6.9	5.8	5.9	34.1	29.0	30.6	39.5	33.6	32.6	6.8	5.8	5.5	6.8	5.8	6.1	117.5
1994Q4	29.4	25.4	24.3	6.2	5.3	5.3	41.5	35.9	37.9	28.5	24.7	23.9	4.6	3.9	3.7	5.5	4.7	5.0	115.7
1995Q1	39.5	33.5	31.9	8.0	6.8	6.9	36.3	30.8	33.2	23.7	20.1	19.4	6.1	5.2	4.8	4.2	3.6	3.9	117.8
1995Q2	35.2	26.7	25.6	7.5	5.7	6.0	42.7	32.4	36.7	36.3	27.6	24.5	7.4	5.6	5.1	2.5	1.9	2.1	131.5
1995Q3	32.8	22.2	20.7	8.2	5.6	5.7	52.6	35.7	38.8	37.2	25.3	24.0	10.2	6.9	6.1	6.2	4.2	4.6	147.3
1995Q4	35.6	26.5	24.3	7.6	5.7	5.8	48.8	36.4	39.0	28.9	21.6	21.8	8.0	6.0	5.1	5.2	3.9	4.1	134.1
1996Q1	65.0	30.4	28.1	15.2	7.1	7.3	85.0	39.8	42.0	30.2	14.1	14.6	10.8	5.1	4.4	7.4	3.5	3.7	213.6
1996Q2	48.7	23.3	21.6	11.9	5.7	5.8	102.9	49.2	50.8	30.8	14.8	15.2	6.8	3.3	2.9	7.7	3.7	3.8	208.9
1996Q3	44.6	22.0	20.1	10.9	5.4	5.3	93.8	46.3	47.8	37.7	18.6	19.4	8.4	4.2	3.6	7.3	3.6	3.7	202.7
1996Q4	53.6	22.9	21.0	23.1	9.9	9.2	109.5	46.8	48.2	36.4	15.6	16.8	5.2	2.2	2.0	6.0	2.6	2.7	233.9
1997Q1	58.5	22.6	21.6	29.7	11.5	10.5	117.3	45.3	45.4	36.1	13.9	15.7	7.6	2.9	2.9	9.9	3.8	3.8	259.1
1997Q2	50.4	19.8	19.4	17.4	6.8	6.2	139.4	54.7	54.5	31.4	12.3	13.6	6.4	2.5	2.5	10.0	3.9	3.9	254.9
1997Q3	59.7	21.4	21.8	17.6	6.3	5.7	150.3	53.9	53.2	35.3	12.7	13.7	5.2	1.9	1.9	10.6	3.8	3.8	278.8
1997Q4	50.0	23.8	23.5	15.3	7.3	6.4	108.1	51.5	50.9	26.6	12.7	14.6	5.8	2.8	2.7	4.0	1.9	1.9	209.8
1998Q1	101.2	29.9	30.6	30.2	9.0	8.0	167.1	49.5	48.8	20.6	6.1	7.2	10.3	3.1	3.1	8.4	2.5	2.5	337.8
1998Q2	82.9	26.9	27.2	21.1	6.8	6.1	174.8	56.7	56.0	13.5	4.4	5.4	8.4	2.7	2.8	7.8	2.5	2.5	308.5
1998Q3	69.2	28.4	28.1	19.9	8.2	7.2	121.1	49.7	48.9	19.0	7.8	10.0	7.5	3.1	3.1	6.7	2.8	2.7	243.5
1998Q4	65.9	26.1	25.4	30.6	12.1	11.0	124.8	49.4	50.4	19.7	7.8	8.8	6.6	2.6	2.5	4.8	1.9	1.9	252.4
1999Q1	147.6	36.2	37.0	27.8	6.8	6.2	197.4	48.4	47.9	17.5	4.3	4.6	10.2	2.5	2.4	7.6	1.9	1.8	408.2
1999Q2	175.1	39.3	40.7	34.5	7.7	7.0	193.9	43.5	42.4	24.9	5.6	6.1	7.0	1.6	1.6	10.3	2.3	2.2	445.6
1999Q3	159.7	38.9	40.5	30.1	7.3	6.6	171.0	41.6	40.5	35.0	8.5	8.7	6.7	1.6	1.7	8.4	2.1	2.0	410.9
1999Q4	127.2	41.0	43.4	24.7	7.9	7.1	111.9	36.1	35.2	34.5	11.1	10.5	4.0	1.3	1.3	7.9	2.5	2.5	310.2

Notes tables 3, 5 and 7:
For detailed descriptions of the data and the definitions of the different measures, see annexes 1 and 2.

The definition of international debt securities including home currency issuance coincides with the BIS definition.
It includes all issues denominated in a currency other than that of the country in which the borrower resides and issues in the home country's currency when the targeted investor resides outside the country of residence of the issuer.

Share cur is the percentage share at current exchange rates. Share con is the percentage share at constant Q1 1994 exchange rates.

When keeping the exchange rate fixed all other EU currencies were treated as GBP denominated (which they are to about 95%) and by using the current exchange rate values for all other currencies (thus implicitly assuming that on (weighted) average those exchange rates remained constant against the USD) over the period considered.

The euro series are adjusted for the "arithmetic" EMU effect for the whole sample period shown. Thus the whole euro area is treated as domestic for euro assets/ liabilities.

Data sources: BIS, ECB staff calculations.

Table 4

International money market instruments excluding home currency issuance ("narrow" measure), announced issues

	Euro			Other EU			USD			JPY			CHF			Other			Total
	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD
1994Q1	4.2	5.9	5.9	3.0	4.1	4.1	60.6	84.7	84.7	0.9	1.3	1.3	1.9	2.7	2.7	1.0	1.4	1.4	71.5
1994Q2	4.3	6.6	6.4	2.8	4.2	4.2	54.3	83.2	83.6	1.3	2.0	1.9	1.9	3.0	2.9	0.6	1.0	1.0	65.3
1994Q3	5.4	7.6	7.0	2.2	3.1	3.0	59.3	83.0	84.0	1.0	1.4	1.3	2.8	3.9	3.6	0.7	1.0	1.0	71.4
1994Q4	6.4	9.4	8.6	2.6	3.7	3.6	55.2	80.2	81.6	1.7	2.4	2.3	2.4	3.5	3.1	0.5	0.8	0.8	68.8
1995Q1	7.7	10.4	9.4	1.9	2.6	2.5	57.9	78.5	80.4	2.0	2.7	2.4	3.9	5.3	4.6	0.4	0.6	0.6	73.8
1995Q2	8.5	11.5	10.1	1.8	2.5	2.4	55.8	76.1	79.1	2.6	3.5	2.9	4.2	5.8	4.8	0.5	0.7	0.7	73.4
1995Q3	7.1	9.2	8.2	1.9	2.5	2.4	60.3	78.4	80.8	2.8	3.6	3.3	4.2	5.5	4.6	0.6	0.8	0.8	76.8
1995Q4	7.6	9.6	8.5	2.5	3.2	3.1	60.4	76.6	79.1	1.9	2.4	2.4	5.6	7.1	5.8	0.8	1.0	1.1	79.0
1996Q1	9.1	11.1	10.0	2.6	3.2	3.2	61.1	74.3	76.3	3.7	4.6	4.6	4.7	5.7	4.8	0.9	1.1	1.1	82.1
1996Q2	6.7	7.4	6.7	2.1	2.3	2.3	71.1	78.8	80.0	4.8	5.4	5.4	4.2	4.6	4.0	1.3	1.5	1.5	90.2
1996Q3	9.5	10.4	9.5	2.2	2.4	2.4	65.7	72.2	73.9	5.5	6.0	6.2	6.0	6.6	5.7	2.1	2.3	2.4	91.0
1996Q4	9.3	9.8	8.9	3.5	3.6	3.4	67.9	71.7	73.1	5.3	5.6	6.0	6.8	7.1	6.5	2.0	2.1	2.2	94.8
1997Q1	9.5	10.0	9.6	4.3	4.6	4.2	67.4	71.1	71.1	6.3	6.6	7.5	5.7	6.1	6.0	1.6	1.7	1.7	94.8
1997Q2	6.7	7.0	6.9	4.2	4.4	4.0	72.9	76.8	76.8	3.7	3.9	4.4	5.8	6.2	6.1	1.6	1.7	1.7	94.9
1997Q3	8.3	8.2	8.4	4.0	4.0	3.6	75.6	74.8	74.4	5.2	5.1	5.6	6.4	6.4	6.5	1.6	1.5	1.5	101.0
1997Q4	9.2	9.5	9.5	5.6	5.8	5.2	67.5	70.3	70.1	6.0	6.2	7.2	6.5	6.8	6.7	1.4	1.4	1.4	96.1
1998Q1	7.8	7.3	7.5	4.8	4.5	4.0	79.2	73.9	73.1	6.9	6.5	7.6	6.9	6.4	6.5	1.4	1.3	1.3	107.1
1998Q2	8.0	8.2	8.3	4.4	4.5	4.0	73.7	75.5	74.6	4.9	5.0	6.2	5.5	5.6	5.7	1.1	1.1	1.1	97.6
1998Q3	9.9	9.1	9.1	5.5	5.0	4.5	80.4	73.8	72.8	6.5	6.0	7.7	5.4	5.0	5.0	1.2	1.1	1.1	109.0
1998Q4	11.7	12.4	12.0	5.3	5.6	5.0	66.7	70.5	71.4	2.9	3.0	3.4	6.6	7.0	6.6	1.4	1.4	1.5	94.6
1999Q1	25.0	20.0	20.7	6.7	5.4	4.9	82.2	65.8	65.6	2.4	1.9	2.1	7.2	5.7	5.6	1.4	1.1	1.1	124.9
1999Q2	19.8	17.4	18.3	9.4	8.3	7.6	77.0	67.5	66.9	2.5	2.2	2.5	4.0	3.5	3.6	1.2	1.1	1.1	114.1
1999Q3	29.7	23.4	24.7	8.8	7.0	6.4	79.3	62.5	61.7	1.6	1.3	1.3	4.3	3.4	3.5	3.1	2.4	2.4	126.8
1999Q4	21.8	20.3	21.8	10.0	9.3	8.4	66.7	62.1	61.5	3.0	2.8	2.7	3.3	3.1	3.3	2.6	2.4	2.4	107.5

Notes tables 2, 4 and 6:
For detailed descriptions of the data and the definitions of the different measures, see annexes 1 and 2.

The definition of international debt securities excluding home currrency issuances *considers all issues denominated in a currency other than that of the country in which the borrower resides.*

Share cur *is the percentage share at current exchange rates.* Share con *is the percentage share at constant Q1 1994 exchange rates.*

When keeping the exchange rate fixed all other EU currencies were treated as GBP denominated (which they are to about 95%) and by using the current exchange rate values for all other currencies (thus implicitly assuming that on (weighted) average those exchange rates remained constant against the USD) over the period considered.

The euro series are adjusted for the "arithmetic" EMU effect for the whole sample period shown. Thus the whole euro area is treated as domestic for euro assets/ liabilities.

Data sources: *BIS and ECB Staff calculations.*

Table 5

International money market instruments including home currency issuance ("broad" measure), announced issues

	Euro			Other EU			USD			JPY			CHF			Other			Total
	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD
1994Q1	7.6	8.4	8.4	3.8	4.2	4.2	71.0	78.0	78.0	1.0	1.1	1.1	1.9	2.1	2.1	5.6	6.2	6.2	91.0
1994Q2	8.7	9.8	9.5	3.8	4.3	4.3	66.9	75.5	75.8	1.3	1.5	1.4	1.9	2.2	2.1	6.0	6.8	6.8	88.7
1994Q3	11.3	12.0	11.2	3.8	4.0	3.9	69.2	73.9	75.0	1.0	1.1	1.0	2.8	3.0	2.8	5.6	6.0	6.1	93.6
1994Q4	12.4	14.1	13.1	4.6	5.2	5.0	62.7	71.4	73.0	1.7	1.9	1.8	2.4	2.7	2.5	4.0	4.6	4.7	87.7
1995Q1	15.1	16.4	14.9	4.3	4.6	4.5	63.0	68.4	70.5	2.0	2.1	2.0	3.9	4.2	3.7	3.9	4.3	4.4	92.2
1995Q2	17.7	18.3	16.2	4.0	4.2	4.1	62.2	64.4	67.5	2.6	2.7	2.2	4.2	4.4	3.7	5.8	6.0	6.3	96.5
1995Q3	18.3	18.2	16.3	5.1	5.1	5.0	64.6	64.1	66.8	2.8	2.8	2.5	4.2	4.2	3.5	5.7	5.7	5.9	100.7
1995Q4	15.6	15.7	13.9	6.3	6.4	6.3	64.2	64.5	67.1	1.9	1.9	1.9	5.7	5.7	4.7	5.8	5.9	6.1	99.5
1996Q1	17.3	16.8	15.1	7.1	6.8	6.9	64.2	62.1	64.1	3.7	3.6	3.7	4.7	4.6	3.9	6.4	6.1	6.4	103.4
1996Q2	15.7	13.4	12.3	6.9	5.9	5.9	75.9	64.8	66.2	4.8	4.1	4.2	4.2	3.5	3.1	9.6	8.2	8.4	117.1
1996Q3	17.3	14.8	13.5	6.8	5.8	5.7	69.4	59.3	60.9	5.5	4.7	4.9	6.0	5.2	4.5	12.0	10.3	10.5	117.0
1996Q4	24.7	19.0	17.5	7.5	5.8	5.4	71.8	55.3	57.0	5.3	4.1	4.4	6.8	5.2	4.8	13.7	10.6	10.9	129.9
1997Q1	18.6	14.8	14.3	9.4	7.5	6.9	71.4	57.0	57.4	6.3	5.0	5.7	5.8	4.6	4.6	13.9	11.1	11.2	125.4
1997Q2	16.3	12.9	12.8	9.4	7.4	6.8	76.9	60.7	61.1	3.7	3.0	3.3	5.9	4.7	4.7	14.3	11.3	11.4	126.6
1997Q3	20.0	14.8	15.2	9.1	6.7	6.1	80.4	59.6	59.3	5.2	3.8	4.2	6.5	4.8	5.0	13.8	10.2	10.2	135.0
1997Q4	19.8	15.4	15.4	11.7	9.0	8.1	72.6	56.3	56.5	6.0	4.6	5.4	6.6	5.1	5.1	12.3	9.5	9.6	128.9
1998Q1	19.2	13.5	13.8	11.7	8.2	7.3	84.2	59.0	58.6	6.9	4.9	5.7	7.0	4.9	5.0	13.7	9.6	9.6	142.8
1998Q2	19.0	14.4	14.7	11.1	8.4	7.5	79.9	60.6	60.3	4.9	3.7	4.6	5.7	4.3	4.4	11.3	8.6	8.5	131.8
1998Q3	23.8	16.5	16.4	11.6	8.0	7.2	86.0	59.4	58.9	6.6	4.5	5.8	5.5	3.8	3.8	11.3	7.8	7.8	144.9
1998Q4	28.3	21.5	20.9	12.1	9.1	8.3	69.9	52.9	54.1	2.9	2.2	2.5	6.6	5.0	4.8	12.2	9.3	9.4	132.0
1999Q1	56.7	31.9	32.8	12.9	7.2	6.6	86.3	48.6	48.4	2.4	1.3	1.4	7.2	4.1	4.0	12.2	6.9	6.8	177.7
1999Q2	44.7	28.0	29.3	16.1	10.1	9.2	80.7	50.5	49.8	2.5	1.6	1.8	4.1	2.5	2.6	11.8	7.4	7.3	159.9
1999Q3	63.2	34.6	36.4	17.7	9.7	8.8	82.2	45.1	44.2	1.6	0.9	0.9	4.3	2.4	2.4	13.4	7.3	7.2	182.3
1999Q4	50.8	32.0	34.1	17.4	11.0	9.8	69.3	43.6	42.9	3.0	1.9	1.8	3.4	2.1	2.2	14.9	9.3	9.2	158.9

Notes tables 3, 5 and 7:
For detailed descriptions of the data and the definitions of the different measures, see annexes 1 and 2.

The definition of international debt securities including home currency issuance coincides with the BIS definition.
It includes all issues denominated in a currency other than that of the country in which the borrower resides and issues in the home country's currency when the targeted investor resides outside the country of residence of the issuer.

Share cur is the percentage share at current exchange rates. Share con is the percentage share at constant Q1 1994 exchange rates.

When keeping the exchange rate fixed all other EU currencies were treated as GBP denominated (which they are to about 95%) and by using the current exchange rate values for all other currencies (thus implicitly assuming that on (weighted) average those exchange rates remained constant against the USD) over the period considered.

The euro series are adjusted for the "arithmetic" EMU effect for the whole sample period shown. Thus the whole euro area is treated as domestic for euro assets/ liabilities.

Data sources: BIS, ECB staff calculations.

Table 6

International debt securities (bonds and notes and money market instruments) excluding home currency issuance ("narrow" measure), amounts outstanding

	Euro			Other EU			USD			JPY			CHF			Other			Total
	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD
1994Q1	257.7	17.5	17.5	67.9	4.6	4.6	720.9	49.1	49.1	216.2	14.7	14.7	151.7	10.3	10.3	54.4	3.7	3.7	1468.9
1994Q2	273.0	18.0	17.6	69.9	4.6	4.5	726.9	47.8	48.8	239.2	15.7	15.4	156.7	10.3	10.0	54.7	3.6	3.7	1520.3
1994Q3	282.2	17.7	17.1	73.0	4.6	4.4	738.2	46.4	47.9	277.8	17.5	17.2	162.9	10.2	9.6	56.9	3.6	3.7	1591.1
1994Q4	290.0	17.9	17.3	73.7	4.6	4.4	742.7	45.9	47.2	294.3	18.2	18.1	159.9	9.9	9.4	56.8	3.5	3.6	1617.3
1995Q1	328.2	19.0	17.7	77.3	4.5	4.4	741.2	42.8	46.4	342.1	19.8	18.5	184.2	10.6	9.3	57.2	3.3	3.6	1730.2
1995Q2	335.5	18.8	17.7	76.5	4.3	4.4	750.4	42.0	46.0	385.6	21.6	19.4	181.3	10.1	9.1	57.6	3.2	3.5	1786.9
1995Q3	340.2	19.1	17.7	78.6	4.4	4.4	758.9	42.6	45.1	357.8	20.1	20.3	183.1	10.3	8.8	61.1	3.4	3.6	1779.7
1995Q4	347.5	19.3	17.7	80.1	4.4	4.4	770.3	42.7	44.7	358.4	19.9	20.7	185.3	10.3	8.8	62.5	3.5	3.6	1804.0
1996Q1	355.3	19.3	17.9	82.6	4.5	4.5	789.4	42.9	44.3	365.0	19.9	21.1	180.2	9.8	8.5	66.0	3.6	3.7	1838.6
1996Q2	359.5	18.9	17.6	86.4	4.5	4.4	839.5	44.1	44.8	377.0	19.8	21.3	172.9	9.1	8.2	68.4	3.6	3.6	1903.8
1996Q3	367.9	18.7	17.4	89.5	4.6	4.4	864.4	44.0	44.5	399.0	20.3	22.1	171.7	8.7	7.9	72.6	3.7	3.7	1965.1
1996Q4	383.9	18.8	17.3	108.1	5.3	4.6	914.6	44.7	44.8	403.0	19.7	22.2	160.0	7.8	7.5	74.4	3.6	3.6	2043.9
1997Q1	371.9	18.0	17.3	118.0	5.7	5.0	954.4	46.2	44.6	396.2	19.2	22.3	148.6	7.2	7.2	76.8	3.7	3.6	2066.0
1997Q2	369.4	17.0	16.9	127.2	5.8	5.1	1007.5	46.2	45.2	445.6	20.5	22.2	148.6	6.8	6.9	80.5	3.7	3.6	2178.8
1997Q3	383.5	17.0	17.0	131.5	5.8	5.2	1073.0	47.6	45.9	433.7	19.2	21.8	150.0	6.7	6.6	82.2	3.6	3.5	2253.9
1997Q4	390.7	17.4	17.3	138.8	6.2	5.3	1090.9	48.5	46.2	406.2	18.1	21.7	146.0	6.5	6.4	76.8	3.4	3.2	2249.5
1998Q1	403.9	17.4	17.6	151.2	6.5	5.4	1153.5	49.7	47.0	397.0	17.1	20.7	139.6	6.0	6.1	76.8	3.3	3.1	2321.9
1998Q2	442.1	18.3	18.2	160.5	6.7	5.6	1221.6	50.7	47.7	368.3	15.3	19.6	142.8	5.9	6.0	75.7	3.1	3.0	2410.9
1998Q3	506.4	19.8	18.9	172.3	6.8	5.7	1256.5	49.2	47.6	380.5	14.9	18.9	158.2	6.2	5.9	77.9	3.1	3.0	2551.8
1998Q4	512.3	19.5	19.1	186.9	7.1	6.3	1257.2	47.9	47.4	434.4	16.5	18.4	158.7	6.0	5.8	77.3	2.9	2.9	2626.8
1999Q1	524.2	19.9	20.5	186.2	7.1	6.2	1292.8	49.0	47.2	407.5	15.4	17.4	150.3	5.7	5.8	79.0	3.0	2.9	2640.0
1999Q2	547.1	20.1	21.4	195.9	7.2	6.5	1337.3	49.2	46.9	404.2	14.9	16.6	147.5	5.4	5.7	84.1	3.1	2.9	2716.2
1999Q3	632.6	21.8	23.2	216.1	7.5	6.6	1351.2	46.6	45.8	462.1	15.9	16.0	152.5	5.3	5.5	86.4	3.0	2.9	2901.1
1999Q4	632.2	21.7	24.2	220.7	7.6	6.7	1349.0	46.3	44.9	481.8	16.5	15.9	140.0	4.8	5.3	88.1	3.0	2.9	2911.8

Notes tables 2, 4 and 6:
For detailed descriptions of the data and the definitions of the different measures, see annexes 1 and 2.

The definition of international debt securities excluding home currrency issuances *considers all issues denominated in a currency other than that of the country in which the borrower resides.*

Share cur *is the percentage share at current exchange rates.* Share con *is the percentage share at constant Q1 1994 exchange rates.*

When keeping the exchange rate fixed all other EU currencies were treated as GBP denominated (which they are to about 95%) and by using the current exchange rate values for all other currencies (thus implicitly assuming that on (weighted) average those exchange rates remained constant against the USD) over the period considered.

The euro series are adjusted for the "arithmetic" EMU effect for the whole sample period shown. Thus the whole euro area is treated as domestic for euro assets/ liabilities.

Data sources: *BIS and ECB staff calculations.*

Table 7

International debt securities (bonds and notes and money market instruments) including home currency issuance ("broad" measure), amounts outstanding

	Euro			Other EU			USD			JPY			CHF			Other			Total
	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD
1994Q1	548.4	25.4	25.4	168.7	7.8	7.8	866.5	40.2	40.2	303.2	14.1	14.1	152.3	7.1	7.1	117.4	5.4	5.4	2156.5
1994Q2	588.9	26.2	25.7	176.9	7.9	7.7	875.7	38.9	39.8	330.4	14.7	14.4	157.4	7.0	6.8	119.8	5.3	5.5	2249.0
1994Q3	618.7	26.2	25.3	185.2	7.9	7.7	890.8	37.8	39.2	372.0	15.8	15.6	163.6	6.9	6.6	127.0	5.4	5.6	2357.4
1994Q4	638.1	26.7	25.8	185.9	7.8	7.6	897.1	37.5	38.6	386.7	16.2	16.1	160.7	6.7	6.4	125.4	5.2	5.4	2393.8
1995Q1	725.0	28.1	26.4	193.5	7.5	7.5	902.0	35.0	38.1	444.3	17.2	16.3	184.8	7.2	6.3	126.4	4.9	5.3	2576.0
1995Q2	747.3	28.1	26.5	193.3	7.3	7.4	918.5	34.5	37.9	493.4	18.5	16.7	182.8	6.9	6.2	128.1	4.8	5.3	2663.4
1995Q3	756.8	28.4	26.5	197.2	7.4	7.4	941.4	35.3	37.6	451.4	16.9	17.2	185.1	6.9	6.0	135.7	5.1	5.4	2667.6
1995Q4	772.3	28.5	26.4	197.5	7.3	7.3	965.3	35.6	37.5	448.1	16.5	17.4	187.6	6.9	6.0	138.5	5.1	5.4	2709.4
1996Q1	791.6	28.4	26.5	203.2	7.3	7.4	1013.4	36.4	37.8	450.4	16.2	17.3	182.6	6.6	5.7	142.0	5.1	5.3	2783.1
1996Q2	801.7	27.8	26.1	208.5	7.2	7.1	1093.8	37.9	38.8	460.2	15.9	17.3	175.1	6.1	5.5	148.7	5.1	5.3	2888.0
1996Q3	825.6	27.6	25.9	214.7	7.2	7.0	1140.5	38.2	39.0	478.8	16.0	17.6	174.0	5.8	5.3	154.0	5.2	5.3	2987.5
1996Q4	856.9	27.4	25.6	251.0	8.0	7.1	1224.8	39.1	39.7	478.5	15.3	17.5	162.1	5.2	5.0	156.9	5.0	5.1	3130.2
1997Q1	829.3	26.2	25.5	264.2	8.4	7.4	1291.5	40.9	40.0	464.0	14.7	17.3	150.4	4.8	4.8	161.1	5.1	5.0	3160.4
1997Q2	829.5	24.9	25.1	279.5	8.4	7.4	1389.7	41.7	41.1	514.9	15.5	16.9	150.3	4.5	4.6	165.4	5.0	4.9	3329.3
1997Q3	857.9	24.8	25.1	284.8	8.2	7.4	1497.7	43.4	42.2	494.6	14.3	16.3	152.3	4.4	4.4	165.7	4.8	4.7	3452.9
1997Q4	879.5	25.2	25.4	299.4	8.6	7.4	1553.6	44.5	42.8	460.4	13.2	16.0	148.6	4.3	4.2	152.6	4.4	4.2	3494.3
1998Q1	912.9	25.0	25.6	323.9	8.9	7.5	1675.7	45.8	43.9	446.4	12.2	15.0	142.7	3.9	4.0	153.3	4.2	4.0	3654.9
1998Q2	1000.5	25.9	26.1	337.1	8.7	7.4	1822.4	47.2	45.1	409.8	10.6	13.8	146.3	3.8	3.9	148.4	3.8	3.7	3864.5
1998Q3	1139.9	27.6	26.7	351.9	8.5	7.3	1908.0	46.2	45.4	422.3	10.2	13.2	162.8	3.9	3.8	147.6	3.6	3.5	4132.5
1998Q4	1169.4	27.2	26.9	367.9	8.6	7.6	1963.3	45.7	45.7	483.0	11.2	12.6	163.4	3.8	3.7	147.0	3.4	3.4	4293.9
1999Q1	1192.0	26.9	28.0	375.9	8.5	7.6	2101.4	47.5	46.0	452.3	10.2	11.6	154.6	3.5	3.6	148.5	3.4	3.3	4424.7
1999Q2	1281.9	27.3	29.2	396.9	8.5	7.6	2252.7	48.0	45.9	446.8	9.5	10.7	151.6	3.2	3.4	158.4	3.4	3.2	4688.3
1999Q3	1482.6	29.0	30.8	437.3	8.6	7.5	2366.5	46.3	45.4	509.3	10.0	10.0	156.5	3.1	3.2	160.4	3.1	3.1	5112.6
1999Q4	1512.1	28.9	32.0	444.8	8.5	7.5	2433.4	46.6	44.8	528.0	10.1	9.6	143.8	2.8	3.0	164.0	3.1	3.0	5226.1

Notes tables 3, 5 and 7:
For detailed descriptions of the data and the definitions of the different measures, see annexes 1 and 2.

The definition of international debt securities including home currency issuances *coincides with the BIS definition.*
It includes all issues denominated in a currency other than that of the country in which the borrower resides and issues in the home country's currency when the targeted investor resides outside the country of residence of the issuer.

Share cur is the percentage share at current exchange rates. Share con is the percentage share at constant Q1 1994 exchange rates.
When keeping the exchange rate fixed all other EU currencies were treated as GBP denominated (which they are to about 95%) and by using the current exchange rate values for all other currencies (thus implicitly assuming that on (weighted) average those exchange rates remained constant against the USD) over the period considered.

The euro series are adjusted for the "arithmetic" EMU effect for the whole sample period shown. Thus the whole euro area is treated as domestic for euro assets/ liabilities.

Data sources: BIS, ECB staff calculations.

Table 8

International bank liabilities

	Euro			USD			JPY			Other Currencies			Total
	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD
1994Q1	1193.3	17.0	17.0	4068.8	57.9	57.9	818.7	11.7	11.7	943.6	13.4	13.4	7024.4
1994Q2	1225.1	17.1	16.6	4159.6	58.0	58.6	812.4	11.3	11.0	980.8	13.7	13.8	7177.9
1994Q3	1257.3	16.8	15.9	4273.9	57.2	58.1	887.0	11.9	11.5	1059.8	14.2	14.4	7478.0
1994Q4	1269.5	16.6	15.8	4362.7	57.0	57.8	907.4	11.9	11.6	1109.7	14.5	14.7	7649.3
1995Q1	1439.6	17.5	15.7	4495.0	54.5	56.9	1067.3	12.9	11.7	1240.4	15.0	15.7	8242.3
1995Q2	1448.5	17.4	15.7	4486.0	53.9	56.7	1087.2	13.1	11.3	1295.2	15.6	16.4	8316.8
1995Q3	1423.8	17.2	15.5	4501.6	54.5	56.0	1032.1	12.5	12.2	1305.6	15.8	16.2	8263.0
1995Q4	1441.5	17.4	15.6	4518.5	54.4	55.6	1029.3	12.4	12.6	1313.2	15.8	16.2	8302.4
1996Q1	1482.5	17.7	16.1	4562.6	54.4	55.2	985.8	11.8	12.3	1354.4	16.2	16.4	8385.4
1996Q2	1496.3	18.0	16.7	4510.0	54.3	54.7	951.5	11.5	12.2	1349.9	16.2	16.4	8307.6
1996Q3	1524.3	18.0	16.7	4583.7	54.2	54.5	935.4	11.1	12.0	1413.9	16.7	16.8	8457.3
1996Q4	1516.7	17.7	16.3	4703.3	54.8	54.8	954.5	11.1	12.5	1408.1	16.4	16.4	8582.7
1997Q1	1501.3	16.9	16.5	5003.7	56.4	55.3	929.9	10.5	12.4	1436.4	16.2	15.9	8871.3
1997Q2	1465.9	16.1	16.2	5140.7	56.5	55.7	1004.2	11.0	12.1	1481.8	16.3	16.0	9092.6
1997Q3	1479.1	16.3	16.5	5079.2	55.8	54.5	950.9	10.5	12.0	1587.1	17.4	17.0	9096.3
1997Q4	1498.8	15.8	16.0	5361.0	56.6	54.6	1018.5	10.7	13.1	1601.3	16.9	16.3	9479.6
1998Q1	1583.9	16.7	17.3	5213.2	55.0	53.0	893.7	9.4	11.6	1779.2	18.8	18.1	9470.0
1998Q2	1694.9	17.6	17.8	5210.1	54.2	52.1	839.7	8.7	11.5	1864.0	19.4	18.6	9608.6
1998Q3	1817.0	18.1	17.4	5335.7	53.2	51.9	863.9	8.6	11.0	2012.3	20.1	19.6	10028.9
1998Q4	1900.5	18.9	18.5	5718.6	56.7	56.3	802.6	8.0	8.9	1656.0	16.4	16.3	10077.8
1999Q1	1870.6	19.3	20.2	5612.6	57.9	56.4	676.8	7.0	7.9	1541.3	15.9	15.5	9701.3
1999Q2	1800.3	18.7	20.3	5628.3	58.5	56.6	622.9	6.5	7.3	1568.0	16.3	15.8	9619.5
1999Q3	1966.4	19.6	20.8	5686.6	56.6	55.6	745.3	7.4	7.5	1648.9	16.4	16.1	10047.3

Notes tables 8 and 9:
For detailed descriptions of the data and the definitions of the different measures, see annexes 1 and 2.

Share cur *is the percentage share at current exchange rates.* Share con *is the percentage share at constant Q1 1994 exchange rates.*
Other currencies are at current exchange rate values (thus implicitly assuming that on (weighted) average those exchange rates remained constant against the USD) over the period considered.

The euro series are adjusted for the "arithmetic" EMU effect for the whole sample period shown. Thus the whole euro area is treated as domestic for euro assets/liabilities.

Data sources: *BIS and ECB staff calculations.*

Table 9

International bank assets

	Euro			USD			JPY			Other Currencies			Total
	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD	share cur	share con	bn USD
1994Q1	1175.7	16.3	16.3	4183.2	57.9	57.9	991.4	13.7	13.7	872.7	12.1	12.1	7222.9
1994Q2	1151.4	15.8	15.3	4252.7	58.4	59.1	979.7	13.5	13.1	899.9	12.4	12.5	7283.7
1994Q3	1164.5	15.6	14.8	4292.4	57.5	58.5	1050.0	14.1	13.7	957.1	12.8	13.0	7464.0
1994Q4	1166.9	15.4	14.6	4350.7	57.3	58.1	1081.7	14.2	14.0	999.9	13.2	13.3	7599.2
1995Q1	1324.0	16.2	14.6	4457.2	54.4	56.9	1300.3	15.9	14.4	1110.7	13.6	14.2	8192.1
1995Q2	1353.4	16.1	14.6	4566.2	54.3	57.2	1334.2	15.9	13.7	1156.8	13.8	14.5	8410.6
1995Q3	1320.6	15.9	14.3	4554.4	54.9	56.5	1257.4	15.2	14.9	1158.5	14.0	14.4	8290.8
1995Q4	1383.6	16.3	14.6	4675.4	55.2	56.3	1244.4	14.7	14.9	1167.6	13.8	14.1	8470.9
1996Q1	1398.6	16.5	15.0	4695.5	55.5	56.2	1164.4	13.8	14.3	1207.7	14.3	14.4	8466.2
1996Q2	1429.1	16.9	15.6	4666.8	55.3	55.6	1129.4	13.4	14.3	1212.9	14.4	14.5	8438.2
1996Q3	1469.8	17.1	15.8	4769.3	55.4	55.6	1110.7	12.9	13.9	1261.5	14.6	14.7	8611.4
1996Q4	1464.2	16.7	15.4	4889.7	55.8	55.7	1117.2	12.8	14.3	1288.9	14.7	14.7	8760.1
1997Q1	1406.9	15.8	15.3	5107.4	57.3	56.0	1052.3	11.8	13.9	1344.1	15.1	14.7	8910.7
1997Q2	1391.4	15.1	15.2	5283.2	57.4	56.4	1138.4	12.4	13.5	1398.9	15.2	14.9	9212.0
1997Q3	1415.9	15.3	15.5	5320.7	57.5	56.0	1108.8	12.0	13.7	1413.4	15.3	14.9	9258.7
1997Q4	1444.1	15.0	15.1	5548.4	57.7	55.5	1191.4	12.4	15.0	1429.7	14.9	14.3	9613.6
1998Q1	1505.4	15.9	16.4	5297.5	56.1	53.8	1007.8	10.7	13.1	1637.6	17.3	16.6	9448.2
1998Q2	1631.2	17.0	17.2	5268.6	55.0	52.6	969.2	10.1	13.2	1703.2	17.8	17.0	9572.2
1998Q3	1807.6	18.2	17.5	5280.8	53.3	51.8	984.5	9.9	12.7	1836.3	18.5	18.0	9909.1
1998Q4	1755.7	17.7	17.3	5549.9	55.9	55.2	1148.6	11.6	12.8	1473.9	14.8	14.7	9928.2
1999Q1	1753.1	18.5	19.3	5392.5	56.8	55.1	951.1	10.0	11.4	1393.7	14.7	14.3	9490.5
1999Q2	1690.2	18.0	19.4	5418.7	57.8	55.8	867.3	9.3	10.5	1395.0	14.9	14.4	9371.3
1999Q3	1910.1	19.5	20.7	5414.9	55.2	54.2	998.3	10.2	10.2	1484.3	15.1	14.9	9807.6

Notes tables 8 and 9:
For detailed descriptions of the data and the definitions of the different measures, see annexes 1 and 2.

Share cur is the percentage share at current exchange rates. Share con is the percentage share at constant Q1 1994 exchange rates. Other currencies are at current exchange rate values (thus implicitly assuming that on (weighted) average those exchange rates remained constant against the USD) over the period considered.

The euro series are adjusted for the "arithmetic" EMU effect for the whole sample period shown. Thus the whole euro area is treated as domestic for euro assets/liabilities.

Data sources: BIS and ECB staff calculations.

Table 10A

Leading global fund managers' bond holdings by curency, %, actual and benchmark (1)

	EUR		USD		JPY		GBP		Other	
	Average	Benchmark	Average	Benchmark	Average	Benchmark	Average	Benchmark	Average	Benchmark
1997Q3	17	16	42	33	12	20	6	6	22	25
1997Q4	17	16	48	35	12	18	7	7	15	24
1998Q1	20	17	47	34	12	19	6	7	15	23
1998Q2	23	17	48	33	9	18	9	7	11	25
1998Q3	21	17	48	32	6	18	10	7	16	26
1998Q4	28*	18	47	30	9	20	7	6	10	26
1999Q1	41**	32*	36**	30	7	21	6	6	10	11
1999Q2	28	39	51	29	9	22	5	6	7	4
1999Q3	30	37	48	28	11	24	4	6	7	5
1999Q4	28	34	49	28	14	26	4	5	5	7

Notes table 10A:
For a detailed description of these portfolio poll data, see annex 1.

* Break in series. From 98 Q4 on the EUR bond shares and from 99 Q1 on the bond benchmark shares include not only FRF and DEM but all euro constituent currencies.

** EUR average=35 and USD average=39 without Credit Suisse.

(1) Benchmark is Salomon Smith Barney world government bond index weights

Data source*: The Economist, ECB staff calculations.*

Lending global fund managers' equity holdings by area, %, actual and benchmark (1)

	Europe (2)		United States		Japan		United Kingdom		Other	
	Average	Benchmark	Average	Benchmark	Average	Benchmark	Average	Benchmark	Average	Benchmark
1997Q3	24	21	38	47	19	15	9	10	10	7
1997Q4	26	22	42	50	16	13	9	10	7	5
1998Q1	28	23	43	50	12	11	9	11	8	5
1998Q2	34	26	42	50	9	10	10	11	5	3
1998Q3	36	23	43	51	7	10	11	11	3	5
1998Q4	37	24	37	51	7	10	11	10	8	5
1999Q1	31	24	43	51	10	10	10	10	6	5
1999Q2	28	21	45	52	12	11	11	11	4	5
1999Q3	25	23	47	50	14	14	10	10	4	3
1999Q4	27	24	45	49	15	13	9	9	5	5

Notes tables 10B:
For a detailed description of these portfolio poll data, see annex 1.

(1) Benchmark is Morgan Stanley Capital International world equity index weights.
(2) Europe equals the sum of Germany, France and Other Europe.

Data sources: The Economist, ECB staff calculations.

Table 11

3-month money market rate bid-ask spreads before and after the introduction of the euro
(in basis points)

	Euro area*	JP	US	IT	FR	GE
1998						
average	9.7	10.4	8.4	10.1	11.9	8.0
stdev.	3.1	4.5	3.1	3.3	3.2	3.0
1999						
average	10.3	10.7	8.2			
stdev	3.0	4.2	3.1			
Second Half 1999						
average	8.9	9.7	8.6			
stdev	2.3	1.9	2.6			

Notes table 11:
* In 1998 the euro area is represented by a weighted average of Italy, France and Germany.
The weights are determined by the ECB capital key, i.e. depend on GDP and population.

Data are daily. The most recent 1999 data in this table are from October.

Data sources: Reuters, ECB staff calculations.

Table 12

Spot foreign exchange market bid-ask spreads before and after the introduction of the euro
(in basis points)

	Reuters	Bloomberg			
	USD/DEM-EUR	USD/DEM-EUR	JPY/DEM-EUR	GBP/DEM-EUR	CHF/DEM-EUR
1998					
average	4.29	3.61	4.11	4.97	5.85
stdev.	1.56	1.31	0.38	0.57	0.33
1999					
average	5.37	3.99	4.89	5.04	6.12
stdev.	2.57	1.52	0.43	0.17	0.48
Second Half 1999					
average	5.24	3.67	5.19	4.95	6.11
stdev.	2.25	1.22	0.32	0.1	0.02

Notes table 12:
Data are daily.

Data sources: Bloomberg, Reuters, ECB staff calculations.

Average monthly CPI inflation rates before and after the introduction of the euro
(in basis points)

	Euro area	USA	Japan	Japan WPI	UK	UK RPIX	Switzerland	Germany
1980-82 average	87.1	67.3	36.7	24.7	86.0	86.3	44.8	45.5
stdev	*23.5*	*47.2*	*65.2*	*38.0*	*78.3*	*78.6*	*42.1*	*31.2*
1983-85 average	51.0	31.5	16.1	-1.0	42.3	38.1	22.7	17.1
stdev	*21.1*	*16.9*	*58.0*	*26.7*	*46.5*	*43.6*	*31.2*	*20.1*
1986-88 average	23.4	27.2	4.2	-17.5	38.8	34.2	10.7	5.2
stdev	*12.6*	*25.1*	*38.5*	*21.1*	*40.4*	*32.2*	*25.8*	*20.5*
1989-91 average	37.2	37.6	24.9	8.4	57.9	56.3	42.2	31.3
stdev	*80.2*	*52.7*	*23.5*	*17.2*	*58.9*	*59.7*	*36.5*	*35.6*
1992-94 average	25.9	22.8	7.9	-10.0	20.5	24.3	17.4	23.7
stdev	*12.4*	*14.4*	*35.6*	*18.7*	*46.9*	*44.0*	*30.3*	*23.7*
1995-97 average	18.4	20.8	5.6	-2.4	25.5	23.9	8.6	13.7
stdev	*13.3*	*16.8*	*45.1*	*38.8*	*34.2*	*33.4*	*24.2*	*23.4*
1998-99 average	9.9	17.8	-2.0	-11.9	18.2	19.7	6.2	6.4
stdev	*10.0*	*16.8*	*39.3*	*24.3*	*39.0*	*35.6*	*18.3*	*19.7*
1999 average	12.6	22.1	-8.9	-14.8	14.7	17.8	13.8	9.6
stdev	*12.1*	*21.7*	*36.0*	*20.0*	*33.4*	*33.3*	*19.8*	*21.9*
1980-99 average	37.7	32.8	14.1	-0.8	42.5	41.5	22.6	21.1
stdev	*29.5*	*29.9*	*50.7*	*30.5*	*55.5*	*54.0*	*34.1*	*28.7*

Average annual CPI inflation rates before and after the introduction of the euro
(in percent)

	Euro area	USA	Japan	Japan WPI	UK	UK RPIX	Switzerland	Germany
1980-82	11.0	8.4	4.5	5.2	10.8	14.6	5.5	5.6
1983-85	6.3	3.8	2.0	0.2	5.2	4.9	2.8	2.1
1986-88	2.8	3.3	0.5	-2.1	4.8	4.0	1.3	0.6
1989-91	4.6	4.6	3.0	0.6	7.2	6.9	5.2	3.8
1992-94	3.2	2.8	1.0	-0.8	2.5	3.4	2.1	2.9
1995-97	2.2	2.5	0.7	-0.6	3.1	2.8	1.0	1.7
1998-99	1.2	1.9	0.2	-0.9	2.5	2.5	0.4	0.8
1999	1.6	2.2	-0.3	-1.3	1.6	2.3	0.8	0.6
1980-99	4.6	4.1	1.8	0.1	5.3	5.5	2.8	2.6

Notes tables 13A and 13B:
CPIs from OECD: all items, publication indices.
UK RPIX from BIS: UK retail price rates. All items excluding mortgage interest payments.
Japan WPI from BIS: wholesale price rates for all consumer goods.

Euro area averages include Ireland only from February 1987 onwards.

Because of a tax change January 1993 was not included in calculations for Germany and euro area.

Data sources: BIS, OECD, ECB staff calculations.

Table 14

International bond and equity return correlation coefficients before and after the introduction of the euro

	US Investor in USD							
	German Bonds		German Equities		Jap. Bonds		Jap. Equities	
Correlations with	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.
1995-98	0.05	0.26	0.19	0.54	-0.07	0.00	0.06	0.38
1998	0.05	0.09	0.38	0.69	-0.17	-0.13	0.13	0.43
1999	0.02	0.15	0.27	0.72	0.02	0.36	-0.04	0.51

	German/Euro Area Investor in DEM/EUR							
	US Bonds		US Equities		Jap. Bonds		Jap. Equities	
Correlations with	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.
1995-98	0.19	0.58	0.43	0.68	0.02	0.08	0.30	0.48
1998	0.10	0.58	0.48	0.77	-0.22	-0.05	0.28	0.42
1999	-0.01	0.36	0.45	0.75	-0.03	0.48	0.26	0.63

	Japanese Investor in JPY							
	US Bonds		US Equities		German Bonds		German Equities	
Correlations with	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.
1995-98	0.09	0.10	0.09	0.36	0.15	0.09	0.22	0.34
1998	0.21	0.24	-0.09	0.24	0.27	0.43	0.07	0.21
1999	0.11	0.27	0.06	0.50	0.20	0.31	0.19	0.45

	US/GE				GE/JP				US/JP			
	Bonds		Equities		Bonds		Equities		Bonds		Equities	
Correlations without currency	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.	daily ret.	month. ret.
1995-98	0.20	0.60	0.24	0.53	0.18	0.03	0.28	0.51	0.08	0.10	0.08	0.40
1998	0.29	0.62	0.43	0.72	0.23	0.22	0.29	0.49	0.14	0.22	0.15	0.54
1999	0.15	0.50	0.39	0.80	0.20	0.10	0.30	0.57	0.02	0.27	0.06	0.67

Notes table 14:
All correlations are averages over moving three months (60 days) correlations with daily data. In case of monthly returns the return on each day is calculated over the past 20 days.
Returns are converted into different currencies using spot rate returns. 1999 correlations are calculated from April onwards to exclude 1998 data in the 1999 correlations.
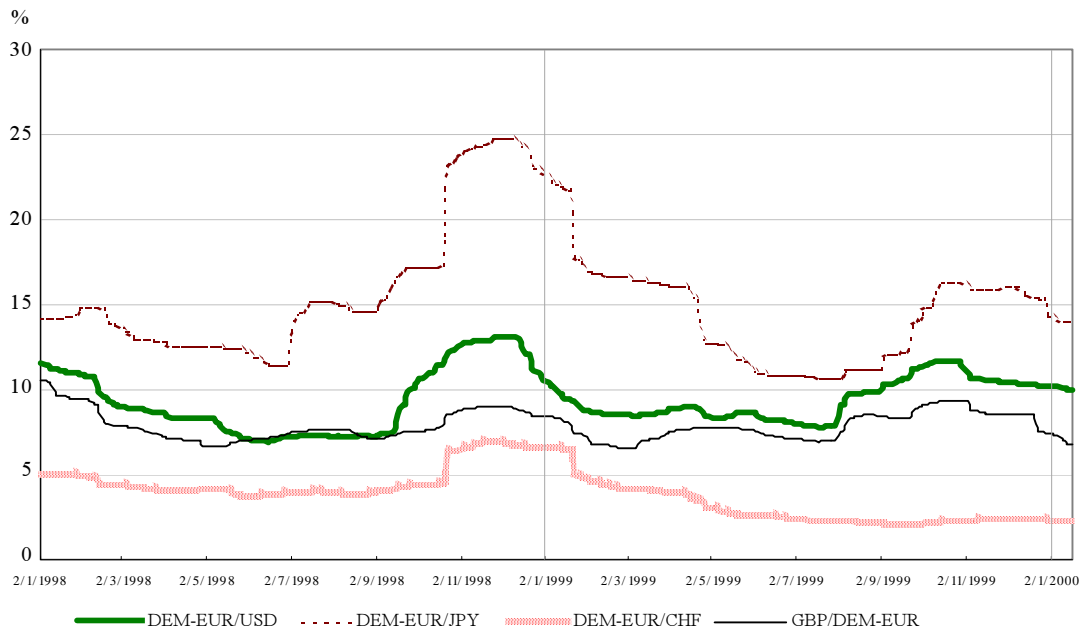*Equity indices used are Standard and Poor's 500, Nikkei 225 and Dax100 (all dividend adjusted). Bond price indices are total return indices for 10-year benchmark issues.*
Data sources: Bloomberg, Datastream, ECB staff calculations.

Chart 1

Exchange rate volatilities before and after the introduction of the euro
(Jan 1998 – Jan 2000)

%

Note: Volatilities are measured as the one-month median of standard deviations of daily returns over the past three months.
Data sources: Reuters, ECB staff calculations.

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