CHAPTER IV

THE CHANGING STRUCTURE OF THE MAJOR GOVERNMENT SECURITIES MARKETS: IMPLICATIONS FOR PRIVATE FINANCIAL MARKETS AND KEY POLICY ISSUES

Introduction

Partly because of their unique characteristics, especially their minimal credit risk, government securities and the deep, liquid markets in which they are traded have come to play important, if not critical, roles in facilitating aspects of private finance. In particular, they have facilitated the pricing and management of financial risks associated with private financial contracts. Many of these benefits can be seen most clearly in the United States, where large, deep, and liquid private securities markets exist. In Europe (especially in pre-euro Europe) and in Japan, where private debt securities markets are still relatively small, government securities markets also have played important roles in facilitating effective banking. For example, these securities markets have provided banks, and financial institutions more generally, with the opportunity to use credit-risk-free government securities to manage their considerable interest rate risks. Accordingly, government securities can be seen as possibly providing public-good benefits—beyond those associated with fiscal policies—by playing a role in financial efficiency and perhaps also in financial stability by facilitating private risk management.

The major government securities markets in the United States, Europe, and Japan are presently undergoing major structural changes. In the United States, the supply of publicly traded U.S. treasuries is shrinking and is projected to fall to very low levels by 2010. In Europe, the introduction of the euro has meant that there are now 12 separate sovereign issuers of euro-denominated government securities; 12 separate and not necessarily compatible auctioning, trading, securities clearing and settlement systems; and no uniform government securities benchmark yield curve. In Japan, the still developing government securities market is presently being challenged by the growing needs of the Japanese public finances and will continue to be challenged for the foreseeable future.

Structural changes in the major currency zones raise important questions about how the roles of government securities and their markets are likely to change, and the implications of changes in these roles for both national and international financial markets. Perhaps the most fundamental question raised by these structural changes—and, in particular, by the possibility that U.S. treasury securities and their markets might disappear—is: to what extent are government securities and their markets the source of unique public-good benefits for which there are no good substitutes?[1] Also, are these benefits important enough to warrant official steps to actively promote and maintain highly developed, deep, and liquid government securities markets when weighed against the macroeconomic benefits of debt reduction? This chapter maintains the hypothesis that there are important, irreplaceable benefits to having deep and liquid government securities markets—especially where private securities markets are not yet highly developed—and examines financial implications of ongoing changes in government securities markets.

[1]It can be argued that most of the private financial public-good benefits associated with the existence of government securities originate from the existence of money, which is a government obligation with instantaneous maturity; that is, it is government debt that is the most liquid instrument. This would suggest that a deep and liquid private money market could substitute somewhat for providing similar public-good benefits. In some ways, what is now being observed as occurring in the United States supports this; that is, markets are increasingly relying on swaps and the swap yield curve, which originates in bank liabilities (money), ultimately backed by central bank funds.

Although there are public policy issues of common concern to all countries (such as the two above-mentioned questions), there also are country-specific issues in each of the major currency areas. The United States presently has the most highly developed, deep, and liquid private debt securities market in the world—the size of which is greater than the combined size of all of the other private debt securities markets. U.S. private securities markets have existed for some time. But the accelerated development of, and heavy reliance on, U.S. private markets during the past few decades can be seen as having developed along with the similarly accelerated development of the U.S. treasury securities market, especially at the longer maturities (10 and 30 years) along the yield curve. Most of the financial issues, implications, and policy questions surrounding the shrinking supply of U.S. treasuries involve the extent to which private finance and private securities markets have come to rely on U.S. treasuries—nationally and internationally—and whether or not market participants can do without them without incurring considerable private and social costs and risks to national and international financial stability. This chapter concludes that private financial instruments can substitute for treasuries in most, although not all, of the roles that treasury securities have provided in U.S. and international financial markets.

The situation is presently quite different in Europe. Before the introduction of the euro in 1999, countries in Europe could be characterized as having effective, and in some parts of the benchmark yield curve, deep and liquid government securities markets. In countries where the authorities nurtured the development of the government securities markets—most notably in France, Germany, and Italy—government securities played some significant role in private finance before 1999, either in private securities markets or in private banking and asset (pension) management. Moreover, where efficient financial market infrastructures have developed, they generally have done so along with the development of government securities markets. With the introduction of the euro, and the possibility and desire (in some places) for European-wide private debt securities markets to play a greater role in European finance, it remains to be seen whether a full range of effective and efficient euro-area private debt securities markets can develop without the parallel (or prior) development of a European-wide market for euro-denominated government securities. If deep and liquid securities markets can help to facilitate the development of private markets, what kind of reforms could be considered in Europe to capture these potential benefits? In addition, to what extent could a European-wide government securities market support the maintenance of financial stability?

Japan presently has the second largest government securities market in the world,[2] and fiscal policy projections suggest that these markets, and the domestic appetite for absorbing Japanese government bond (JGB) issuance, may well be challenged by the task of financing Japan's fiscal deficits. A key national policy challenge—recognized by domestic and international market participants as well as officials—is the development of the kind of market infrastructure that would make this challenge less daunting. Reform measures could also help establish a highly effective, deep, and liquid government securities market: one that could, in principle, help manage the private financial risks associated with the difficult task of rebuilding Japan's financial and corporate sectors, and play the kind of supportive role that government securities have played elsewhere in facilitating private financial activity. Japan already has taken some steps to modernize the underlying infrastructure of the JGB market. But there are other significant, structurally oriented policy measures that could improve the efficiency, depth, and liquidity of the world's second largest government securities market.

[2]Based on the amount of outstanding public debt securities; see Annex IV.

Although there are no simple answers to many of these questions, the chapter attempts to at least clarify them and suggest ways of thinking about them. The nest section analyzes the key characteristics of government securities and their markets and discusses how these characteristics underlie the main roles that government securities have come to play in domestic and, in some cases, also in international financial markets. The subsequent three sections comprise a set of separate essays that discuss the impact of recent structural changes and the important challenges associated with them in each of the three major government securities markets: those of the United States, the euro area, and Japan. Annex IV discusses the size of the major government securities markets as well as recent and prospective changes in supplies of government securities.

Key Characteristics and Roles of Government Securities and Their Markets

Key Characteristics

Government securities and government securities markets have several characteristics that, together, distinguish them from private securities. These characteristics may include:

- minimal credit risk;
- high liquidity and a wide range of maturities;
- well-developed market infrastructure (including supporting repo and derivatives markets).

Not all of these characteristics are present, or present to the same degree, in all government securities markets. The U.S. treasury market is probably toward one end of the spectrum, since this market exhibits all of these characteristics. For the major countries' government securities, the most-shared characteristic is minimal credit risk.[3] This is because the major economies are reasonably well-managed and diversified, and their governments have access to fairly stable tax bases. Perceptions of credit risk on government debt do, however, differ across the major countries, although these differences are small in comparison to corporate credit risk or that of many less developed sovereign issuers. In the euro area, for example, spreads of 10-year government bonds issued by member countries relative to German 10-year bonds have remained fairly stable at less than 50 basis points since the euro's introduction in 1999 (Figure 4.1). Moreover, observers note that a major share—on the order of 20 basis points or more—of the spread of euro-area government securities relative to comparable-maturity German government securities is accounted for by differences in liquidity rather than credit risk.[4]

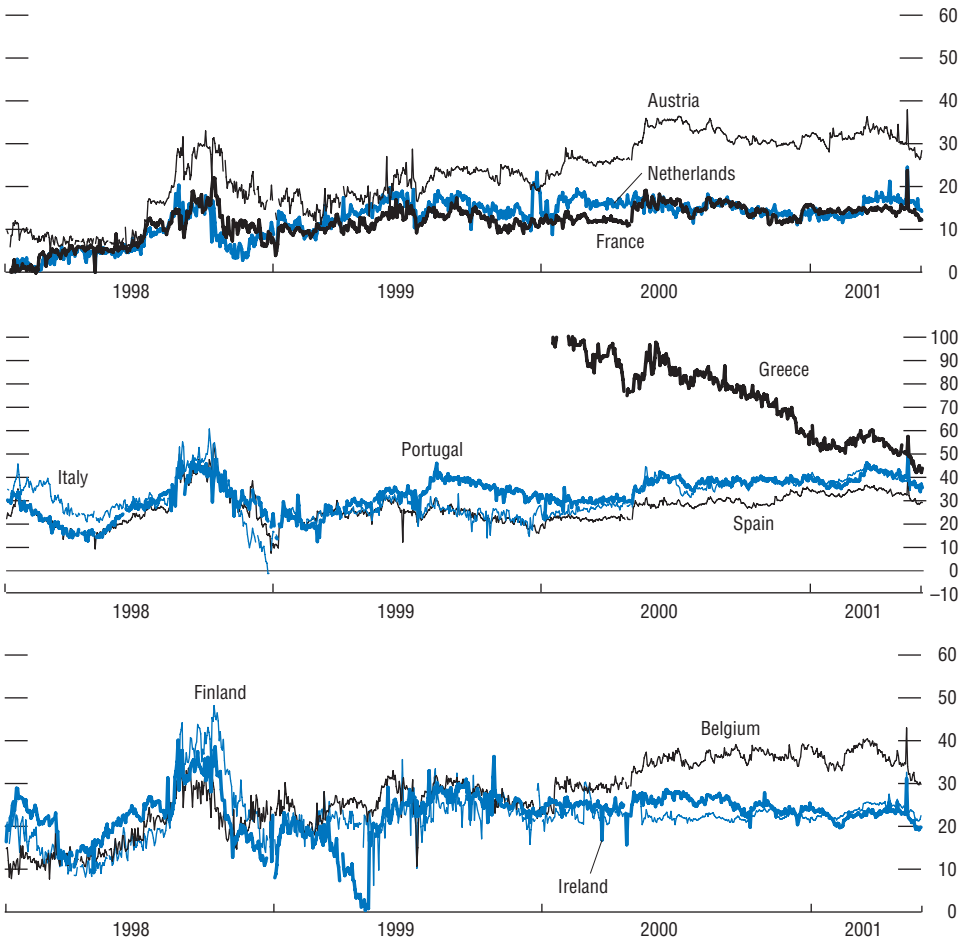
The high liquidity and range of maturities of government securities also differ markedly across markets. In the United States, there are liquid markets in U.S. treasury securities with three months to maturity (when first issued) all the way out to 30-year treasury bonds. In the euro area, the issuer of short-term benchmark securities is generally different from the issuer of long-term benchmark securities (where the "benchmark" is defined as the lowest-yielding issue). At present, for example, French government securities are the benchmark at several maturities below 10 years, while German government securities make up the benchmark in the 10-year segment. In Japan, JGB market liquidity is limited, except for a few issues in the 5- to 10-year segment.

During the past decade or two, market infrastructure—clearance and settlement, repo and derivatives markets, techniques for issuing securities, and trading systems in secondary markets—has developed to an advanced state in most major economies. Furthermore, there has been considerable convergence of practices in primary and secondary government securities

[3]Among G-10 countries, Moody's presently gives seven countries the highest possible rating, and the remaining countries have ratings just slightly lower (see Annex IV).

[4]See, for example, the Giovannini Group (2000).

Figure 4.1. Bond Yield Spreads Against Germany for Selected Euro-Area Countries
(In basis points)



Source: Bloomberg Financial Markets L.P.

markets in the major economies, mainly owing to initiatives by governments to minimize the cost of the public debt and, more recently in most countries, to foster the development of securities markets more generally.[5] For example, authorities in most countries have implemented primary dealer systems, used auctions for issuing debt (in contrast to corporate securities markets), and established preannounced issue calendars with "benchmark" issues.

Roles of Government Securities in National and International Markets

The combination of the above characteristics has allowed government securities and government securities markets to play certain roles that may not be easily played by private financial products and their markets. These roles are: providers of benchmark interest rates for reference or pricing in private fixed-income markets; hedging vehicles; vehicles for funding financial market positions and managing liquidity; instruments for investment and position-taking on the level of interest rates; and "near-monies" and safe havens.

Benchmark Interest Rates

Government yield curves sometimes serve as benchmarks for quoting and pricing yields on private (credit-risky) securities. From the public issuer's point of view, the key advantage of having debt securities used as benchmarks is that they are heavily traded. This characteristic, in tandem with their low default risk, usually means the yield is the lowest possible for the particular market segment. Benchmark interest rates are most useful when they allow investors to clearly distinguish fluctuations in premia for credit risk from fluctuations in interest rates. Changes in benchmark rates are usually passed-through one-for-one to other fixed-income instruments with the same maturity.

The benchmark role of government securities could in principle be important, not just for quoting yields on private securities but, more fundamentally, for pricing those securities. For instance, a uniform set of discount rates might be valuable for discounting cash flows in order to price claims to such cash flows. In the major economies, however, government securities are not generally used directly by investment banks to price new issues of securities. Instead, private securities are usually priced by reference to prices of existing private instruments that are close substitutes. In European fixed-income markets, the swap yield curve itself is often used as a pricing reference, owing in part to the lack of a uniform benchmark government yield curve. In less developed markets where a wide range of private debt securities outstanding does not exist, interest rates on benchmark government securities may be essential for pricing private fixed-income instruments and possibly other financial contracts. In short-term, fixed-income markets more generally, private obligations are more likely to be indexed to private interbank rates (such as LIBOR) than to rates on short-term government obligations.

Hedging Interest Rate Risk

Many types of market participants—commercial and investment banks, asset managers, and even nonfinancial firms—demand government securities for hedging fixed-income risks, primarily interest rate risk and maturity mismatches (Box 4.1). Participants in the primary market, including securities dealers, will often sell short government securities to reduce the risk of losses on securities inventories if interest rates rise and bond prices fall. Bond traders buy and sell government securities to manage the risk characteristics of their portfolios. Interest rate derivatives dealers buy and sell government securities to dynamically hedge risks in options positions or to balance mismatches in their forward-rate agreements (FRAs) and swap books (Box 4.2).

[5]See Inoue (1999) and Annex IV for more details on the major government securities markets.

Box 4.1. Managing Interest-Rate Risk Using Government Securities: An Example

This box provides a simple example of how a short position in a government security can be used to hedge interest rate risk. For simplicity, the example uses the short sale of a cash security, although short positions in derivatives contracts are often used as well.

Suppose that a securities dealer holds a corporate bond for one week. During the week, the dealer is exposed to interest rate risk—for instance, an 80-basis-point rise in interest rates would lower the bond's price by about 7 percent (see the table). The dealer can hedge this risk by selling short a government bond: at the beginning of the week, the dealer borrows the government bond and sells it; at the end of the week, the dealer repurchases it and returns it to its owner. If the price of the government bond falls, the short sale yields a gain, which offsets the loss from the long position in the corporate bond.

The effectiveness of the hedge hinges on a positive correlation between the yields on government and corporate bonds, as two scenarios illustrate. In the first scenario—a general rise in interest rates—yields on corporate and government bonds are perfectly correlated. That is, the spread between corporate and government bonds is constant. Government bond prices thus fall in tandem with corporate bond prices and the gain on the short sale of the government bond offsets the loss on the corporate bond.[1] In the second scenario—a "flight to quality" event—the spread between corporate and government bonds widens as market participants sell corporate bonds and buy government bonds. That is, government and corporate bond yields are negatively correlated—corporate bond prices fall as government prices rise. In this example, the short position in the government security is not only ineffective in hedging the interest rate risk associated with the corporate bond, but it actually adds to the loss on the portfolio. Such losses were reportedly experienced by fixed-income traders that tried to hedge using treasuries during the market turbulence surrounding the near-collapse of Long-Term Capital Management in the autumn of 1998.[2]

Hedging Interest Rate Risk with a Short Position in a Government Bond[1]

Scenario 1: General Rise in Interest Rates (Constant Spread)

	Day 1	Day 2	Day 3	Day 4	Day 5
			(In percent)		
Yield					
Corporate	6.0	6.2	6.4	6.6	6.8
Government	5.0	5.2	5.4	5.6	5.8
			(In basis points)		
Spread	100	100	100	100	100
			(In U.S. dollars)		
Price					
Corporate	55.84	54.80	53.78	52.77	51.79
Government	61.39	60.23	59.10	57.99	56.90
Change in value					
Corporate	0.00	–1.04	–2.06	–3.06	–4.04
Government (short)	0.00	1.16	2.29	3.40	4.49
Portfolio	0.00	0.12	0.23	0.34	0.45

Scenario 2: "Flight to Quality" (Widening Spread)

	Day 1	Day 2	Day 3	Day 4	Day 5
			(In percent)		
Yield					
Corporate	6.0	6.2	6.4	6.6	6.8
Government	5.0	4.8	4.6	4.4	4.2
			(In basis points)		
Spread	100	140	180	220	260
			(In U.S. dollars)		
Price					
Corporate	55.84	54.80	53.78	52.77	51.79
Government	61.39	62.57	63.78	65.01	66.27
Change in value					
Corporate	0.00	–1.04	–2.06	–3.06	–4.04
Government (short)	0.00	–1.18	–2.39	–3.62	–4.88
Portfolio	0.00	–2.22	–4.45	–6.68	–8.92

Source: IMF staff calculations.
[1]Assumes zero-coupon, 10-year bonds with $100 face value.

[1]In this simple example, the dealer is in fact "overhedged"—the gain on the short government position more than offsets the loss on the corporate bond by a small margin. In practice, the dealer would probably set and periodically adjust the size of the short position so as to more closely match the interest rate exposure on the corporate bond.

[2]See IMF (1999).

Box 4.2. U.S. Treasury Derivatives Contracts and Markets

Treasury derivatives contracts are actively traded both over the counter and on organized exchanges.[1] First introduced in 1977, treasury futures were among the earliest exchange-traded financial derivatives. During the 1980s and 1990s, trading in treasury futures on the Chicago Board of Trade (CBOT) and the Chicago Mercantile Exchange (CME) boomed along with activity in the cash treasury market and private securities markets. Today, the major exchanges offer a variety of contracts—both futures and options on futures—on treasury instruments. The benchmark contracts have traditionally been long-term bond contracts such as the CBOT 30-year "long bond" futures.[2] The CME and CBOT also offer futures on shorter-term treasuries: the CBOT lists futures contracts on 10-year, 5-year, and 2-year treasury notes, and the CME lists a futures contract on three-month treasury bills.

Recent developments in the cash treasury market have significantly influenced the treasury derivatives markets. In the cash market, benchmark status has shifted to the 10-year note from the 30-year bond; reflecting this shift, positions in 10-year note futures now exceed positions in 30-year bond futures. In addition, cash instruments such as agency bonds and bank deposits have begun to replace treasuries in some roles. At the same time, market participants have increasingly relied on derivatives such as agency note futures and LIBOR-based OTC interest-rate swaps for hedging and trading purposes. The increased use of swaps for hedging may in turn have contributed to upward pressure on swap spreads, owing to the increased demand to pay fixed rates on swaps in order to hedge long positions in cash instruments.

Experience suggests that agency futures could develop into a viable substitute for treasury futures. In 1975, the CBOT introduced a futures contract on Government National Mortgage Association (GNMA) mortgage-backed securities. GNMA futures trading climbed sharply through the early 1980s as the contract became a preeminent hedging vehicle. Trading later fell, however, as the contract's hedging performance deteriorated; flaws in the contract's design have been blamed.[3] By the mid-1980s, GNMA futures trading had fallen to negligible levels as hedgers shifted to treasury bond futures and the contract was discontinued. In recent years, the shrinking supply of treasury securities has revived interest in derivatives on agency securities. In 1999, the CBOT introduced a futures contract on a 10-year agency note and in 2000 the CME launched a similar contract.

[1]Schinasi and others (2000) discuss OTC derivatives markets.

[2]Notwithstanding its name, the 30-year futures contract is not strictly a claim on a 30-year bond. The seller of a long-bond futures contract may deliver either (1) any noncallable treasury security with at least 15 years remaining maturity from the first day of the delivery month, or (2) any callable treasury security that cannot be called for at least 15 years from that day.

[3]Johnston and McConnell (1989).

The usefulness of government securities for hedging interest rate risks derives from the comparatively high degree of liquidity of these markets and a usually high correlation between government yields and yields on private debt contracts, including bank loans. The reason is that, for example, the value of a short position in treasury securities will offset, to a large degree, price movements of a long position in other fixed-income instruments, such as corporate bonds.

Position Funding and Liquidity Management

Cash and repo markets in government securities are widely used for funding and liquidity management by a variety of market participants, including proprietary trading desks, bond dealers, investors, and portfolio managers (Box 4.3 and Box 4.4). Since repo transactions are collateralized, borrowing and lending through the repo market occurs at lower rates than on unsecured loans. Repos create leverage that can be used to take positions and finance securities in-

Box 4.3. The U.S. Treasury Repo Market

The treasury repurchase agreement (repo) market is a primary nexus for trading, hedging, and financing activities in the U.S. dollar financial markets. As the supply of treasuries has declined, various other securities—including agency, mortgage-backed, money-market, and corporate securities—have increasingly been used in repo transactions. Nonetheless, treasuries remain the single most important repo instrument, reflecting their lack of credit risk, their liquid secondary market, and the broad range of participants in the market, including the U.S. Federal Reserve.

In a repo transaction, two counterparties exchange cash and a security, then later reverse the transaction.[1] The initial seller of the security is said to "repo" the security or engage in a repo, while the initial buyer is said to "reverse in" the security or engage in a reverse repo. In effect, the buyer lends cash to the seller, with the security as collateral. The interest rate implied by the difference between the purchase and repurchase prices is known as the repo rate, which is below uncollateralized rates. If the borrower (seller) defaults, the lender (buyer) can sell the security to recover any potential loss on the loan. The credit exposure on the loan thus fluctuates with the market value of the collateral. Market participants mark this exposure to market and adjust margin payments and "haircuts"—discounts on the underlying collateral—accordingly. Such haircuts can be very low for treasury securities.

A wide array of institutions participate in the repo markets, including commercial banks, money-market funds, securities dealers, municipalities, and official institutions. Government securities dealers are particularly active participants. In February 2001, U.S. government securities dealers were involved in some $2.6 trillion in repo and reverse repo agreements. Securities dealers finance long positions in treasury securities by lending them out in the repo market, in effect taking a leveraged position, and cover short positions by reversing in securities.[2] Government securities dealers can obtain zero haircuts on treasury securities (implying potentially unbounded leverage); that is, their treasury positions can be fully financed in the repo market.

The Federal Reserve is a key official participant in the treasury repo market. Like many other central banks, the Federal Reserve operates in repo markets to manage domestic monetary conditions. The Federal Reserve can also engage in repo transactions involving other types of securities. In September 1999, it expanded the list of collateral instruments that are eligible for its repo operations (as described in the main chapter text).

[1]An overnight repo terminates the next day; a term repo lasts more than one day. An open maturity or continuing repo is rolled over until one counterparty terminates it.

[2]See Box 3.3 in IMF (1998).

ventories. The extent of leverage depends mainly on the "haircut," or discount, applied to the security used for collateral.[6]

Investment and Position Taking

Minimal credit risk and relatively low market risk in government securities makes them relatively safe long-term investments for pension funds, insurance companies, and other institutional investors. Moreover, rating agencies and investment restrictions (e.g., U.S. Employee Retirement Income Security Act "prudent man" guidelines for pension funds) can provide a strong incentive for institutional investors to focus on low-credit-risk bonds with long maturities in order to match the maturity of their liabilities.

Speculators and arbitrageurs also use government securities markets for taking positions on

[6]See Box 3.3 in IMF (1998).

Box 4.4. U.S. Treasury Securities as Collateral

Treasury securities have three key characteristics that give them an advantage over private securities for use as collateral instruments. First, treasury securities are virtually free of credit risk, which is useful because collateralization is meant to mitigate such risk. Second, there is minimal operational risk in holding treasury securities, because treasury markets have a well-developed and smoothly functioning infrastructure. Third, because treasury securities have deep and active markets, they can be liquidated quickly and at low cost if the need arises.

Reflecting these characteristics, U.S. government securities (including treasury and agency securities) are second only to cash as the most widely accepted and widely used collateral instruments.[1] According to a recent survey, over 80 percent of market participants accept U.S. government securities for derivatives transactions.[2] By comparison, only about 40 percent accept Japanese government bonds (JGBs), and about 20 percent accept top-rated corporate bonds. U.S. government and agency securities also account for about 40 percent of outstanding collateral; by comparison, European government securities, JGBs, and AAA-rated corporate bonds each account for 5 percent or less.[3]

The shrinking supply of treasuries has eroded the advantages of U.S. treasuries over private securities as collateral. Treasury securities have become more costly to use as collateral as prices have been bid up. In addition, their market risk has risen as market liquidity has declined. As a result of these trends, collateral managers increasingly accept private securities, including corporate bonds, money market securities, and equities. Private collateral is more challenging to manage than treasury collateral because private securities involve greater credit, operational, and liquidity risks. Nevertheless, collateral managers see little alternative to broadening the menu of acceptable collateral as the supply of treasury securities falls.

[1]ISDA (2000b).
[2]ISDA (2000b).
[3]ISDA (2000b).

the level of interest rates. One reason for this is that one can quickly and cheaply trade in and out of positions in liquid government securities markets and in related repo and derivatives markets in order to take views on the future path of interest rates or exploit arbitrage opportunities. Trading and investment strategies involving government securities frequently are oriented toward taking advantage of anticipated changes in the slope or shape of the yield curve. For example, a trader that expects the yield curve to steepen (expects long-term bond prices to fall relative to short-term bond prices) might sell short long-term bonds and buy short-term bonds.

Government Securities as Near Monies and Safe Havens

Government securities are close substitutes for the currency of the issuing country. At very short maturities, government securities have little market risk and thus are reliable stores of value. As a result, government securities serve as a medium of exchange in financial markets—they are widely accepted as collateral against the future delivery of cash (including transfers of central bank reserves and bank deposits). For example, U.S. treasury securities can be used to settle certain kinds of financial obligations, and European government securities can be used as collateral to obtain intraday liquidity (central bank funds) for transactions settled on the European payments system TARGET.

This near-money property has created a safe-haven role, particularly for U.S. treasury securities, but also for some euro-denominated government securities (notably German government bonds) and, to a lesser degree JGBs, during periods of financial stress. The safe-haven

role is supported by the use of these markets by central banks for monetary policy, foreign exchange reserves management, and financial stability purposes, since central banks readily deliver central bank deposits (base money) against government securities. Specifically, while by definition any liquid asset can be converted into a safe asset by selling the asset and buying a safe asset, during extreme market events when there is an increase in the aggregate demand for liquidity, the central bank has the most control over the supply of liquidity. This reinforces the safe-haven role of government securities.

The Shrinking Supply of U.S. Treasuries: Financial Market Effects and Policy Issues[7]

The declining stock of U.S. treasury securities has already significantly affected the characteristics and roles of treasury securities and the treasury market. This section discusses the salient features of recent financial market effects associated with the shrinking supply of treasury securities, and examines key policy issues. The subsequent two sections of the chapter take a similar approach in discussing government securities markets in the euro area and Japan.

Recent Market Developments

The shrinking supply of U.S. treasury securities seems to have had three main effects in the treasury market so far: rising corporate interest rate spreads relative to treasury yields; reduced liquidity of the treasury market; and, from a portfolio manager's perspective, a less reliable treasury yield curve. In addition, the shrinking supply has sparked efforts by other large issuers of bonds to obtain benchmark status, and it has also presented some possibly significant changes in the range of assets that the U.S. Federal Reserve will need to put on its balance sheet in the course of conducting monetary operations.

Rising Interest Rate Spreads

During the past three years, the widening of spreads between interest rates on U.S. treasury securities and private debt securities has been caused to some extent by events, such as the Long-Term Capital Management (LTCM) crisis (especially the subsequent deleveraging in fixed-income markets). Spreads also widened in response to perceptions about rising private credit risk related to the maturation of the U.S. business and credit cycles (see Chapter II). However, part of this widening—and perhaps a significant part—is widely regarded to be related to the shrinking supply of U.S. treasuries and the associated rise in their scarcity value.[8]

The confluence of all of these factors, and the divergence of pricing between treasury markets and other dollar fixed-income markets, can be seen most clearly in the relative behavior of yields on private interest rate swaps and on U.S. treasury securities. Beginning in 1997, the pass-through of changes in treasury yields to yields on other fixed-income securities (that is, the co-movements between them) systematically diminished somewhat. In 1998, the impact of these structural shifts was exacerbated by the flight to quality associated with the LTCM-crisis-related turbulence. This further pushed up the spread between the swap rate and the U.S. treasury rate as well as the spread between corporate bonds and treasuries. Relative prices and yields were pushed further apart beginning in mid-1999, when the U.S. Treasury announced that it would begin buying back treasury securities in early 2000. Overall, from 1997 to 2000, the 10-year

[7]The following discussion draws heavily on Schinasi, Kramer, and Smith (2001). Another major country experiencing changes in the government securities market is Canada. Debt reduction has been reflected in a substantial decline in the stock of treasury bills, although the stock of longer-term bonds has not fallen. In the money market, private securities issues have grown to fill the roles played by treasury bills. At the longer end, marketable government bonds have continued to serve as a pricing benchmark, investment vehicle, and safe haven although their use in hedging private credit risk has declined. For further details, see IMF (forthcoming).

[8]See Cooper and Scholtes (forthcoming).

swap spread increased from about 40 basis points to over 100 basis points.

The rise in the 10-year swap spread is fully consistent with reduced reliance on 10-year U.S. treasuries, and increased reliance on 10-year interest rate swaps, for hedging market risks on corporate debt securities. Less hedging in the 10-year treasury market would reduce the extent of short-selling and thereby raise the 10-year bond's price (and reduce its yield), while increased short-selling of the 10-year swap would put upward pressure on the swap yield. Either shift would support wider 10-year swap spreads.

Reduced Liquidity and Greater Volatility

The shrinking supply of U.S. treasury securities appears also to have reduced liquidity in U.S. treasury markets and markets for some treasury derivatives contracts. This has occurred for a number of reasons, the most important of which is that the commercial and investment banks that deal in these markets have systematically reduced the amount of capital devoted to market-making.[9] The risk-adjusted return to capital of market-making in fixed-income markets has declined, in some markets dramatically, in part because the costs and financial risks associated with owning, maintaining, and hedging large inventories of U.S. treasuries have increased significantly. As a result, dealers are holding leaner inventories of fixed-income securities, including U.S. treasuries, and are managing their risks more carefully. This has resulted in a reduction in trading activity, market turnover, and market liquidity.

This reduced market-making and liquidity is reflected in standard barometers of treasury market liquidity. Although fewer market-makers may not necessarily imply reduced market liquidity, it is noteworthy that the number of treasury primary dealers is decreasing, and is presently down by nearly half from its historical peak a decade ago. Consolidation of large financial institutions recently has significantly reduced the number of firms making secondary markets. At a more technical level, Fleming (2000b) presents various market-derived liquidity indicators, including bid-ask spreads and on-the-run/off-the-run spreads for various maturities.[10] This analysis shows that bid-ask spreads in treasury bill and treasury note markets ratcheted up in line with the series of events mentioned above.

The increasingly idiosyncratic behavior of treasury yields has been reflected in higher volatility of treasury yields (Figure 4.2). This also has resulted in increased volatility of private credit spreads measured relative to treasury securities. For example, the volatility of the 10-year swap spread has risen markedly from about 2 percent to as high as 18 percent since mid-1998. This higher volatility appears to have had various sources, including the slowing of U.S. economic growth. But reduced liquidity in treasury securities as well as the LTCM crisis raised concerns about market and liquidity risks associated with owning U.S. treasury securities and private fixed-income securities as well. According to market participants, these concerns have led to a situation in which the overall riskiness of treasuries (market, credit, and liquidity risks together) is perceived to be higher now than it was a few years ago, owing to increasing market and liquidity risks.

Diminished Reliability of U.S. Treasuries

According to a varied group of market participants engaged in a wide range of financial businesses (both buy side and sell side), present conditions in U.S. treasury markets suggest that, in several of their more important roles, U.S. treasury securities have become less reliable or at least more expensive to use. First, in repo markets, the scarcity of some maturities of treasuries

[9]Liquidity in a wide range of financial markets may have been reduced by the growth of electronic trading systems—that is, the fragmentation of trading activity as more trading platforms have been introduced. See, for example, Committee on the Global Financial System (2001).

[10]See Fleming (2000b).

Figure 4.2. Volatility of Government Bond Yields for Selected Countries[1]
(In percent)

Source: Bloomberg Financial Markets L.P.
[1]Volatility calculated as rolling 100-day standard deviation of annualized yield on 10-year bonds.

has raised the level of price volatility. Second, the increasing prices of treasury securities compared with other fixed-income securities with similar maturities has made them more expensive to post as collateral to support a range of financial transactions. Third, the idiosyncratic, supply-demand driven volatility in treasury yields has reduced the usefulness of the treasury yield curve as a benchmark for credit risk and as a barometer of future economic and financial developments. Finally, the usefulness of treasuries for hedging interest rate risks has deteriorated. "Flight to quality" effects on treasury prices during major market adjustments, in particular, have become such an important factor driving treasury yield dynamics that co-movements with other fixed-income yields tend to reverse at precisely those times when "short hedgers" rely most on high positive correlations (see Box 4.1).

Private Efforts to Become Benchmark Issuers

Reduced liquidity in the treasury market and the sensitivity to supply and demand factors of treasury prices have been the main reasons behind the efforts of three U.S. agencies (Freddie Mac, Fannie Mae, and FHLB) to establish themselves as the new benchmarks at certain maturities and therefore capitalize on the lower costs of issuing in those segments.[11] Although some of the agencies—in particular, Fannie Mac and Freddie Mac—are private, shareholder-owned, profit maximizing firms, they operate under federal charter and have some privileges, including a credit line with the Treasury and tax benefits. The agencies have announced the regular issuance of large amounts (around $3–6 billion each)[12] of non-callable bonds in a range of maturities, paralleling the Treasury's practice. Fannie Mae and Freddie Mac have also introduced benchmark bill programs, thus more-or-

[11]These agencies are formally known as the Federal Home Loan Mortgage Corporation, the Federal National Mortgage Association, and the Federal Home Loan Bank system, respectively.
[12]See Fleming (2000a).

less filling out the yield curve. In addition, the infrastructure for agency securities is developing: they are more widely used in repo operations, some agency issues are strippable, and in March 2000, the Chicago Mercantile Exchange, the Chicago Board of Trade, and the (electronic) Cantor Exchange launched futures and options contracts on agency bonds. The agencies' competition for benchmark status extends beyond the U.S. dollar markets: certain euro-denominated agency issues are designed to be substitutes for euro-area government bonds—the November 2000 issue by Freddie Mac of a five-year, €5 billion bond is an example.[13] Bid-ask spreads for agency securities are currently on the order of one-half to one basis point for the most liquid securities, compared with about four basis points just a few years ago.

Some large corporate borrowers are also positioning themselves as benchmark issuers, including Ford Motor Credit (with its GLOBUS program) and the General Motors Acceptance Corporation. As yet, the corporate markets appear to lack much of the infrastructure and supporting markets that underpin liquidity in the treasury market. Market participants point out that the development of corporate bond futures would add liquidity to benchmark corporate bonds and promote their benchmark status. The creation of alternative, private benchmarks is also supported by the development of private fixed-income indices. In the last two years, major fixed-income dealers have redoubled their efforts to devise and market private credit indices, based on cash bond prices, for use in performance measurement and benchmarking.

Changes in the U.S. Federal Reserve Balance Sheet

The U.S. Federal Reserve currently relies almost exclusively on U.S. treasury securities for outright purchases, and on treasury and agency repo markets for controlling the supply of base money. However, the Federal Reserve Act gives authority to the Federal Reserve to purchase a broader menu of financial instruments.[14] Specifically, the Federal Reserve has express authority (under sections 14(b)(1)–(2) of the Federal Reserve Act) to purchase debt issued or guaranteed by the U.S. government or any agency of the U.S. government, some debt obligations of state and local governments, as well as direct obligations and securities fully guaranteed by a foreign government. It also has the authority to purchase not only direct debt obligations of the major agencies (Freddie Mac, Fannie Mae, and the FHLB), but also "guaranteed certificates of participation" such as mortgage-backed securities (MBS). On the other hand, there is no explicit authority for the Federal Reserve to purchase most other private sector assets, including corporate bonds, commercial paper, mortgages, equity, or land.

As the Federal Reserve Board is both a major holder and a major net purchaser of treasuries, it has taken two steps to limit the adverse effects of its monetary operations on treasury market liquidity.[15] First, in August 1999, the Federal Reserve Bank of New York, as manager of the System Open Market Account, asked for and was given authority to accept a broader range of collateral in repurchase agreements (it did not request permission to make outright purchases of other assets).[16] For such purposes, the Federal Reserve Bank of New York currently has the authority from the Federal Open Market Committee to accept treasury securities (including strips) as well as direct agency debt, as well as temporary authority to accept pass-through mortgage securities of GNMA, FNMA, and FHLMC. Second, the Federal Reserve has established, as guidelines, caps on its holdings of indi-

[13]See Van Duyn (2000). The yield was quoted relative to the swap curve, not a government benchmark. Freddie Mac has also issued three-year and 10-year euro-denominated bonds.

[14]See Clouse and others (2000).

[15]See United States, Federal Reserve Bank of New York (2000).

[16]See United States, Board of Governors of the Federal Reserve System (2000).

vidual issues of treasury securities, as a percentage of the publicly held supply, and it has also concentrated its outright purchases in less liquid, "off-the-run" securities.

In an environment of shrinking supply of publicly held treasuries and trend growth in the Federal Reserve's holdings of treasuries, under current operating procedures the Federal Reserve will likely reach the caps on its treasury holdings within just a few years. At that juncture, the Federal Reserve will have two main options. First, the Federal Reserve could relax the caps on its holdings of treasury securities at additional cost to market liquidity. However, this option would only delay the problem caused by a shrinking supply of treasury securities. The second option is that the Federal Reserve could begin selling its treasury holdings and accumulating alternative assets. This is the only long-term option if the supply of treasury securities continues to decrease.

The Federal Reserve's present practice of relying almost exclusively on treasury securities for maintaining monetary stability is therefore not sustainable with a shrinking supply of treasury securities. The Federal Reserve will have to consider broadening the menu of securities that it uses to conduct its monetary operations, and especially those it buys and sells to control the supply of high-powered money. As mentioned above, the Federal Reserve already has the authority to purchase both direct debt obligations and MBS issued by the large agencies, as well as certain debt obligations of state, local, and foreign governments. Paralleling the practice in several major advanced economies, the Federal Reserve in fact relied heavily on discounting private financial instruments in the period before a large stock of U.S. treasury securities existed. There is, therefore, considerable precedent in the United States and in other countries for central banks accumulating private financial assets in order to affect the money supply. A likely reason the Federal Reserve has not recently exercised its authority to purchase outright securities other than treasuries is a concern that this could alter the perceived risks from investing in those securities.[17] Additional concerns about using private assets include the possibility of distortions in capital allocation and the implications of the Federal Reserve taking on credit risk.[18] Another option—which may require legislative action—is to fundamentally alter the way in which the Federal Reserve controls the money supply.[19] For instance, the Federal Reserve could discount assets of banks through its discount window.

Private Financial and Public-Policy Issues Associated with the Shrinking Supply of U.S. Treasury Securities

The potential for the supply of U.S. treasuries to diminish beyond the point where treasury markets are no longer able to fulfill their present roles raises important issues of immediate interest to private market participants and policymakers. Most issues under discussion in the markets are relatively technical and oriented toward maintaining the profitability—in some cases, the viability—of some of their lines of business. They immediately involve the question of whether private substitutes exist or can be created for pricing and quoting private debt securities, for hedging private financial risk, and for cost-effective and reliable collateralization of financial transactions. Market participants are already shifting, to some extent, toward using private substitutes in dollar and euro markets—such as swaps—for price quotation, hedging, and investment. Moreover, they recently have begun using private securities and even delivery of cash in the form of bank deposits as substitutes for collateral. To a considerable extent, this is because dollar fixed-income markets are sufficiently developed that reasonably safe private in-

[17]See Clouse and others (2000).
[18]See Greenspan (2001).
[19]See Goldman Sachs (2000).

struments exist for benchmarking, hedging, and to some degree as collateral, at least during periods of normal financial activity. Concerns remain, however, regarding the availability of substitutes for treasuries as a safe haven during turbulent periods in U.S. and international financial markets.

Possible Substitutes for Treasuries as Pricing Benchmarks

U.S. treasury securities are one of several reference points used for *quoting* yields on both new and existing fixed-income instruments. As noted above, current methodologies for *pricing* new issues of private debt securities and dollar-denominated sovereign bonds issued in the international markets are based on market prices of existing debt securities that are similar in terms of credit risk characteristics, the structure of the security (coupon and maturity), the industry of the issuer, and the issue's liquidity. A variety of non-treasury benchmarks—including swaps, agency securities, and some large corporate issues—could be and are used for reference purposes. Thus, the science and art of pricing and quotation of fixed-income instruments in U.S. dollar markets are unlikely to be significantly affected by the shrinking supply of treasury securities.

Consequences for Portfolio Management

The shrinking supply of treasury securities may have important consequences for some types of investors. First, as treasuries have become increasingly expensive for use in repos, and have become less reliable for such purposes (which has led to larger "haircuts") because of increased market risk, market participants have shifted some short-term liquidity and funding activities toward high-quality, liquid alternatives to the treasury bill and repo markets—mainly agencies and some low-risk corporate bonds. Second, treasury securities are free of private credit risk and such low-risk investments may be important for the feasible set of portfolios that investors have available.[20] Third, long-term treasuries serve an important role for investors with long-term investment horizons—for example, investors that have long-duration liabilities, including pension funds and insurance companies.

Treasuries also are important to portfolio managers because the performance of portfolio managers is assessed against benchmark portfolios, and all of the main benchmark fixed-income portfolios presently attach a significant weight to U.S. treasury securities. The shrinking supply of treasuries is reducing the share that treasuries have in the main benchmark portfolios. There are two main consequences of this. First, other fixed-income market segments, and particularly the U.S. and European corporate sectors, are receiving higher weights in benchmark portfolios. This has produced increased demand for bonds in these segments of the fixed-income markets. Second, some market participants report that higher weights on corporate markets in benchmark indices may have altered market dynamics in that the price of private credit is dependent on the portfolio rebalancing operations of a wider range (including geographically) of institutions. It is unclear whether this has raised or lowered the volatility of interest rates.

Overall, the shrinking supply of treasury securities is likely to continue to have important consequences for short-term liquidity management and funding as well as longer-term portfolio management. The consequences for short-term liquidity management and funding appear largely transitional, and market participants have already made significant headway in adjusting their businesses to the shrinking supply of treasuries. The consequences for longer-term portfolio management appear to be less easily accommodated. There tends to be a dearth of high-quality, long-maturity fixed-income instruments that are desired by investment managers that have long-duration liabilities (insurance compa-

[20]See Bomfim (2001), and Reinhart and Sack (2000).

nies and pension funds).[21] Managers may need to manage growing "gap risk" caused by a greater mismatch between the maturities of their assets and liabilities. If these private risks are not well managed, they could pose financial stability challenges in some national markets.

Possible Substitutes for Hedging Interest Rate Risk

While liquidity in the U.S. treasury market is still unmatched—and the cost of establishing or removing positions is still comparatively low—U.S. treasuries have become less reliable, and more expensive, for hedging interest rate risk. The consensus among market participants is that the reduced ability to hedge interest rate risk in the treasury market does not present a major concern during periods of normal financial activity (that is, when interest rates fluctuate within normal trading ranges). A variety of alternative financial instruments can be used to manage these risks. Swaps, and to a lesser degree agency and corporate bonds, have higher correlations with most other instruments than do treasuries. As a result, a considerable amount of hedging activity that had been conducted in the treasury market is now being conducted in swaps and corporate/agency bond markets.

There are, however, two transitional issues that remain before hedging in swaps markets can fully replace treasuries in this role. First, the swaps market is insufficiently "commoditized" to hedge the various risks that have historically been hedged in the treasury market. This is partly a result of the apparent difficulty in creating liquid markets for traded futures and options markets on nongovernment securities. Some market participants suggest that the swaps market needs to mature to a point where participants can freely trade and unwind swaps of all maturities as easily as they currently trade treasury instruments, instead of booking long-term credit obligations as is currently done. Infrastructure improvements, possibly including a central clearinghouse, might be needed to deal with the potential for a buildup of counterparty risks. Counterparty risk in swaps is usually small during normal times, but could rise sharply during crises. Some securities traders suggest that a swap futures market could complement the swaps market and help it to serve the hedging role, much as the highly liquid market for treasury futures has complemented the cash treasury markets.

A second, closely related, transitional issue concerns the relatively lower liquidity of swaps (as well as agency securities) compared with the treasury market. Most market participants agree that, over time, liquidity will further migrate from the treasury market to other fixed-income markets, particularly the swaps market. However, because swaps are bilateral contracts that are not "traded" in a market the same way that treasury securities are, some market participants are concerned that there may never be the degree of liquidity in the swaps market that had existed in the treasury market. In turn, this depends on how commoditized the swaps market becomes. If "liquidity" in the swaps market—defined as the cost of putting on and removing hedges—does not achieve the degree of liquidity that has existed in the treasury market, then there may be a potentially significant effect on pricing in fixed-income markets due to a higher long-term cost of "insurance." This increased cost of hedging has apparently already reduced the willingness of securities dealers to hold inventories in primary and secondary markets—and could over time affect the pricing of initial bond offerings.

Substitutes for Treasuries as a Universally Accepted Collateral

The shrinking supply of U.S. treasury securities has made U.S. treasuries increasingly expensive to provide as collateral. This increased expense has occurred because treasury yields have fallen relative to the LIBOR curve and because heightened market risk and lower liquidity of treasuries has led to increased haircuts on these

[21]In large part for this reason, the Bond Market Association (2001)—whose membership includes financial institutions that are active in U.S. fixed-income markets—has advocated maintaining issuance of 30-year treasury bonds.

securities when they are posted as collateral. For these reasons, market participants report that they are using fewer treasuries to collateralize transactions. In their place, they are using agency securities, high-grade corporate paper, and even cash (bank deposits). This has been a key reason why repo markets in agencies and high-grade corporates have flourished recently.

A complementary reason for the richening of the menu of acceptable collateral in U.S. and international financial markets is the recent behavior of central banks. Specifically, central banks in the United States and elsewhere (including in emerging market countries) have expanded the menu of securities that they use for liquidity and reserve management purposes to include other countries' government securities, agency securities, supranational bonds, and asset-backed securities. For example, the benchmark for the U.S. dollar reserves of the European Central Bank now includes agency securities. Moreover, in 1999 the Bank of England expanded its list of eligible collateral for open market operations to include bonds issued by European Economic Area governments. It also has become increasingly common for central banks to use derivatives instruments for specific purposes.

There are important transitional issues in shifting to an environment in which the menu of acceptable collateral goes beyond government securities. As government bond supply diminishes, perhaps other securities could be admitted as collateral for settlement systems (with larger haircuts)—which would then take on some of the role as medium of exchange. In any event, probably the key, on-going adjustment is a greater focus on the management of collateral risk, including the magnitudes of required haircuts to compensate for the increased credit and liquidity risks of non-treasury collateral. This adjustment could pose considerable challenges to financial institutions, especially those that have less sophisticated risk management and control systems. It appears likely that these factors will complement other forces leading to financial consolidation. Specifically, large institutions with sizable capital bases and sophisticated risk-management and collateral-management systems have a natural advantage in dealing with riskier collateral. In addition, the increased reliance on LIBOR-based instruments (swaps) for hedging and on cash (deposits) for collateral management implies an expanded role for the major internationally active banks in financial intermediation.

Possible Implications for Market Dynamics and the Supply of Safe-Haven Assets

Government securities may act as a "shock absorber" when there are significant economic or financial shocks that cause investors to seek to reduce the riskiness of their portfolios. During such events, short-term debt is either rolled over at higher prices or not at all, and prices of long-term debt and equity fall sharply. In recent financial history, the treasury market has been the main safe haven to which investors flee during major market adjustments.

However, it is not at all obvious that the presence of the treasury market necessarily buffers the amount by which the "price of risk" rises when major adverse shocks occur. Having a "safe asset" to move into during crises possibly is associated with larger changes in asset prices and/or volumes of private financing than if a safe asset did not exist. The converse also cannot be ruled out. Further, agency securities and bank deposits, for example, may be close substitutes for treasury securities in that these investments appear to contain small amounts of private credit risk. Overall, the consequences for market dynamics of not having a large and liquid U.S. treasury market are not clear.[22]

Reflecting this ambiguity, there are two main views among market participants. The first view is that other instruments will substitute for treasury securities in all the roles that they have played. According to this view, U.S. treasury se-

[22]For a discussion of the potential impact on investors of disappearing U.S. treasuries and the availability of portfolio substitutes, see Reinhart and Sack (2000).

curities have served as an "anchor" that supports a broad range of financial activity, and markets will adapt to a shrinking supply of treasury securities by "shifting the anchor." According to this first view, the adjustment to a shrinking supply of treasuries is not a cause for alarm. The second view is that private financial instruments cannot substitute for treasury securities in their role as a safe haven. As a result, the disappearance of a large, deep, and liquid treasury market will fundamentally alter the operation of the U.S. financial system and even international finance, especially during periods of stress.[23]

A key to assessing potential changes in market dynamics during periods of stress is whether other instruments could substitute for treasuries as a safe haven. In U.S. dollar financial markets, possible substitutes for treasury securities as safe havens could include claims on U.S. financial institutions and securities issued or guaranteed by the agencies in the United States (notably Fannie Mae, Freddie Mac, and the FHLB). The supply of agency securities is presently not much less than the free float of treasury securities. Even agency securities have some private credit risk, however. Since the magnitude of credit risk will be time-varying, this magnitude must be continuously gauged.[24]

Implications for the International Role of the Dollar?

The U.S. dollar is the main currency of denomination for international financial transactions, accounting for about 44 percent of international money market, bond, and (cross-border) bank loans as of September 2000.[25] The predominant role of the dollar in international financial markets is due to at least three factors. First, market participants consider the U.S. economic and financial system to be stable, resilient, transparent, well-managed, and possessing a robust legal and operational infrastructure. Because of this, the risk of an isolated, unilateral, and catastrophic collapse in the U.S. economy and financial system is considered to be remote. Second, U.S. dollar fixed-income markets are arguably the deepest and most liquid in the world. Third, the main intervention tool in foreign exchange markets by central banks around the world has historically been U.S. treasury securities.

Central banks and private market participants have responded to the shrinking supply of treasuries by substituting into other U.S. dollar financial instruments. In light of the historical international role of the dollar, this raises the question of whether that role will shift as financial instruments increasingly substitute for treasuries in their traditional functions. The predominant view among market participants is that the dollar's role will not shift because the role of U.S. treasuries in international finance is regarded largely as due to the role of the U.S. economy and dollar financial markets in international finance, rather than the converse. The shrinking supply of treasury securities has already resulted in a shift in the menu of U.S. dollar securities that are used to support international financial activities, rather than resulting in a marked shift in the uses of the major currencies in international financial activities. Moreover, the shrinking supply of treasury securities has not reduced the significance of U.S. dollar markets. The groups of market participants that the report's authors meet with regularly almost uniformly believe that the relative

[23]See, for example, Wojnilower (2000).

[24]It may be possible to manufacture a debt security that is virtually risk-free in the form of a high-quality tranche of a collateralized bond or loan obligation (CBO or CLO). These vehicles pool bonds or loans and issue different tranches of claims, differentiated by their seniority of claim to the underlying cash flows. Thus, in principle one tranche could be senior enough that the credit risk is nil. Whether it is feasible to create a large enough supply of this senior-most tranche appears unlikely. The publicly held stock of treasury securities is currently more than half as large as the entire stock of private corporate debt securities outstanding in the United States. In addition, if it were to serve also as the instrument of Federal Reserve intervention, then the supply of it would have to grow at least at the rate of base money growth, which has been close to 8 percent on average over the past several decades.

[25]See BIS (2001).

roles of the major currencies in the future will depend importantly on how well the respective economies and financial systems are managed.[26]

Euro-Area Government Securities Markets: Challenges in Eliminating Fragmented Markets

Prior to the introduction of the euro, some countries in Europe had effective—and in some parts of the yield curve, deep and liquid—markets for trading government securities denominated in national currencies. These markets played important roles in facilitating effective private finance, either in private national securities markets—albeit relatively small markets—or in private national banking and asset (pension) management.

The euro's introduction and the associated elimination of foreign exchange risk within the euro area has created benefits in terms of creating a large euro-denominated pool of capital and liquidity. It also has created the possibility of integrated European-wide markets for pricing and trading debt securities, both private and public. Some private markets have become more or less fully integrated—most notably the unsecured interbank money market and, to a lesser extent, a rapidly growing market for corporate debt. Government securities markets have remained segmented, however. Unified platforms for government debt trading such as BrokerTec and Euro-MTS have proliferated, but a unified secondary market for trading euro-denominated government securities is, according to both market participants and officials, a long way off.

As a result of this national segmentation, the euro area presently lacks a uniform, benchmark yield curve for government securities, and is not able to capture some of the potential gains from having a deep and liquid euro-area-wide government securities market. Moreover, member states of the euro area are competing aggressively to become the benchmark yield curve—first at certain maturities and perhaps later at all maturities. To some extent, competition for investor interest is encouraging harmonization of trading platforms and market conventions. At the same time, this national competition is encouraging the persistence—some would say the entrenchment—of market segmentation along national lines and has resulted in the fragmentation of euro liquidity in national government securities markets. This fragmentation of markets and liquidity is most likely reducing the efficiency of government finance and securities markets—by keeping costs higher than they would be with a fully integrated euro-area market. This fragmentation may also be inhibiting the rapid development of other euro-area-wide private debt securities markets. Depending on market conditions, fragmentation can either impair or improve financial stability across the euro area, although the balance of opinion is that closer integration would tend to improve stability.

Recent Structural Changes in European Government Securities Markets

The Single Currency and Fixed-Income Securities Markets

With the introduction of the euro in 1999, the participating countries agreed that all new government debt issues would be denominated in the euro. The euro-area countries also agreed that their outstanding stocks of government debt would be redenominated from the legacy currencies into the euro. This redenomination from national currencies to a single currency created a stock of government securities that is much closer in size to the two largest government bond markets: the U.S. treasury market and the JGB market.[27]

At the same time, euro-denominated government securities markets have become increas-

[26]Truman (2001) reaches the same conclusion.

[27]As discussed in previous *International Capital Markets* reports, the introduction of the euro also led to rapid integration of some segments of the euro-area capital markets. See IMF (2000), p. 13.

Table 4.1. Euro Area: Holders of Government Debt Securities
(As a percentage of total)

	Domestic Creditors[1]				
	Total	MFIs[2]	Other Financial Corporations	Other Sectors	Other Creditors[3]
1991	83.8	43.4	12.5	27.9	16.2
1992	82.4	43.7	12.3	26.4	17.6
1993	78.2	41.4	12.8	23.9	21.8
1994	80.3	42.8	13.9	23.6	19.7
1995	78.9	41.2	14.7	23.1	21.1
1996	78.5	40.2	17.4	20.8	21.5
1997	76.4	38.8	19.3	18.3	23.6
1998	73.4	37.0	22.2	14.2	26.7
1999	69.8	35.2	20.5	14.0	30.2

Source: ECB *Monthly Bulletin* (various issues).
[1]Holders resident in the country whose government has issued the debt.
[2]Monetary and financial institutions.
[3]Includes residents of euro-area countries other than the country whose government has issued the debt.

ingly internationalized. The share of ownership by nondomestic creditors accounts for about one-third of the total outstanding stock of euro-denominated public debt (Table 4.1), amid diversification of fixed-income portfolios by both euro-area residents and overseas investors. During the past few years, cash and repo trading of some euro-area government securities has been introduced on electronic trading systems such as e-speed, BrokerTec, and MTS that are accessible to international traders and investors. Foreign participation in national primary markets has also broadened. In France, for example, the number of foreign primary dealers has risen from 2 out of 30 in 1989 to 11 out of 18 in 2001.

In the euro area, as in the United States and some other countries, fiscal discipline has reduced the outstanding stock of government debt relative to GDP. Unlike in the United States, however, the attendant financial market consequences have been either negligible or much less important than the other factors driving fixed-income markets in these countries. The explanation for this is partly that the improvement in fiscal accounts has been uneven across the EU and, on balance, not as significant as in the United States. It also reflects, to a large degree, simply the fact that the euro area does not yet rely on securities markets for corporate finance to the same extent as the United States does. As a result, euro-area corporate finance is not as dependent on government securities markets—in the sense of filling the roles discussed in the second section of this chapter—as has been the case in the United States.

Increased Need for a Benchmark Yield Curve and Competition for Benchmark Status

European private debt securities outstanding, issued in domestic markets and in the international markets (mainly London), have grown significantly since the introduction of the euro, from €3.95 trillion at end-1998 to nearly €5.70 trillion in 2000.[28] Nevertheless, they are still smaller than private debt securities markets in the United States. At end-2000, corporate bonds and commercial paper in the United States totaled about $7.0 trillion (about €7.5 trillion).[29] Moreover, U.S. debt securities markets have historically been a viable source of funds for a wide range of (larger) firms, both from the United States and from other countries. This has not historically been the case in most other advanced economies—issuance in most domestic markets outside the United States overwhelmingly has been by domestic financial institutions. Private debt securities have been much more actively traded in the United States than in euro-area countries, where traditionally buy-and-hold investors (e.g., insurance companies) have held private debt securities for long periods of time. The United States also has larger and more active markets for mortgage-backed securities, which—in addition to debt securities issued by the Government-Sponsored Enterprises (GSEs)—totaled

[28]These figures refer to outstanding amounts of private debt securities issued by private financial and nonfinancial institutions from the EU-15 countries. The source is the Bank for International Settlements. The 2000 figure is for September. The EU-15 figure includes Pfandbriefe securities issued by German financial institutions.
[29]Figures for the United States are from United States, Board of Governors of the Federal Reserve (2001).

another $4.1 trillion at end-2000 (€4.4 trillion). Active markets for mortgage-backed securities have only much more recently begun to develop in some euro-area countries, notably Germany. As euro-area private debt securities markets grow in importance for European finance, so too will the need for reliable benchmarks for pricing private fixed-income instruments and for a fuller range of financial instruments (including government securities) for hedging interest rate risk and managing liquidity and trading positions in securities markets.

Market liquidity and trading activity are both usually strongly correlated with the outstanding stock of securities traded in the market. Size breeds liquidity and liquidity is a critical determinant of benchmarks in fixed-income markets. As a result, market and issue size are key elements to attaining benchmark status. Euro-area sovereign bonds with issue sizes of more than €5 billion are eligible for trading on Euro-MTS, the pan-European trading platform. Countries such as Ireland, Spain, and the Netherlands, which have tended to have smaller issue sizes, have in some instances transformed their debt structure into a comparatively small number of benchmark issues and/or instituted exchange programs where they substitute "benchmark" bonds for relatively illiquid securities.[30] Smaller countries such as Portugal are also striving to issue in magnitudes that qualify for the Euro-MTS system, and are therefore more liquid and thus lead to lower-cost public debt.

Competition for benchmark status in the euro area has also been reflected in the implementation by countries of measures to boost liquidity in secondary markets for their securities. In France, Germany, and Italy, authorities have promoted electronic trading platforms and derivatives exchanges. In France and Italy, authorities also have established official repo windows and/or treasury reopening facilities in order to limit the potential for secondary market squeezes. Germany, France, and other countries have established or will soon establish official debt management agencies to help manage all these processes.

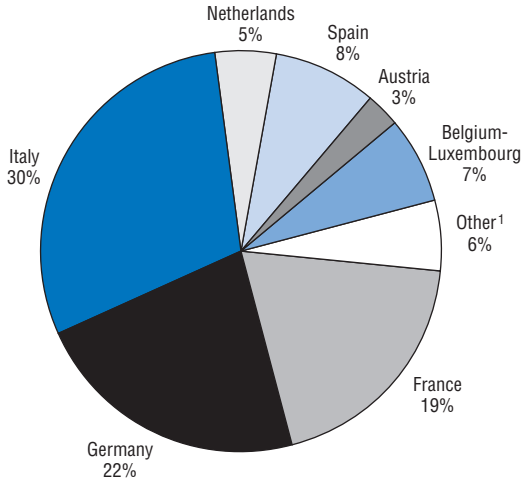
The Emergence of Three Liquidity Pools: France, Germany, and Italy

In European government securities markets, market liquidity is concentrated in the debt instruments issued by the three largest issuers—France, Germany, and Italy. Debt issued by these three countries accounts for almost three-fourths of all euro-denominated public debt (Figure 4.3). The securities issued by these governments have emerged as the benchmarks in certain segments of the euro-area yield curve. However, because of their relatively small size compared to overall euro financial market activity (private and public), no one of these separate pools of liquidity (markets) can by itself fulfill all pricing, hedging, investment, collateral, and liquidity needs in the way in which the U.S. treasury market has served for dollar-based transactions. It also remains to be seen whether one vehicle will become the preferred safe haven if a European-wide liquidity or credit crisis occurs—particularly if European finance moves more in the direction of European-wide, market-oriented finance and away from bank-intermediated finance.

Extensive discussions with market participants in March 2001 indicated that the investor base for euro-area government securities views the French, German, and Italian market segments as three distinct "habitats" for managing financial positions and risks. First, market participants that want to trade and hedge long-term interest rate risk rely on the German market, because the 10-year bund has firmly established itself as the long-term benchmark for the euro area. Its benchmark status partly reflects the very large issue sizes—more than €10 billion, and as much as €20 billion for one recent issue. German bonds are, together with U.S. treasury bonds, among the most actively traded fixed-income instruments in the world, and the bund futures contract traded on Eurex is used widely for trading

[30]See Santillán, Bayle, and Thygesen (2000).

Figure 4.3. Euro-Area Members' Domestic Public Debt
(As a percentage of total euro-area public debt at December 2000)



Source: BIS.
[1]Finland, Greece, Ireland, and Portugal.

and hedging long-term euro-denominated interest rate risk.

Second, those investors that want to trade and hedge shorter-term euro-denominated interest rate risk rely heavily on the French market, which is the benchmark for shorter maturities. This reflects the French authorities' proactive approach to encouraging the development of active money markets in France. By comparison, Germany is seen as having been less proactive in encouraging money markets out of concern that it could impair the implementation of monetary policy. The French authorities' approach was embodied in a series of reforms in 1993–94 that clarified the legal and regulatory framework for repos and established primary dealerships in repos. French money markets now include one of the euro area's deepest and most liquid repo markets.[31]

Third, market participants that want to trade cross-country interest rate spreads rely heavily on the Italian market. The development of the Italian government securities markets was boosted by the creation in 1988 of a legislative and operational framework aimed at producing a deep and liquid market. This framework covers aspects of official participation—for example, Italy's Treasury participates in the repo market to offer bonds that might be at risk of a squeeze. It also covers aspects of the market structure, which includes primary dealers, specialists, and market-makers. Italy's well-developed electronic secondary markets, namely the MTS system and Euro-MTS systems, are another important part of the framework.

Challenges in Developing a European-Wide Secondary Market for Euro-Denominated Government Securities

The main challenges in developing a European-wide market for pricing and trading euro-denominated government securities are associated with reducing market segmentation and eliminating the fragmentation of euro liquidity

[31]See Deutsche Bank (2000).

within these still separate markets. The benefits of doing so include capturing the potential benefits of having a deep and liquid European market for government securities and the associated efficiency and financial stability gains discussed below. This section first discusses the sources and consequences of fragmentation and then considers options and recent initiatives for reducing it.

Sources of Fragmentation

There appear to be at least three sources of fragmentation in euro-area government securities markets. First, these markets are fragmented because there are 12 separate issuers. That is, there are 12 separate primary markets for government securities, and hence 12 different credit risks. These credit risks are highly similar across the major countries, as evident in their credit ratings (Table 4.2) and their relatively tight and stable intercountry spreads (which also reflect the relative liquidity of different issues)—see Figure 4.1. Credit quality is not perfectly correlated across countries, however, and market participants are sensitive to changes in the relative creditworthiness of euro-area governments. The segmentation of credit risk is also a matter of international law. Article 103 of the EU Treaty—the so-called "no bailout" clause—states that each EU member is responsible for its own debt and prohibits member states from being liable for, or assuming, the obligations of other member states.

A second source of fragmentation is national competition—rather than coordination and cooperation—among these separate issuers to capture market shares and thereby achieve benchmark status. By definition, the benchmark issuer can borrow at the cheapest rate available in the particular market segment and maturity. In order to capitalize on this cost advantage and other potential advantages, euro-area governments are competing aggressively to establish their government debt as the euro-area benchmark. Competition for benchmark status is manifested in the push by euro-area governments to boost secondary market liquidity in their issues and concentrate issuance at key points on the yield curve. According to market participants, this competition is providing some benefits, as governments are trying to make it easier for market participants throughout the euro area and, more generally internationally, to access their markets and use their securities in the various roles that government securities are potentially capable of playing. As a result of competition, some benchmark bonds in some maturities are easily traded from anywhere in the euro area—if not internationally. Moreover, there is an active, although not necessarily efficient, market in cross-market arbitrage and trading. Competition also has improved the primary markets because it has led euro-area treasuries and finance ministries to increase the transparency and predictability of their debt-management strategies—for example, by establishing strict issuance calendars and by announcing the maturities and amounts of issuance well in advance.

Third, there are various structural sources of market segmentation. These include differences across countries in legal traditions, issuance procedures and calendars, primary dealer systems, market conventions, and the market infrastructure (Table 4.3). Whereas the unsecured euro-

Table 4.2. Sovereign Credit Ratings for Selected Countries

	Foreign Currency	Local Currency
	Moody's/S&P	Moody's/S&P
Euro Area		
Austria	Aaa/AAA	Aaa/AAA
Belgium	Aa1/AA+	Aa1/AA+
Finland	Aaa/AA+	Aaa/AA+
France	Aaa/AAA	Aaa/AAA
Germany	Aaa/AAA	Aaa/AAA
Greece	A2/A–	A2/A–
Ireland	Aaa/AA+	Aaa/AA+
Italy	Aa3/AA	Aa3/AA
Luxembourg	Aaa/AAA	NR/AAA
Netherlands	Aaa/AAA	Aaa/AAA
Portugal	Aa2/AA	Aa2/AA
Spain	Aa2/AA+	Aa2/AA+
Japan	Aa1/AA+	Aa1/AA+
North America		
Canada	Aa1/AA+	Aa1/AAA
United States	Aaa/AAA	Aaa/AAA

Sources: Moody's Investors Service; and Standard & Poor's.

Table 4.3. Public Debt Issuance Procedures in Selected Euro-Area Countries

	Auction Types	Participants	Frequency
Austria	Bonds are issued via auction. Issuance calendar is announced at year-end of the previous year. The maturity of a new issue is announced one week ahead and the amount one banking day prior to the auction (Reuters pages OEKB02).	Nine Austrian and 18 foreign banks are obliged to participate in the auction.	5-year to 10-year RAGBs (Republic of Austria Government Bonds) are usually issued every six weeks (on a Tuesday), except in the month of August. The typical monthly size is €1 billion.
Belgium	Bonds are issued via auctions and noncompetitive (primary dealer) auctions. New OLOs (obligations linéaire) can be issued via syndication. Before January 1 and July 1 of each year, an issuance schedule is published for the coming half-year. The auction details are announced one week ahead (Reuters page BELG and BELE).	Open to primary dealers and recognized dealers.	OLOs are issued within three time bands: up to 5 years; 6–10 years; and 11–30 years, on a monthly basis, generally on the last Monday of the month. Typical size is about €1.5 billion a month.
France	Bonds are issued through a bid-price auction system. A detailed and complete auction calendar is published annually for OATs (Obligation assimilable du trésor) and semi-annually for BTANs (Bons du trésor à taux fixe et intérêt annuel). Individual auction details are announced at the last two trading days prior to an auction (Reuters pages ADJUBTAN and ADJUOAT).	Open auction via primary dealers-SVT (Spécialites en valeur du trésor).	2-year and/or 5-year BTANs are issued on the third Thursday of every month. Average size is €3–3.5 billion a month. 10-year and 30-year OATs are issued on the first Thursday of every month. A 10-year OAT is issued at every auction; other maturities are issued according to market demand. Average auction size is €3–3.5 billion a month.
Germany	Bonds are issued through competitive auction via the Bund Issues Auction Group (BIAG) and partly by tap. An issuance calendar (nonbinding) is published on a quarterly basis in the last 10 days of the month preceding the start of the next quarter (Reuters page ESZB/BBK01). Auction details are announced a week in advance (Reuters pages ESZB/BBK02).	BIAG, but anyone can purchase securities via a credit institution in the BIAG.	5-year bobls are issued at three-month intervals in the second or third ten days of the month (on Wednesdays) starting in February. Typical size is €7 billion. New 10-year/30-year bunds are issued at irregular intervals, although usually every January and July. Typically, €5–10 billion is issued each auction, up to a total issue size of €15 billion.[1]
Italy	Bonds are issued by uniform price auction. The Finance Ministry publishes the auction schedule one year in advance. There is also a more detailed quarterly announcement of the type of bonds and their maturities. Auction details are announced three days ahead (Reuters pages DGTA, TESA, BITX, and BITY).	Open to eligible primary dealers.	18/24-month CTZs (zero-coupon bonds) are auctioned twice a month. Typical size is €4 billion a month. 3- and 5-year BTPs (Buoni del tresoro poliennali) are normally issued twice a month. Typical size is €4 per billion a month. 10-year and 30-year BTPs are normally issued once a month. Average size is €3 billion. 7-year CCTs (Certificati di credito del tresoro) are issued at month-end. Average size is €2 billion.
Netherlands	Tap issuance is typical although there are a limited number of Dutch style auctions. Auction details are announced on the prior Friday on Reuters page DSTAMENU. A number of bond conversions of illiquid bonds into benchmark issues are likely.	Via 13 primary dealers (and stock exchange members, if desired).	Issuance will concentrate on 3-year, 10-year, and 30-year maturities. Auctions are held in August. Bonds will be reopened regularly and the target volume is expected to be around €2–2.5 billion a month. Benchmark issues will have a minimum volume of €10 billion.
Spain	Bonds are issued through competitive auction in two rounds of bidding. An annual issuance calendar is published. Details of the auction are available on Reuters page BANCN.	Open to financial institutions (primary dealers) and nonprivate investors.	3-year, 5-year, 10-year, and 15-year SPGBs (Spanish Government Bonds) are auctioned monthly; 30-year SPGBs are auctioned on a bimonthly basis. 5-year and 15-year securities are auctioned on the first Wednesday, and 3-year, 10-year, and 30-year securities are auctioned on the first Thursday of the month. Average size is €1.5–2.5 a month.

Source: Deutsche Bank.

[1]A portion of the issue amount is invariably set aside for market management operations. The Bundesbank gradually sells the amounts concerned through the stock exchanges. It can also increase the size of new bonds via small taps during the year.

area money market is supported by the smoothly-functioning TARGET payments system, repo and securities markets rely on a fragmented network of 14 national and cross-border securities settlement systems (SSSs) and a patchwork of legal and regulatory requirements.[32] Cross-border securities transactions often involve systems that have incompatible settlement lags or are linked only indirectly.[33] Industry groups and official institutions have also highlighted a number of shortcomings in the European legal environment for collateral.[34] These include uncertainty about conflict of law questions and cumbersome rules surrounding the implementation of pledge collateral arrangements.[35]

Market rules and practices also limit fungibility by limiting the set of securities that can be (for example) used as collateral or delivered into futures contracts. Attempts to establish "multi-deliverable" futures contracts for which the short position holder can deliver securities issued by different governments have been unsuccessful, partly because of technical problems. (The lowest-credit-quality bond always ends up being the cheapest to deliver, and thus the contract in effect becomes a single-issue futures.) In addition, non-uniform tax treatment of euro-area government securities complicates cross-market transactions and hedging. Finally, repo markets also lack standard documentation, raising the possibility of documentation mismatches in cross-border transactions.

Financial Market Consequences of Fragmentation

Fragmentation appears to have three main financial market consequences.[36] First, because the benchmark yield curve is segmented—German bunds at the long end and French government securities at the short end of the yield curve—liquidity at specific maturities is reduced relative to what it would be with a unified market. The effective supply of liquid benchmark government bonds at (say) the 10-year maturity is not the sum of 10-year issues by all governments. This is because there is only one benchmark issuer and securities of other issuers are not fully fungible with it. The effective supply at some benchmark maturities is limited enough that even in the German government securities market, fragmentation of liquidity has been associated with adverse market events such as squeezes (Box 4.5).

Second, segmentation of the benchmark may be impairing the ability of euro-area government securities to perform the roles discussed in the second section of this chapter. Of course, private alternatives such as swaps can play some of the roles discussed in that section. As noted above, however, even in the comparatively well developed U.S. dollar private securities markets, private financial instruments are not perfect substitutes for government securities and government securities markets in some roles. A key question is whether segmentation of euro-area government securities markets is affecting the efficiency and cost of private financial activities. At a general level, market participants report that the fragmented legal and operational infrastructure for euro-area securities markets (including repo and derivatives markets, and collateral) may be significant enough that some deals in fixed-income and repo markets—arbitrage, position-taking, hedging, and other risk-mitigation trades—that would get done in a more integrated system are not being done in the current system.[37] An important specific cost

[32]Santillán, Bayle, and Thygesen (2000) discuss barriers to integration of euro-area repo and securities markets.

[33]For this reason, some investors use international securities depositories such as Clearstream or Euroclear to put their holdings in one place.

[34]See ISDA (2000a). See also European Commission (2001).

[35]These shortcomings impinge on efficient and effective collateralization of other transactions—particularly OTC derivatives transactions (see Schinasi and others, 2000).

[36]There also may be nonfinancial market costs and benefits of segmentation. For instance, reduced liquidity may result in higher fiscal costs of government debt.

[37]For a discussion of the different legal traditions regarding collateral, see European Commission (2001).

Box 4.5. Squeezes in German Government Securities Markets

German government bonds are the de facto benchmark for euro-area government securities at the long end of the yield curve (especially in the 10-year segment). Nevertheless, even at benchmark maturities of the German government yield curve, difficulties have occasionally emerged. One such instance was a squeeze that occurred in March 2001.[1]

The benchmark role of German government bonds fueled the growth of the associated futures market as a cost-effective risk management vehicle throughout the euro area. Frequently, notional amounts of outstanding futures contracts, however, exceed the amount of underlying bonds outstanding in the cash market, providing ideal conditions for a squeeze. For example, prior to the expiration of the March 2001 Bundesobligationen ("bobl") futures contract, open interest exceeded €79 billion, compared with €43.1 billion of "eligible" or "deliverable" underlying securities.[2] Market participants claim that under such conditions, limited transparency in the cash market due to fragmented trading platforms makes it relatively easy for a few large market makers with superior knowledge of order flows to engineer market squeezes, reducing the efficiency of German government bond, derivatives, and repo markets.

A large squeeze involving the bobl futures occurred prior to the expiration of the March 2001 contract. A large market-maker allegedly used its informational advantage to acquire a large proportion of the free float of securities eligible for delivery under the contract.[3] To avoid stiff penalties imposed by the exchange, Eurex, market participants with delivery obligations from short positions scrambled to borrow deliverable bobls to meet their settlement obligations, resulting in a significant premium on the eligible bonds in the repo market.[4] Whereas the repo rate for similar bonds that were ineligible to be delivered under the futures contract was around 4.8 percent, the repo rate for eligible bonds was close to zero—meaning that holders of eligible bonds could borrow cash at a zero interest rate in the repo market by providing the bonds as collateral.

Further squeezes near the expiration of future contracts remain possible. The small size of the cheapest-to-deliver (CTD) bond for the September 2001 contract (€7.1 billion) has already prompted some traders to roll some of their exposure forward into the December contract (see the table). However, currently only one bond (compared to five in the March contract) with an outstanding volume of €15 billion is eligible for delivery for the December contract—though the issuance of an additional eligible security in August will raise that amount somewhat. Concerns about future squeezes have spawned competition to the Eurex futures contracts. The London International Financial Futures and Options Exchange (LIFFE) launched a similar futures contract (based on the interest rate swap curve) that is not subject to squeezes because it is settled in cash. Within the first two months, open interest for the five-year, June 2001 contract reached about six percent of open interest on the comparable bobl futures contract.

In addition to the informational advantages of large market participants and the small issue size of many of the underlying bonds relative to notional amounts of futures contracts, three other factors may make German government bond markets and related derivatives and repo

[1]Other squeezes occurred in 1994, September 1998, and June 1999.

[2]A delivery obligation arising out of a short position in a euro-bobl futures contract may only be satisfied by the delivery of specific debt securities—namely, German federal bonds (Bundesanleihen) and German federal debt obligations (Bundesobligationen)—with a remaining term upon delivery of 4½ to 5½ years. The debt securities must have a minimum issue amount of €2 billion.

[3]The "free float" of a security is the portion of the issue size that is not held by buy-and-hold investors and circulates freely in the market.

[4]Eurex demands a fine of €400 per contract (contract size of €100,000) on each day during which delivery obligations are not met, plus penalty interest of 6.25 percent on the outstanding amount.

Bonds Deliverable Into Eurex Bobl Futures Contracts
(In billions of euros)

Security (Coupon Rate, Maturity Date)	Deliverable into June 2001	Deliverable into September 2001	Deliverable into December 2001
Bund (6 percent, January 2006)	12.7	no	no
Bund (6 percent, February 2006)	6.1	no	no
Bobl (5 percent, February 2006)	7.0	no	no
Bund (6.25 percent, April 2006)	7.1	7.1	no
Bobl (to be issued August 2001)	no	n.a.	n.a.
Bund (6 percent, January 2007)	no	15.3	15.3
Bund (6 percent, July 2007)	no	no	no
Total	32.9	22.4	15.3
Memorandum items:			
Open interest (5/15/01)			
Eurex bobl contract	45.4	1.9	1.4
LIFFE 5-year Swapnote	3.0	0.0	0.0

Sources: Eurex; LIFFE; and UBS Warburg.

markets prone to squeezes. First, settlement procedures in the cash and repo markets for German government bonds are not conducive to arbitrage between futures and cash markets, which would make squeezes less likely.[5] For example, differences in the delivery time (as long as T+5 days in the cash market compared with T+2 in the futures market) and small penalties for failure to deliver in the cash/repo market compared to the stiff penalties in the futures market hinder effective arbitrage. It is too early to judge whether efforts by Eurex to introduce both cash bond trading and repo trading will attract enough traders to alleviate this problem.

Second, the basket of securities eligible to be delivered under German bond futures contracts does not reflect the international use of the contract and may be too small—there is a lack of fungibility among different bond issuers. If a larger set of securities was eligible to satisfy delivery obligations, it would be far more difficult to initiate squeezes. Rather than expanding the set of eligible securities for delivery under bobl and bund futures contracts, Eurex, which is partly owned by the large market-makers, narrowed the basket of eligible securities for the bobl contract in June 2000 from maturities between 3½ to 5 years to maturities between 4½ to 5½ years of exclusively German bonds.

Finally, squeezes in the most liquid benchmark issues of the euro area could be averted if, for instance, the German government could increase the supply of eligible securities. The Bundesbank does, in fact, provide liquidity in the secondary market for German government securities, but it is restricted by limits set by the European System of Central Banks. These limits may adversely affect the ability of the Bundesbank to use repos to increase the supply of eligible securities to avert squeezes. The Ministry of Finance could also reopen issues of eligible securities. Short of "reopenings" in response to squeezes, the German authorities have recently increased issue sizes on a five-year bobl and on 10-year bunds. If this increase in issue

[5]If the arbitrage mechanism between cash and derivatives markets functions well, squeezes in the deliverable bonds are less likely, because the repo market would provide sufficient liquidity to borrow the deliverable bonds. Although arbitrage opportunities occasionally exist between the futures and cash markets, market participants are reluctant to engage in these activities due to inefficiencies in the repo and cash market. For example, according to market participants, immediately prior to expiration of the March futures contract, the difference between the futures price and the implied forward price of the CTD bond (the "basis") was negative 37 cents, whereas it should have been zero.

Box 4.5 *(concluded)*

size became permanent, some of the imbalance between cash and futures markets might be alleviated. Merely introducing the possibility of reopening issues when squeezes emerge could help to discourage them.

To summarize, the chance of market squeezes in the German government bond market might be reduced by continuing the recent policy of large issue sizes; enforcing stricter settlement and delivery regulations in the cash and repo markets; reopening an issue when a squeeze is likely; increasing the basket of deliverable bonds; and introducing cash settlement of futures contracts.[6] In addition, reporting of trades as either opening or closing trades would improve market transparency and allow market participants to better assess the probability of a squeeze. Finally, a large position reporting system could further mitigate the potential for future squeezes.

[6]Rather than extending the maturity spectrum of deliverable German bonds, the basket of deliverable bonds could include government bonds of other European issuers, although differences in perceived credit quality might limit the uncertainty as to which bond will be cheapest to deliver at maturity.

of fragmentation is that it impairs the efficient use of government securities as collateral (particularly in repo transactions).[38] Partly as a result of these problems, European government securities accounted for only about 5 percent of collateral in use among global market participants at end-1999, while U.S. treasury and agency securities accounted for about 40 percent of collateral.[39] Finally, fragmentation also may raise the cost of cross-market transactions and hedging.

The third main consequence of segmentation is that it could impair financial stability relative to what it could be with more unified secondary markets, clearing and settlement systems, and supporting repo and derivatives markets. Less segmentation appears to have both costs and benefits for financial stability. The costs derive from the fact that closer integration makes national financial markets more responsive to shocks that originate in other euro-area markets. Thus, in a more unified government securities market, an economic or financial shock that affects pricing and trading activity in one market segment could more easily translate into changes in prices and trading activity in other countries within the euro zone. This suggests that local financial institutions may be exposed to a broader range of shocks that will need to be managed to preserve financial stability. The financial stability benefits derive from the fact that risks are diversified when they are pooled and, as outlined above, from the more efficient market infrastructure—greater liquidity in both cash and supporting repo and derivative markets, and seamless clearance and settlement for all euro-area government securities transactions. Although it is difficult to measure accurately these costs and benefits, the main question is similar to the other market integration questions. The balance of opinion is that there are net benefits, including for financial stability, of closer financial market integration.

Options for Reducing Fragmentation

There are a number of steps that could be taken to reduce fragmentation of euro-area government securities markets.[40] In particular, as

[38]See European Commission (1999).

[39]See ISDA (2000b).

[40]The following discussion draws on IMF staff discussions with market participants and official institutions, and published reports. See, in particular, the report by the Giovannini Group (2000) for a thorough discussion of approaches to reducing fragmentation. The report apparently gained little support among debt managers, who sought action to improve repo markets and settlement systems.

noted above, there is presently little coordination among member countries about the dates and the frequency with which they issue new government securities (see Table 4.1). Accordingly, euro-area governments could better coordinate debt issuance techniques, features of government securities, trading systems, and surrounding markets. More specific possibilities in this regard include uniform calendars for issuance, common coupon and maturity dates, a single primary dealership system, unified legal treatment of collateral, and a shared real-time clearing and settlement system.

Another, more radical option that has been suggested[41] would be to reduce the differences in credit risk among countries—either through cross-guarantees among member states or through the establishment of a single debt-issuing authority. This would create a more uniform set of securities and would probably result in relatively more liquid markets. The same argument could, of course, be applied to any heterogeneous group of securities issuers. As a result, this would be a radical method for creating more liquid markets, since a main role of securities markets is arguably to differentiate among different credit risks and price the instruments accordingly. Another argument against this proposal is that, as a practical matter, there may be little incentive for larger, more creditworthy countries to participate, particularly if it would be difficult for them to monitor and discipline other borrowing countries.

Moreover, this more radical option presents political and legal obstacles that might be insurmountable. At a technical level, the creation of a unified debt obligation would require amending Article 103 of the EU Treaty; the structure of the joint guarantee would need to be made clear and defined in such a way as to not violate covenants in existing bond prospectuses and loan agreements; and the institutional arrangements for issuance of the instrument would need to be carefully designed and set up. Finally, in order to maintain uniformity of the issues over time, the set of participating issuers would need to remain constant over time, which might complicate the admittance of new participants into the euro area.

Recent Proposals and Initiatives for Reducing Fragmentation

European authorities and market participants are increasingly aware of these problems. In a 1999 report, the Giovannini Group identified a number of challenges to the integration of European repo markets, including fragmented market infrastructures, differences in relevant laws, and inconsistencies in market practices across countries.[42] The EC's Brouhns Group has discussed and reported on issues and progress in the integration and harmonization of European government securities markets.[43] For example, recent reports by the Brouhns Group document issuing procedures and calendars, characteristics of government bond instruments, and primary dealership structures in EU public debt markets, and note key similarities and differences across countries. Industry groups such as the International Swaps and Derivatives Association (ISDA) have highlighted relevant documentation and legal issues for the use of securities as collateral and in repo arrangements.

Key regulatory and legal obstacles to harmonized securities markets are being addressed by the EU Commission's Financial Services Action Plan, which was adopted in May 1999. The Action Plan, to be implemented in 2005, includes more than 40 initiatives and pursues, among other things, the objectives of creating a single market for wholesale financial services by advancing a common legal framework for inte-

[41]The Giovannini Group (2000).

[42]See the Giovannini Group (1999). The group, chaired by Alberto Giovannini, is comprised of market participants and advises the European Commission on financial market issues.

[43]The "Brouhns Group" (formally entitled the European Commission Economic and Financial Committee Group on EU Government Bills and Bonds) is comprised of public debt managers from the 15 EU member states and representatives of the EC and the ECB.

grated securities markets and eliminating tax obstacles to financial market integration, particularly tax distortions on cross-border financial transactions.

In March 2001, as part of the Action Plan, the Commission issued a draft Directive on the Cross-Border Use of Collateral that would provide legal certainty for cross-border collateralized transactions. The directive would create a pan-European legal framework for the use of collateral to avoid potential conflicts between jurisdictions. The new EU regime would also ensure priority of collateral arrangements in the case of bankruptcy and would clarify which jurisdiction's law would apply for book-entry securities, whose location is difficult to determine. Collateral-takers would explicitly be permitted to reuse collateral for their own purposes under pledge structures. The directive also would simplify so-called perfection requirements that collateral-takers must comply with to ensure their rights to the collateral.

The European Commission is also in the process of revising the 1993 Investment Services Directive (ISD). In November 2000, it issued consultative proposals for upgrading the ISD that, among other things, were aimed at improving the regulatory framework for the trading infrastructure.[44] It is widely being recognized that the ISD provisions for "regulated markets" have become outdated in light of new trading techniques, such as electronic trading, and pressures for consolidation of trading, clearing, and settlement functions.

To accelerate the implementation of the Action Plan and, more generally, to speed up decision making on EU securities regulation, the Lamfalussy Report (see Chapter II)[45] proposed a new four-level process that would separate political from technical decisions. If the report's proposals were enacted, draft directives would be implemented faster and more consistently across member countries. The report also urged that clearing and settlement systems in Europe should be consolidated, but it viewed this process as mostly driven by private market forces. Nonetheless, the Lamfalussy Committee saw some scope for public policy, primarily to ensure open and non-discriminatory access, to rule out exclusivity agreements, and possibly to supervise clearing and settlement systems according to common European standards.

Despite these recent initiatives and considerable discussion of the issues, there has been limited progress in reducing sources of fragmentation of euro-area government securities markets, and the consensus in Europe is that the outlook for progress is also limited. For instance, legal counsel at major European financial institutions emphasize the difficulty of changing the national legal traditions. As a result, market participants have begun to seek to address these problems through less onerous approaches, such as devising common standards for cross-border repos in the form of master agreements. In addition, the ECB has convened a European Financial Markets Lawyers Group that is examining these and related issues in European securities law.

In summary, increased integration of European government securities markets faces various structural impediments that have resulted in slow progress. First, there are limited incentives for national governments that currently have benchmark status to cooperate in issuance and share the benefits of that status more broadly. Broadening the set of credits underlying the benchmark security to include lower-rated countries could reduce the perceived credit quality of the instrument and increase financing costs for the current benchmark issuers. Second, as noted above, cooperative arrangements that involved joint guarantees of debt would be problematic for a number of reasons—including that they would require amendments to the EU Treaty. The consensus seems to be that such amendments would take considerable time to put in place. Finally, there are few incentives at

[44]European Commission (2000).

[45]See Committee of Wise Men (2001).

the national level to address the fragmented clearing and settlement infrastructure for securities markets by allowing mergers, improving linkages, and increasing the compatibility among systems—particularly as these systems are often owned by or part of domestic securities exchanges.

Japan: Market Infrastructure and Expanding Government Debt Supply

Japan presently has the second largest government securities market in the world. The prospects for continued large fiscal deficits in Japan suggest that this market and the domestic appetite for absorbing Japanese government securities issuance may face important challenges. Although a growing JGB market and a shrinking U.S. treasury market might present an opportunity for JGBs to take on much greater significance in international financial markets, this prospect may be limited for now. The JGB market's infrastructure has well-recognized weaknesses, and a key policy challenge is to improve the market infrastructure so that the absorption of government debt will be less daunting. This section identifies some of the most important and recognized weaknesses in the JGB market, what the authorities are presently doing about them, and remaining challenges.

Recent Structural Changes and Issues

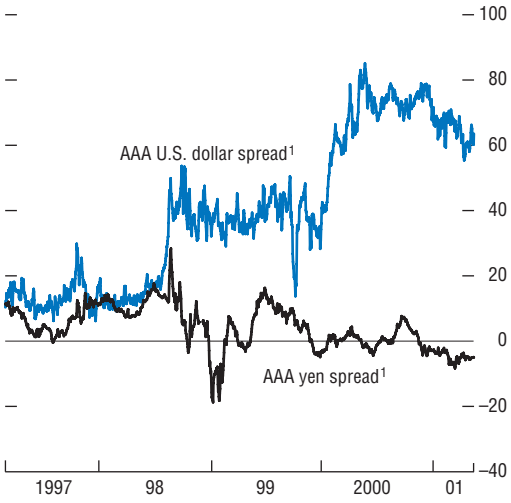
Rapidly Growing Debt Supply and Official Efforts to Manage Its Impact

In contrast to other advanced economies, the volume of government debt in Japan is expanding rapidly relative to GDP. The IMF's *World Economic Outlook* projects that government debt in Japan will continue to rise over the 2000–05 period. In particular, with the fiscal balance expected to remain in significant deficit over the next five years, the stock of Japanese government net debt is projected to rise by 50 percent in nominal terms and by about 16 percentage points as a share of GDP to about 60 percent by 2006. *Gross* debt is projected to rise from 130 percent of GDP in 2000 to 150 percent of GDP by 2005.

The growing supply of JGBs—and attendant market concerns about how smoothly the market can continue to absorb such supply—has had several noticeable effects on the market. For example, in an environment of near-zero short-term interest rates and long-term interest rates of below 2 percent, growing JGB supply appears to be contributing to market volatility (see Figure 4.2). This may partly reflect concerns about how smoothly the market can absorb further increases in supply or shifts in demand—bond prices are more sensitive to changes in interest rates when interest rates are low. In this connection, past bouts of volatility in the JGB market illustrate why the market is perceived as driven by technical supply and demand factors rather than fundamental factors.[46] In late 1998, a strong increase in demand for JGBs drove yields on 10-year issues from about 160 basis points at end-June to about 80 basis points in mid-November, amid repatriation of funds and heightened concerns about the domestic economic situation and problems in the banking system. Subsequent concerns that expansionary fiscal policy would strongly boost the supply of JGBs and that purchases in the market by the Trust Fund Bureau might be cut back sharply contributed to a sharp rebound in JGB yields, which reached about 225 basis points in December. Later, suggestions (and in February 1999, official confirmation) that the Trust Fund Bureau would continue to buy JGBs, combined with injections of public capital into the major banks, a reduction in the amount of 10-year JGB issuance from ¥1.8 trillion per month to ¥1.4 trillion per month, and an improvement in auction transparency owing to the release of the auction schedule, contributed to a subsequent decline in yields and volatility. This episode remains fresh in the minds of many market participants, particularly in light of the pickup in supply of JGBs and

[46]See IMF (1999), Chapter II, p. 23.

Figure 4.4. Japan and United States: Euromarket Spreads over Government Bonds
(In basis points)



Source: Bloomberg Financial Markets L.P.

[1]The U.S. dollar AAA-rated bond is issued by the International Bank for Reconstruction and Development (World Bank) and the yen AAA-rated bond is issued by the European Investment Bank (EIB). Calculated as a five-day moving average.

continued strong purchases by Japanese banks in the recent period (see Chapter II).

In addition, large JGB issuance seems to have compressed spreads of corporate bonds relative to JGBs, as Japanese corporate bond yields have declined by more than JGB yields (see Chapter II). This compression can be attributed to two factors. First, lingering economic and financial imbalances in Japan together have caused private financial market activity to stagnate. As a result, corporate bonds have become relatively scarce, especially high-quality bonds. Second, investor appetite for credit spreads has increased under low interest rates. Third, the perceived credit quality of the Japanese government has deteriorated relative to other high-rated issuers of yen-denominated bonds. For example, whereas a highly rated euro-dollar bond tends to yield 15–30 basis points more than the corresponding U.S. treasury, top-rated euro-yen bonds frequently yield less than the corresponding JGB (Figure 4.4).

The Japanese authorities have recently taken a number of steps to mitigate the impact of rising JGB supply on pricing in the JGB market and help ensure smooth financing of future deficits. For example, the Ministry of Finance (MOF) has reduced issuance of long-maturity bonds relative to the supplies of short-maturity bonds, in order to diversify maturities. As a result, the average maturity of government debt issuance has shortened from 6.4 years in 1989 to around five years in 2000. Looking ahead, the lengthening of the average maturity of planned issuance in FY2001 to five years and four months may put upward pressure on longer-maturity JGB yields. Meanwhile, to enhance liquidity in five-year benchmark issues, four-year and six-year bonds have been discontinued from the current fiscal year. Several structural improvements to the JGB market also have been implemented in the past two years: the securities transaction tax was abolished in April 1999; coupon-bearing JGBs held by nonresidents were exempted from withholding tax under certain conditions starting September 1999 and further administrative changes were introduced in April

2001;[47] real-time gross settlement (RTGS) was introduced in January 2001;[48] and the Bank of Japan (BOJ) introduced procedures for JGB delivery failures in money market operations in May 2001.[49]

Lack of Foreign Investor Participation

Notwithstanding efforts of the Japanese authorities to address the shortcomings in the JGB market, foreign investor interest in the market remains muted. According to a range of market participants, this lack of interest reflects (in addition to the current very low yields) the costs and perceived risks associated with imperfections in the market's underlying financial infrastructure, and the perception that the JGB market is presently driven primarily by technical factors rather than fundamental economic factors. For example, in their formation of JGB yield expectations, analysts are heavily concerned with cash flows of major JGB investors—since that affects the flow demand for JGBs and the ability to absorb new issues—and comparatively little weight appears to be placed on economic fundamentals. Because it is difficult to understand many of these technical factors, when international investors want to increase their yen exposure (in order to avoid underperforming benchmark indices) they often prefer to build up positions in the offshore euro-yen market rather than the domestic JGB market. This has tended to limit liquidity in the domestic market, and probably has tended to raise JGB yields relative to other high-rated, yen-denominated bonds.

Accordingly, although increased debt issuance has resulted in a growing share of Japanese fixed-income instruments in global indices, international fixed-income investors have continued to hold underweighted positions in JGBs (relative to benchmark portfolio weights). Japan's weight in the Merrill Lynch Government Bond Index had risen steadily to 24 percent at end-March 2001; similarly, JGBs had a 27 percent weight in Salomon Smith Barney's World Government Bond Index. But despite these large and rising weights of JGBs in benchmark bond indices, foreign investors have reportedly been hesitant to raise their holdings to near benchmark weights. As a consequence, non-Japanese investors hold less than 6.5 percent of all JGBs—much lower than is the case for the corresponding government securities markets in the United States or the euro area (see Table 4.1).

Remaining Challenges in Creating an Effective, Deep, and Liquid JGB Market

Notwithstanding the efforts of the Japanese authorities to improve the infrastructure for the JGB markets, in the view of market participants (and, in some instances, also the authorities) a number of key shortcomings remain. These involve the withholding tax; the clearing and settlement infrastructure; the structure of issuance; and the repo market.

Remaining Shortcomings in the Infrastructure

It is well known in the markets and by the authorities (as discussed below) that the withholding tax fragmented the market and reduced JGB market liquidity. This is because, in the past, the desire to circumvent the withholding tax has led to the creation of a secondary market in which some entities subject to the withholding tax failed to reregister acquired JGBs under their

[47]There are entities other than nonresidents that are exempt from the withholding tax. For example, entities exempt from income taxes are also exempt from the withholding tax. Currently, the government withholds 20 percent of coupon payments on JGBs held by taxable entities. The withholding tax consists of 15 percent income tax and 5 percent local taxes. Profits on the sale of bonds are tax-exempt, while profits on the redemption of discount bonds are subject to 18 percent withholding tax at the source at issuance.

[48]Also in January 2001, the Japan Securities Dealers Association introduced a fail rule for JGB transactions among dealers.

[49]The Bank of Japan also disclosed which JGB issues it was holding, so that market participants could better gauge the size of the privately held stock of each issue.

own names in the official name registry.[50] Instead, they reportedly "borrowed" the names of tax-exempt investors by trading the "Letter of Transfer" (L/T—also known as the "name registration form" (NRF)), which normally instructs the BOJ to change the name of the owner of a security following a trade, but is kept blank to facilitate further trades.[51] The blank form could be treated as a bearer bond and was cleared and settled against cash (although not necessarily simultaneously), while leaving the JGBs registered in the original name.

Measures to circumvent the withholding tax have also introduced additional risks into trading and holding JGBs. First, they have introduced additional counterparty risk into some JGB trades. For instance, an insolvent name lender would still be recognized by the Bank of Japan as the official owner of the JGB, exposing the name borrower to credit risk. In addition, these practices have introduced delivery risk as NRFs cannot in practice be exchanged on a delivery-versus-payment basis. Second, foreign investors see the withholding tax as increasing market risk on JGBs, because foreign investors tend to sell one issue before the coupon payment and buy another whose coupon payment is further in the future. When shifting JGB holdings across issues, the investor is exposed to significant market and liquidity risk. As noted above, the authorities have introduced procedures that allow nonresident investors to obtain exemption from the tax. According to market participants, however, satisfying the conditions to maintain tax-exempt status in Japan is costly.[52]

There are also a number of remaining shortcomings in the clearing and settlement infrastructure. Many JGB transactions are settled on an RTGS basis, with settlement at T+3.[53] While some of these transactions in Japan are settled on a delivery versus payment (DVP) basis under RTGS, it is not unusual, according to market participants, for large clients to insist on confirming receipt of cash payment prior to releasing the bond in a given transaction. This apparent violation of the JGB settlement guideline set by the Japan Securities Dealers Association reduces some of the purported benefits of an RTGS system because it exposes the intermediary and the counterparty to credit risk and forces them to fund their position for the duration of the unsettled transaction (usually a few hours).

In addition, JGB transactions involving foreign central banks and primary offerings are still conducted on a non-RTGS basis (they are settled at 3 p.m. each day). As a result, all related transactions need to be completed in the few remaining hours of the day before the RTGS system shuts down at 6 p.m., causing concern among market participants that a dealer may not be able to deliver securities to a customer during this small window of time. However, settlement failures, despite being accepted among brokers, are frowned upon by some market participants, and proce-

[50]JGBs are either registered under the ultimate holder's name in the name registration system or are held by participating institutions for their clients in the book entry system of the Bank of Japan. See Ohashi and Milligan (1998). Since the implementation of the recent tax reforms, the vast majority of JGBs are held by participating institutions for their clients or for themselves in the book-entry system.

Interest on registered bonds held by financial institutions is not exempt from withholding tax if the calculation period begins during or after January 2001. Accordingly, it is now impossible to circumvent the withholding tax by trading NRFs.

[51]The L/T is an instruction issued (to the Bank of Japan) upon trade of a JGB to change the name of the owner of the security.

[52]According to the amended Special Taxation Measures Law, as of April 1, 2001, nonresidents of Japan or foreign (nonresident) corporations are exempt from withholding tax on interest payments on JGBs held with non-Japanese operations (branches or operational bases outside Japan) of foreign financial institutions under certain conditions. Foreign financial institutions must be approved as qualified foreign intermediaries (QFIs) by the National Tax Administration and as foreign indirect participants of the JGB book-entry system by the Bank of Japan before they take deposit of JGBs from nonresidents through their non-Japanese operations.

[53]For comparison, settlement occurs at T+1 (one day after execution of the trade) in the U.S. and U.K. government securities markets and T+3 (three days after the trade) in most euro-area government securities markets.

dures that apply to JGB settlement failures in JGB-related money market operations were only recently announced by the BOJ.[54] To avoid settlement failures, repo traders expecting a delivery at issuance or from a foreign central bank—typically involving large transactions—have been forced to wait until the delivery is made before they can sell that bond to a third party. This was viewed as a cause of JGB market illiquidity, often reflected in the premium the market placed on certain bonds in the market for repurchasing agreements. As market participants demanded the desired bonds, the premium on these bonds became large. In fact, according to dealers, on many occasions repo rates have become negative, so that lenders of bonds were paid to borrow cash against their bonds.

Adding to these problems, the JGB repo market is fragmented. Although Japanese markets have been gradually moving toward the international standard BMA/ISMA master agreement for repos, non-uniform tax treatment of investors and transactions has perpetuated three forms of repo markets in Japan: gensaki, for sale and repurchase of bonds; taishaku, for unsecured bond lending[55]; and genkin tampo tsuki taishaku, for bond lending using cash as collateral. In addition, some large holders of JGBs seemingly resist lending them out. Dealers see this as reflecting the lack of a "repo culture" among such investors.

As a result of the fragmentation and lack of development of the repo market, establishing short positions, and borrowing and lending government securities more generally, is not as seamless in Japan as in some other advanced government securities markets. Market participants suggest that segmentation of the JGB repo market has also contributed to an erosion of the arbitrage relationships between cash and futures markets. In a repo transaction, the borrower of cash typically pays a positive interest rate while lending a bond for collateral at the same time. In Japan, this relationship inverts quite regularly. For example, rumors that some public sector investors would not be executing repo transactions over the millennium changeover prompted the repo rate for the cheapest to deliver (CTD) bonds to decline even further than its already low level.[56] At one point, bondholders would be paid more than 2 percent interest for borrowing cash in return for lending their bonds. For some perspective, during the recent squeeze in the German government bond market (see Box 4.5), repo rates did not drop below zero (although prevailing short-term rates were also much higher in Germany than in Japan).

JGB market fragmentation also exists in the sense that there is often a very large number of different bond issues. For comparison, the issue size of a single tranche of a 10-year German bund typically amounts to around 5.8 percent of total issuance during the fiscal year. By contrast, the comparable figure in Japan is only 1.7 percent. Reflecting this, in May 2001 there were 76 different issues of JGBs with original maturities of 10 years. Of the many issues outstanding, among the most actively traded issues is the cheapest issue that can be delivered (the CTD bond) to settle JGB futures contracts. The relatively small issue size of the CTD bond when compared to open interest in the futures contract has led on occasion to significant distortions of the yield curve. For example, in June 1999 open interest in the futures market

[54]Settlement failures are allowed and are routine in most of the well-functioning clearance and settlement systems. Moreover, other central banks permit settlement failures of its counterparties: for example, the ECB sets guidelines for failures, with penalties for the first failure and exclusion from the panel of counterparties at the third failure. The BOJ recently announced procedures that apply to JGB settlement failures in JGB-related money market operations, including suspension of offers to the counterparty for a certain period.

[55]The taishaku market evolved as a way of circumventing the securities transaction tax that would be charged on gensaki transactions. Liquidity in this market is impeded by the inability to deliver a similar but different bond at maturity of the transaction, as is common in other repo transactions.

[56]See Shigemi and others (2001).

(¥15 trillion) exceeded the amount outstanding of the original CTD issue (¥8 trillion). As delivery failures in settlement for futures contracts are not recognized in Japan, market participants were keen to obtain the CTD bond to satisfy their obligation under the futures contract. The resulting sharp price increases of the original 10-year CTD bond caused a 20-year bond to become CTD, thus affecting the shape of the yield curve. In March 2001, reopenings were introduced, which will reduce the number of different issues of bonds. The authorities expect that this will improve JGB market liquidity.

Possible Steps to Improve Infrastructure and Increase Market Depth and Liquidity

Internationally active market participants have expressed skepticism about whether recent reforms to the withholding tax regime will reduce the actual and perceived costs of investing in JGBs. QFIs in Japan will need to shoulder the administrative burden and responsibility of identifying and maintaining individual account records of foreign investors.[57] Foreign investors or (on their behalf) QFIs are also still required to supply a "statement of the holding period" one day prior to each coupon payment for each JGB they own in order to satisfy exemption status, which maintains the administrative burden for obtaining the tax exemption. The current reform also aims to shut down the NRF market by subjecting *all* investors recorded in the name registration system to withholding tax on all coupon payments after June 20, 2001. It is unclear whether foreign investors selling their tax-exempt holdings in the NRF market prior to this date will see the recent reforms as sufficient to increase their participation in the regular book-entry JGB market.

The simplest approach to these problems would be to abolish the withholding tax. It has been suggested that the Japanese tax authorities may be reluctant to sacrifice tax fairness and the possibly higher total tax revenues associated with the withholding tax. At the same time, the withholding tax increases borrowing costs by fragmenting the investor base and reducing market liquidity. It is conceivable that, as has happened in many other countries, the savings in borrowing costs from abolishing the withholding tax would outweigh the loss of the revenue from the tax. Short of abolishing the withholding tax, steps to make it easier to obtain and maintain exemption could significantly increase the attractiveness of the domestic market to foreign investors and thereby potentially broaden the investor base.

In addition, market participants view settlement practices in the JGB market as unnecessarily complicated, and are eager to see them revised. The BOJ has announced that it will implement RTGS for foreign central bank JGB sales within the year and that it will shift new JGB issuance to RTGS by the middle of next year. In addition, the attractiveness of the JGB market could be enhanced—some say significantly—by encouraging the full use of DVP settlement practices and reducing the settlement period below T+3. Transaction costs could be reduced and market liquidity enhanced if the process—beginning from a trade on through to the change of ownership at the registrar—could be simplified by straight-through processing.

According to market participants, two additional market design changes could help to improve the ability of investors to manage fixed-income risk and therefore possibly reduce the cost of the public debt: a legal environment that is supportive of stripping of JGBs and inflation-indexed JGBs. Present monetary policy in Japan puts most of the risk in one tail of the distribution of interest rates. This had produced considerable "convexity risk," which in turn has made many international investors shy away from all yen-denominated instruments. The introduction of inflation-indexed government securities and permitting investors to strip existing government securities (a "strips" market) would enable investors to better manage yen-denominated fixed-income risks. While inflation is not a present

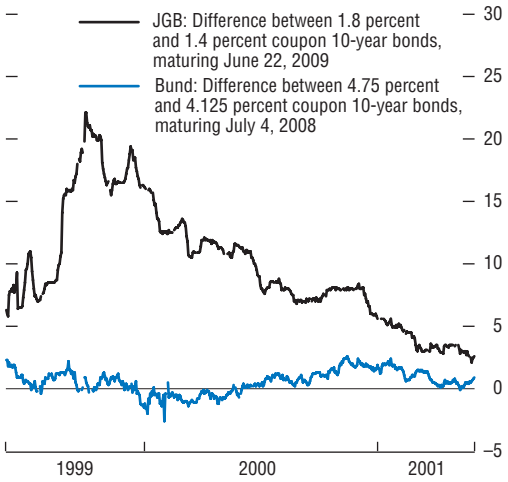
[57]See Shirakawa (2000).

risk, future inflation risk is much more uncertain. Similarly, a strips market would make it easier to arbitrage price differences between similar instruments that have been unusually large in the past and have continued to be significant in comparison to other countries. For example, as shown in Figure 4.5, the yield difference between two 10-year bonds issued two months apart but maturing on precisely the same day was around 5 basis points in May 2001 but reached as high as 22 basis points in 1999, compared to 2 basis points for a similar pair of German government bonds. The lack of legal certainty associated with stripping coupon payments from principal payments discourages arbitraging such extreme price anomalies away.

Improvements to the market infrastructure, as noted above, would no doubt add liquidity to the repo market as well as to the cash market, including by broadening the array of participants in both markets and by increasing the available supply of benchmark securities. Other official steps could help as well. Market participants have raised the possibility of a securities lending facility operated by the BOJ, which could lend liquidity to the bond market and help prevent the emergence of squeezes. Similarly, while the Ministry of Finance has on occasion reopened a bond issue when its market price returned to par value, it does not presently operate a securities lending facility (it introduced reopening in March 2001, which the authorities expect will enhance the liquidity of the JGB market).

In conclusion, these measures would strengthen the infrastructure for the JGB market, encourage broader participation in the market, and help to improve its depth and liquidity. This would have at least two significant benefits. First, a deeper and more liquid JGB market would contribute to the smooth financing of fiscal deficits going forward—an important macroeconomic issue in light of the rapid increase in financing needs that is likely to occur in the period ahead. Second, an improved JGB market would yield significant benefits for Japanese financial markets. It would enhance the public benefits from the growing JGB market, including

Figure 4.5. Japan and Germany: Yield Spread on Government Bonds with Similar Maturities
(In basis points)



Source: Bloomberg Financial Markets L.P.

by improving the usefulness of the JGB market as a benchmark for credit risk, as a market for hedging and managing interest rate risk, and (as regards improvements to the repo market) as a market for funding. Moreover, a more liquid market and resilient market infrastructure, in tandem with broader participation, could work to reduce concerns about potential market instabilities that might be associated with a growing supply of JGBs.

References

Bank for International Settlements, 2001, *Quarterly Review: International Banking and Financial Market Developments* (Basel, March).

Bomfim, Antulio N., 2001, "Optimal Portfolio Allocation in a World Without Treasury Securities," Finance and Economics Discussion Series No. 2001–11 (Washington: Board of Governors of the Federal Reserve System).

Bond Market Association, 2001, "Maintaining the 30-Year Benchmark Bond Benefits the Economy and Taxpayers," Treasury Debt Management Position Paper No. 2001–01 (Washington).

Clouse, James, Dale Henderson, Athanasios Orphanides, David Small, and Peter Tinsley, 2000, "Monetary Policy When the Nominal Short-Term Interest Rate Is Zero," Finance and Economics Discussion Series No. 2000–51 (Washington: Board of Governors of the Federal Reserve System).

Committee on the Global Financial System, 2001, *The Implications of Electronic Trading in Financial Markets* (Basel: Bank for International Settlements).

Committee of Wise Men, 2001, *Final Report of the Committee of Wise Men on the Regulation of European Securities Markets* (Brussels).

Cooper, Neil, and Cedric Scholtes, forthcoming, "Government Bond Market Valuations in an Era of Dwindling Supply," BIS Working Paper (Basil: Bank for International Settlements).

Deutsche Bank, 2000, *Deutsche Bank Global Markets Research*, Deutsche Bank (August).

European Commission, 2000, *Communication on Upgrading the Investment Services Directive* (Brussels: Commission of the European Communities).

———, 2001, *Proposal for a Directive of the European Parliament and of the Council on Financial Collateral Arrangements* (Brussels: Commission of the European Communities).

Fleming, Michael J., 2000a, "The Benchmark U.S. Treasury Market: Recent Performance and Possible Alternatives," *Economic Policy Review*, Vol. 6, No. 1 (April), pp. 129–145.

———, 2000b, *Treasury Market Liquidity* (unpublished; New York: Federal Reserve Bank of New York).

Giovannini Group, 1999, "The EU Repo Markets: Opportunities for Change," Euro Papers No. 35 (Brussels: European Commission). Available via the Internet: http://europa.eu.int/comm/economy_finance/document/europap/eup35en.htm

———, 2000, *Report on Co-ordinated Issuance of Public Debt in the Euro Area* (Brussels). Available via the Internet: http://europa.eu.int/comm/economy_finance/document/euro/giovannini1100_en.htm

Goldman Sachs, 2000, "Why the Fed's Open Market Operations Must Be Changed," *U.S. Economics Analyst*, September 1.

Greenspan, Alan, 2001, "The Paydown of Federal Debt," remarks before the Bond Market Association, White Sulphur Springs, West Virginia, April 27.

Inoue, Hirotaka, 1999, "The Structure of Government Securities Markets in G-10 Countries: Summary of Questionnaire Results," in *Market Liquidity: Research Findings and Selected Policy Implications* (Basel: Bank for International Settlements).

International Monetary Fund, 1998, *World Economic Outlook and International Capital Markets: Interim Assessment*, World Economic and Financial Surveys (Washington).

———, 1999, *International Capital Markets: Developments, Prospects, and Key Policy Issues*, World Economic and Financial Surveys (Washington).

———, 2000, *International Capital Markets: Developments, Prospects, and Key Policy Issues*, World Economic and Financial Surveys (Washington).

———, forthcoming, "Management of the Government Debt: Implications for Monetary Policy Implementation and Financial Markets," *Canada—Selected Issues* (Washington).

International Swaps and Derivatives Association, 2000a, *Collateral Arrangements in the European*

Financial Markets: The Need for National Law Reform (London).

———, 2000b, *ISDA 2000 Collateral Survey* (London).

Johnston, Elizabeth T., and John J. McConnell, 1989, "Requiem for a Market: An Analysis of the Rise and Fall of a Financial Futures Contract," *Review of Financial Studies*, Vol. 2, No. 1, pp. 1–23.

Ohashi, Kazunari, and Jan Milligan, 1998, "A Case for Reforming the JGB Market," Financial Market Discussion Paper No. 98–1 (London: Chief Representative Office in Europe, Bank of Japan).

Reinhart, Vincent, and Brian Sack, 2000, "The Economic Consequences of Disappearing Government Debt," *Brookings Papers on Economic Activity: 2*, Brookings Institution, pp. 163–220.

Santillán, Javier, Marc Bayle, and Christian Thygesen, 2000, "The Impact of the Euro on Money and Bond Markets," ECB Occasional Paper No. 1 (Frankfurt: European Central Bank).

Schinasi, Garry J., R. Sean Craig, Burkhard Drees, and Charles Kramer, 2000, *Modern Banking and OTC Derivatives Markets: The Transformation of Global Finance and Its Implications for Systemic Risk*, IMF Occasional Paper No. 203 (Washington: International Monetary Fund).

Schinasi, Garry J., Charles F. Kramer, and R. Todd Smith, 2001, "Financial Implications of the Shrinking Supply of U.S. Treasury Securities," IMF Working Paper 01/61 (Washington: International Monetary Fund).

Shigemi, Yosuke, S. Kato, Y. Soejima, and T. Shimizu, 2001, "Market Participants' Behavior and Pricing Mechanisms in the JGB Markets: Analysis of Market Developments from the End of 1998 to 1999," Financial Markets Department Working Paper E-Series (Tokyo: Bank of Japan).

Shirakawa, Masaaki, 2000, "The Reforms in the Japanese Government Securities Market," Financial Markets Department Working Paper E-Series (Tokyo: Bank of Japan).

Truman, Edwin M., 2001, "The International Implications of Paying Down the Debt," Policy Briefs No. 01–7 (Washington: Institute for International Economics).

United States, Board of Governors of the Federal Reserve System, 2000, *Minutes of the Federal Open Market Committee* (Washington, March 21).

———, 2001, *Federal Reserve Bulletin* (Washington, May).

United States, Federal Reserve Bank of New York, 2000, *Announcement of Changes in the Management of the System Open Market Account (SOMA)* (New York, July 5).

Van Duyn, Aline, 2000, "Freddie Mac to Offer Premium," *Financial Times* (London), November 28, p. 30.

Wojnilower, Albert M., 2000, "Life Without Treasury Securities," *Business Economics* (October), pp. 10–15.