The euro and the liquidity of European fixed income markets

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Abstract

This paper considers the effect of the introduction of the euro on the liquidity of European fixed income markets. From the outset, the private money market in euros achieved unity, as evidenced by the near identity of euro bank deposit rates within and without the euro area. Transactions in the euro's predecessor currencies' money market futures point to liquidity in excess of that in the yen but less than in the dollar while transactions in interest rate swaps point to liquidity in excess of that in the yen or the dollar. The introduction of the euro appears to have accelerated the concentration of liquidity in the futures markets in the German government bond, which show trading volumes in excess of that in the US Treasury long bond. While this concentration brings a measure of integration to the euro government bond market, the relatively narrow national base of deliverable bonds may leave the euro area's premier duration-management tool particularly subject to squeezes. The disproportion of futures and cash market may leave the euro government bond market less liquid than it might be otherwise.

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* The views expressed are those of the author and should not be attributed to the BIS.

1. Introduction

The introduction of a single money in Europe exerts a profound effect on the business of borrowing and lending money. Looking across the various activities involved in this business, McCauley and White (1997) argued that the introduction of the euro would have its most immediate impact on the wholesale money market, interest rate swap markets and the government securities markets. All of these markets look set to gain breadth, depth and liquidity, as further argued in McCauley (1998).

Just how much more liquid the European government bond market will prove to be is a point of controversy. Euroland will not at its inception field a large federal borrower. Von Hagen argues that budgetary constraints like the Stability and Growth Pact on lower levels of government—in this case national—tend to divert demands for spending to the higher level—in this case the EU level. But for the time being, there is neither a federal issuer nor joint and several liability among the governments of Euroland. For some observers, this implies a thoroughly fragmented market along the lines of the US market for state and local government debt (the somewhat misleadingly termed municipal bond market). Other observers concede that the differences in creditworthiness of governments in Euroland do matter but hold that a partially integrated bond market is likely. Even partial integration could boost liquidity very substantially.

This paper seeks to demonstrate that interbank and capital markets in Europe jumped in January 1999 into the first league with their US dollar and Japanese yen counterparts. It then takes the measure of the potential gain in liquidity in the European government bond market. It describes several possible outcomes in terms of the relationship between government bond cash and futures markets. While it is recognised that it is very hard to predict the outcome even after the introduction of the euro, developments even through 1998 suggest a considerable centralisation of risk management activity in the European government bond market. This development points to a more liquid government bond market in Europe. The European manifestations of the global flight to quality and liquidity last summer suggest that the liquidity of the European government bond market would benefit from a broader basis for futures contracts than that afforded by single government's debt.

As noted in the Overview of this volume, liquidity is an elusive concept. This paper relies on turnover data from derivatives markets to indicate liquidity. These data are consulted rather than the more frequently cited stocks of underlying cash bonds or even transactions in cash markets for several reasons. A practical reason is that it is easier to assemble comparable data on derivative transactions than for cash transactions. In addition, the derivatives markets represent the most liquid pole of the closely linked cash and derivatives markets. This is evident in lower bid-ask spreads, as shown for the US market in the Fleming and Sarker paper in this volume. It is also evident in transactions volume and outstanding instruments, larger in the futures market than in the underlying cash instruments in the US Treasury market, and even more so in the European government bond markets.[1]

2. The euro and the money market

The prospect of the euro supported and its introduction completed a remarkable process of convergence of private interest rates in Europe. As shown in figure 1, by the time of the May 1998 announcement of which countries would share the single currency from the outset, yields in all but the shortest-dated private interest rate contracts had fallen to or near levels prevailing for the Deutsche mark. Indeed, this process had largely run its course by late spring and early summer of 1997.

Ironically, the interest rates most influenced by central banks, namely those prevailing in the money-market, proved the last to converge. It was only in December 1999 that the central banks of the euro

[1] Serge Jeanneau, "Interest rate futures: Characteristics and Market Development", in BIS *International Financial Market and Banking Developments*, November 1995 and February 1996.

area acted with near unanimity to lower their policy rates to 3%; the Bank of Italy's policy rate remained above that level until the arrival of the euro proper. In part because of the lag between bond yield convergence and policy rate convergence, futures contracts base on three-month interbank rates denominated in French franc, Italian lira, and Spanish peseta, as traded respectively in Paris, London and Madrid, remained very active and maintained their market share vis-à-vis the offshore Deutsche mark contract traded in London. By contrast, as discussed below, futures trading in 10-year government bonds in the euro area did concentrate quite markedly in the German government bond contract in the approach to the euro's introduction.

This competitive equilibrium among the money market futures contracts in Europe, however, could not survive the introduction of the euro. The competition between two money-market futures contracts in the US dollar, namely a contract based on certificates of deposit issued in New York and between interbank deposits in London, resulted in the dominance of the latter. Liquidity draws transactions and transactions make for liquidity in a virtuous circle that gives competition in the futures business a winner take all aspect.

At the introduction of the euro, there were two contenders for the benchmark 3-month interbank rate. The British Bankers Association polls 16 banks for euro deposit rates at various maturities every working day, trims the 4 highest and 4 lowest rates, and averages the remaining yields to produce a euro LIBOR. Each bank in the panel "contributes the rate at which it could borrow funds, were it to do so by asking for and then accepting inter-bank offers in reasonable market size, just prior to 1100 hours".[2] The heavy trimming of high and low rates responded to the perception that Deutsche mark LIBOR had been biased upwards by the presence of two Japanese banks and the practice of only trimming the top two rates. Remarkably, the panel of 16 top-rated banks contains only 4 from the euro area itself—two German banks, one French bank and one Dutch bank. By contrast, 9 US, Canadian and UK banks bulk large in the 16-bank euro LIBOR panel.

The other contender is the European Bankers Association's Euro Interbank Offered Rate (EurIBOR), defined as the "rate at which Euro interbank term deposits within the Euro zone are offered by one Prime Bank to another Prime Bank". With 57 banks, the panel is large and spread across the euro area: 18 in Germany, 12 in Paris, 7 in Italy, 5 in Madrid, 3 in each of Brussels, Amsterdam and Luxembourg, 2 in Helsinki and Vienna and one in each of Dublin and Lisbon. Out of the 57 banks, only 10 are headquartered outside the euro area. The calculation of EurIBOR involves less trimming, with only the top and bottom 15% of rates excluded.

Advance commentary on the two contenders highlighted the implications of both reserve requirements and a broader EurIBOR panel. Had the European Central Bank (ECB) chosen to impose unremunerated reserve requirements on banks in the euro area, an offshore rate would almost surely have prevailed. This was the experience in the US dollar market, where the domestic certificate of deposit based contract laboured under the disadvantage of Federal Reserve Regulation D reserves. In the event, the ECB accepted the Bundesbank argument for reserve requirements, but decided in mid-1998 to remunerate them at a market-related rate. This left the fight a fair one.

As to the size of the panel, a large chorus of banks, it was argued, would necessarily be a less prime panel and a less prime panel would mean a EurIBOR above euro LIBOR. To some extent, those designing the EurIBOR rate addressed this problem by specifying that the rates to be reported are those of *Prime Banks*, rather than the *reporting bank's* own, possibly higher, dealing rates. It is not clear what difference these different specifications make: Bank of Tokyo-Mitsubishi reported an identical rate of 3.28% in both panels on 29 January, reflecting about a 20 basis-point "Japan premium".

Experience during the first month and a half of competition between euro LIBOR and EurIBOR offers some support for the advance commentary. EurIBOR tended to come in a bit higher than its London competitor. In the 32 trading days for value dates in January and the first half of February (i.e., 30

[2] Reuters page BBALIBORT, 29 January 1999.

December through 12 February, inclusive), EurIBOR exceeded euro LIBOR by a rounded one basis point on 7 days and euro LIBOR never exceeded EurIBOR by the same amount. On average over the 32 days, euro LIBOR came in a fifth of a basis point below EurIBOR. Moreover, on the scant time series evidence of the first month, euro LIBOR appears the more sensitive indicator, dropping faster to its trough a day before its Continental rival's trough on the 20th of January (see Table 1).

EuroLIBOR and EurIBOR compete on three fields. The first is in *loan and bond contracts*. A borrower negotiating a credit with a bank or a bond issuer negotiating with its underwriters must fix a reference rate for floating-rate charges. Better names will seek to use, or reserve the option to use, the lower interest rate. In the early 1980s, the Kingdom of Sweden insisted on having the option to borrow at a spread over the US certificate of deposit rate *or* dollar LIBOR. Based only on the data so far, a prime borrower would tend to want to use euro LIBOR (for a given spread). Instead, Abbey National, a highly-rated UK bank that frequently issues in the international debt market, issued euro 2 billion in floating rate notes on the 14th of January based on eurIBOR. Since the issuer of such a jumbo issue may be presumed to be seeking to offer investors maximum liquidity, Abbey National's choice signalled a market preference for euro area rate over the London rate.

Another field of competition is in the *over-the-counter derivative* market. Those trading forward rate agreements—essentially side bets on money-market rates in 3 or 6 months--must decide on a reference rate. More important is the choice of benchmark money market rate for the floating leg of interest rate swaps, used to transform floating to fixed financing or assets (or vice-versa). The choice of reference rates in new swap contracts reflects the best guesses of professionals, but is generally unobservable. It is interesting that the fixed rates for euro swaps are identical, whether based on euro LIBOR or EurIBOR; if a noticeable difference in yields were expected to persist, then the fixed rates corresponding to EurIBOR would be higher.[3] LIFFE officials are reported to have estimated in late January that 60-80% of new contracts in 1999 had referred to EurIBOR.[4]

The third field of competition is in the *futures market.* Here euro LIBOR had the advantage that Deutsche mark LIBOR was the most heavily traded money-market futures contract in Europe; lira LIBOR also traded in volume (Table 2). EurIBOR is the successor to Euroland's number two money-market contract, the Paris Interbank Offered Rate (PIBOR) and the lesser traded Madrid Interbank Offered Rate (MIBOR). In terms of the locus of trading, both LIFFE in London and Eurex in Frankfurt offered trading in euro LIBOR, while LIFFE, Eurex and the MATIF in Paris all have set up to trade EurIBOR.

At writing, EurIBOR seems to have trounced euro LIBOR in the futures markets. Euro LIBOR still has more contracts outstanding on LIFFE, given the weight of contracts opened in Deutsche mark, and Italian lira before the introduction of the euro proper (Table 3). Even in London, however, transactions at the margin take place in the 3-month euro contract based not on London rates but rather on the euro area interest rates. Indeed, the LIFFE accommodated itself to eurIBOR's prospective success by launching a eurIBOR contract on the 8th of December. The exchange then enabled holders of position in euro LIBOR, euromark and eurolira contracts to convert these into eurIBOR positions on the 19th of January and again on the 17th of February.

However the competition turns out, it is easy to overstate the consequences of the eventual dominance of one or the other reference rate. Clearly, some in the euro area treat this as an important issue. The predominance of European banks in the EurIBOR panel as well as its restriction to banks in the euro area point to pride of ownership and pride of place. Many in London claim that the competition was skewed by political pressure on Continental banks to favour eurIBOR. There may, however, be a confusion here between the geographical source of the reference rates and the locus of the jobs

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[3] For example, Deutsche mark swap rates based on DM LIBOR exceeded French franc swap rates based on PIBOR for much of 1997-98 because the larger share of Japanese banks in the DM LIBOR panel was tending to raise DM LIBOR relative to PIBOR>

[4] Edward Luce, "Euribor gaining ground on 'offshore' rival", *Financial Times* 21 January 1999, p. 21.

associated with trading contracts based on it. By way of parallel, it should be recalled that the compilation of dollar LIBOR may provide a few jobs in London and may afford that centre some prestige. The heavy trading of dollar LIBOR nevertheless occurs in Chicago, with substantial trading in Singapore. Put otherwise, precious few jobs would be created in New York were LIBOR suddenly somehow to lose out to NYIBOR. From the standpoint of competing financial centres, the interesting question is not euro LIBOR versus eurIBOR but rather London trading of either of these versus Continental trading of either. At this stage, it looks as though London is ahead in trading eurIBOR.

Stepping back from the competition among rate sources and among financial centres, the key observation is that the euro area has a unified money market. The collection of interest rates in London and in the euro area can be considered a "natural experiment" and the conclusion is evidently that there is a single euro money market stretching across Europe. To be complete and truly competitive with the dollar money market, it will need to have an active repurchase market joining the money market to the government bond market. Here the operations of the European System of Central Banks can be counted on to homogenise European repurchase markets.

Another money market instrument that can be expected to benefit from the single currency is commercial paper. The contrast between the US money market and its European counterparts has been very striking in this regard. With over a trillion dollars in outstanding commercial paper, the US market dwarfs not only its European domestic counterparts but also the euromarket. Even in the latter, dollar paper outstanding, at $111 billion at end-1998 is triple that of euro area currencies, at $36 billion.[5]

Finally, the introduction of the euro has added a Treasury bill market to the world's second largest reserve currency. For years the Bundesbank's disapproval of short-term finance kept the German finance ministry from issuing paper. As a result, many central banks and other risk-averse investors accepted bank risk, either directly by making deposits in Deutsche mark with banks or indirectly by buying US Treasury bills and selling dollars forward against Deutsche mark with a bank counterparty. Now with the euro, central banks can buy French Treasury bills denominated in euro. Indeed, bowing to the inevitable, the Bundesbank has dropped its opposition to the German government's sale of bills.

One way of summarising the effect of the euro on the liquidity of the money market is by comparing derivatives transactions in euro area money market instruments with their counterparts in the dollar and yen. Table 2 shows that in 1997, proto-euro area transactions had surpassed those in yen while still falling significantly short of transactions in the dollar.

3. The euro and the private capital market

Unlike the money market, there was no dicontinuity in yields in the private bond market in the euro area at the introduction of the euro. As figure 1 makes clear, the convergence of long–term private yields had largely run its course 18 months before the euro's arrival. In particular, swap rates in the euro's various predecessor currencies had already anticipated the arrival of the euro, so in some respects the private capital market has been unified for some time.

This section discusses the euro's effect on the private bond market in Europe under two headings. First, the greater size and liquidity of the swap market is considered, as well as its linkage to dollar (and yen) fixed income markets through the currency swap market. Then, discussion turns to the implication of the single money for sharper competition among underwriters.

[5] BIS, *International Banking and Financial Market Developments*, February 1999, p. 16 and annex page 70.

3.1 The euro and the swap market

The introduction of the euro has collapsed into a single swap market several distinct, albeit already closely linked, markets. In this single swap market, prime banks and corporations manage their interest rate risk by buying and selling fixed-rate payments against floating-rate payments. Maturities range from 1 to 2 years out to 10 years or longer. Even in the US market, the swap market is more liquid than the cash market in US corporate or foreign dollar issues; outside of the US market, where corporate bond markets are less developed, this observation holds *a fortiori*.

Since interest-rate swaps have two legs, one a floating-rate stream of interest payments, the initial competition between two floating-rate indices in euro slowed the integration of the euro swap market by some days. Thus, in the first days of the euro there was some difference in pricing of swaps, depending on whether the floating-rate leg was based on euro LIBOR or on eurIBOR. But that difference disappeared and since then there has effectively been only one price at which floating-rate streams of interest payments are exchanged against fixed streams of interest payments.

The swap market in euro promises to be as active, and therefore as liquid, as the US dollar swap market. In 1996, the International Swaps and Derivatives Association reported $4¼ trillion in turnover in both US dollar swaps and in the euro's 4 major predecessor currencies (Table 4). In 1997, however, the four European markets taken together grew by a half, while the US dollar market hardly grew. Even recognising that convergence trades, which effectively netted out with the arrival of the euro, boosted activity in 1996-98 (Bradbery, 1996), the euro swap market probably started off larger than its US counterpart and well ahead of the yen swap market in turnover.

Even as the interest-rate swap market in Europe gains liquidity, its linkage to the dollar and yen fixed income markets will become stronger. Judging by indicated bid-ask spreads, swapping from euros into dollars is already on average be cheaper than swapping from the euro's predecessor currencies. That is, before the introduction of the euro, swaps out of some of the predecessor currencies were not cheap. To be sure, swaps between dollars and Deutsche mark, French franc, Italian lira, ECU, Dutch guilders and Belgian franc all showed posted bid-ask spreads of 3 basis points. Those between dollars and Spanish pesetas, Portuguese escudo, Austrian schillings, Finnish markka, and Irish pounds all however showed wider spreads, ranging from 4 to 10 basis points (McCauley and White, p. 42). With the euro, incentives for swapping fixed-income assets or liabilities across the euro area are stronger by virtue of the same low transactions costs.

One clear implication of these improvements in swap market liquidity is greater issuance and investment in euros. For instance, if the Republic of the Philippines has issued repeatedly in the dollar sector, so that it is in danger of wearing out its welcome and moving its spread against itself, but still wants dollar funding, it might achieve better all-in costs from selling a euro fixed-rate bond and swapping it into dollars. As a result, issuance in euros is encouraged. Or, if mortgage bonds were to fall out of favour in Europe, they could be more economically turned into synthetic dollar or yen paper (through so-called asset swaps) and sold to US or Japanese insurance companies, thereby encouraging investment euro-area instruments, if not in euros.

The importance of these liquidity effects can be inferred from the skewing toward denomination in the dollar of larger issues in the international bond market. Right across different category of issuers, jumbo issues have been more likely to be denominated in dollars (Table 5). This may reflect the formerly greater size of dollar-based portfolios at pension funds and insurance companies. It may also have reflected keener competition among underwriters in the dollar market (see immediately below). To some extent it may have reflected the greater liquidity of the underlying government bond market, permitting easier hedging of dollar holdings with government bond futures and repurchase-market transactions (also see below).

3.2 The euro and competition among underwriters

If multiple currencies in Europe tend to segment its bond markets, keener competition in the bond market should result from monetary union. As background, consider the range of factors that bear on competition in a primary bond market. One can conceive of bond underwriters drawing their

competitive advantage from one of three sources: relations with the *issuers*, general *understanding* of the money and bond markets, including the direction of rates and associated movements in spreads, and relations with *end-investors*. Government bond auctions seek to limit the influence of the first factor, and studies of the US Treasury market have in fact emphasised "a large customer base with heavy order flow" as the principal source of competitive advantage (see Ruocco et al. (1991)).

The source of competitive advantage bears directly on the question of the effect of monetary union. If relations with issuers are key, then the euro will tend not to disturb competition. But if an underwriter benefits from understanding the direction of national interest rates, or from access to investors, then the euro will sharpen competition. No longer will a French bank have a natural edge in understanding the monetary and fiscal policies that can move the French bond market, and eventually a French bank will not be able to use its French investor base to win deals.

One test for whether the euro will sharpen competition in the bond market, therefore, is to check whether currency makes a difference in the choice of underwriter, *controlling for the nationality of the bond issuer*. The test can be performed on the international bond market for reasons both of data availability and of relevance. The data are relevant because the international bond market is, to a considerable extent, the euro bond market to be: one-quarter of the outstanding issues feature EU issuers in EU currencies, and a substantial fraction of investors are EU institutional investors. An early study of this question documented a decline of issuer-underwriter relations and a rise in the role of currency in the selection of underwriter (see Courtadon (1985)). A more recent study (Balder et al. (1991)) found a strong association between the nationality of the lead underwriter and the currency denomination of the bond for all but eurodollar issues, where customer relations seemed important. Most recently, Dermine (1996) points to the dominance of home-country lead managers in the league tables by currency sector, without distinguishing the influence of customer from that of currency.

An analysis of the effect of customer nationality and the currency denomination of the bond on the choice of lead managers (dubbed bookrunner after a period of title inflation) points to the strong predominance of currency effects over issuer effects in European currency sectors (see Table 6).[6] German, French, UK and Dutch underwriters capture fairly close to the same share of the business of home-country issuers and foreign issuers, but show huge differences in market shares in their home currencies as against all other currencies. As found previously, the influence of customer and that of currency is much more balanced for US underwriters.

The upshot of this analysis is that separate currencies in Europe have tended to segment the international bond market and that, over time, currency has shown more persistence as a factor bearing on competition than have relations between customers and underwriters. Brown (1996, p. 4) argues that the competitive challenge is not symmetrical: "the advantage German banks have had in the no. 2 international capital market, the euro-DM market, will not carry over into the euro capital market". As underwriter competition becomes sharper under the euro, the cost of corporate issuance of debt should decline. Another factor that could ease the marketing of European corporate bonds would be a more integrated European market for government bonds. To this we turn.

[6] The association of currency of issue and nationality of underwriter, however, seems weaker in 1996 than it was in 1983 for the mark, pound and guilder sectors (see Courtadon (1985), pp. 40-41). And even today, some sectors of the international bond market show a stronger influence of customer ties, in contrast to the general finding in the text. For instance, the *Neue Zürcher Zeitung* of 20th February 1997, p. 25, reports that the Japanese big four securities firms plus Tokyo-Mitsubishi and Kankaku captured 46.5% of the underwriting mandates of Japanese issuers in the Swiss franc market, more than the 39% captured by the Swiss big three plus Gotthard Bank. But this SF 7.4 billion sector features small, often equity-related, issues, and the customer base may include a large proportion of Japanese accounts.

4. The euro and the European government bond market

How much increased liquidity will the euro area government bond markets derive from the single currency? One view is that it will remain quite fragmented. The often-repeated analogy of the US municipal bond market can be dismissed quickly, however. The point of tangency between the euro area government bond market and the market for state and local debt in the United States is that variable spreads set off one euro-area sovereign's bonds from another (Table 7), just as they mark off the bonds of California from those of New York. But the tax treatment of municipal bonds fragments demand—there are no national mutual funds for these assets to speak of—and an attempted futures contract never got off the ground. The European government bond market will not in its liquidity aspect resemble the US municipal bond market or indeed any other subnational government bond market. Neither the former nor the latter has an associated futures contract, drawing on and feeding the liquidity of the cash market.

It is useful to start off with an understanding of the structure of the government bond market of the proto-euro area. There were four major governments whose bonds underlay four different futures contracts (Figure 2). These futures markets were all of fairly recent origin: the mid-1980s in the case of the futures on French government bonds, and the early 1990s in the case of the others. Trading in French government bond futures centred in Paris and trading in Spanish government bond futures in Barcelona. The London International Financial Futures and Options Exchange originally traded most of the German and Italian government bond futures, but the Eurex in Frankfurt succeeded in winning the German bond business back in the course of 1998. Frankfurt eating London's lunch made good copy but perhaps obscured two underlying trends. First was the increasing liquidity of the European government bond market relative to its US counterpart. Second was the tipping of liquidity in the European government bond market toward the market leader.

In the mid- to late-1990s, the European government bond market was catching up, and by some measures surpassing, its US counterpart. Taken together, transactions in futures based on euro area government bonds have exceeded transactions in US Treasuries or Japanese government bonds since 1996 (Table 8). Transactions in German government bond futures alone nosed past those in US Treasuries in 1996 and well exceeded them in 1998. It should be recognised, however, that not all the measures on Table 8 put the German government bond market ahead of the US Treasury market on the eve of the euro. Government bond option trading remains more active in Chicago than in all the Continental government bond markets combined. Weighted by duration, moreover, the figures would probably show the US Treasury market still ahead, given the heavy trade in the 20-year bond in Chicago as against the 10-year bond on the Continent. In addition, the range of choice in the US Treasury futures is broader, with active trading in both the intermediate sector and the long sector. In Europe the only real choice in nodes is in the German bond futures market which offers only the choice of two intermediate maturities, namely the 5- and 10-year.

Recognising the longer duration and wider range of trading nodes available in the US Treasury futures, it is still fair to say that the German government bond futures singlehandedly stacked up favourably against its US counterpart, even before the arrival of the euro. This result reflected the concentration of liquidity in the German government bond future as the euro approached. In early 1993, the futures contracts on the French and German government bonds traded in roughly equal amounts, with each representing about 45% of turnover in what would become the euro area. By 1998 the German government contract represented about 80% of trading the French government contract only about 10% (Figure 3). Clearly, with currency concerns increasingly remote, market participants found it convenient to hedge risks or take positions in generic euro area fixed income by using the bund future.

With the advent of the euro, the bund share has increased into the upper 80s (Table 9). Thus, the structure of the euro government bond market could shift to that shown schematically in Figure 4. Perhaps in view of the two-tiers of spreads over the German government bond at the 10-year maturity (Table 7 and Figure 5), the more likely scenario is Figure 6, in which the Spanish or Italian government bond future sustains itself. (Such a structure would offer the world a liquid means of trading a credit spread, which might find application in the dollar and yen markets, even if the

correlation between credit risk across European sovereigns were an imperfect proxy for corporate credit spreads.)

The problem with market participants' hedging generic euro area risk with the German bund contract was demonstrated during the so-called bund squeeze in the summer of 1998. The immediate market background was a heightened sense of credit risk (arising from the Russian default) and an unprecedented premium placed on the most liquid government bonds deliverable into futures contracts. Not only did this period see a widening of credit spreads, whether those between swap yields and US Treasury yields, or junk bond yields and US Treasury yields. In addition, liquidity spreads widened. In particular, the spread between US Treasury bonds deliverable into futures contracts ("on the run bonds") and the undeliverable bonds with proximate time to maturity widened to an unheard of spread. In Europe this same phenomenon found its clearest expression in the yield gap between German government-guaranteed paper, for instance bonds of the export agency KfW, which are zero-weighted under the Basle capital rules, and the German government bond of the same 10-year maturity. The KfW could not be delivered into the futures contract, while the German government bond could. At launch in spring 1998, a jumbo KfW bond offered a 10-15 basis-point pick-up against the benchmark German government bond. This yield premium reflected a compound of slightly higher credit risk arising from a guarantee rather than full faith and credit backing, on the one hand, and the lesser prospective liquidity of the guaranteed bond on the other hand). At times in the fall of 1998, however, the guaranteed bond traded to yield more than 40 basis points more than the German benchmark bond. This development points to a headlong rush into the most liquid instruments as leveraged portfolios holding long positions in less liquid bonds against short positions in benchmark bonds were wound down in the face of financing constraints.

This same premium on liquidity affected the spreads among benchmark government bonds in the euro area. Some observers have suggested that the widening of spreads across bonds of different sovereigns in Euroland in the summer of 1998 shown in Figure 5 proves that highly variable credit spreads will necessarily leave the European government bond market fractured and relatively illiquid. But this view ignores the divergent developments in the liquidity of benchmark bonds and the importance of liquidity as measured by the widening of the KfW-bund spread. Therefore, rather than just a sudden reappraisal of credit risk, the sovereign spread widening reflected liquidity, particularly in the case of the spread of the French bond yield over that on the German bond. In extreme circumstances, at least, the tilt of liquidity to the German futures contract led to idiosyncratic price movements that undermined its usefulness as a hedge for other fixed-income risk in Europe. Although there was a parallel development in the US Treasury market, it seems to have been worse in Europe because of the relatively narrow base of deliverable German government bonds. To be sure, particular circumstances and the impending transition to the euro suggest caution in interpreting this episode.[7] Still, the squeeze highlighted the awkwardness of an evolutionary outcome in which derivatives trading on a scale

[7] In addition, it could be argued that the initial conditions last year in the European bond market helped set the stage for the shortage of German government paper. Two or three years ago, heavy buying of French government bonds by French insurance companies pushed yields down below those available on bunds and induced foreign portfolio managers to abandon the French market for the German market. In 1997 and early 1998, as liquidity shifted to the German government bond market and bunds outperformed their French and Dutch counterparts, these portfolio managers retained their heavy portfolio weights on the bunds. These holdings limited the free "float" of bonds available in the market for repurchase and thus limited the paper available for delivery into the maturing futures contracts. Thus a "squeeze" was more likely because bunds has so recently come to command a premium price. (In mid-July Michael Rosenberg of Merrill Lunch, referring to the squeeze in the bund benchmark, trimmed his recommended holdings of bunds in favour of French government bonds. See *Currency & Bond Market Trends*, 16 July 1998, p. 17.) To some extent, therefore, the situation last fall should be interpreted as a disequilibrium in which the derivatives markets favoured the bund, but the "value investors" in the cash bond market had not yet shifted away from the overpriced bunds. Another factor that may have inhibited portfolio reallocations by value investors was the administrative complication of the upcoming conversion to euros of Euroland bonds. A broader range of bonds in a given portfolio would make more work at the turn of the year and this factor may have inhibited value trades away from the German bunds.

comparable to that in the US Treasury market rests on the narrow base of a single European government's cash market debt.

A structure that might be more conducive to liquidity would be one that overcame the imbalance between futures and underlying cash bonds by permitting more than one sovereign's bonds to be delivered into a single contract. Such so-called multiple issuer deliverability is shown schematically in Figure 7 in the context of a two-tier euro area market. As an example, the German, French and Dutch government bonds could be delivered into one contract, and the Italian, Spanish and Portuguese into another. Such a structure would recognise substantial credit differences between tiers, while suppressing, or making adjustments for, small differences within tiers. Such an approach, widely if not universally regarded as feasible by market participants, could not preclude later divergences in credit that would break down the structure.[8]

Governments could encourage such a development with measures to bring their debt management into convergence. These measures need not include mutual guarantees or even common schedules for the auction of new government bonds. Instead, matching maturities, coupons, coupon dates, and other conventions could serve to make it easier for market participants to treat paper carrying different signatures as practically interchangeable. The treatment by the European System of Central Banks of collateral will all by itself tend to homogenise repurchase markets for government debt, but further efforts in that direction would offer governments a reward in the form of more liquid markets.

These suggestions may sound unlikely in view of the present open competition among futures exchanges and implicit competition between ministries of finance. Keating (1996) anticipated a prisoner's dilemma situation in which European taxpayers would collectively benefit from coordination of debt management, but individual ministries of finance would undermine that collective interest in the pursuit of a unique benchmark status for their government's debt. Nevertheless, the ultimate convergence of debt management practices with respect to the redenomination of stocks of government debt into euros in January 1999 suggests the power of liquidity to persuade policy-makers. The early intention of the French authorities to redenominate led other European governments to follow suit lest the French government bond market derive a unique liquidity advantage from having old euro-denominated bonds to trade against the new euro-denominated bonds that euro area governments had committed themselves to issue. As euro area governments followed the French lead in order to deny the French government bond market a "first-mover" advantage, they ended up converging on the first important debt management question posed by the introduction of the euro. The disappointment of those in the market that European governments chose different approaches to redenomination, choices which ruined the first weekend in 1999 for many professionals, should not obscure the common outcome of rapid redenomnation.

It would be a mistake to underestimate the power of the particular interests engaged in the ultimate structure of the euro area government bond market. And under the best of circumstances, debt managers in Europe (and the United States) face a real challenge in reconciling the needs of futures markets, which grew up in eras of large fiscal deficits, with more prudent fiscal management. In any case, it seems unlikely that four national ten-year contracts will survive in the euro area. However things turn out, the introduction of the euro seems to have increased the liquidity of the European fixed income markets relative to their US counterparts. The liquidity of the euro area government bond market would benefit from a broadening of the cash market basis of the fewer contracts that remain.

[8] Futures professional recall how the successful US certificate of deposit contract lost out to the dollar LIBOR contract when the Latin American debt crisis of the early 1980s led to the breakdown of the "run" of large banks, any of whose certificates could be delivered into a maturing contract.

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Table 1

Three-month offered rates on deposits in euros, January-February 1999

Day	EurIBOR (in %)	EuroLIBOR (in %)	Difference (basis pts)
30.12.98	3.248	3.25000	– 0.200
31.12.98	3.245	3.23875	0.625
04.01.99	3.234	3.22125	1.275
05.01.99	3.222	3.21234	0.966
06.01.99	3.214	3.20734	0.666
07.01.99	3.206	3.20250	0.350
08.01.99	3.196	3.19750	– 0.150
11.01.99	3.193	3.19219	0.081
12.01.99	3.190	3.18719	0.281
13.01.99	3.183	3.17844	0.456
14.01.99	3.163	3.16625	– 0.325
15.01.99	3.134	3.12688	0.712
18.01.99	3.102	3.09547	0.653
19.01.99	3.056	3.05000	0.600
20.01.99	3.054	3.05063	0.337
21.01.99	3.056	3.05375	0.225
22.01.99	3.059	3.05656	0.244
25.01.99	3.069	3.07156	– 0.256
26.01.99	3.080	3.08438	– 0.438
27.01.99	3.080	3.08188	– 0.188
28.01.99	3.077	3.07438	0.262
29.01.99	3.074	3.07375	0.025
01.02.99	3.078	3.08063	– 0.263
02.02.99	3.091	3.09234	– 0.134
03.02.09	3.098	3.09734	0.066
04.02.99	3.105	3.10125	0.375
05.02.99	3.107	3.10250	0.450
08.02.99	3.113	3.11469	– 0.169
09.02.99	3.112	3.11125	0.075
10.02.99	3.109	3.10594	0.306
11.02.99	3.106	3.10750	– 0.150
12.02.99	3.100	3.09938	0.062

Table 2

Derivative transactions in private money market instruments in dollars, yen and euros

In trillions of US dollars per annum

	1995	1996	1997	1998
US dollar				
Eurodollar futures (CME, SIMEX)	104.1	97.1	107.2	119.3
Federal funds (CBOT)	3.2	3.0	4.6	4.2
Forward rate agreements[1]	4.7	n.a.	n.a.	5.9
Eurodollar options (CME, SIMEX)	22.4	22.2	29.6	33.1
Japanese yen				
Euroyen futures (TIFFE, SIMEX)	46.8	34.7	29.9	23.5
Forward rate agreements[1]	2.5	n.a.	n.a.	0.8
Euroyen options (TIFFE, SIMEX)	0.5	0.7	0.9	0.9
Total Deutsche mark, French franc, Italian lira, Spanish pesetas				
Euro-mark/franc/lira futures	37.2	43.3	48.3	46.1
Forward rate agreements	5.2	n.a.	n.a.	2.3
Euro-mark/franc/lira options	7.3	7.1	6.5	5.4
Deutsche mark				
Euromark futures (LIFFE)	18.4	24.0	25.6	31.5
Forward rate agreements[1]	2.2	n.a.	n.a.	4.9
Euromark options (LIFFE)	2.4	3.2	2.4	3.4
French franc				
PIBOR[2] contracts (MATIF)	15.9	13.7	12.3	4.4
Forward rate agreements	2.6[3]	n.a.	n.a.	0.2
PIBOR options (MATIF)	4.7	3.0	2.4	0.4
Italian lira				
Eurolira futures (LIFFE)	2.4	4.5	8.7	8.9
Forward rate agreements	0.5[3]	n.a.	n.a.	n.a.
Eurolira options (LIFFE)	0.1	0.6	1.4	1.5
Spanish pesetas				
Europeseta futures 3 month (MEFF)	0.5	1.0	1.7	1.3
Forward rate agreements[1]	n.a.	n.a.	n.a.	n.a.
Europeseta options 4 month (MEFF)	0.1	0.2	0.3	0.1

Note: Japanese yen, Deutsche mark, French franc and Italian lira amounts converted at year-average exchange rates.

[1] Estimated as average daily turnover in April times 255. [2] Paris interbank offered rate. [3] Estimated as DM forward rate agreements (FRAs) times the ratio of FRA trading in Paris or Milan to FRA trading in Frankfurt.

Sources: Chicago Board of Trade (CBOT), Chicago Mercantile Exchange (CME), London International Financial Futures and Options Exchange (LIFFE), Marché à Terme Internationale de France (MATIF), Singapore International Monetary Exchange (SIMEX), Tokyo International Financial Futures Exchange (TIFFE), *Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1995*, BIS and author's estimates.

Table 3

Three-month euro contracts on LIFFE

On 12 February 1999, in thousands of contracts of a million euros each

Settlement date	Volume		Open interest	
	EurIBOR	Euro LIBOR	EurIBOR	Euro LIBOR
March 1999	34	0	141	161
June 1999	22	2	116	126
September 1999	28	0	69	123
December 1999	12	0	73	99
March 2000	12	0	52	94
June 2000	6	0	34	74
September 2000	4	0	42	48
December 2000	3	0	17	20
March 2001	3	0	15	19
June 2001	2	0	5	12
September 2001	2	0	7	10
December 2001	1	0	4	5

Source: London International Financial Futures and Options Exchange

Table 4

Transactions in interest rate swaps and swaptions in dollars, yen and euros

(in trillions of US dollars per annum)

	Central bank survey	International Swaps and Derivatives Association (ISDA)			Central bank survey
	1995		1996	1997	1998
US dollar	5.98				
Swaps	4.28	2.86	4.21	4.39	9.13
Swaptions	1.70				
Japanese yen	4.90				
Swaps	4.38	2.26	2.83	2.90	3.60
Swaptions	0.52				
Total mark, franc, lira, peseta	> 4.68				
Swaps	3.91	2.41	4.28	6.39	<17.39
Swaptions	0.77				
Deutsche mark	1.95				
Swaps	1.66	0.98	1.82	2.59	11.88
Swaptions	0.29				
French franc	2.30				
Swaps	1.88[2]	1.11	1.67	2.52	5.51
Swaptions	0.42[3]				
Italian lira	0.43				
Swaps	0.37[2]	0.22	0.56	0.95	
Swaptions	0.06[3]				
Spanish pesetas					
Swaps		0.09	0.22	0.32	

[1] Estimated as average daily turnover in April times 255. [2] Estimated as DM swaps times the ratio of ISDA-reported French franc swaps or ISDA-reported Italian lira swaps to ISDA-reported DM swaps. [3] Estimated as DM swaptions times the ratio of swaption transactions in Paris or Milan to such transactions in Frankfurt.

Sources: ISDA, *Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1995*, BIS and author's estimates.

Table 5

International security issues by issue size and currency

Currency by region	Size of issue		Total
	< $1.0 bn	³ $1.0 bn	
	in billions of US dollars, 1990-95		
Developing countries	141.7	10.5	152.2
US dollar	96.8	7.4	104.2
EU currencies	17.6	0.0	17.6
Japanese yen	27.3	3.2	30.5
Developed countries	1,555.7	209.1	1,764.8
US dollar	554.9	119.5	674.4
EU currencies	660.1	58.9	719.0
Japanese yen	340.8	30.6	371.4
International institutions	117.1	39.9	216.9
US dollar	34.1	15.0	49.1
EU currencies	113.9	15.3	129.3
Japanese yen	29.1	9.5	38.6
Total	1,874.5	259.5	2,134.0
US dollar	685.8	141.9	827.7
EU currencies	791.6	74.3	865.9
Japanese yen	397.1	43.3	440.4
Grand total, including offshore centres	**2,078.6**	**276.9**	**2,355.5**

Note: Including bonds and medium-term notes.

Source: BIS.

Table 6

Currency and home-country relationship in the choice of bond bookrunner, 1996

Percentage market share won by bookrunners of indicated nationality

German bookrunners				French bookrunners			
Borrower	Currency			Borrower	Currency		
	Mark	Other	All		French franc	Other	All
German	44	16	24	French	86	10	25
Other	37	2	5	Other	75	2	5
All	39	4	8	All	77	2	6
UK bookrunners				**Dutch bookrunners**			
Borrower	Currency			Borrower	Currency		
	Pound	Other	All		Guilder	Other	All
UK	40	21	31	Dutch	83	26	48
Other	48	3	5	Other	85	2	3
All	44	4	7	All	84	2	5
US bookrunners				**Japanese bookrunners**			
Borrower	Currency			Borrower	Currency		
	Dollar	Other	All		Yen	Other	All
US	86	46	76	Japanese	75	46	59
Other	54	13	28	Other	87	6	14
All	64	16	37	All	84	8	17

Note: Each entry shows market share of German, French, UK, Dutch, US or Japanese bookrunners for issuers of the indicated nationality in the indicated currency. For example, the 44% in the upper left-hand corner means that German underwriters ran the books for 44% of the bonds of German issuers that were denominated in marks. Data include all bonds in the Euromoney database, including international bonds issued under medium-term note programmes, that are not equity-related. Total amount of bond issuance by currency: DM: $81 billion; French franc: $37 billion; pound: $54 billion; guilder: $22 billion; dollar: $319 billion; yen: $91 billion; grand total: $725 billion.

Sources: *Euromoney Bondware* and BIS.

Table 7

Yield spreads to the German Government bund of 10-year benchmark issues in Europe

On 17 February 1999 in basis points

Government	Spread
France	10
Netherlands	10
Austria	17
Belgium	21
Portugal	22
Spain	22
Finland	23
Ireland	24
Italy	25
Memorandum:	
Denmark	32
Sweden	34
United Kingdom	68
Greece	223
Japan	– 193
Switzerland	– 140
United States	116

Source: Reuters

Table 8

Derivative transactions in long-term government securities

(in trillions of US dollars perannum)

	1995	1996	1997	1998
US Treasuries				
Futures	12.4	12.1	14.1	16.6
Exchange-traded options	3.6	3.7	3.9	5.3
OTC[1] options	0.4			
Cash market trading	*35.8*			
Outstandings (at year-end)	*2.5*	*2.7*	*2.7*	*2.6*
Japanese government bonds				
Futures	16.2	12.3	10.6	9.0
Exchange-traded options	2.2	1.8	1.6	1.4
OTC[1] options	1.6			
Cash market trading	*6.5*			
Outstandings (at year-end)	*2.3*	*2.3*	*2.2*	*2.7*
German, French, Italian and Spanish bonds				
Futures	15.4	19.2	21.2	23.9
Exchange-traded options	2.6	3.0	3.0	2.3
OTC[1] options	> 0.6			
Cash market trading	*19.3*			
Outstandings (at year-end)	*1.6*	*1.7*	*1.5*	*1.9*
German bonds				
Futures	9.3	12.3	14.5	19.5
Exchange-traded options	1.3	1.5	1.8	1.9
OTC[1] options	0.1			
Cash market trading	*16.6*			
Outstandings (at year-end)	*0.6*	*0.6*	*0.5*	*0.6*
French bonds				
Futures	3.4	3.4	3.1	2.2
Exchange-traded options	1.0	0.9	0.7	0.3
OTC[1] options	0.3[2]			
Cash market trading	*1.7*			
Outstandings (at year-end)	*0.4*	*0.4*	*0.4*	*0.5*
Italian bonds				
Futures	1.6	2.0	2.2	1.1
Exchange-traded options	0.2	0.3	0.3	0.1
OTC[1] options	0.0			
Cash market trading	*0.4*[3]			
Outstandings (at year-end)	*0.4*[4]	*0.5*	*0.4*	*0.5*
Spanish pesetas				
Futures	1.1	1.5	1.4	1.1
Exchange-traded options	0.2	0.3	0.2	0.1
Cash market trading	*0.6*			
Outstandings (at year-end)	*0.2*	*0.2*	*0.2*	*0.3*

[1] Over-the counter (OTC) activity estimated as average daily turnover in April times 255. [2] Estimated as OTC trading in interest rate options on traded securities in Deutsche marks times the ratio of total OTC trading in interest rate options in Paris or Milan to that in Frankfurt. [3] Euroclear and Cedel only. [4] Lira-denominated Treasury bonds only; excludes floating rate notes.

Sources: Salomon Brothers, *Central bank Survey of Foreign Exchange and Derivatives Market Activity 1995*, various futures exchanges, national sources and BIS.

Table 9

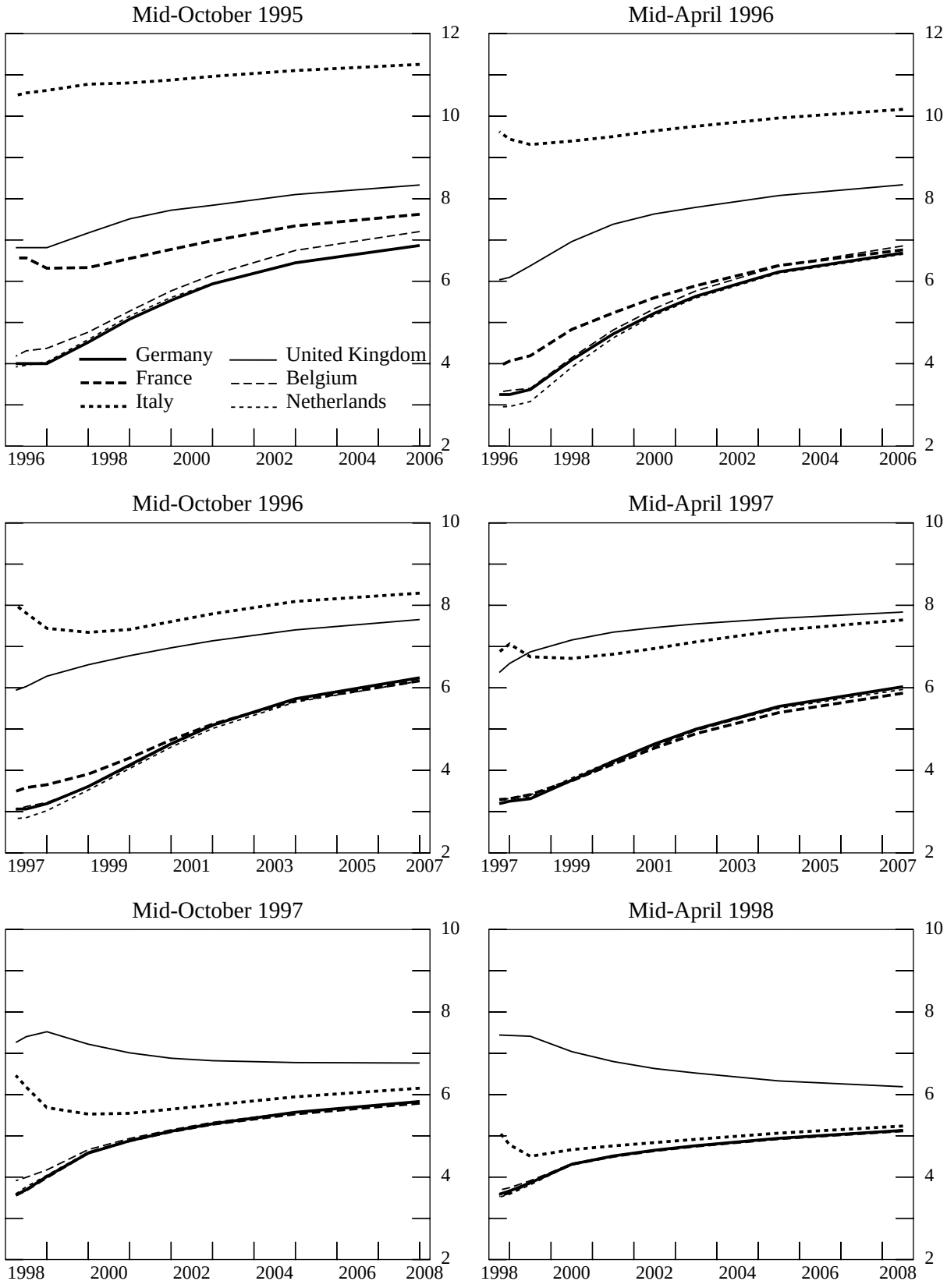
Euro area 10-year government bond futures, early 1999

	Transactions					Open interest				
	DE	FR	ES	IT	***memo:***	DE	FR	ES	IT	***memo:***
					US					***US***
04.01.99	244	17	12	12	*91*	261	94	13	36	*587*
05.01.99	312	33	16	11	*275*	261	93	13	37	*585*
06.01.99	292	34	16	8	*272*	293	93	13	36	*593*
07.01.99	444	28	16	10	*373*	261	93	13	37	*596*
08.01.99	422	29	16	11	*406*	287	93	15	35	*601*
11.01.99	521	32	19	22	*502*	312	91	14	36	*612*
12.01.99	590	35	20	15	*403*	312	91	15	38	*620*
13.01.99	791	44	32	23	*353*	329	91	15	38	*608*
14.01.99	526	40	30	12	*619*	369	91	16	41	*609*
15.01.99	574	43	30	16	*484*	388	91	17	42	*592*
18.01.99	188	21	14	6	*473*	388	91	17	43	*604*
19.01.99	430	33	20	9	*292*	391	91	21	43	*592*
20.01.99	534	36	19	12	*289*	369	91	21	43	*592*
21.01.99	433	38	25	9	*329*	358	91	22	43	*574*
22.01.99	477	23	20	8	*374*	351	91	28	43	*560*
25.01.99	294	20	19	8	*379*	405	91	29	43	*570*
26.01.99	427	23	21	9	*238*	377	91	25	44	*585*
27.01.99	477	27	20	12	*240*	406	91	23	45	*576*
28.01.99	431	22	27	11	*305*	426	91	23	46	*574*
29.01.99	290	24	15	5	*392*	421	92	24	45	*585*
01.02.99	411	27	14	9	*356*	379	91	24	45	*604*
02.02.99	598	53	20	17	*334*	384	92	25	45	*601*
03.02.09	623	44	25	14	*434*	417	89	24	45	*602*
04.02.99	841	51	33	22	*343*	447	86	26	45	*606*
05.02.99	554	43	22	9	*558*	523	89	26	45	*613*
08.02.99	557	25	20	15	*424*	523	89	27	45	*631*
09.02.99	518	33	24	12	*258*	512	92	27	45	*630*
10.02.99	395	37	15	8	*330*	537	93	23	45	*629*
11.02.99	413	30	15	9	*293*	537	92	22	45	*616*
12.02.99	603	39	31	15	*339*	537	92	22	46	*609*
Average	474	33	21	12	*359*	392	91	21	42	*599*
euro%	88	6	4	2		73	17	4	8	

Figure 1

Private interest rates in Europe

In percent per annum



Note: The yield curves are based on eurodeposit rates and, for longer horizons, on swap (midpoint) yields.

Sources: Datastream, Reuters and BIS.

Figure 2: Pre-euro structure of euro area government bond market

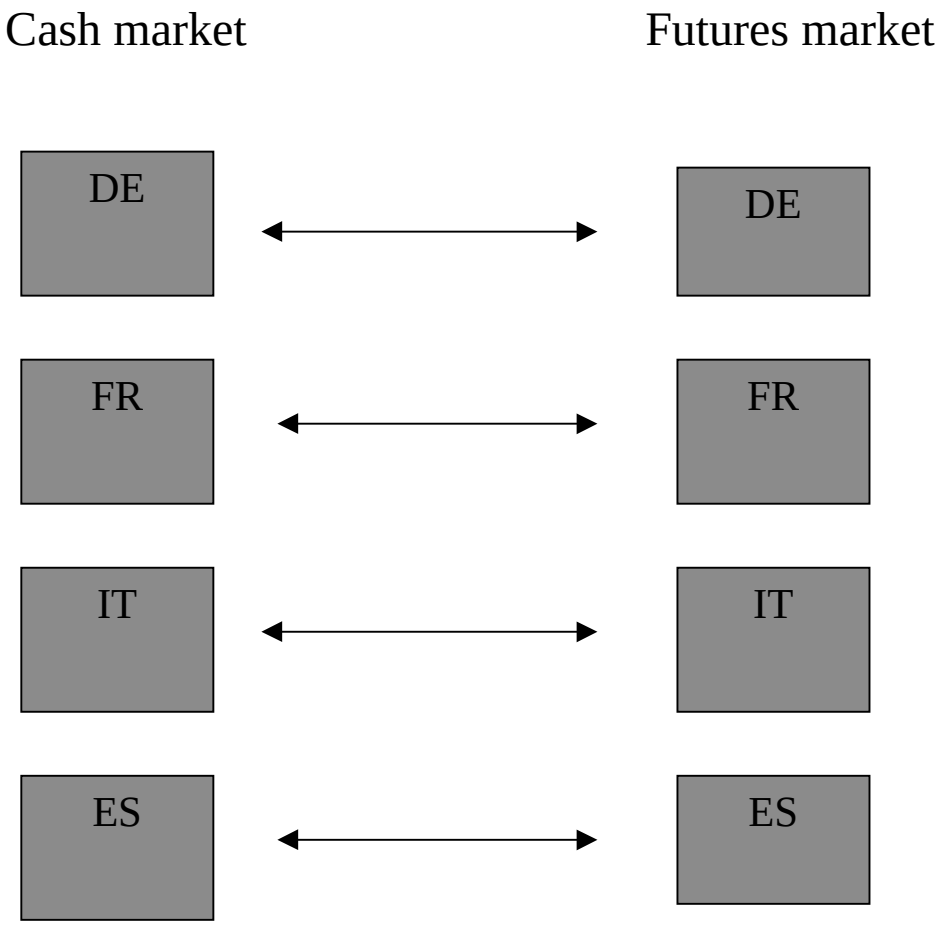


Figure 3: Share of euro-area government bond futures turnover

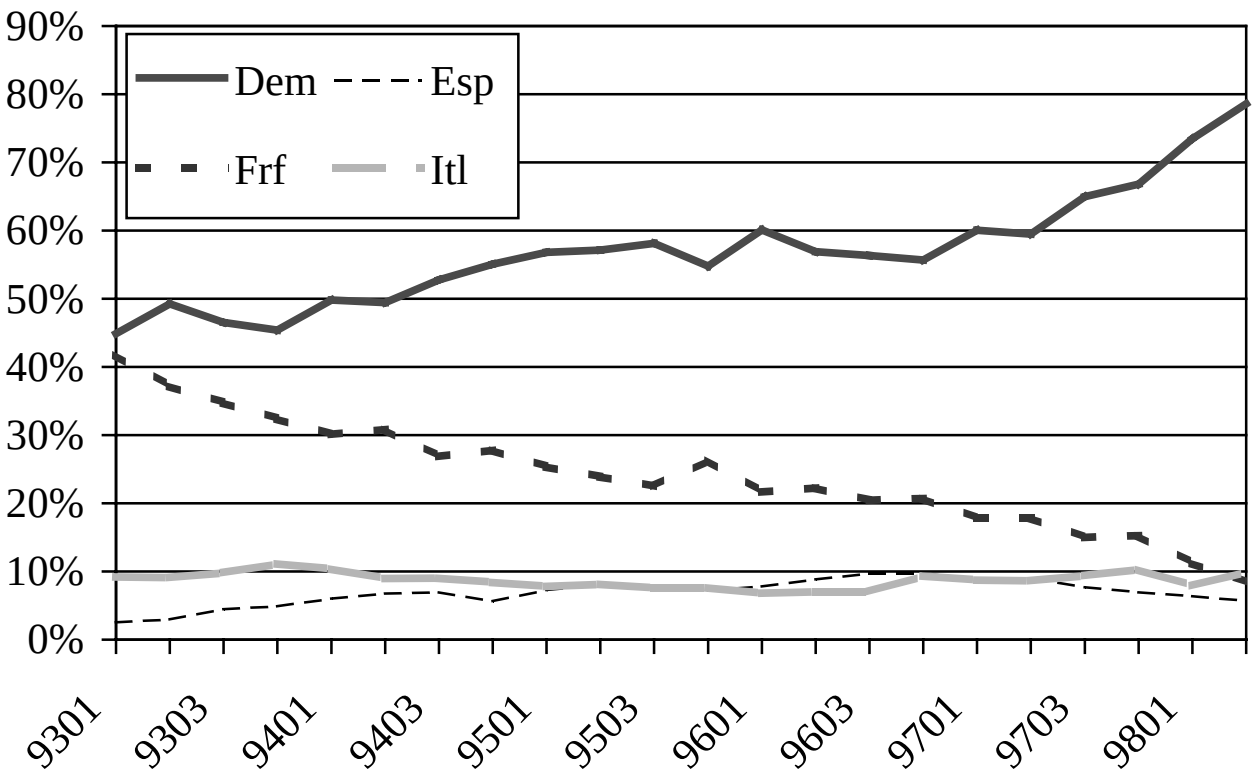


Figure 4: Post-euro structure of euro area government bond market: hypothesis of a single futures contract

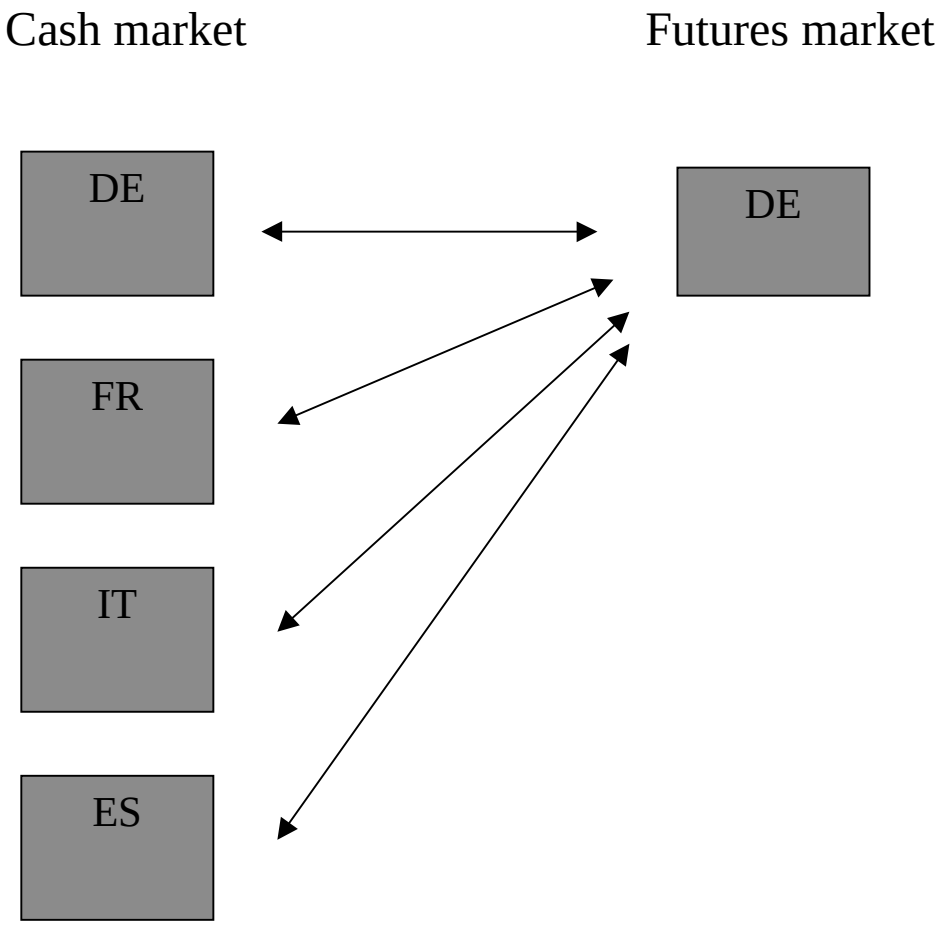


Figure 5

Spreads of benchmark government bond yields over that on the German 10-year bond

Weekly averages, in basis points

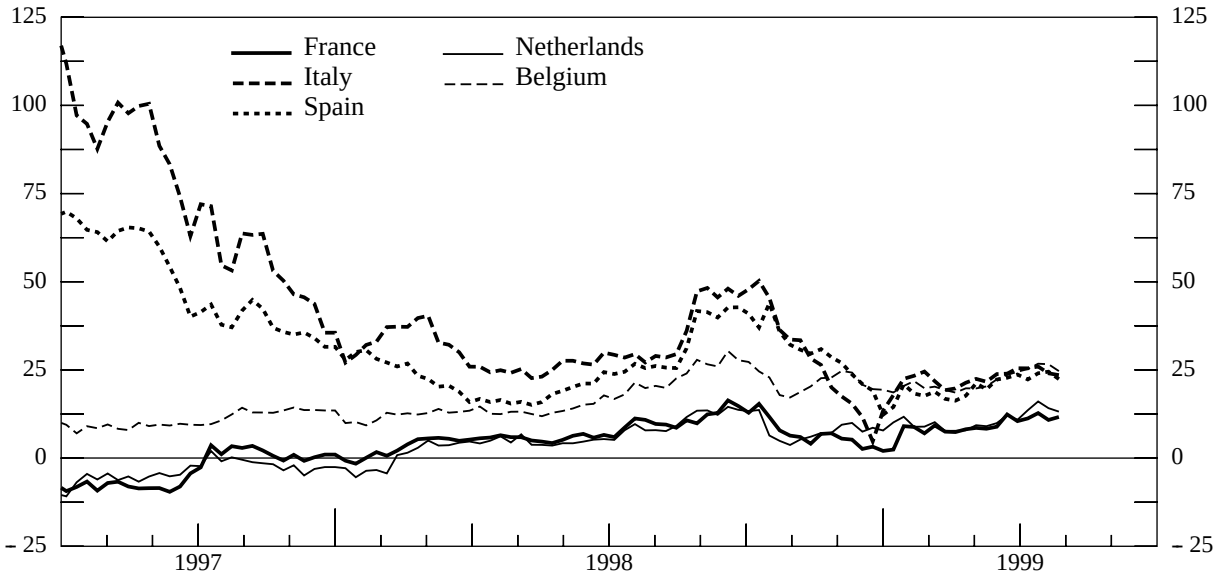


Figure 6: Post-euro structure of euro area government bond market: hypothesis of two credit tiers

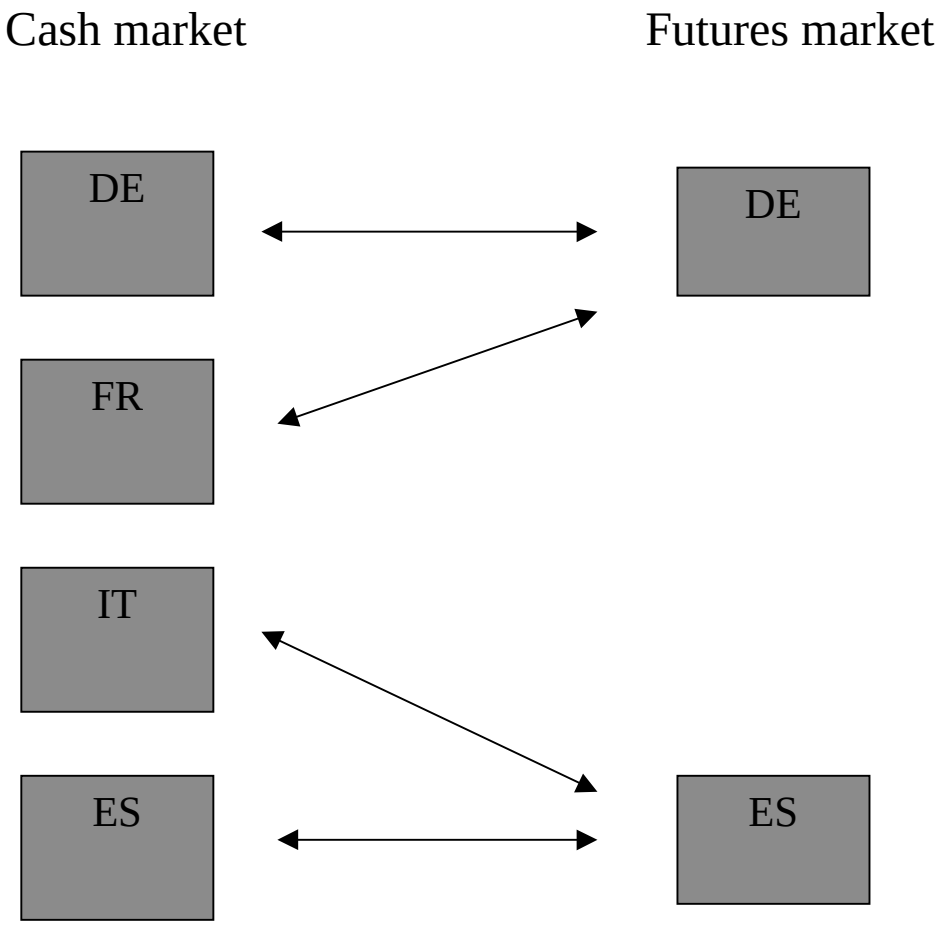


Figure 7: Post-euro structure of euro area government bond market: hypothesis of two credit tiers and multiple issuer deliverability