



Financial Markets Report

Bank of Japan
Financial Markets Department

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- This is a translation of the Japanese version published on July 31, 2008.
- This report covers the market developments during the first half of 2008, unless otherwise stated.
- In the charts, the shadowed portion represents the period from January to June 2008.

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Executive Summary

Turmoil in Global Financial Markets: Negative Feedback Loop between the Financial Sector and the Real Economy

Global financial markets have been in turmoil, triggered by the U.S. subprime mortgage problem. Repricing of risks that originated from securitized products backed by subprime mortgages has spread to overall securitization markets. As of summer 2007, when the subprime problem emerged, the quality of underlying assets for securitized products other than subprime mortgages had not deteriorated notably. The repricing of risks in the second half of 2007 could be considered as a corrective reversal of the lax risk evaluation, stemming from the information asymmetry inherent in the originate-and-distribute model. Since the start of 2008, however, not only subprime mortgages, but also various underlying assets of securitized products, such as corporate loans, consumer loans, and commercial mortgages, began to deteriorate, as the impact of a U.S. economic slowdown gradually spread. This heightened downward pressure on prices of securitized products.

Amid the continued decline in prices of securitized products, transactions dwindled and market liquidity contracted. As a result, financial institutions that had made profits by adopting the originate-and-distribute model with sufficient market liquidity were forced not only to incur mark-to-market losses on securitized products, but also to reintermediate risks. This resulted in an involuntary expansion of their balance sheets, and downward pressure on their capital adequacy. Banks then further tightened their credit standards, and this began to exert negative pressure on the real economy.

Increased Uncertainties about the Economic and Financial Environment, and Decline in Market Liquidity

As the negative feedback loop between the financial sector and the real economy became stronger in the United States, uncertainties about the economic and financial environment increased, leading to a decrease in risk appetite of market participants, i.e., the widespread reduction of overall holdings of risk assets. Market participants'

concerns were fanned by the difficulty in forecasting how far the negative feedback effect would spread and how long it would continue; for example, to what extent the decline in housing prices would expand, and to what extent the financial condition of banks and the household sector would deteriorate. This heightened instability in the markets and made investors more cautious about investing in risk assets. Reflecting the decline in investors' risk appetite, market liquidity declined considerably not only for securitized products, but also for financial assets overall. Because a decrease in market liquidity leads to an elevated risk of price volatility, investors with reduced risk appetite do not buy risk assets, unless a sufficiently high risk premium is paid to them. This means large price discounts may be needed to persuade investors to buy assets with impaired market liquidity. Market contacts suggested that prices of some securitized products had fallen below the level justified by the deterioration in underlying assets. As such, the smooth functioning of markets was impaired, and the price discovery mechanism weakened.

Banks that had to hold assets with low market liquidity increased their demand for raising funds through the money markets to finance the involuntary expansion of their balance sheets. At the same time, in order to secure funds, they were forced to sell securities, which had been considered relatively liquid, such as municipal bonds and agency residential mortgage-backed securities (RMBSs) issued by government-sponsored enterprises (GSEs). As a result, financial institutions faced funding liquidity constraints through mid-March, against the background of the decline in market liquidity due to selling pressure on assets that had been considered liquid and deterioration in the functioning of the repo market, where such securities were used as collateral. Amid a mutually feeding downward spiral in market liquidity and funding liquidity, business came to a standstill at Bear Stearns, a major U.S. investment bank.

Responses of Central Banks and Private Financial Institutions to the Turmoil

As a result of impaired functioning of secured money markets, concerns heightened about the functioning of the two intermediary channels of the U.S. financial system, namely, the securities markets and the banking sector. To address the heightened

concerns about financial system stability, the Federal Reserve and other central banks in major countries took a series of liquidity provision measures from mid-March to early May, while many major financial institutions in the United States and Europe strengthened their capital base.

The series of measures staved off a "market run," i.e., herded panic selling of assets by market participants, and thus, concerns about financial system stability and the overly pessimistic views about the U.S. economy abated through mid-May.

However, financial markets remained unstable, amid the continued negative feedback loop between the real economy and financial markets. After mid-May, concerns about the deterioration in financial institutions' earnings resurged, against the background of concerns about an increase in nonperforming assets, due to an economic downturn and a persistent decline in housing prices. This led to a plunge in stock prices. Prices of securitized products also declined further, against the backdrop of the view that financial institutions' increasing difficulties in raising capital would apply even greater selling pressure on their assets. In addition, market concerns over the financial condition of monolines and GSEs, which function as part of the market infrastructure, reemerged, further heightening the instability in markets.

Heightened Inflationary Concerns Caused Instability in Markets

These unstable conditions in the markets were aggravated by heightened concerns about inflation. Since mid-May, inflationary concerns had increased, against the background of continued rise in commodity prices, such as a surge in crude oil and grain prices. This increased uncertainties about the future steering of monetary policy and the macroeconomic environment, and hence reduced market participants' risk appetite further. As uncertainties about financial and economic conditions increased with the rise in crude oil prices, earnings prospects deteriorated not only for the financial sector, but also for a wide range of industrial sectors in the United States, leading to declines in stock prices. Additionally, in emerging economies with a high external dependence on energy, the fragility of the economies became evident with a decline in both stock prices and currencies, as concerns heightened over higher inflation rates, and/or a notable deterioration in external and fiscal balances.

Investment inflows into the commodity markets continued to increase, and hence market liquidity followed an upward trend. In addition to speculators searching for yield, long-term investors, such as pension funds with their aim of diversifying investments, have increased significantly. A driving force that attracted investors into the market was the enhancement of market infrastructure, including investment channels, such as commodity indices and exchange traded funds (ETFs). Amid the recent upward trend of commodity prices, however, the outlook for commodity prices has become increasingly uncertain for both sides: rise or fall. If commodity prices fluctuate significantly in the future, there is a possibility that other financial markets will be affected considerably, as commodity futures have come to play a significant role as financial investment instruments.

Japanese Financial Markets' Linkage with Global Financial Markets

The effects of turmoil in global financial markets spread to Japanese financial markets through a portfolio rebalancing by overseas investors and financial institutions. The effects were most pronounced in medium- and long-term fixed income markets and credit default swap (CDS) markets, where the trading share of overseas investors had increased in recent years. In Japan's medium- to long-term fixed income markets, such as Japanese government bond (JGB) markets, prices fluctuated significantly in mid-March, as hedge funds were forced to unwind (i.e., deleverage) their positions, due to funding liquidity constraints. Not only overseas investors, such as hedge funds, reduced their risk-taking ability, but also securities companies, particularly ones that restrained the expansion of risk assets, faced involuntary accumulation of inventories and hence became less active in their market-making activities. This led to the decline in market liquidity in JGB markets. Furthermore, the impact from concerns about global inflation spread to Japan's markets, and this caused long-term interest rates to rise sharply and remain volatile under low market liquidity. Investors' risk appetite declined and they became cautious in investing in assets, whose price volatility was high. This was one factor that had slowed the recovery in market liquidity in JGB markets.

In CDS markets in Japan, CDS premiums widened sharply through mid-March, mainly led by risk reduction and arbitrage transactions by overseas investors. Domestic

investors followed these movements and adjusted their positions, inducing market liquidity in CDS markets to shrink rapidly, and accelerating the increase in CDS premiums.

Meanwhile, although stock markets in Japan were also heavily influenced by the activities of overseas investors, Japanese stock prices remained firm relative to U.S. and European stock prices since mid-March, partly supported by the yen depreciation, due to the rise in U.S. interest rates.

"Relative Stability" of Financial Markets in Japan

Due to the tightening of supply-and-demand conditions in U.S. and European money markets, Japan's money markets remained nervous, as interbank rates were under upward pressure. However, the uncollateralized overnight call rate was stable at around the Bank of Japan's policy rate target of 0.5 percent. Taken as a whole, the turmoil in U.S. and European money markets had only a limited impact on Japan's money markets in the first half of 2008.

Under relatively stable conditions of Japan's money markets, banks in foreign countries (including overseas branches of Japanese banks) increased borrowing funds from banks in Japan (including Japanese banks and Tokyo branches of foreign banks). These funds were then converted into U.S. dollars via foreign exchange (FX) swaps. In addition, the relative stability of interest rates and investors' demand in the Japanese markets contributed not only to the increase in the amount of corporate bonds issued by domestic corporations, but also the increase in the amount of yen-denominated bonds (such as *samurai* bonds and nonresidents' Euroyen bonds) issued by overseas financial institutions and corporations.

I. Increased Uncertainties about the Economic and Financial Environment, and the Turmoil in Global Financial Markets

Global financial markets have been in turmoil since summer 2007, affected by the so-called "subprime mortgage problem." The turmoil was triggered by a rise in delinquencies on subprime mortgages in the United States and the resultant decline in prices of subprime residential mortgage-backed securities (RMBSs). As indicated in the March 2008 *Financial Markets Report*, in the second half of 2007, the problem soon affected not only securitization markets but also a wide range of financial markets, including credit, stock, and money markets. Looking back on the first half of 2008, the impact of the market turmoil spread further with a negative interaction between financial markets and the real economy. In addition, on the backdrop of a sharp rise in crude oil prices, heightened concerns over global inflation have led to increased uncertainties about economic conditions, causing instability in financial markets.

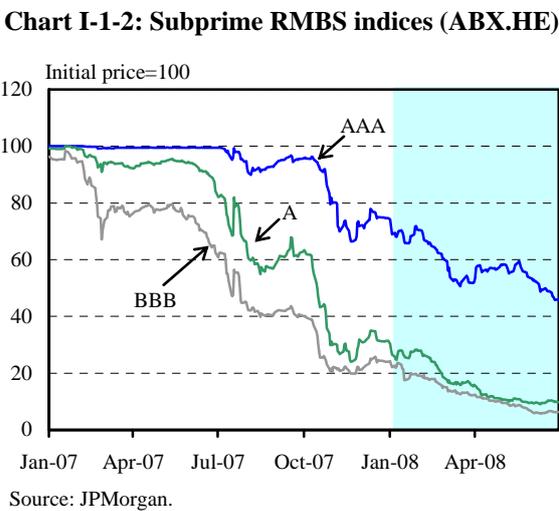
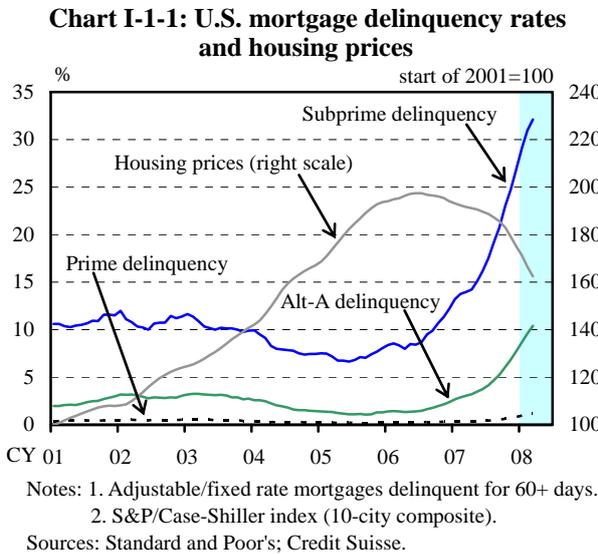
This chapter provides an overview of how global financial markets were affected by the U.S. subprime mortgage problem, and explains why the effects became so widespread. It then discusses the liquidity provision measures central banks undertook in the face of spreading financial market turmoil, and market developments that followed. Finally, after explaining the effects of stronger inflationary concerns on financial markets, the chapter discusses changes in the structure of the commodity market and its interaction with the financial markets.

1. Chain Reaction of the Turmoil Stemming from Securitization Markets

This section looks back on developments regarding the financial market turmoil in the United States and Europe, focusing on four aspects: (1) RMBSs and resecuritized products backed by them; (2) other securitized products; (3) financial assets that were considered relatively risk-free and liquid, such as municipal bonds and agency bonds; and (4) the repo market to finance these financial assets. While this section focuses on the market turmoil in the first half of 2008, Box 1 explains how a financial imbalance had accumulated until summer 2007 and developments thereon. The box draws on findings from existing literature, as current financial market developments stemming from the subprime mortgage problem have features in common with financial market turmoil in the past.

Further correction in RMBSs and resecuritized products backed by them

In the first half of 2008, a correction in the U.S. housing market continued, and downward pressure on housing prices increased further (Chart I-1-1). Delinquencies on housing loans and the number of foreclosures continued to increase, and deterioration in underlying assets of subprime RMBSs became more evident. Under these circumstances, the price of subprime RMBSs, of which a sharp decline was triggered by credit rating downgrades in summer 2007, continued to decline further in the first half of 2008 (Chart I-1-2). In addition to forced liquidation of hedge funds and structured investment vehicles (SIVs), the decline in RMBS prices led to a steep increase in breaches of overcollateralization tests of resecuritized products backed by RMBSs.¹ This then worsened supply-and-demand conditions of RMBSs, and further accelerated the decline in prices. The price of BBB- and A-rated RMBSs fell to below one-fifth of their initial price. Even AAA-rated RMBSs fell to about one-half of their initial price, as the rating downgrades spread to the higher-rated tranches with the increase in mortgage delinquencies.

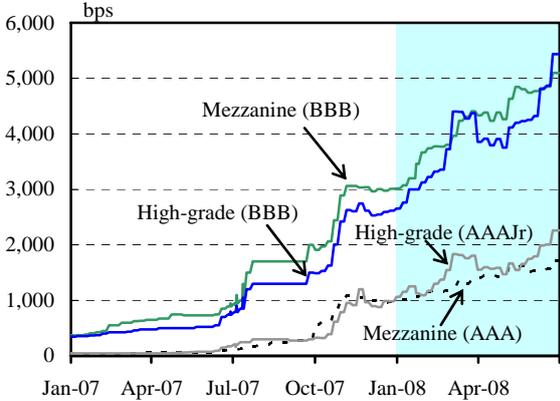


Alt-A loans, which are loans with higher creditworthiness than subprime loans, were not immune from the problem either. As the delinquency rates on these loans reached

¹ Overcollateralization tests evaluate the value of underlying assets, in order to assure redemption of (re)securitized products. A decline in the value of underlying assets below a certain predetermined threshold triggers early redemption or liquidation, commonly leading to a sale of underlying assets.

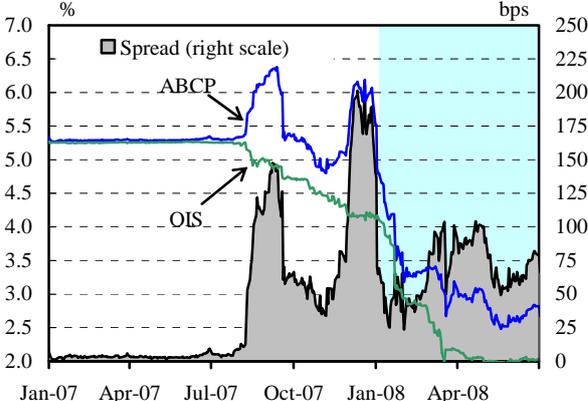
historical highs, downgrades on RMBSs backed by them also gained momentum. The number of rating downgrades for Alt-A RMBSs between March and June 2008 surpassed that for subprime RMBSs from the summer through fall of 2007, inducing a decline in prices for Alt-A RMBSs. In addition, with regard to resecuritized products backed by RMBSs, the spread of asset-backed securities collateralized debt obligations (ABS CDOs, hereafter simply referred to as CDOs) over benchmark rates continued to widen, reflecting rating downgrades of RMBSs.² The spread on short-term maturity asset-backed commercial paper (ABCP) backed by long-term RMBSs and CDOs also remained wide (Charts I-1-3 and I-1-4).

Chart I-1-3: U.S. CDO spreads over LIBOR



Note: Data from Oct. 2007 are estimates by JPMorgan.
Source: JPMorgan.

Chart I-1-4: U.S. ABCP spread over OIS



Note: 1-month maturity.
Source: Bloomberg.

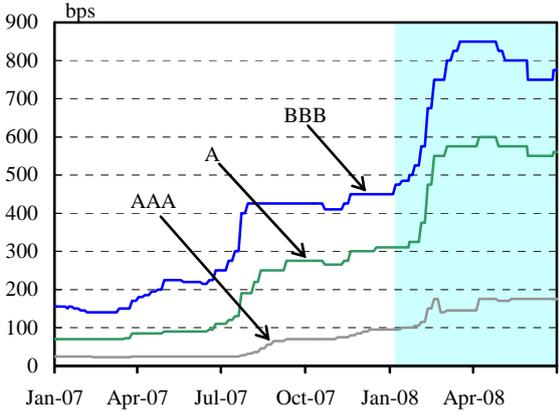
Fundamentals of securitized products deteriorated overall

Collateralized loan obligations (CLOs) backed by corporate loans, commercial mortgage-backed securities (CMBSs), ABSs backed by consumer loans, and RMBSs in Europe, all continued to be in their correction phase (Charts I-1-5 through I-1-8). These securitized products, unlike subprime RMBSs, were not experiencing a deterioration in their underlying assets in the latter half of 2007. Nevertheless, leading up to mid-2007, the lending criteria were eased for the underlying loans of these products, and credit ratings and risk evaluations were based on default data generated in the relatively favorable credit cycle. This was much like the case for RMBSs in the United States, and as such, since mid-2007, reevaluation of risk, and a cautious investment stance, were similarly shown for all these

² Since there were no trades of CDOs, the spread shown in Chart I-1-3 is an estimate based on ABX.HE.

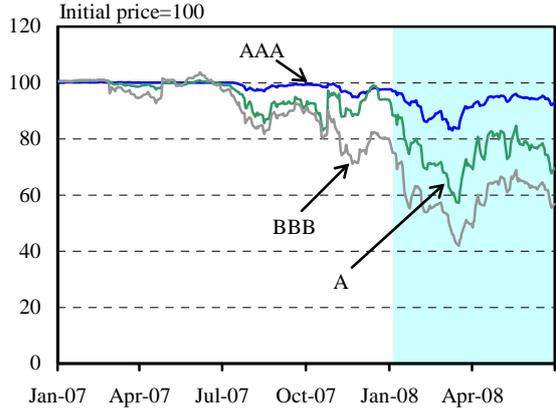
securitized products. In other words, the widening of spread (decline in prices) for these products in the second half of 2007 could be considered as a corrective reversal of the lax risk evaluation at the originating stage.

Chart I-1-5: U.S. CLO spreads over LIBOR



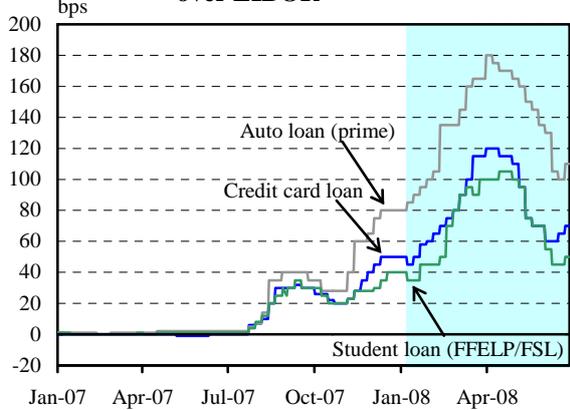
Source: JPMorgan.

Chart I-1-6: U.S. CMBS indices (CMBX)



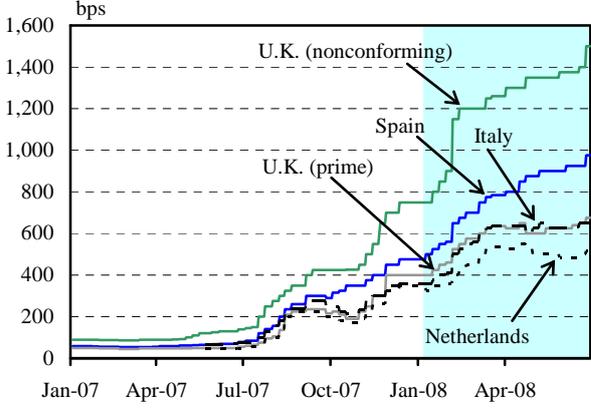
Source: JPMorgan.

Chart I-1-7: U.S. consumer loan ABS spreads over LIBOR



Note: AAA-rated and 3-year maturity.
Source: JPMorgan.

Chart I-1-8: European RMBS spreads over LIBOR

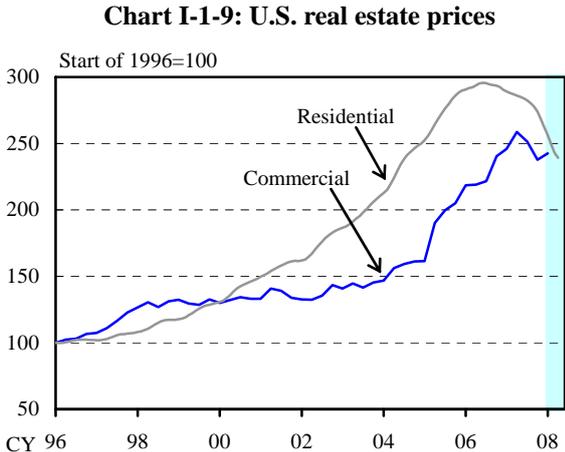


Note: BBB-rated.
Source: JPMorgan.

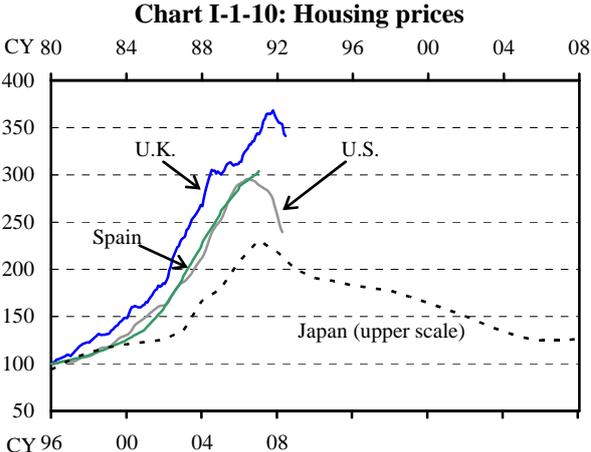
Since the start of 2008, however, the deterioration in various underlying assets of securitized products gradually became evident. Default rates and delinquencies of corporate and consumer loans rose, as concerns over a U.S. recession heightened. With regard to consumer loans, delinquencies rose particularly for HELOCs and CESs, backed by the value of remaining collateral of home mortgages.³ In the United States, vacancy rates of

³ HELOC, which stands for home equity line of credit, refers to a line of credit backed by the borrower's

commercial real estate properties rose, and rent and real estate prices peaked out (Chart I-1-9). With regard to mortgage markets in Europe, the decline in housing prices became more evident, especially in the United Kingdom (Chart I-1-10). These developments accelerated the widening of spreads for securitized products overall.



Sources: Massachusetts Institute of Technology; Standard and Poor's.



Note: S&P/Case-Shiller index (10-city composite) for U.S.; Nationwide's index for U.K.; OECD's index for Spain; public notice of land prices for Japan.
Sources: Standard and Poor's; Nationwide; OECD; MLIT.

Spreads widened for financial assets that had been considered risk-free and liquid

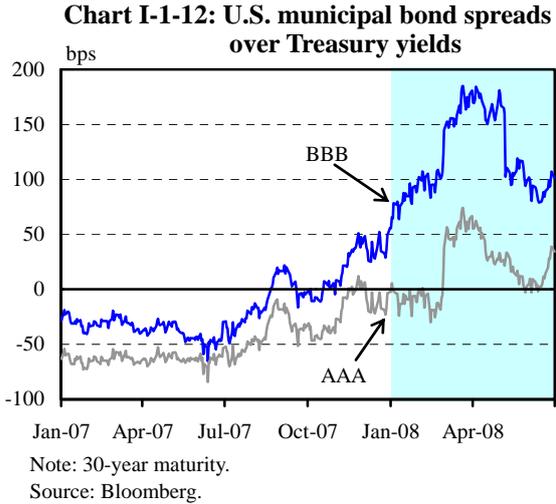
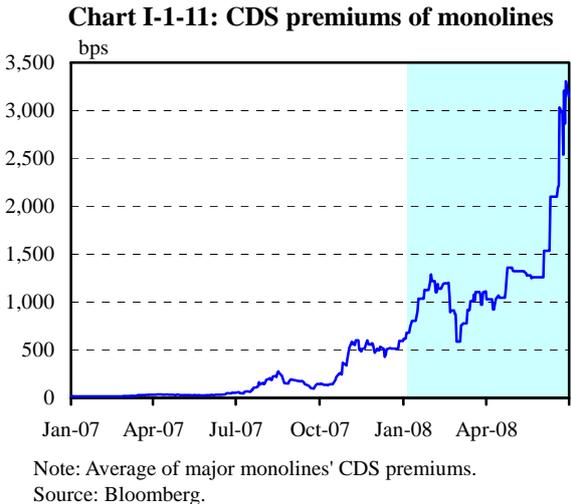
The effects of the market turmoil spread to financial assets that had been considered relatively risk-free and liquid, such as municipal bonds and government-sponsored enterprise (GSE) bonds. This was triggered by increased concerns over a deterioration in the financial condition of U.S. monoline insurers (monolines for short) and GSEs, both of which functioned as part of the market infrastructure.

Monolines are mainly engaged in the business of guaranteeing the payment of bond principal and interest, when an issuer defaults. Financial assets that they insure, mainly municipal bonds and securitized products, receive the same credit rating as the monolines themselves. As of 2007, there were seven monolines with an AAA-rating insuring about 1.2 trillion dollars worth of U.S. municipal bonds, and approximately 0.6 trillion dollars worth of

equity in a house; and CES, which is closed-end second lien loan, refers to a loan backed by a second lien loan.

securitized products. Monolines contributed to enhancing market liquidity by conferring their own creditworthiness on the insured products, and transforming them into standardized financial products with the highest rating.⁴

However, amid the decline in prices of securitized products, many monolines were forced to incur mark-to-market losses on their guarantees, which led to increased concerns about deterioration in their financial condition (Chart I-1-11). Since the beginning of 2008, monolines, including the largest one, were downgraded one after another, because they did not raise enough capital in spite of the deterioration in their earnings, and also because they violated covenants on the commitment line contracts with financial institutions by posting net losses. This led to rating downgrades in municipal bonds which monolines insured, and the spread on municipal bonds widened until mid-March (Chart I-1-12).⁵

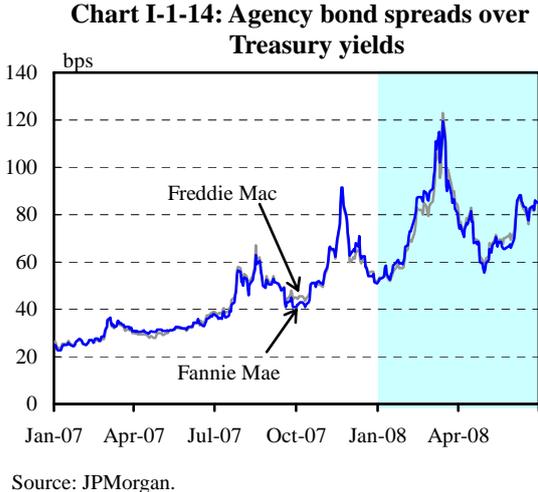
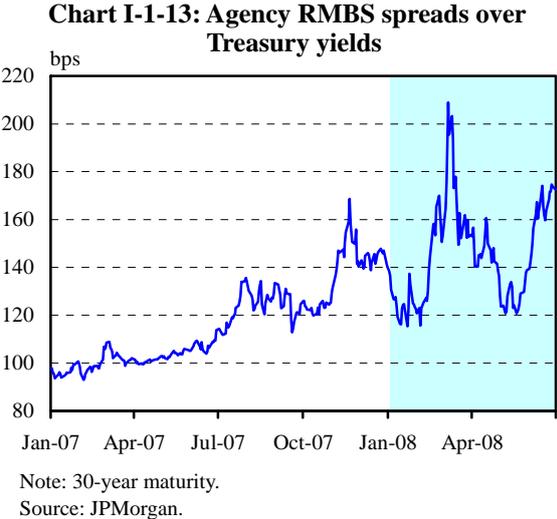


Furthermore, in the municipal bond market, there were several factors that accelerated the price declines on top of the effects of monoline downgrades. They included the following conditions: (1) concerns had increased over a deterioration in the financial condition of municipalities, such as declines in both sales and property tax revenues due to a slowdown in

⁴ A liquid market is a market where large-volume transactions can be executed rapidly with a small impact on prices (Box 3). Since many investors can easily trade standardized products, a market with standardized products is more likely to have higher liquidity.

⁵ For most U.S. municipal bonds, investors can enjoy the benefit of being exempt from Federal income tax on municipal bond interest. Therefore, under normal market conditions, as it was before summer 2007, these bonds' interest rates become lower than government bonds' rates which are taxed.

the economy and declines in housing prices; (2) financial institutions had started to sell, or had become less willing to buy, municipal bonds in order to avoid an expansion of their balance sheets; and (3) structured investment programs and hedge funds that had long positions in municipal bonds had sold their holdings to raise cash.⁶



The effects of the financial market turmoil also spread to agency RMBSs (i.e., RMBSs issued by GSEs) and agency bonds issued by GSEs to raise funds. Of the GSEs, the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac) are principally engaged in purchasing and securitizing prime mortgage loans called conforming loans, while also investing in securities, especially RMBSs issued by the private sector. Fannie Mae and Freddie Mac posted net losses in their earnings reports for the fourth quarter of 2007 due to the following: (1) an increase in provisions for

⁶ In the municipal bond market, tender option bonds (TOBs), or short-term floating-rate bonds issued by investment vehicles which have long positions in fixed-interest long-term municipal bonds, became popular as securities bridging the maturity mismatch between investors that want short-term financing and municipalities that want to obtain long-term funds. With the aim of profiting from differences between short- and long-term interest rates, investment vehicles that are invested in long-term municipal bonds hold them until maturity, and finance those assets through the issuance of TOBs. Such a scheme has an inherent weakness in structure in terms of maturity mismatches, just like SIVs in securitization markets. That is, SIVs were to hold a securitized product until maturity, while financing it with short-term ABCP backed by the securitized product. Short-term financing programs, such as TOBs, and similar securities -- that is, auction rate securities (ARSs) and variable rate demand obligations (VRDOs) -- together seemed to have absorbed about one-half of the amount outstanding of all municipal bonds.

credit losses on purchased mortgage loans due to an increase in delinquencies in underlying housing loans; and (2) mark-to-market losses in their own account on investments in RMBSs and other securities. This led to a widening of spreads on the agency RMBSs, of which they had guaranteed principal and interest, and spreads on agency bonds issued by Fannie Mae and Freddie Mac through mid-March, as concerns over the deterioration in their financial condition increased (Charts I-1-13 and I-1-14). Agency RMBSs and agency bonds are normally considered to be risk-free and liquid, but the concurrent selling of these securities by financial institutions, in order to secure the funds they needed, triggered the widening of spreads on these securities, and subsequently a decline in their market liquidity.

The functioning of the repo market deteriorated

Against the background of the price declines in financial assets that had been considered to be relatively risk-free and liquid, such as municipal bonds, agency RMBSs, and agency bonds, the functioning of the repo market, where such securities are used as collateral, deteriorated from the end of February until mid-March. Specifically, financial institutions were forced to sell agency RMBSs and agency bonds, in order to secure funds, while securities companies or market makers had to hold these securities, which became less liquid, as inventories and their funding needs grew (Chart I-1-15). As a result, the interest rates of repos, for which these securities were used as collateral, rose (Chart I-1-16). Additionally, as these securities' prices declined, margin calls arose and haircuts were raised, triggering a default in repo transactions by several mortgage loan companies and investment funds that could not meet their margin calls.⁷ Repo rates, for which Treasury securities were used as collateral, fell due to a "flight to quality," and the differential between these rates and repo rates with agency RMBSs and bonds being used as collateral became great.

The turmoil in the repo market increased uncertainties about financial institutions' funding conditions and rapidly tightened liquidity conditions. Coupled with the higher counterparty risk, due to increased concerns over further losses at financial institutions, tightened liquidity conditions then rapidly raised the tension in U.S. and European money

⁷ Margin call refers to a procedure related to the application of variation margins, implying that if the value, as regularly measured, of the underlying collateral assets falls below a certain level, the bank requires counterparties to supply additional assets (or cash). Haircut refers to a percentage that is subtracted from the market value of the assets that are being used as collateral.

markets through mid-March, as observed in the widening of spreads between LIBOR and the overnight index swap rate (LIBOR-OIS spreads). In these circumstances, Bear Stearns, a major U.S. investment bank, experienced difficulty in securing funds, and its business came to a standstill. Meanwhile, major financial institutions, faced with funding liquidity constraints, applied more stringent standards in extending credit to hedge funds and other borrowers, and also canceled commitment lines in an increasing number of repo transactions.

Chart I-1-15: U.S. primary dealers' financing by type of security

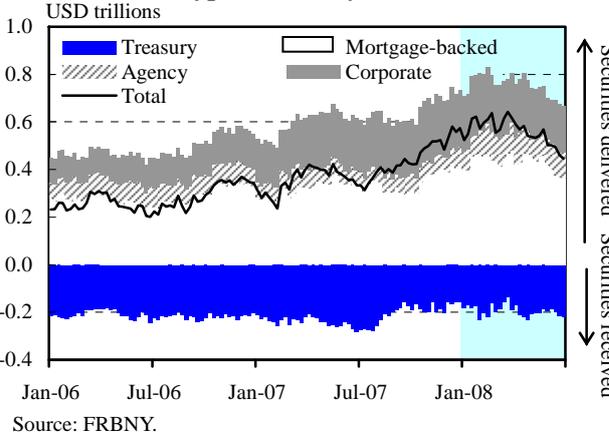
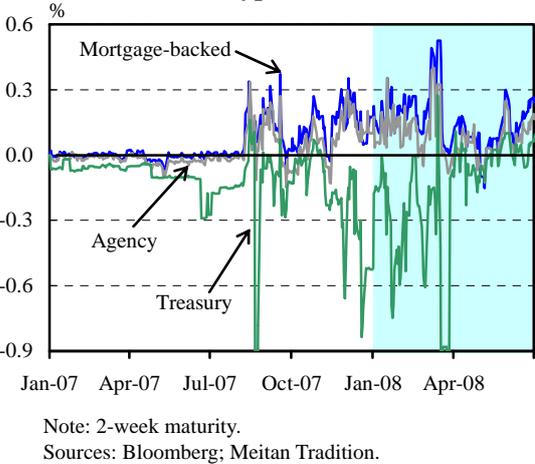


Chart I-1-16: U.S. repo-OIS spreads by type of collateral



Box 1: Mechanism for the Accumulation of Financial Imbalances Leading to Crises: Findings from Existing Literature

The background to the turmoil in global financial markets since summer 2007 is closely related to market participants' investment behavior from around 2003 through the first half of 2007. Investors relaxed their risk evaluation standards and accelerated their "search for yield," in the process of raising leverage against the background of favorable fundamentals and historically low interest rates. Banks and other market participants expanded their balance sheets with assets of which risks were underestimated, and financial system instability materialized as they, in turn, unwound their positions.

Existing literature suggests that the mechanism, in which a financial imbalance built up

and then was unwound in the current turmoil, portrays many features observed in the past financial turmoil.⁸ In the following, key factors of the mechanism for financial turmoil are given.

Credit booms often start from financial innovation and deregulation. Innovation and deregulation contribute to alleviate distortions in asset allocation, and improve economic welfare by expanding frontiers of financial transactions and stimulating competition by promoting the entry of new market participants. In the case of the expansionary credit cycle which began in 2003, the following were observed: technological progress of credit risk transfer, such as securitization and credit derivatives; a proliferation of the originate-and-distribute model; and, an increase in presence of new market players such as hedge funds and investment vehicles.

As innovation and deregulation present new earnings opportunities, banks and other market participants strengthen their stance on risk-taking, which intensifies a positive feedback within financial markets and/or between financial markets and the real economy, leading to an increase in financial transactions.⁹ For example, when many financial institutions make profits by investing in risk assets, their capital ratios rise and create a surplus for more risk-taking, causing further rises in asset prices and an increase in profits. In particular, during the credit boom that continued up to summer 2007, financial institutions' mark-to-market accounting led to higher leverage, contributing to a self-reinforcing mechanism, where the increase in financial transactions accelerated.¹⁰ In addition, a rise in

⁸ Bordo, Michael D., "The Crisis of 2007: The Same Old Story, Only the Players Have Changed," remarks prepared for the Federal Reserve Bank of Chicago and International Monetary Fund conference, September 28, 2007.

Brunnermeier, Markus K., "Deciphering the 2007-08 Liquidity and Credit Crunch," *Journal of Economic Perspectives*, forthcoming, 2008.

Reinhart, Carmen M., and Kenneth S. Rogoff, "Is the 2007 U.S. Sub-prime Financial Crisis so Different? An International Historical Comparison," NBER Working Paper No. 13761, January 2008.

----- and -----, "This Time Is Different: A Panoramic View of Eight Centuries of Financial Crises," NBER Working Paper No. 13882, March 2008.

⁹ Borio, Claudio E. V., "Change and Consistency in the Financial System: Implications for Financial Distress and Policy," BIS Working Papers No. 237, October 2007.

¹⁰ Greenlaw, David, Jan Hatzius, Anil Kashyap, and Hyun Song Shin, "Leverage Losses: Lessons from the Mortgage Market Meltdown," U.S. Monetary Policy Forum Conference Draft, February 2008.

Persuad, Avinash, "Why Bank Risk Model Failed," VOX, April 4, 2008.

asset prices, reflecting expectations over the effects of technological innovation and deregulation, exerts a positive feedback effect on the economy, via a rise in the value of asset collateral and wealth effect created. In turn, the effect on the economy is fed back into financial markets.

Risk-taking by market participants tends to overshoot due to limited risk recognition. Financial turmoil rarely occurs, but once it does, it significantly affects the financial system and the real economy. However, when orderly market conditions continue for a long period of time, the perception of banks and other market participants that financial crises may occur becomes extremely low, also known as "disaster myopia."¹¹ In the credit boom up to summer 2007, lending expanded to low-income borrowers with a poor credit history, and credit risk associated with securitized products backed by these loans were underestimated in the originate-and-distribute model. In addition, although the market liquidity of securitized products had been relatively low, market participants seemed to overlook this point when making investments.

Problems associated with lax risk evaluation tend to be concealed by investors' herding behavior. Even when asset prices deviate from fundamentals due to the lax risk evaluation, one cannot keep making modest profits when competitors are making larger profits by taking advantage of a rise in asset prices. As many market participants start actively taking similar trading positions, reinforcing the herding behavior, asset prices follow an upward trend in a self-fulfilling manner. This was probably the case since around 2003, where many investors started to invest in securitized products, reducing risk premiums in many financial markets.

The macroeconomic and financial environment also significantly influence the behavior of investors in financial markets. For example, in developed economies, there is a tendency for stock market booms to arise, when the economic growth rate is high and inflation is low.¹² In addition, in a low interest rate environment, life insurance companies and hedge funds tend to strengthen their risk-taking behavior, in order to eradicate their negative margins and

¹¹ Herring, Richard J., "Credit Risk and Financial Instability," *Oxford Review of Economic Policy*, Vol. 15, No. 3, 1999.

¹² Bordo, Michael D., Michael J. Dueker, and David C. Wheelock, "Inflation, Monetary Policy and Stock Market Conditions," Federal Reserve Bank of St. Louis Working Paper Series 2007-020, May 2007. -----, -----, and -----, "Monetary Policy and Stock Market Booms and Busts in the 20th Century," Federal Reserve Bank of St. Louis Working Paper Series 2008-012, May 2008.

improve profits on their investments,¹³ and banks tend to expand lending by relaxing their credit standards.¹⁴ Looking back at the economic and financial developments from 2003 to summer 2007, when the stable macroeconomic environment, or the so-called "Great Moderation," was accompanied by the accommodative interest rate environment for a prolonged period, market participants expanded their financial transactions.¹⁵

As seen above, when banks and other market participants strengthen their risk-taking stance and this leads to a self-reinforcing increase in financial market transactions, their assets with underestimated risks expand in their balance sheets; hence, imbalances accumulate in the financial system. Such imbalances cause turmoil in the financial system, which is triggered by a rise in interest rates or a decline in the asset prices. In this process, information asymmetry and maturity mismatches inherent in financial transactions amplify the turmoil. In the current phase, where information asymmetry inherent in the originate-and-distribute model caused the lax risk evaluation, once investors realized that risk assets had been mispriced, uncertainty about risk evaluation increased due to information asymmetry, and this amplified the effects of the turmoil in the financial system.¹⁶ In addition, the decline in asset prices induced deleveraging through mark-to-market valuations. Investment vehicles, such as SIVs and ABCP conduits, faced liquidity constraints due to maturity mismatches and were forced to sell their assets, which caused further declines in asset prices.¹⁷ As a result, market transactions

¹³ Rajan, Raghuram G., "Monetary Policy and Incentives," address at the Bank of Spain Conference on Central Banks in 21st Century, June 8, 2006.

¹⁴ Dell'Ariccia, Giovanni, Deniz Igan, and Luc Laeven, "Credit Booms and Lending Standards: Evidence from the Subprime Mortgage Market," CEPR Discussion Paper No. 6683, 2008.

Ioannidou, Vasso P., Steven Ongena, and Jose Luis Peydro, "Monetary Policy and Subprime Lending: A Tall Tale of Low Federal Fund Rates, Hazardous Loans, and Reduced Loan Spreads," mimeo, 2007.

¹⁵ Hattori, Masazumi, and Hyun Song Shin, "The Broad Yen Carry Trade," Institute for Monetary and Economic Studies, Bank of Japan, Discussion Paper Series 2007-E-19, 2007.

¹⁶ For more on information asymmetry associated with the originate-and-distribute model, see *Financial Markets Reports -- Developments during the Second Half of 2007 --*, March 2008. For the current financial intermediation in Japan and the United States using the originate-and-distribute model, see *Financial System Report*, March 2008.

¹⁷ These investment vehicles had raised profits from yield differentials, by holding medium- to long-term assets, such as securitized assets, until maturity while financing them with short-term ABCP backed by the securitized products. However, since summer 2007, these investment vehicles' funding conditions have deteriorated as rates on ABCP in the secondary market surged, because many money market funds (MMFs) became cautious about investing in ABCP in view of a price fall in its underlying securitized assets (Chart I-1-4).

became sluggish and market liquidity declined, which then accelerated the decline in funding liquidity of banks and other market participants. The resultant downward spiral in market liquidity and funding liquidity aggravated the financial market turmoil.

2. Decline in the Financial Intermediary Function of Securities Markets and the Banking Sector

The spread of the financial turmoil is outlined in the above section, with a focus on securitization markets. The deterioration in market liquidity over the course of the turmoil significantly affected banks, which had made profits by adopting the originate-and-distribute model. Since this model worked well only with sufficient market liquidity, the actual decrease in liquidity forced banks into reintermediation of risks. The decline in the financial intermediary function of securities markets and the banking sector led to funding liquidity constraints of economic agents, which, in turn, exerted downward pressure on the U.S. economy and triggered further corrections in securities markets. In this way, a negative feedback effect between financial markets and the real economy was created.

In this section, the mechanism behind the decline in functioning of the two intermediary channels of the U.S. financial system, namely, securities markets and the banking sector, will be summarized with regard to three aspects: (1) increased uncertainties about the financial and economic environment, and decline in investors' risk appetite; (2) decline in market liquidity; and (3) the effects of banks' reintermediation of risk.

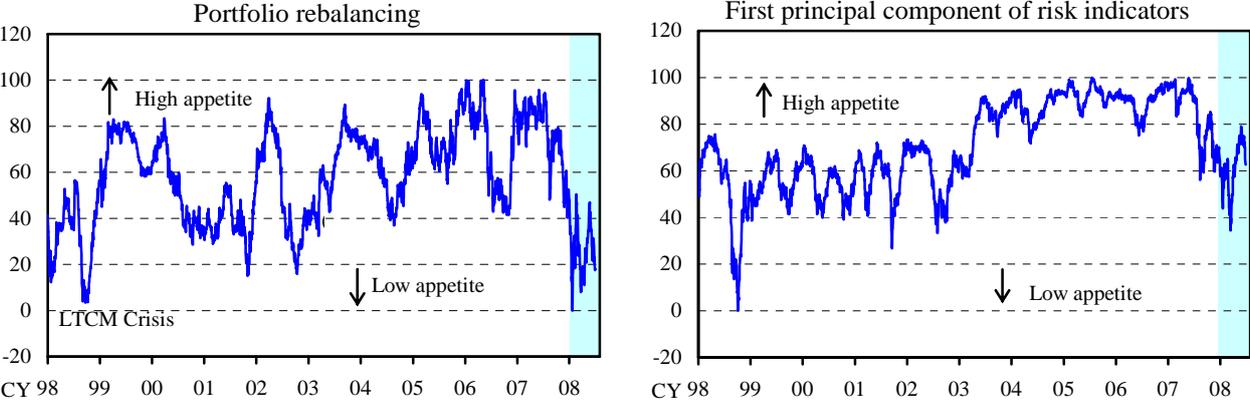
Uncertainties about the financial and economic environment increased, and investors' risk appetite declined

Repricing of risks, which spread throughout financial markets from summer 2007, was indeed a corrective reversal of the lax risk evaluation that had prevailed in the credit boom cycle up to that time. As the subprime mortgage problem began to make it evident that risks had been mispriced, financial institutions tightened their lending standards for underlying assets of

securitized products, while investors who held securitized products accelerated their asset sales. As mentioned above, as of the second half of 2007, the quality of underlying assets for securitized products, except for subprime mortgages, had not deteriorated notably. Since around the end of 2007, however, as signs of weakness in the U.S. economy began to show, prices of various credit-related assets began to gradually factor in a deterioration in fundamentals.

As the economy continued to slow and asset prices declined further, there were increased concerns about the financial condition of major market participants, which supported the smooth functioning of financial markets, such as private financial institutions, monolines, and GSEs. Such concerns over the soundness of the financial sector spread through various markets, including not only the residential mortgage market but also the commercial mortgage market, leveraged loan market, and consumer loan market. Corrections in the financial sector then began to exert negative pressure on the real economy, via tightening of banks' credit standards and deterioration in the market functioning.

Chart I-2-1: Risk appetite of global investors



Notes: 1. Linearly transformed between 0 and 100.
 2. Portfolio rebalancing is estimated from 63 series composing of MSCI stock index, Lehman Brothers bond index, and EMBI+.
 3. First principal component of risk indicators is estimated from 17 representative market data series including VIX.
 Sources: Bloomberg; JPMorgan; Lehman Brothers; Japan Securities Dealers Association.

In this way, as the negative feedback effect between the financial sector and the real economy became stronger, uncertainties about the financial and economic environment increased. Market participants' concerns were fanned by the difficulty in forecasting how far this effect would spread and how long it would continue; for example, to what extent the

decline in housing prices would expand, and to what extent the financial condition of banks and the household sector would deteriorate. Heightened uncertainties about the financial and economic outlook led to the decrease in risk appetite of market participants, i.e., the widespread reduction of overall holdings in risk assets, and this exerted additional adjustment pressures on financial markets (Box 2). It should be noted that, even when the risk for each financial product is priced adequately, selling pressure may increase, particularly for high-risk financial assets, when investors' risk appetite decreases. Persistent downward pressure on credit-related asset prices since the beginning of 2008 resulted partly from the gradual decrease in investors' risk appetite, due to growing uncertainties over financial markets and the economy. Indeed, indicators of risk appetite show that global investors' appetite decreased significantly since entering 2008, to reach levels comparable to those observed in the fall of 1998 when markets experienced the LTCM crisis (Chart I-2-1).

Box 2: Risk Appetite: Concept and Measurement

Risk appetite -- the willingness of investors to bear risk -- depends on both the level of uncertainty about the macroeconomic environment and risk aversion of investors (i.e., the degree to which investors dislike such uncertainty). When uncertainty about the economic outlook increases, holding risk assets causes a higher uncertainty over income and consumption prospects because of the unpredictability about assets' return. For this reason, investors try to raise their share of investment in risk-free assets, in order to avert an increase in uncertainty about income and consumption prospects as much as possible. In other words, when uncertainty over the macroeconomic environment increases, investors try to curb their overall risk asset holdings. However, given uncertainty about the economic outlook, the share of risk assets and relatively risk-free assets in their portfolio may vary among investors, because of the difference in their degree of risk aversion.

According to the asset pricing theory, risk appetite can be expressed by the equation

below, under some simple assumptions:¹⁸

$$\text{Risk appetite} = \frac{1}{\text{Risk aversion} \times \text{Uncertainty over the macroeconomy}}$$

This means that the higher the degree of investors' risk aversion and uncertainty over the macroeconomic environment, the smaller the investors' risk appetite. Risk premium of financial assets is then determined partly by the inherent risk level of each asset, and partly by the level of risk appetite, as shown in the following equation:

$$\begin{aligned} \text{Risk premium of each financial asset} &= \frac{\text{Quantity of risk associated with each asset}}{\text{Risk appetite of investors}} \\ &= \text{Quantity of risk associated with each asset} \times \text{Risk aversion} \times \text{Uncertainty over the macroeconomy} \end{aligned}$$

Here, the quantity of risk associated with each asset depends on the variance of asset return and the correlation with the return of market portfolio. The larger the variance of asset return and the higher the correlation with the return of market portfolio, the larger the quantity of risk of the financial asset. In contrast, when correlation with market portfolio is low or negative, the quantity of risk becomes low owing to portfolio diversification. Factoring in the quantity of risk of each asset, investors determine the amount of each financial asset they hold based upon their risk appetite. Through this process, the asset price and risk premium are determined in the markets.

Under the stable macroeconomic environment that lasted from 2003 to the middle of 2007 (i.e., the Great Moderation), the decline in uncertainty over the macroeconomic environment increased investors' risk appetite and decreased the risk premium on financial assets. The lax risk assessment in the originate-and-distribute model also contributed to pushing risk premiums down, as the quantity of risk in financial assets was undervalued. However, after summer 2007, a corrective reversal in the lax risk assessment of financial assets, followed by an increase in uncertainty over future macroeconomic conditions, caused a decrease in investors' risk appetite and an increase in risk premium.

In the asset pricing model, on which the above two equations are based, it is assumed that investors can trade risk assets without facing any funding liquidity constraints and risk

¹⁸ For more details, refer to Gai, Prasanna, and Nicholas Vause, "Measuring Investors' Risk Appetite," *International Journal of Central Banking*, Vol. 2, No. 1, March 2006.

limits. However, as the experience from the current subprime mortgage problem reveals, investors were forced to sell their risk assets, because of funding liquidity constraints stemming from a tightening in the money markets, and because of a decline in risk limits stemming from downward pressure on banks' capital ratios. Therefore, it is more realistic to consider that investors' risk appetite depends not only on uncertainty in the macroeconomic environment and risk aversion, but also on funding liquidity constraints and capital adequacy.

Since the degree of risk aversion of investors reflects deep-seated preferences, it is assumed to be constant in the asset pricing model. However, the market's overall risk aversion is affected by changes in the relative weight or proportion of different types of investors with different risk aversions. For example, if the proportion of market positions being held by hedge funds increases due to ample funding liquidity, this then reduces the market's overall risk aversion, because the risk aversion of hedge funds is considered to be lower than that of other market participants, such as banks and life insurance companies. In contrast, when liquidity constraints become tighter, hedge funds are forced to sell their assets and the relative weight of their market positions declines, which leads to the increase in the market's overall risk aversion.

Two indicators of risk appetite are shown in Chart I-2-1, although we must note that it is difficult to measure risk appetite adequately, due to a gap between the theoretical concept and actual appetite, as explained above.

The first indicator is based on information about investors' portfolio rebalancing. The cross-sectional linear regression of excess returns and past risks (volatility) is run with a pool of risk-free assets and risk assets.¹⁹ The slope of the regression line represents the risk appetite index. An increase in investors' risk appetite, other things being equal, shifts demand in favor of riskier assets (higher-volatility assets) and their price rises relative to less risky assets, which leads to an increase in the slope of the regression line. Conversely, a decreasing

¹⁹ A total of 63 indices are used, comprising the MSCI Index on stock markets (for 21 developed countries and 19 emerging economies), the Lehman Brothers index on fixed income markets (for 16 developed countries), and EMBI+ on emerging markets bonds (for 7 emerging economies). For each asset, the six-month excess return over cash and 12-month volatility are calculated. For details of calculation, see Deutsche Bundesbank, "Risk Appetite in a Dynamic Financial Market Environment," *Monthly Report*, October 2005. In order to improve the methods applied in the above report, data that exceed two standard deviations are eliminated as outliers for both dependent and independent variables.

risk appetite increases demand for assets associated with lower risks (lower-volatility assets) and triggers a price increase relative to riskier investments, which leads to a decrease in the slope of the regression line. The indicator of risk appetite, based on the daily slope of the regression line, is shown in the left-hand chart of Chart I-2-1.

The second indicator is based on the principal component analysis that aggregates information extracted from various market prices associated with risk appetite. The first principal component captures the latent "commonality" of the underlying risk appetite indicators, which is shown in the right-hand chart of Chart I-2-1.²⁰

Effects of decline in market liquidity

The decline in investors' risk appetite, as well as the widespread risk reevaluation of securitized products and other financial assets, led to higher adjustment pressures in financial markets. Market liquidity is indispensable for such heightened pressures to be absorbed smoothly in financial markets, and for market participants to reprice risks properly. In other words, it is essential to have a market environment in which a large number of market participants that bring together different information can trade financial assets efficiently, and in which financial asset trades can be executed rapidly with a small impact on prices.

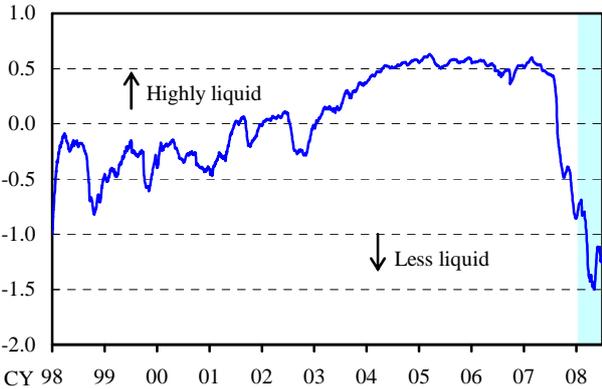
However, liquidity in global financial markets declined considerably, as market participants strengthened selling pressures in the markets on the one hand, and became more cautious to buy assets on the other, reflecting increased uncertainties about the financial and economic environment (Chart I-2-2).²¹ Specifically, in the secondary market for subprime

²⁰ In more detail, the principal component analysis uses 17 risk indicators, comprising: VIX; DAX implied volatility; spread between S&P financial stocks and S&P public-sector stocks; U.S. small-cap stocks; MSCI emerging index; implied volatility of the U.S. dollar against the Japanese yen; the Australian dollar against the Japanese yen; the euro against the Swiss franc; swap spreads among Japan, the United States, and Europe; credit spreads of the speculative grade corporate bonds in Japan, the United States, and Europe; TED spreads in the United States and Europe; and spreads on emerging bonds.

²¹ The liquidity index in Chart I-2-2 shows the number of standard deviations from the mean. It is a simple

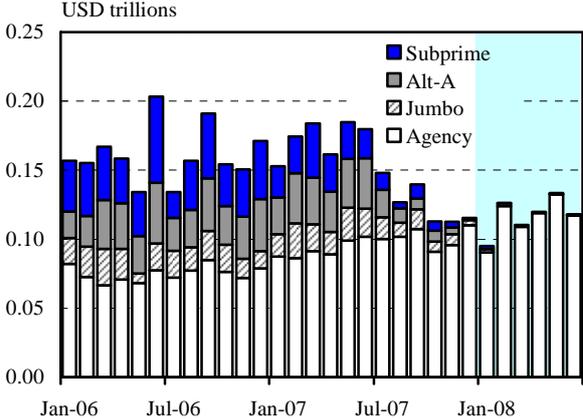
RMBSs, liquidity dried up, which made it difficult for the market to establish prices. The primary market for RMBSs, backed by not only subprime loans but also Alt-A loans, whose risk category falls between subprime and prime loans, and jumbo loans, was effectively closed since the second half of 2007 (Chart I-2-3).²² With regard to resecuritized products backed by subprime RMBSs, there has been virtually no CDO issuance since the end of 2007, due to lackluster secondary market transactions of underlying assets; and ABCP issuance has followed a continuous downward path, with the current amount outstanding declining to about two-thirds of peak volumes (Charts I-2-4 and I-2-5). Moreover, as financial institutions became more cautious about lending, issuance of CMBSs and CLOs, as well as RMBSs in Europe, has stalled.

Chart I-2-2: Global financial market liquidity



Note: Normalized measure of deviation from the average.
Sources: Bloomberg; QUICK; Japan Securities Dealers Association.

Chart I-2-3: U.S. RMBS issuance



Source: UBS.

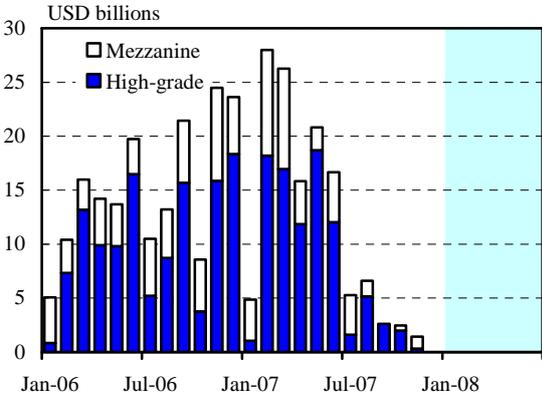
Because a decrease in market liquidity leads to an elevated risk of price volatility, investors do not buy risk assets unless a sufficiently high risk premium is paid to them. This means large price discounts may be needed to persuade investors to buy assets with impaired

unweighted average of 24 liquidity indicators from U.S., European, and Japanese markets, normalized on the period 1997-2004. See the March 2008 *Financial Markets Report* for details. This liquidity index aggregates information based on stock, bond, foreign exchange, and money markets, but does not include securitization markets whose liquidity deteriorated significantly. Therefore, the actual market liquidity may be lower than the index.

²² Issuance of agency RMBSs picked up somewhat, owing to an easing in portfolio restrictions on GSEs, as will be explained later, but not to an extent as to compensate for the decline in non-agency RMBSs.

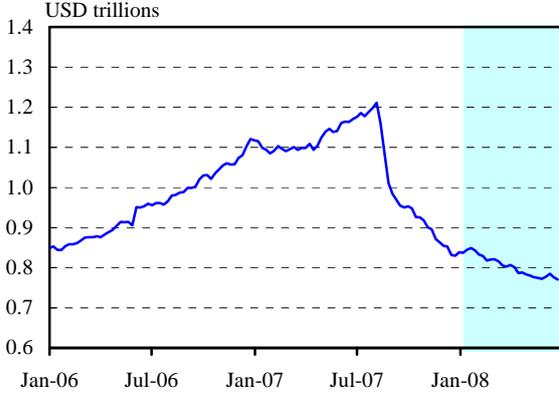
market liquidity. Such a tendency became strengthened amid the decline in risk appetite stemming from an increase in uncertainties over the macroeconomic environment. Therefore, even when transactions were executed in the markets, the extent of asset price declines became large. Market contacts suggested that prices of some securitized products in particular have fallen below the level justified by the deterioration in underlying assets. As such, when market liquidity declines, the smooth functioning of markets is impaired, and price discovery based on fundamentals is hindered.

Chart I-2-4: U.S. CDO issuance



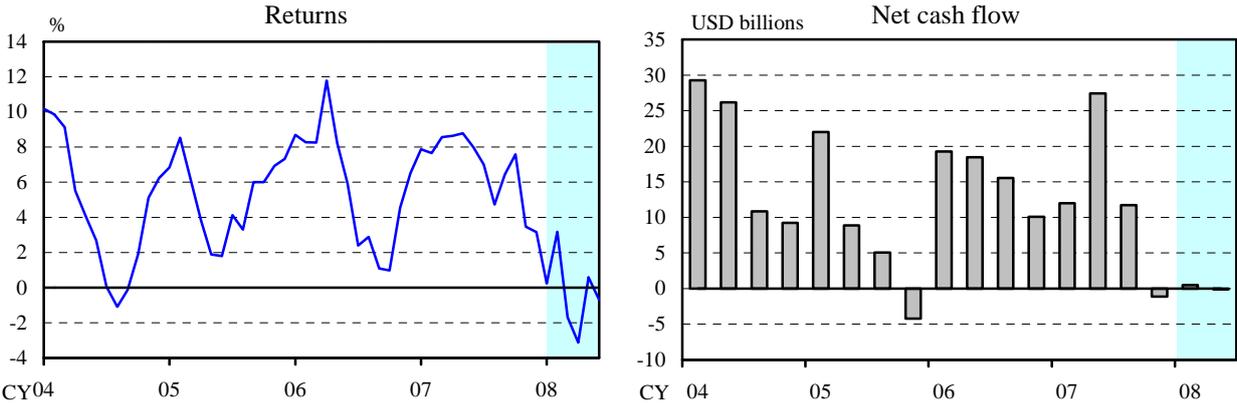
Source: JPMorgan.

Chart I-2-5: U.S. ABCP amount outstanding



Source: FRB.

Chart I-2-6: Hedge funds' returns and net cash flow

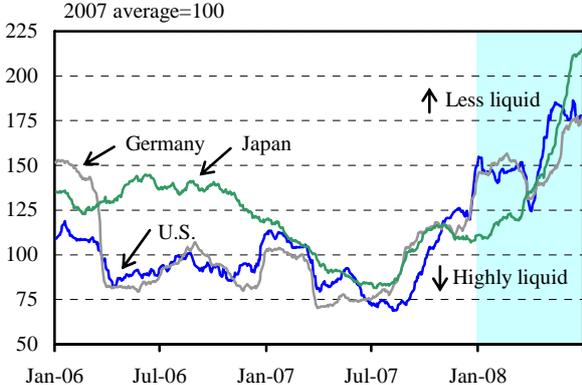


Notes: 1. Returns are the average of 6-month returns on selected hedge fund indices.
 2. Net cash flow is estimated using Lipper TASS database.
 Sources: Barclay Hedge; Credit Suisse Tremont; Eurekahedge; Hedge Fund Research; Hennessee Group; Lipper.

Mark-to-market losses stemming from asset price declines induced investors to

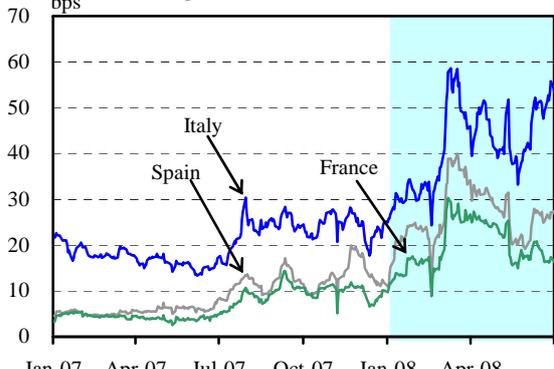
deleverage, and some market participants were forced into fire sales of their assets through mid-March. Investors that had increased their leverage, such as hedge funds, were forced to unwind their positions as financial institutions made margin calls and cut credit lines in repo transactions. In some cases, this caused a further decline in asset prices, and led to additional margin calls. Deleveraging was also accelerated by the fact that hedge funds' performance recorded lows for the year, and that cash outflows and redemptions increased especially for funds with a weak performance (Chart I-2-6). Such pressures to deleverage resulted in further contraction of market liquidity for various securitized products (see Box 3 for details on fluctuations in market liquidity).

Chart I-2-7: Government bond market liquidity



Note: Market liquidity indicates the ratio of intraday high-low spread to trading volume for government bond futures (60-day moving average).
Sources: Bloomberg; QUICK.

Chart I-2-8: Intra-euro area yield spreads on government bonds



Note: 10-year yield spreads relative to Germany.
Source: Bloomberg.

Tightening in investors' funding liquidity constraints reduced market liquidity of not only securitized products but also government bonds, which are considered to be the lowest risk and most liquid assets. Liquidity in government bond markets declined globally, as overseas investors, such as relative-value hedge funds, suddenly unwound their positions, facing the tightening of lending by financial institutions. Liquidity declined especially in Japanese government bond (JGB) markets, which is discussed in more detail in the following Chapter II. 2, but the U.S. and European markets were also by no means unaffected, as reflected in large price fluctuations (Chart I-2-7). For example, the yield spreads of European government bonds over Bunds or German government bonds widened, because hedge funds that had taken positions in anticipation of tightening in the spreads unwound their positions

due to funding liquidity constraints (Chart I-2-8). In addition, securities companies that had taken counterparty positions against the hedge funds' unwinding were forced to increase their holding of government bonds as inventories. As a result, they faced a rise in funding costs, and their functioning as market makers deteriorated, which caused a further decline in the liquidity of government bond markets.

Box 3: Stylized Facts about Market Liquidity

Market liquidity is an elusive concept, reflecting its multi-faceted nature. Nevertheless, one definition of a liquid market that might garner relatively wide support is that it is one where participants can rapidly execute large-volume transactions with a small impact on prices.²³ Indicators of market liquidity based on this definition generally include bid-ask spreads and return-to-volume ratio. Developments in global financial market liquidity shown in Chart I-2-2 are based on an aggregated index construed from these liquidity indicators in various markets in the United States, Europe, and Japan.

The subprime mortgage problem caused a significant contraction of market liquidity, and looking at this in perspective, current and past phases of large shifts in the market liquidity display common characteristics, which can be summarized as the following stylized facts.

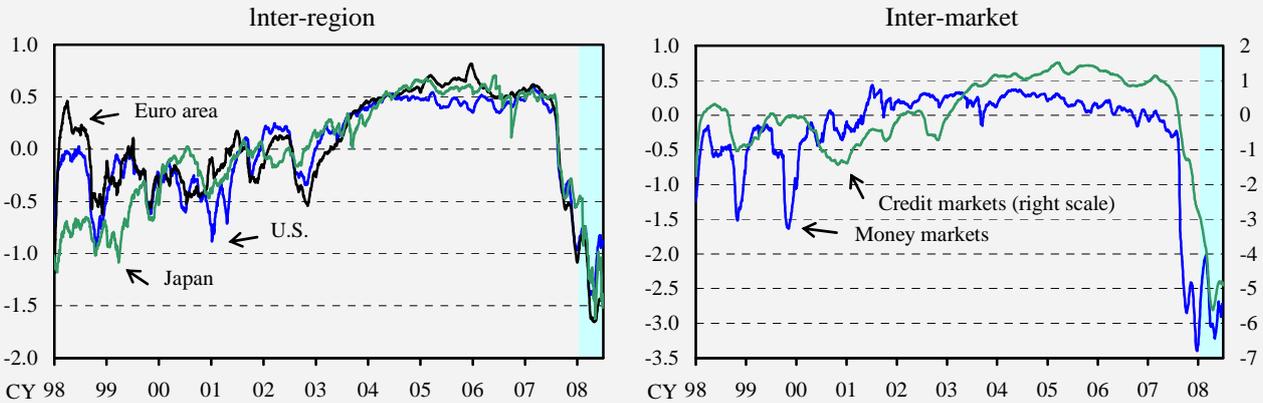
The first stylized fact is a *procyclicality* of market liquidity (Chart I-2-2). During an economic boom, market liquidity increases, because a large number of various economic agents trade financial assets actively due to an increase in risk appetite.

The second stylized fact is a *commonality*, or comovement of liquidity in different markets (Box 3 Chart 1). Commonality of market liquidity between regions or between financial assets can be explained by the effects of cross-market shocks and investors'

²³ For details, refer to Bank for International Settlements, "Market Liquidity: Research Findings and Selected Policy Implications," Report of a Study Group Established by the Committee on the Global Financial System, 1999.

cross-market portfolio rebalancing activities. Commonality tends to become pronounced when many market participants face funding liquidity constraints.

Box 3 Chart 1: Comovement of financial market liquidity

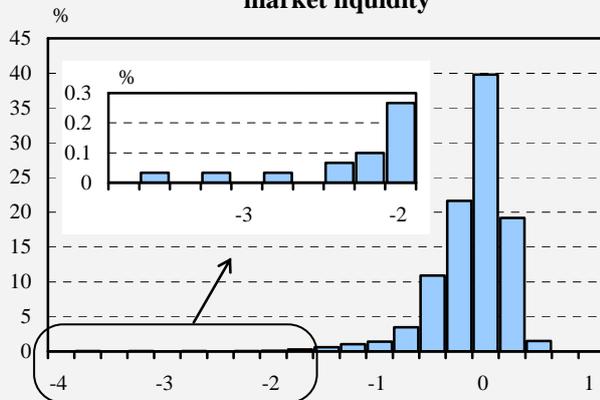


Notes: 1. Normalized measures of deviation from the average.

2. The left-hand chart shows area-based indicators composing market liquidity measures in stock, government bond, FX, credit, and money markets.

3. The right-hand chart shows credit and money market indicators composing market liquidity measures in U.S., euro area, and Japanese

Box 3 Chart 2: Histogram of fluctuations in market liquidity



Note: Deviation from the trend of market liquidity plotted on Chart I-2-2.

Sources: Bloomberg; QUICK; Japan Securities Dealers Association.

Box 3 Chart 3: Financial market liquidity and volatility



Note: Market liquidity is a normalized measure of deviation from the average.

Sources: Bloomberg; QUICK; Japan Securities Dealers Association.

The third stylized fact is *a rare but sudden evaporation* of market liquidity (Box 3 Chart 2). As was most evident in the current market turmoil, this is caused by a market run, i.e., herded panic selling. Individual investors may choose not to participate in the herding behavior and hold assets to maturity, but there is a possibility that they will face a liquidity shock before the asset reaches maturity. In such cases, they incur larger losses, because they

have to bear the consequences of being a late seller, being able to sell only at a much lower price. For this reason, investors are inclined to consider it wise to jump on the bandwagon and sell their assets early. When all investors embrace this kind of outlook at the same time, a market run occurs.

The last stylized fact is *a high correlation between market liquidity and volatility* (Box 3 Chart 3). This is because a rise in volatility of financial assets, due to increased uncertainty over the macroeconomic environment, leads to a decline in investors' risk appetite and less investment in illiquid assets, and hence a fall in market liquidity.

Reintermediation of risks

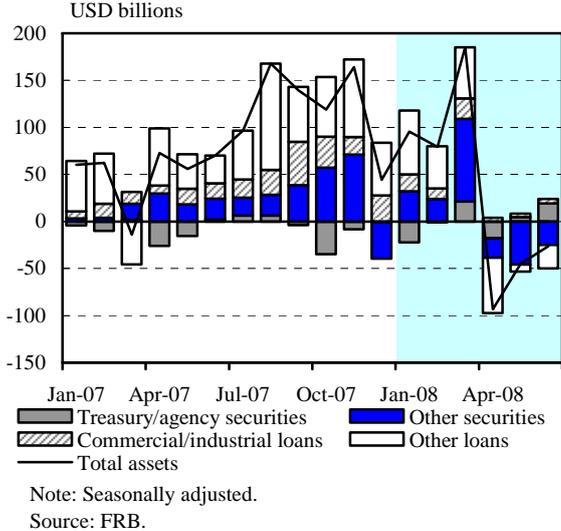
Against the backdrop of a decline in market liquidity, financial institutions were forced into an involuntary expansion of their balance sheets, i.e., the reintermediation of risks, toward the end of March (Chart I-2-9).²⁴ For example, banks were obliged to provide liquidity enhancements to SIVs and ABCP conduits, which faced difficulties in raising funds, due to deterioration of the ABCP market functioning, and to purchase assets from these investment vehicles. In the same manner, amid the turmoil in municipal bond markets, banks were forced to provide liquidity enhancements, and increasingly buy municipal bonds from investment programs, which also faced difficulties in raising funds. In addition, as liquidity declined in the market of RMBSs, backed by Alt-A and jumbo loans on top of subprime loans, banks were increasingly forced to keep these loans on their balance sheets.²⁵ The involuntary expansion of banks' balance sheets also resulted from the deterioration in market liquidity for

²⁴ The increase in "other securities" shown in Chart I-2-9 reflects the fact that U.S. banks took the assets of their affiliated ABCP conduits and SIVs onto their own balance sheets. The increase in "commercial/industrial loans" reflects banks' provision of liquidity support to their affiliated ABCP conduits and SIVs and extension of bridge loans to finance leveraged buyouts (LBOs).

²⁵ In July 2008, IndyMac, a large hybrid thrift/mortgage banking company in the United States specialized in making and selling Alt-A mortgages, went bankrupt. The bankruptcy resulted from the acceleration of deposit withdrawals, following a deterioration in its capital as it incurred large losses from a downturn in the secondary market for Alt-A loans, which made securitization and sales of these loans impossible.

CLOs. The decline in investors' appetite for CLOs left banks holding a large share of leveraged loans, which they had expected to transfer off their balance sheets. Banks also faced additional requests by firms to use their commitment lines, which implies an increase in borrowings. Moreover, from the end of February to March, the deleveraging of affiliated hedge funds forced banks to buy securitized products backed by mortgages.

Chart I-2-9: Monthly changes in U.S. banks' assets

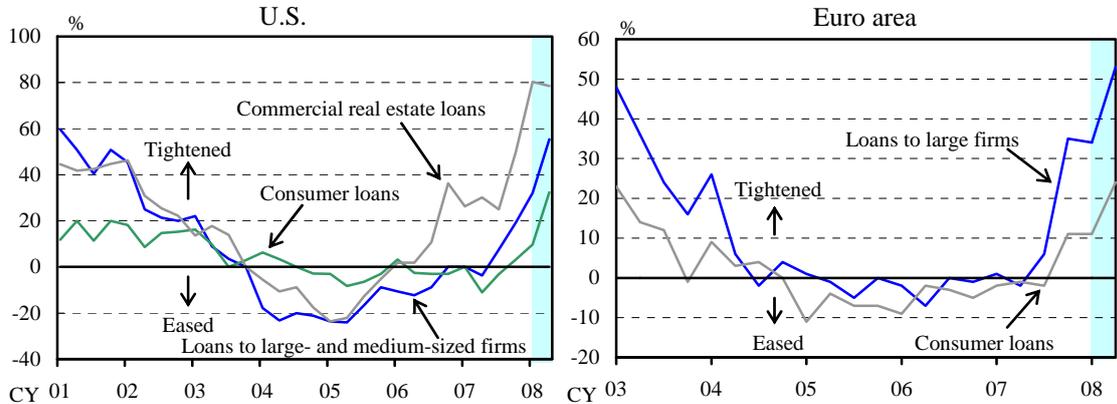


Banks increased their demand for funds in money markets to finance the involuntary expansion of their balance sheets. As a result, the upward pressure on interbank interest rates intensified, and precautionary demand for funds increased further among banks that became concerned about funding liquidity risk.

The unexpected increase in risk assets, as well as larger mark-to-market losses and provision for credit losses, exerted downward pressure on banks' capital adequacy ratios, which then increased counterparty risk in the interbank market and made banks more cautious in carrying out transactions with others. The downward pressure on capital ratios also eroded banks' intermediary functioning and caused them to deleverage. The results of loan surveys conducted by the Federal Reserve and the European Central Bank (ECB) indicate that financial institutions have tightened their lending stance significantly since around the end of 2007, which implies a substantially selective credit extension to the corporate sector (Chart I-2-10). Especially in the United States, tightening of lending standards was most notable with respect to lending to the commercial real estate sector, where concerns over a further

deterioration in underlying fundamentals had heightened; the tightening reached historical levels far surpassing those seen in past recessions. With regard to banks' deleveraging, they strengthened selling pressures for leveraged loans, agency RMBSs and agency bonds from around the end of March. However, these selling pressures were roughly offset by the expansionary pressures on the banks' balance sheets, such as the increase in purchased assets from investment vehicles and hedge funds, liquidity enhancements, and withdrawal of loans on credit lines by firms and individuals. Therefore, banks' balance sheets stayed more or less unchanged after April (Chart I-2-9).²⁶

Chart I-2-10: Banks' lending stance



Sources: FRB, "Senior Loan Officer Opinion Survey on Bank Lending Practices"; ECB, "The Euro Area Bank Lending Survey."

The reintermediation of risks caused by the financial market turmoil gradually began to exert downward pressure on the real economy, via the effects of upward pressure on interbank rates and the tightening of banks' lending conditions. As described in this section, this led to widespread deterioration in the asset quality of financial products, as well as higher uncertainties about the macroeconomic environment, depressing investors' risk appetite and causing a decline in asset prices.

²⁶ Chart I-2-9 shows that the outstanding amount of assets on banks' balance sheets has decreased significantly in April, but this owes to the fact that some commercial banks started to apply fair value option accounting (FAS 159).

3. Responses of Central Banks and Private Financial Institutions to the Turmoil

As explained above, in global financial markets through mid-March, concerns heightened considerably over the financial condition of U.S. and European banks and over financial system stability. To address the elevated tension in financial markets, central banks in major countries took a series of liquidity provision measures,²⁷ while many of the major private financial institutions strengthened their capital bases.

Central banks' responses

The Federal Reserve enhanced the liquidity provision measures already introduced and took a step further to provide funds directly to primary dealers. On March 7, 2008, the Federal Reserve announced two initiatives to address heightened liquidity pressures in term funding markets. One was to increase the amount outstanding in the Term Auction Facility (TAF) established in December 2007, from 30 billion to 50 billion dollars for each auction.²⁸ The other was to initiate a series of 28-day term repurchase transactions that are expected to cumulate to 100 billion dollars via weekly tenders, and are longer in maturity than regular operations. On March 11, 2008, five major central banks took the second coordinated actions following December 2007. The Federal Reserve announced the authorization of increases in its existing temporary reciprocal currency swap lines with the ECB and the Swiss National Bank (SNB) from 24 billion to 36 billion dollars in total,²⁹ and the introduction of the Term Securities Lending Facility (TSLF) to primary dealers.³⁰ The TSLF lends up to 200 billion

²⁷ For more details, refer to the following papers:

Bank of Japan Financial Markets Department, "Central Bank Responses to the Money Market Turmoil Stemming from Subprime Woes," Bank of Japan Research Paper, 2008.

Bank for International Settlements, "Central Bank Operations in Response to the Financial Turmoil," Committee on the Global Financial System Publications, No. 31, 2008.

²⁸ Unlike the regular money market operations for primary dealers, the TAF has the following characteristics: (1) it targets depository institutions eligible to the primary credit discount window program by the Federal Reserve Banks -- their counterparties in generally sound financial condition; and (2) a wide range of collateral that is eligible to the discount window program is acceptable.

²⁹ The currency swap line arrangements allow the ECB and the SNB to provide U.S. dollars in order to meet the demand for dollars by European financial institutions. The ECB and the SNB draw on the swap facility, conducting term U.S. dollar funding auctions in tandem with the Federal Reserve's TAF auctions. Counterparties eligible for the ECB's and SNB's operations, through auctions offered by these central banks, would be able to secure U.S. dollars against ECB- and SNB-eligible collateral.

³⁰ While the existing Securities Lending Program offers specific Treasury securities for loan against

dollars of Treasury securities held by the Federal Reserve for a term of 28 days by a pledge of other securities, including agency RMBSs that are difficult to finance via repos, and is intended to foster the functioning of repo markets. In addition, on March 16, 2008, the Federal Reserve established a Primary Dealer Credit Facility (PDCF), a discount window program for primary dealers to improve the ability of primary dealers to provide financing to participants in securitization markets. Further, the Federal Reserve provided secured funding to Bear Stearns, a prominent investment bank facing difficulties in continuing its operations, through JPMorgan Chase, which later purchased Bear Stearns on March 14. The Federal Reserve also agreed to establish a term funding facility to a limited liability company, in order to facilitate the purchase on March 16.

These actions taken by the Federal Reserve and other central banks can be interpreted as measures intended to ease strains in overall financial markets by restraining increases in liquidity premiums on interbank transactions (Box 4). The series of liquidity provision measures taken in a timely manner were able to stave off a "market run" involving mutually correlated deterioration in market liquidity and funding liquidity (Box 3). Liquidity provisions by central banks thus played a major role in avoiding market runs.

Although these liquidity provision measures were effective in avoiding a widespread market run, financial institutions' balance sheets continued to expand and strains in money markets remained high even after April. Under these circumstances, on May 2, 2008, the Federal Reserve, together with the ECB and the SNB, announced an expansion of their liquidity measures. Specifically, three measures were announced: (1) an increase in the amounts auctioned under the TAF (from 50 billion to 75 billion dollars for each auction); (2) further increases in the existing temporary reciprocal currency swap lines with the ECB and the SNB (from 36 billion to 62 billion dollars in total); and (3) an expansion of the collateral that can be pledged in the TSLF auctions (to include AAA-rated ABSs). The first two measures sought to address the persistent liquidity pressures in U.S. dollar term funding markets, and the third promoted improvement in financing conditions in a broader range of

Treasury general collateral, the TSLF offers Treasury general collateral. As for repos with agency RMBSs and agency bonds, financial institutions have incentives to bid in the TSLF to exchange those securities for Treasury securities rather than financing them in the market, as long as the spreads of those repos over the Treasury repo rate are above the minimum bid rate of 0.1 percent or 0.25 percent.

financial markets.³¹ In addition, the Bank of England (BOE), on April 21, 2008, launched a Special Liquidity Scheme (SLS), a securities lending facility similar to the TSLF in the United States.³² The scheme aimed to improve the liquidity positions of the banking system by allowing financial institutions to swap an overhang of RMBSs on their balance sheets for UK Treasury Bills.

Government's responses to GSEs

In response to a decline in market liquidity of RMBSs, a major product in the securitization markets, a series of measures were taken to encourage GSEs to increase their investments in securitized products. From mid-February until early March, the Office of Federal Housing Enterprise Oversight (OFHEO) permitted two GSEs, Fannie Mae and Freddie Mac, to raise their conforming loan limits, and removed the portfolio growth caps for both GSEs. In mid-March, OFHEO and the two GSEs jointly announced the reduction of the OFHEO-directed capital requirement above the minimum statutory capital requirement, and the provision of up to 200 billion dollars to the RMBS market, through these GSEs' purchasing and guaranteeing of RMBSs. In late March, the Federal Home Loan Banks (FHLBs), which are engaged in providing secured funding to their member financial institutions, announced measures to temporarily increase the regulatory limit for investment in RMBSs from 300 percent of capital to 600 percent of capital for two years, and to provide the RMBS market with over 100 billion dollars of additional liquidity.

Private financial institutions' responses

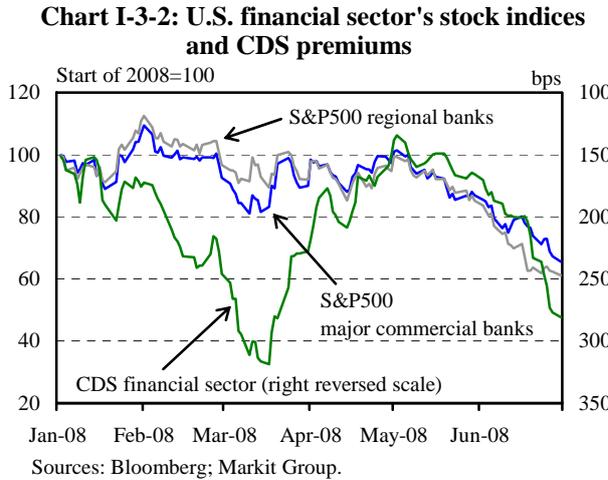
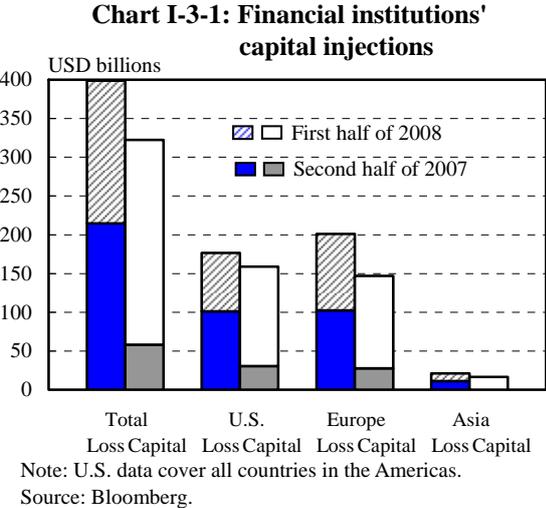
U.S. and European financial institutions reinforced their capital base, in order to offset the downward pressure on their capital ratios exerted by the expansion of their balance sheets, due to a reintermediation of risk, as well as the increase in securitized product-related losses.

³¹ European financial institutions constantly have short positions in U.S. dollars, as they only have limited sources of U.S. dollar funding; they generally do not have retail deposits in U.S. dollars and have limited access to the Federal Reserve's funds-provision measures. Therefore, the bid-to-cover ratio remained higher for the TAF offered through the ECB and SNB than for the TAF offered by the Federal Reserve.

³² The scheme has three features: (1) each swap will be as long as 1 year and may be renewed up to a total of 3 years; (2) the frequency of the use of the scheme will depend on market conditions; and (3) the scheme will involve newly issued Treasury Bills for loan.

As of the end of June 2008, U.S. financial institutions have raised capital equal to the losses they posted, since the subprime mortgage problem surfaced (Chart I-3-1). This capital reinforcement played a role in preventing a downward spiral in financial markets.

However, capital reinforcement since April was largely sourced by issuing high-yielding preferred stocks, as well as common stocks priced at a large discount of up to nearly 50 percent, which led to an increase in financial institutions' cost of capital. Additionally, in the stock markets, there were heightened concerns about a deterioration in supply-and-demand conditions and dilution caused by banks' capital reinforcement. Meanwhile, the proportion of commercial mortgages in U.S. regional banks' portfolios had risen considerably in the last decade, although their exposures to subprime-related products were limited. Therefore, market participants suggested that concerns over an increase in write-offs of regional banks would heighten, if commercial real estate market conditions, on top of the housing market, remained weak.



Market reactions

As a result of responses of central banks, governments, and private financial institutions, concerns about financial system stability and overly pessimistic views about the U.S. economy were abated through mid-May. Spreads of agency RMBSs and agency bonds started to narrow after mid-March, and the functioning of repo markets, where these securities are

used as collateral, improved (Charts I-1-13, I-1-14, and I-1-16). In addition, the issuance volume of agency RMBSs increased, due to eased restrictions on the amount of mortgages which GSEs could purchase (Chart I-2-3). Because the private sector's issuance of RMBSs remained virtually suspended in the United States, mortgage markets became even more dependent on GSEs in the first half of 2008. As for CMBSs, ABSs backed by consumer loans, and municipal bonds, the spreads narrowed and prices rose, although the level of those spreads was still higher than usual (Charts I-1-6, I-1-7, and I-1-12). With regard to subprime RMBSs whose underlying assets continued to deteriorate, price declines of AAA-rated securities came to a halt temporarily in April 2008, although those of BBB-rated securities continued (Chart I-1-2).

However, the U.S. financial system became unstable again, amid the continued negative feedback loop between the real economy and financial markets. After mid-May, concerns about the deterioration in financial institutions' earnings resurged, against the background of concerns about an increase in nonperforming assets, due to an economic downturn and a persistent decline in housing prices. This led to a plunge in stock prices of both major commercial banks and regional banks, as well as a widening of credit default swap (CDS) premiums of these banks (Chart I-3-2). Spreads of securitized products also widened again, due to the view that their underlying assets would deteriorate further, and banks which faced worsened financial conditions and increasing difficulties in raising capital would strengthen selling pressure on their assets (Charts I-1-2, I-1-3, I-1-6, and I-1-7). In addition, market concerns over the financial condition of monolines and GSEs, which function as part of the market infrastructure, reemerged. After June, CDS premiums of monolines surged (Chart I-1-11),³³ and spreads of agency RMBSs and agency bonds started to widen again (Charts I-1-13 and I-1-14).³⁴

³³ In early June 2008, selling pressure on securitized products and municipal bonds increased, triggered by a downgrade in the ratings of the two largest monolines, which together guarantee more than 1 trillion dollars in total. As monolines guarantee CDOs held by financial institutions, a downgrade of monolines implies lowering guarantee capabilities and requires financial institutions to increase provisions for credit losses.

³⁴ The amount outstanding of securities issued by Fannie Mae and Freddie Mac, 5.8 trillion dollars of both agency RMBSs and agency bonds as of the end of the first quarter of 2008, exceeds that of U.S. Treasury securities at 5.3 trillion dollars. Investors and financial institutions in many countries hold these securities. For this reason, tensions in the market rose sharply in early July, as stock prices of these two GSEs fell rapidly, reflecting concerns over their financial condition. In addressing this situation, the U.S. Department

Box 4: Liquidity and Credit Risks in Interbank Transactions

The LIBOR-OIS spread is an indicator of credit risk and liquidity risk premium in interbank transactions. This is because LIBOR reflects current and expected future overnight interest rates over the corresponding period of time, and the premium associated with counterparty credit risk and liquidity risk, while the OIS rate reflects pure expectations about future overnight interest rates.

The OISs are interest rate swaps between the overnight interest rate over a specified period and the fixed interest rate. Since OIS transactions do not involve a cash flow, the premium for its credit and liquidity risks is quite limited. On the other hand, LIBOR is the rate on unsecured interbank lending, and counterparty credit risk premium is reflected in LIBOR, because the lender requires compensation for the risk of default on this credit. Liquidity premium is also reflected in LIBOR, because of financial institutions' incentive to protect their liquidity positions under uncertainty. Specifically, as strains in money markets grow, financial institutions find it harder to secure term funding. In such a funding environment, some financial institutions have an increased demand for funding, but others become reluctant to provide cash since they seek to protect their own liquidity positions. This then pushes the LIBOR well above what could be considered reasonable compensation for default risk.

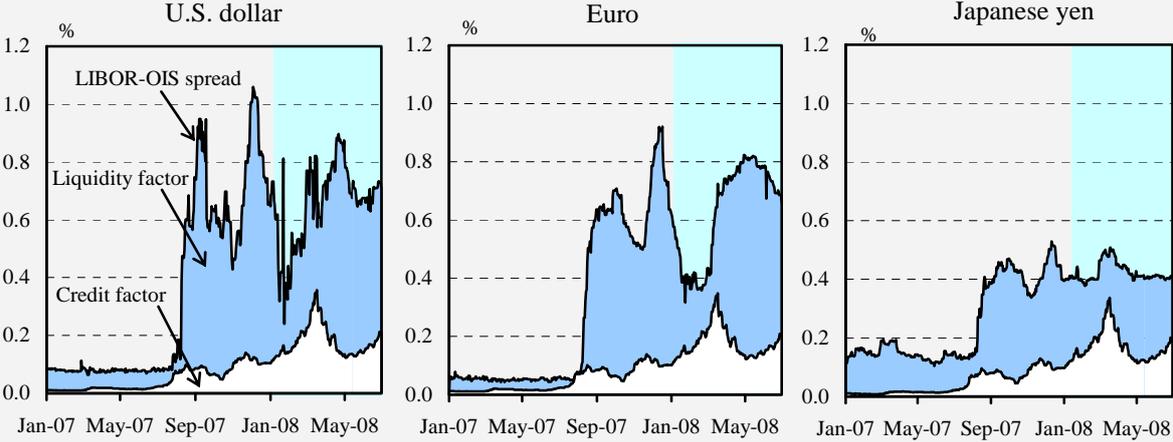
In order to reduce credit risk, financial institutions' capital reinforcement becomes absolutely indispensable. On the other hand, in order to reduce liquidity risk, the more aggressively financial institutions try to protect their liquidity positions, the more they increase precautionary demand for liquidity, and thus the more reluctant they become to provide funds, leading to a further tightening of the markets. Therefore, liquidity provisions by central banks play an important role in reducing liquidity risk in interbank transactions.

Box 4 Chart 1 shows the decomposition of 3-month LIBOR-OIS spreads into credit risk

of the Treasury (Treasury) and the Federal Reserve implemented measures to support the GSEs on July 13, 2008. The Treasury announced that it would immediately commence talks with Congress regarding legislation to allow (1) a temporary increase in lines of credit the GSEs have with the Treasury, (2) temporary authority for the Treasury to purchase equity in either of the two GSEs, and (3) a consultative role of the Federal Reserve in the new GSE regulator's process for setting capital requirements and other prudential standards. At the same time, the Federal Reserve announced that it had granted the Federal Reserve Bank of New York the authority to lend to the two GSEs.

premium and liquidity risk premium under some assumptions. Credit risk premium is estimated based on prices of CDSs for banks in the LIBOR panel.³⁵ Any difference between the observed LIBOR-OIS spread and the estimated credit risk premium is assumed to reflect the liquidity risk premium. As for U.S. dollar spreads, the liquidity risk premium, which had larger explanatory power for fluctuations in the spreads, rose from the end of February, but the rise temporarily came to a halt, following the Federal Reserve's liquidity provision measures. The credit risk premium also rose until mid-March, but then started to decline thereafter. However, the liquidity risk premium rose again after April and remained high, and the credit risk premium also widened again after June, amid resurging concerns about the financial condition of banks. Euro spreads rose sharply from March, and the expansion of the liquidity risk premium came to a halt in May, but continued to be at a high level.

Box 4 Chart 1: Decomposition of 3-month LIBOR-OIS spreads



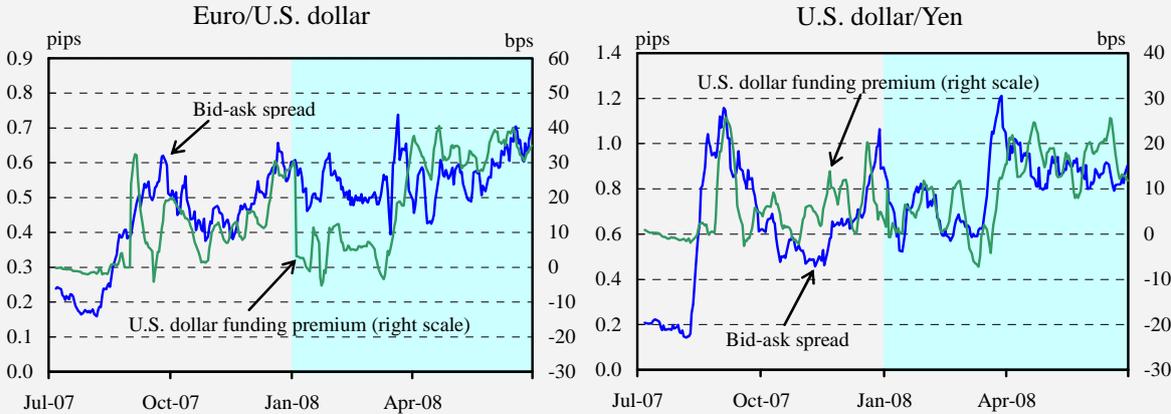
Sources: Bloomberg; Meitan Tradition.

In foreign exchange (FX) swap markets, many financial institutions, especially European ones, moved actively to convert euros and yen into U.S. dollars after August 2007, leading to an increase in the U.S. dollar funding premium (Box 4 Chart 2). If FX swap markets are highly liquid, they can absorb supply-and-demand shocks in the U.S. dollar market by diversifying the effects of shocks to other currency-denominated money markets, and therefore the U.S. dollar funding premium does not emerge. If FX swap markets are illiquid, however, it is difficult for financial institutions to find sellers of U.S. dollars, and this

³⁵ For details of the estimation, see Bank of England, "An Indicative Decomposition of Libor Spreads," *Quarterly Bulletin*, Vol. 47, No. 4, 2007.

exerts upward pressure on the U.S. dollar funding premium. Indeed, the bid-ask spread (the difference between prices quoted by buyers and sellers), a proxy for the market liquidity of FX swaps, has remained wide in FX swap markets for the euro/U.S. dollar and the U.S. dollar/yen pairs since August 2007. This seems to have contributed to the increase in the U.S. dollar funding premium. The reciprocal currency (swap) arrangements of the Federal Reserve with the ECB and the SNB have proved to be measures aimed at easing the effects of reduced market liquidity.

Box 4 Chart 2: FX swap market liquidity and U.S. dollar funding premium (3-month)



Note: 5-day moving average. U.S. dollar funding premium indicates the spread between the FX swap implied U.S. dollar rate and U.S. dollar LIBOR.
Sources: Bloomberg; Meitan Tradition.

4. Heightened Inflationary Concerns, and Commodity Market Developments

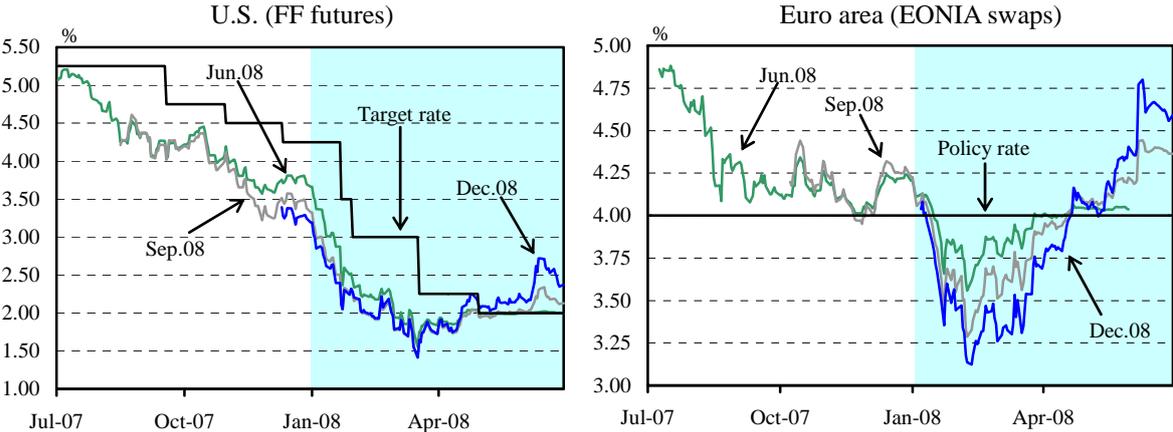
The series of various liquidity provision measures taken by central banks were effective in preventing a collapse of the financial system, as well as a downward spiral in the financial sector and the real economy. However, fundamental concerns about the profitability of financial institutions and deterioration of the economic activity have not been swept away, and uncertainties about the economic and financial situation remained high. These conditions were aggravated by heightened concerns about inflation. The heightened concerns about global inflation due to the continued rise in commodity prices, such as a surge in crude oil

prices, increased uncertainties about the steering of future monetary policy, and the macroeconomic environment, and further reduced market participants' risk appetite.

Heightened inflationary concerns and unstable interest rates

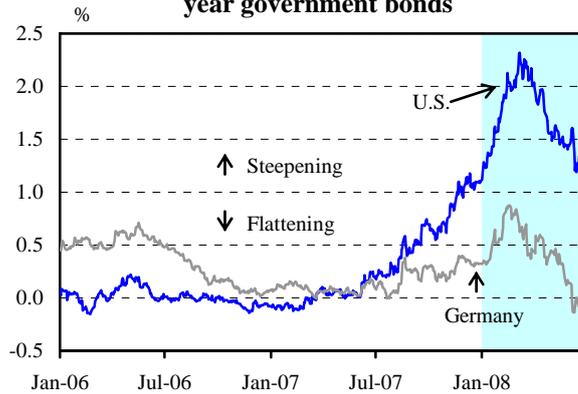
U.S. and European yield curves continued to steepen until mid-March, reflecting concerns about the downward pressure from the U.S. subprime mortgage problem on economic activity, but then flattened off as the overly pessimistic views on the economic outlook receded (Charts I-4-1 and I-4-2). Meanwhile, commodity prices remained on an upward trend even after the subprime woes emerged, leading to a gradual increase in concerns about inflation (Charts I-4-3 and I-4-4). In mid-May, long-term interest rates rose sharply and the yield curves flattened further, owing to stronger expectations for a policy rate hike in the United States and Europe, where inflationary concerns rose. Concurrently, many market participants executed transactions in European markets to hedge against positions in structured bonds that bet on steepening yield curves, which further accelerated the rise in interest rates. Heightened concerns about inflation made interest rate movements even more unstable, because liquidity in government bond markets remained low globally from mid-March, due to the exit of relative-value hedge funds from the markets and a decline in the market-making capability of financial institutions.

Chart I-4-1: Forecasts for policy rates



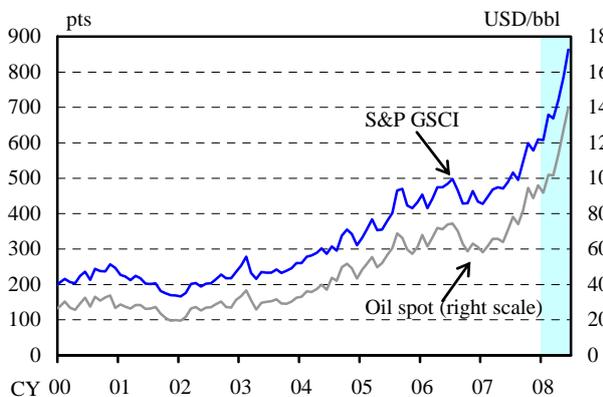
Note: EONIA swaps show 1-month forward rates.
Source: Bloomberg.

Chart I-4-2: Yield spreads between 10- and 2-year government bonds



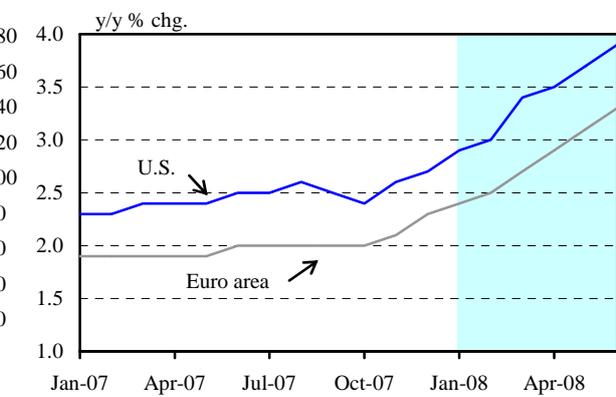
Source: Bloomberg.

Chart I-4-3: Commodity prices



Note: Oil spot indicates the WTI price.
Source: Bloomberg.

Chart I-4-4: Forecasts for CPI inflation in 2008



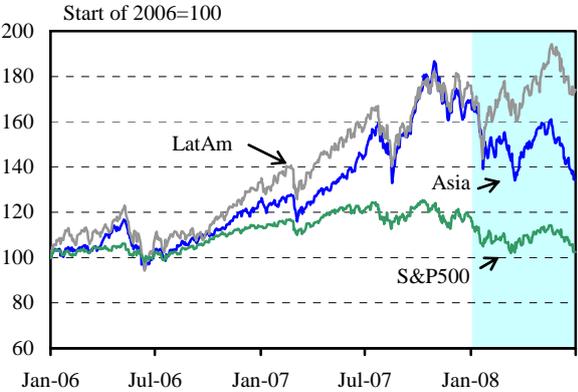
Sources: Blue Chip Financial Forecasts; Consensus Economics.

A surge in commodity prices may place pressure on long-term interest rates, depending on market sentiment about future monetary policy, namely, upward pressure through concerns about inflation, or downward pressure through concerns about an economic downturn. In late June, as concerns over an economic downturn increased, the markets overall continued to be volatile and long-term interest rates declined with a flight to quality due to the resurgence of financial system uncertainty.

Heightened concerns about inflation also significantly affected financial markets in emerging economies. In the second half of 2007, despite the effects of the subprime mortgage problem, stock prices moved at around historical highs upheld by the so-called "decoupling" theme, according to which the negative impact of U.S. economic slowdown would be offset by domestic demand-led growth in emerging economies. However, since entering 2008, developments in stock prices have varied across countries (Chart I-4-5). While stock prices in

resource-rich countries that benefited from the rise in commodity prices stayed unchanged or were on an uptrend, those in non-resource-rich countries with higher inflation, and/or notable deterioration in external and fiscal balances, showed relatively larger declines. Emerging economies' currencies, on the whole, remained at around historical highs, but the performance gap between resource-rich and non-resource-rich countries widened further (Chart I-4-6). In particular, currencies of Asian economies with high external dependence on energy, such as South Korea, India, the Philippines, and Vietnam, followed a downtrend along with stock prices.

Chart I-4-5: Emerging stock price indices



Notes: 1. MSCI emerging market indices in local currencies.
 2. LatAm indicates Latin American index.
 Source: Bloomberg.

Chart I-4-6: Emerging currency indices



Notes: 1. JPMorgan emerging currency indices.
 2. LatAm indicates Latin American index.
 Source: Bloomberg.

Background to the continuous rise in commodity prices

The factors behind the continuous rise in commodity prices that are exerting inflationary pressures globally can be broadly categorized into two factors: the demand-and-supply factor, and the financial factor.

The demand-and-supply factor is mainly based on the effects of an increase in demand for commodities against the background of growth in economies worldwide, mainly emerging economies. Consumption of energy and grain has grown in China and other emerging economies, boosted by the economic expansion, as well as a proliferation of goods that largely consume energy and grain in their production (such as automobiles and beef). Furthermore, some emerging economies have controlled the domestic price of commodities,

and hence domestic demand for commodities has not been adjusted through the price mechanism. Along with increasing demand, there were some periods when both supply constraints in producing countries and geopolitical risks placed upward pressure on commodity prices.

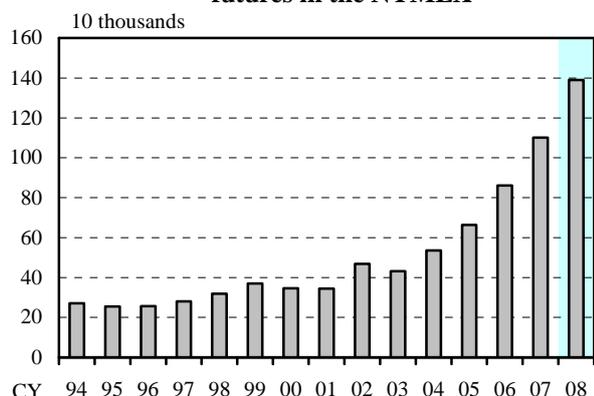
The rise in commodity prices, due to the demand-and-supply factor, may have been amplified by several financial factors, although the size of impact is uncertain. For example, some consider that the accommodative global monetary conditions not only supported global economic growth and increased demand for commodities but also induced speculative investment in commodities and the rise in commodity prices.³⁶ This refers to investors' activities of increasing inventory investment in commodities, and seeking capital gains due to lower inventory cost under a low interest rate situation.³⁷ In addition, the rapid capital inflows into the commodity futures market in recent years might have put upward pressure on futures prices, and then raised spot prices (Chart I-4-7).³⁸

³⁶ In theory, a decline in real interest rates not only stimulates global demand for commodities, but also suppresses supply of commodities. In a low real interest rate situation, for example, oil-producing countries are unlikely to secure sufficient income gain, even if they increase oil production and invest earned profits in financial assets. In this case, it may be more profitable for oil-producing countries to reduce their supply of oil and seek an increase in oil prices. In contrast, in a high real interest rate situation, it may be profitable for them to increase oil production and invest earned profits in financial assets for high income gain. Indeed, in the early 1980s, the rise in real interest rates in the United States led to an increase in oil production and a fall in oil prices.

³⁷ Some major U.S. and European financial institutions began to warehouse oil at storage tanks in early 2004. If such speculative trading is the main factor behind the rise in commodity spot prices, both an increase in crude oil inventories and positive spreads of futures prices over spot prices (i.e., contango) can be observed concurrently. An increase in oil inventories cannot be confirmed from statistical data, as it is not possible to distinguish whether inventories are held for speculative reasons or stored for future consumption. On the other hand, contango, which was rarely observed until 2005, has often emerged since then.

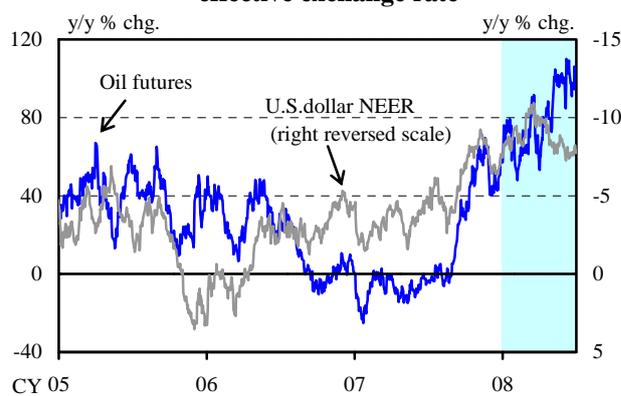
³⁸ Investors, such as pension funds, who have longer investment horizons, increased their presence in the futures market with considerable speed, and started to take long positions. This was probably one of the factors placing upward pressure on futures prices. Counterparties to these investors held short positions in the futures market, and when they began to hedge their positions in the spot market, upward pressures were exerted on spot prices.

Chart I-4-7: Trading volume of commodity futures in the NYMEX



Note: As of May 2008. Daily average.
Source: New York Mercantile Exchange.

Chart I-4-8: Oil prices and U.S. dollar nominal effective exchange rate



Note: Oil futures indicate the price of the nearest contract months.
Source: Bloomberg.

As another financial factor, there is a view that the depreciation of the U.S. dollar resulting from an interest rate cut in the United States may have led to an increase in commodity prices. One possible mechanism is that since most commodities are priced in U.S. dollar terms, depreciation of the U.S. dollar may have increased demand for commodities in non-U.S. dollar areas, and thus triggered an increase in prices. Another possibility is that as a weaker U.S. dollar leads to a higher U.S. inflation rate via increases in import prices, investors may have increased their investments in commodities to hedge against inflation. Indeed, the correlation between crude oil prices and the nominal effective exchange rate of the U.S. dollar became higher in recent years (Chart I-4-8).

Increase in liquidity in the commodity futures market

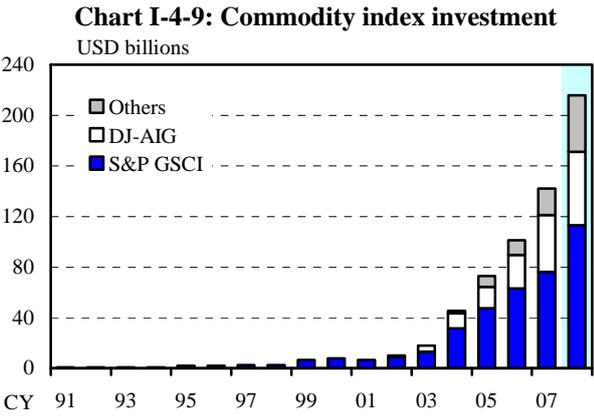
There are several factors behind the continued investment inflows into the commodity futures market.

First, under the global low interest rate situation since 2003, speculators, such as hedge funds, used the futures market as one of the means to "search for yield." In addition, a notable feature in recent years is that not only speculators with short-term investment horizons but also pension funds and other investors with long-term investment horizons have rapidly increased their presence in the commodity futures market (Chart I-4-9). The purpose of long-term investors is diversified investment and inflation hedging. More investors began to enter the market, as they had recognized that commodity futures investment in the long run

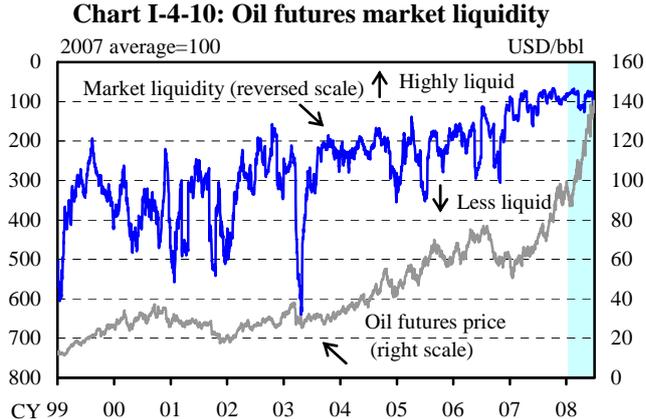
displays risk-return characteristics similar to investment in stocks, and that the return on commodity futures was uncorrelated with returns on stocks, negatively correlated with returns on bonds, and positively correlated with inflation.³⁹

Second, another driving force that attracted investors into the market was the enhancement of the futures market infrastructure.⁴⁰ For example, investment channels such as commodity indices and exchange-traded funds (ETFs) became more widely used in 2003-04. The New York Mercantile Exchange (NYMEX) in the United States introduced its electronic trading platform for commodities in 2006. These improvements in infrastructure have led to the rapid execution of trades and reduction in transaction costs.

As a result of the above factors, more investors continued to enter the commodity futures market, and hence market liquidity followed an uptrend (Chart I-4-10).



Note: As of May 2008. Investments in U.S. dollar billions are estimates only. A large percentage of the total commodity investment is over-the-counter and therefore cannot be tracked precisely.
Source: Goldman Sachs.



Note: Market liquidity indicates the ratio of daily return to trading volume for oil futures. Exponentially weighted 30-day moving average.
Source: Bloomberg.

Returns on commodity futures investment

A comparison between returns on commodity futures investment (S&P GSCI) and those on

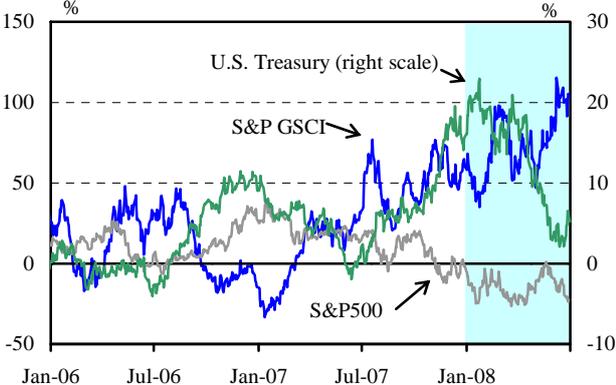
³⁹ For details, see Gorton, Gray B., and K. Geert Rouwenhorst, "Facts and Fantasies about Commodity Futures," *Financial Analysts Journal*, 62, 2006.

⁴⁰ For investors' entry into the commodity market, see Terada, Tai, and Tokiko Shimizu, "Monitoring Commodity Markets -- From the Perspective of Understanding Global Financial Market Trends," *Bank of Japan Review*, 2007-E-5, 2007.

stock investment (S&P 500) has shown a negative correlation, at least in the past few years (Chart I-4-11).⁴¹ This became more evident since summer 2007, after the subprime mortgage problem surfaced. On the other hand, a comparison between returns on commodity futures investment and those on government bond investment showed a weak positive correlation since summer 2007, reflecting the rise in government bond prices because of the flight to quality, but showed a negative correlation since May 2008, reflecting the decline in government bond prices because of heightened concerns over inflation.

High commodity prices, particularly of crude oil, have led to growing concerns over inflation and an economic slowdown, and this has increased a risk of decline in bond prices (or rise in interest rates), as well as a risk of decline in stock prices. Under these circumstances, investors in commodity futures seem to have fulfilled their initial purposes of making diversified investments.

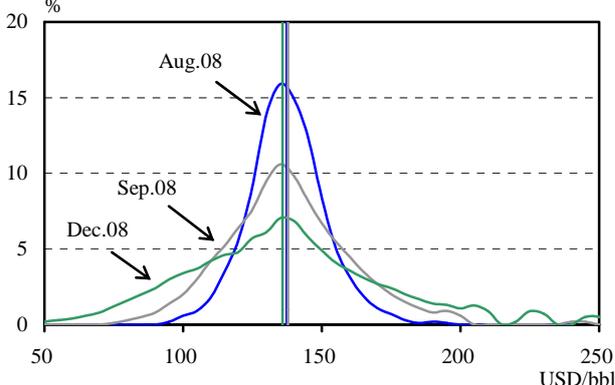
Chart I-4-11: Returns on commodities, stocks, and government bonds



Note: Annualized rates. S&P GSCI commodity is the sum of 6-month return and the corresponding Treasury yield. Both S&P 500 index (with dividends) and Lehman Brothers U.S. Treasury index (with interest) indicate 6-month returns.

Sources: Bloomberg; Lehman Brothers.

Chart I-4-12: Implied probability distribution of oil futures prices



Note: As of the end of June 2008. Probability distribution implied in premiums at 5-dollar interval strike prices. Vertical lines indicate the average of oil futures prices.

Source: New York Mercantile Exchange.

However, the correlation between prices of commodity futures and those of other financial assets is not necessarily stable. At least in the short term, there is a risk that fluctuations in commodity prices may significantly affect returns to investors. As mentioned above, liquidity in the commodity futures market has become higher with the entry of various

⁴¹ S&P GSCI is a composite index of commodity sector returns, which is based on the weighted prices of futures contracts of 24 commodities produced around the world.

investors, such as speculators and pension funds, but in terms of diversity of market participants, investors in the commodity future market are still relatively homogenous compared to those in stock markets, where many financial institutions, individuals, and companies, as well as speculators and pension funds, participate. As described earlier, market liquidity may exhibit a "rare but sudden evaporation" (Box 3). Especially in markets where participants are homogenous, they tend to choose similar trading behavior, and therefore there is a risk that the markets may move in one direction, and liquidity may evaporate suddenly when a shock occurs.

The outlook for commodity prices has recently become increasingly uncertain. The distribution of outlook for prices implied from options on crude oil futures (WTI), as of the end of June 2008, indicates that about 140 dollars a barrel is the most likely price level, but the tails are fat on both sides of the distribution, and the outlook for distant contract months was widely distributed (Chart I-4-12).⁴² Considering these points, it is highly likely that commodity prices will fluctuate significantly in the future. If that occurs, there is a possibility that other financial markets will be affected considerably, as commodity futures have come to play a significant role as financial investment instruments.

⁴² The U.S. Commodity Futures Trading Commission (CFTC), the U.K. Financial Services Authority (FSA), and ICE Futures Europe reached an agreement for expanded information-sharing for surveillance of energy commodity contracts. U.S. Congress is also debating measures to fill regulatory "loopholes" in crude oil futures transactions. It is uncertain what shape these developments will take and what impact they will have.

II. Developments in Domestic Financial Markets in the First Half of 2008: "Linkage with Global Financial Markets" and "Relative Stability"

Chapter II reviews developments in various financial markets during the first half of 2008, focusing primarily on domestic ones, which were relatively stable despite the turmoil in global financial markets.

1. Money Markets

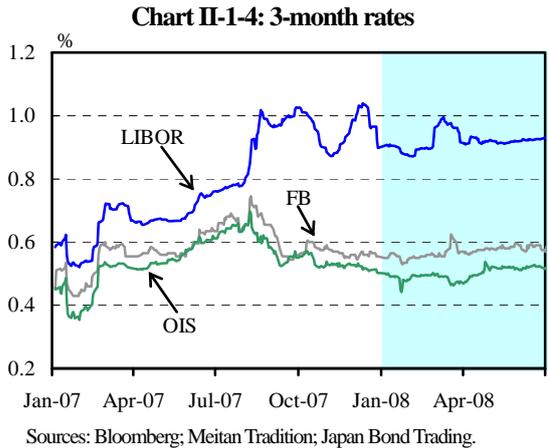
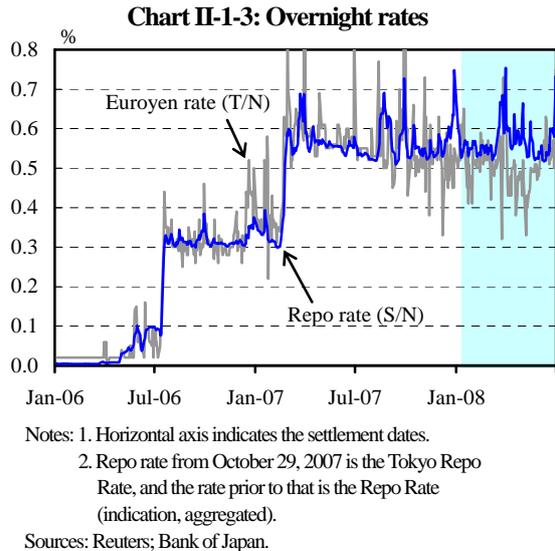
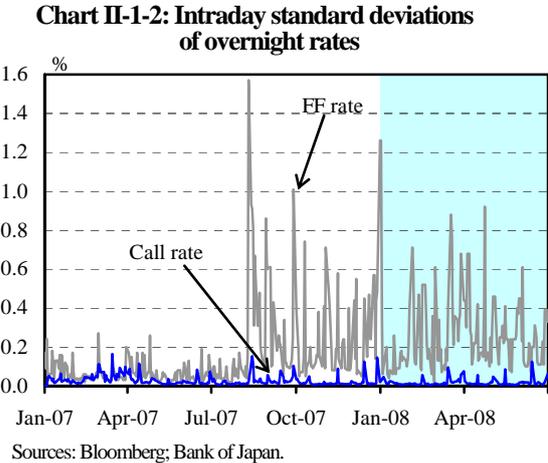
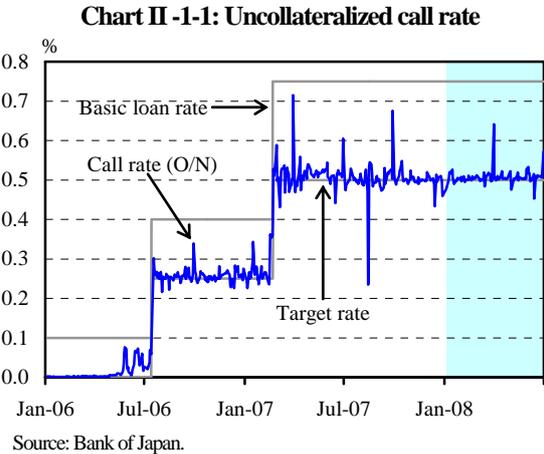
Due to a tightening of credit conditions in U.S. and European money markets triggered by the U.S. subprime mortgage problem, Japan's money markets remained nervous during the first half of 2008, as interbank term rates were under upward pressure. However, tension in Japan's money markets was weaker than that observed in the U.S. and European markets, and the uncollateralized overnight call rate was generally stable at around 0.5 percent. Taken as a whole, the turmoil in U.S. and European money markets had only a limited impact on Japan's money markets in the first half of 2008.

Overnight rates were generally stable

The uncollateralized overnight call rate remained generally stable at around the Bank of Japan's policy interest rate target of 0.5 percent (Chart II-1-1). The call rate was stable not only in its daily average, but also in its intraday volatility, which is measured by a standard deviation of intraday tick data (Chart II-1-2). This is in contrast to the situation in the United States, where the intraday volatility of the federal funds (FF) rate remained high after summer 2007 (Box 5).⁴³ However, as the turmoil in U.S. and European money markets continued, the call rate in Japan came under upward pressure around the fiscal year-end and quarter-end, respectively, as well as at the end of each reserve maintenance period, and the spread of funding rates between Japanese banks and foreign financial institutions widened. Looking at the repo rates, the spot/next rate temporarily increased to more than 0.7 percent near the fiscal year-end from mid-March until the end of the month (Chart II-1-3). This increase in repo rates was partly explained by a heightening of securities companies' demand for funding through repo transactions to finance JGBs accumulated, due to an unwinding of positions held by some hedge funds.

⁴³ Intraday volatility of the FF rate has risen since August 2007, because of an increase in the liquidity gap. European financial institutions, who are borrowers of U.S. dollars, try to cover their short dollar positions in European trading hours, during which U.S. financial institutions, who are lenders of U.S. dollars, are reluctant to lend, as they prefer to wait until uncertainties related to their liquidity positions are reduced later, in U.S. trading hours. Due to this time-zone friction, the fluctuations of the intraday liquidity gap in the FF market have increased, as European financial institutions have raised their demand for U.S. dollars since summer 2007.

Repo rates also came under upward pressure through the end of June, because major banks remained cautious about interbank lending. The repo market, as a whole, kept a nervous tone after summer 2007.

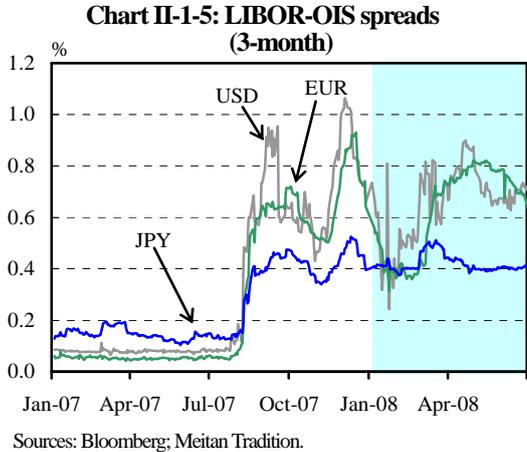


The Bank has been monitoring developments in financial markets at home and abroad carefully, while communicating closely with central banks of major countries. In response to the upward pressure on interest rates described above, the Bank supplied funds in a timely and flexible manner, using a variety of operational tools. The Bank also provided longer-term funds maturing beyond the fiscal year-end, earlier than the previous year, in addition to funds maturing beyond the calendar year-end. Meanwhile, foreign financial institutions were cautious about their funding, and reduced their overnight short positions. They also raised funds in Euroyen and FX swap markets when rates in these markets

were lower than 0.5 percent (Chart II-1-3). By doing so, they reduced funding in the call market, and instead invested those funds in the call and repo markets as arbitrage transactions. As a result, fluctuations in Japan's overnight rates as a whole were rather limited compared with U.S. and European rates.

Interbank term rates remained high

Three-month FB yields and OIS rates were more or less flat, after falling somewhat in summer 2007, as market expectations that the Bank would raise the policy interest rate target receded (Chart II-1-4). Interbank rates, such as LIBOR, on the other hand, remained high after rising in summer 2007 reflecting the turmoil in the global financial markets. Consequently, the spread between LIBOR and OIS rates, which represents the premium for both credit and liquidity risks, remained wide (Chart II-1-5 and Box 4). The wide spread was attributable to the worsening of the subprime woes, which led to further losses at U.S. and European financial institutions, and impaired their creditworthiness, and this, in turn, aggravated concerns among Japanese financial institutions over counterparty risk, and thus affected Japan's money markets.⁴⁴



The Japanese yen's LIBOR-OIS spread was, however, lower than the spreads for the U.S. dollar and the euro, even at the end of March, when financial institutions became more cautious about funding around the fiscal year-end. This was mainly due to the following: (1) uncertainties about Japanese

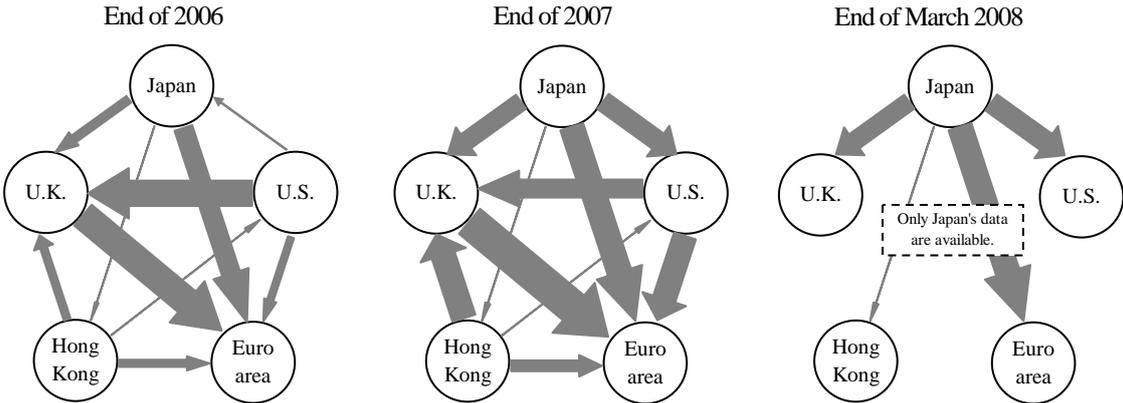
⁴⁴ Regarding cross-currency transmission mechanisms of risk premiums implied in LIBOR-OIS spreads, see Imakubo, Kei, Takeshi Kimura, and Tepei Nagano, "Cross-Currency Transmission of Money Market Tensions," *Bank of Japan Review*, 2008-E-2, 2008.

financial institutions' funding had been relatively well contained compared with the situation in the United States and Europe, because they had limited exposure to subprime-related products,⁴⁵ and (2) stable overnight rates contributed to the stability of the money markets in Japan as a whole, thereby easing the upward pressure on term funding rates (Box 5).

U.S. dollar funding in FX swap markets increased

Financial institutions raised yen funds in Japan's relatively stable money markets, and converted these funds into U.S. dollars in an environment where U.S. dollar funding conditions remained tight. As a result of this active movement through FX swaps, the premium for U.S. dollar funding remained high (Box 4 Chart 2).

Chart II-1-6: Net cash flows between selected interbank markets



Note: The direction of the arrows indicates net inflows to banks in each market, and the thickness of the arrows indicates the amount of net flows relative to that of 43.2 billion U.S. dollars from Japan to the U.K. at the end of 2006.
 Source: BIS, "International Locational Banking Statistics."

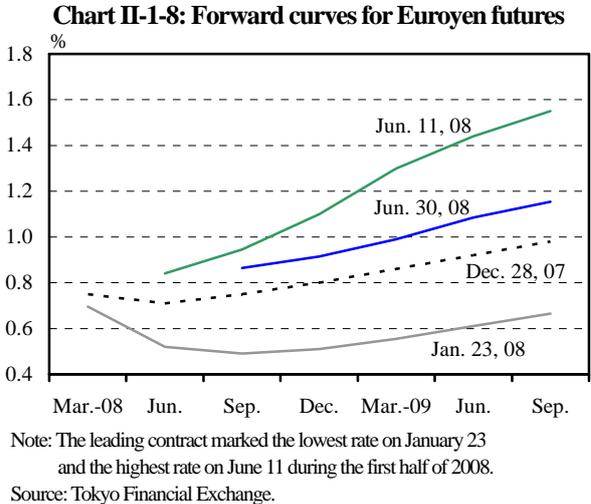
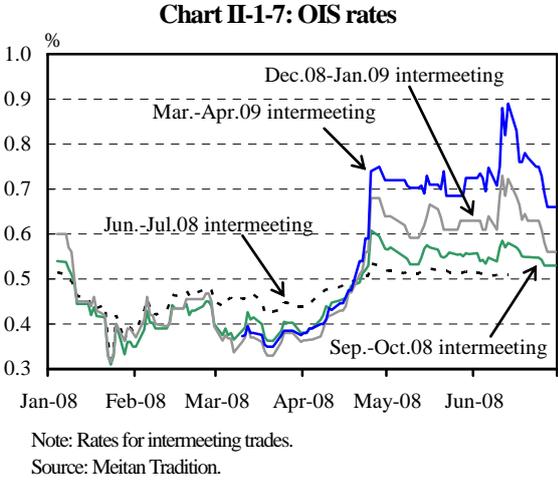
The cross-border banking flows show that the net outflow from Japan to the United States, the euro area, and the United Kingdom increased after the subprime woes (Chart II-1-6).^{46,47} Under the

⁴⁵ See *Financial System Report*, Bank of Japan, March 2008.
⁴⁶ Another characteristic of the recent cross-border banking flows is an increase in borrowing by banks in the euro zone. It appears that these banks had to borrow funds in interbank markets to meet an increase in lending to non-banks in the offshore market for liquidity support to SIVs and ABCP conduits.
⁴⁷ As of July 2008, the latest available data on the comprehensive cross-border banking flows, which are reported in the Bank for International Settlements' "International Locational Banking Statistics," are those at the end of December 2007. Data for the banking flows to and from banks in Japan at the end of March 2008 are available, and these data suggest that there is no significant change in the flow between the end of December 2007 and March 2008.

relatively stable conditions of Japan's money markets compared with overseas markets, banks in foreign countries (including overseas branches of Japanese banks) increased their borrowing from banks in Japan (including Japanese banks and Tokyo branches of foreign banks), and appeared to convert those funds into U.S. dollars via FX swaps. The net outflow from Japan also included funds raised by foreign banks' issuance of *samurai* bonds that pension funds bought via trust banks, and that Japanese banks bought.

Interest rates with distant contract months fluctuated largely

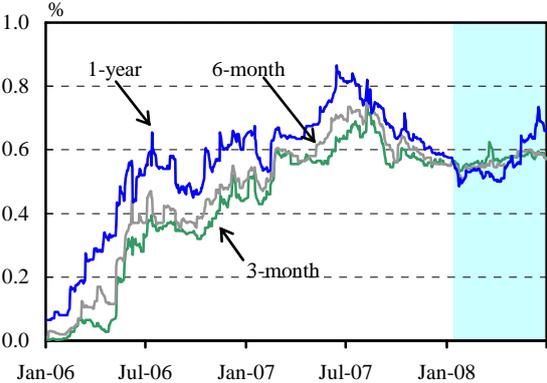
OIS rates, Euroyen futures rates with distant contract months, and 1-year TB rates fluctuated, reflecting changes in the outlook for the policy interest rate (Charts II-1-7 through II-1-9). When overseas and domestic stock prices declined sharply through late January with concerns about a recession in the U.S. economy, the yield curve became downward-sloping because market participants factored in a policy rate cut in Japan (Chart II-1-8). On the contrary, as the overly pessimistic views on the U.S. economy moderated from mid-March, the yield curve became, in turn, upward-sloping, implying a future rise in short-term interest rates.



These changes in market rates were mainly driven by foreign investors, who took positions on a simple assumption that rates in Japan, the United States, and the euro area would move in the same direction. As market expectations of a policy rate cut had receded since April, hedge funds, which bet on a policy rate cut, suddenly unwound their positions, and thereby induced abrupt changes in market interest rates. Domestic investors, on the other hand, who did not firmly expect a policy rate rise, faced

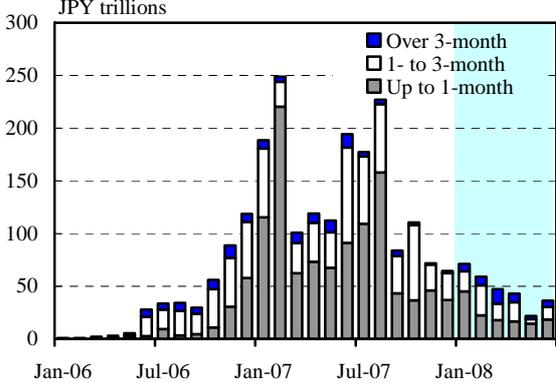
the need to hedge against price changes of FBs/TBs that they held in large amounts, in reaction to the price changes caused by the hedge funds' unwinding. These reactions of domestic investors were, as a result, reflected in the markets as an expectation for a policy rate hike. In addition, in the OIS market, it became more difficult for market participants to arbitrage with other products, because market makers reduced their activities in the face of a decrease in transactions after summer 2007 (Chart II-1-10). This specific feature of Japan's OIS market also contributed to the high volatility in its rates.

Chart II-1-9: FB/TB rates



Source: Japan Bond Trading.

Chart II-1-10: OIS trading



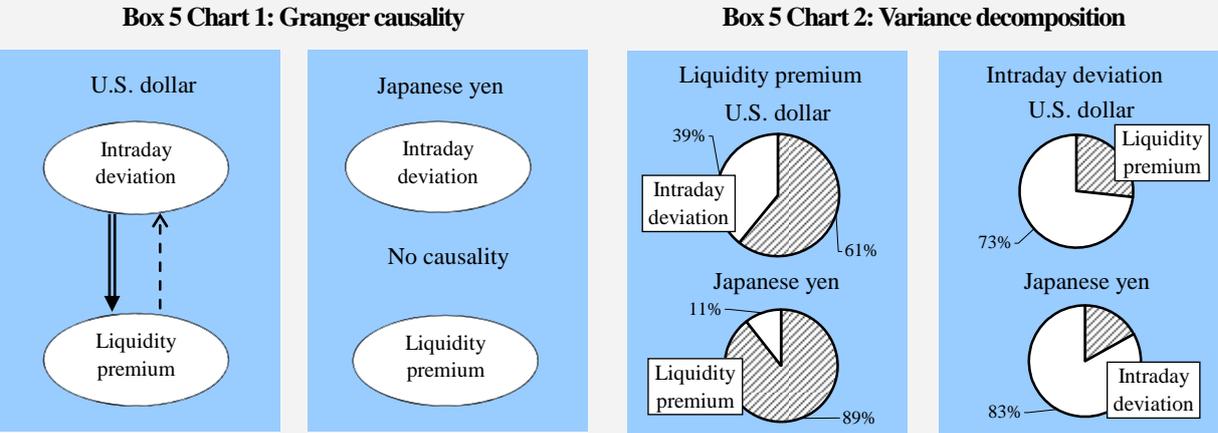
Source: Money Brokers Association.

Box 5: Relationship between the Intraday Volatility of Overnight Rates and the Liquidity Premium

Intraday volatility of overnight rates reflects the magnitude of financial institutions' liquidity gap, the amount of payments to be settled within that day, and the degree of fine-tuning of central banks' market operations. The larger the financial institutions' liquidity gap and the larger the amount of payments to be settled, the higher the intraday volatility of overnight rates, which play a role in adjusting the liquidity gap among financial institutions. Meanwhile, the more inclined central banks are to fill liquidity gaps in the market, the lower the intraday volatility of overnight rates.

Intraday volatility of overnight interest rates may affect the liquidity premium on term funding. If the intraday volatility of overnight rates increases, financial institutions become concerned about their daily funding and are inclined to raise more funds from term funding markets, which leads to an

increase in the liquidity premium. In contrast, if the intraday volatility of overnight rates remains low, financial institutions feel secure about their daily funding and are less inclined to raise funds from term funding markets, which reduces the liquidity premium.



Note: The double and dotted arrows indicate that the null hypothesis of no causality can be rejected at the 1% and 10% significance level, respectively.

In order to analyze the interdependence between intraday volatility of overnight interest rates and liquidity premium on term funding, we estimate the bivariate vector autoregression (VAR) model for the U.S. dollar and the Japanese yen comprising the "liquidity premium on 3-month LIBOR-OIS spreads" and "intraday standard deviations of overnight interest rates."⁴⁸ The VAR model is an econometric model used to capture the dynamics and interdependence between multiple time series. Box 5 Chart 1 shows the results of the Granger causality test. Granger causality is a statistical concept of causality that is based on prediction, i.e., a technique for determining whether one variable is useful in forecasting another. We find a clear causality in the Granger sense from the intraday volatility of the overnight interest rate to the liquidity premium on term funding for the U.S. dollar, but not for the Japanese yen.⁴⁹

Variance decompositions, which provide information about the relative importance of each shock

⁴⁸ The sample period is from January 2007 to March 2008. The VAR model is identified by using the Cholesky decomposition, with the order being intraday standard deviation and liquidity premium. We use weekly data to remove noisy spikes in intraday volatility of overnight rates related to reserve maintenances. Regarding the liquidity premium implied in the LIBOR-OIS spread, see Box 4.

⁴⁹ The reason why we find no causality for the Japanese yen is that the intraday volatility of the call rate did not largely fluctuate during the sample period (Chart II-1-2). If the sample data of the VAR model include the period when the intraday volatility of the call rate is large, the causality to the liquidity premium on term funding may be observed. However, there is no such period in the sample data available for 2006 and onward.

in affecting the variables in the VAR model, suggest that the intraday volatility of overnight rates is exogenous and relatively less attributable to the liquidity premium on term funding for both the U.S. dollar and the Japanese yen (the right-hand chart of Box 5 Chart 2). They also indicate that about 40 percent of the variance of the liquidity premium on U.S. dollar term funding is attributable to the intraday volatility of the FF rate, while only 10 percent of the variance of the liquidity premium on Japanese yen term funding is attributable to the intraday volatility of the call rate (the left-hand chart of Box 5 Chart 2).

These results imply that, since summer 2007, the increase in the intraday volatility of the FF rate has partly caused the increase in the liquidity premium on term funding for the U.S. dollar, while that of the call rate has not brought about such an increase for the Japanese yen, because it has remained stable.

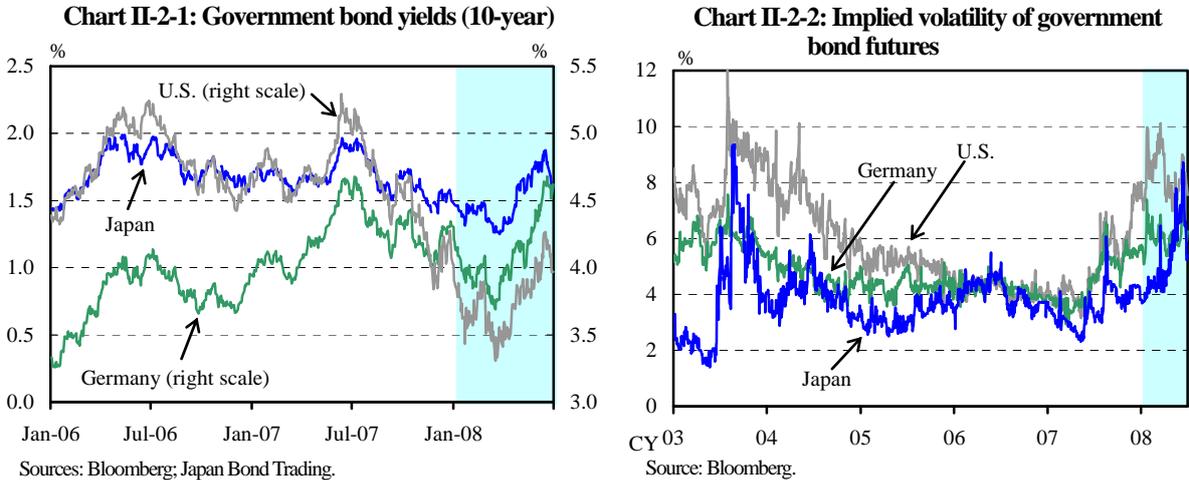
2. Japanese Government Bond Markets

Long-term government bond yields were volatile in both domestic and overseas markets amid mixed concerns for an economic slowdown on the one hand, and inflation on the other. JGB yields fluctuated significantly with a decrease in market liquidity, and a sharp rise in volatility affected by the turmoil in the global financial markets.

U.S. and European yields were destabilized

Long-term yields in U.S. and European markets declined with some fluctuations through mid-March, reflecting the flight to quality caused by uncertainties regarding financial systemic risk, as well as heightened concerns about a U.S. recession (Chart II-2-1). As the overly pessimistic views about U.S. economic and financial conditions were alleviated in response to the Federal Reserve's liquidity provision measures, long-term yields stopped declining and rebounded. Stronger inflationary concerns, against a backdrop of global price hikes in commodities, such as crude oil and grain, came to be considered as a factor exerting upward pressure on interest rates. Especially from mid-April, U.S. and European bond yields, particularly of the short- and medium-term, rose rapidly reflecting stronger expectations that the U.S. and European monetary policy stance would shift to contain inflation. From

late June, however, long-term yields declined, as concerns about the financial condition of banks and about a deterioration in U.S. and European economies were highlighted again.



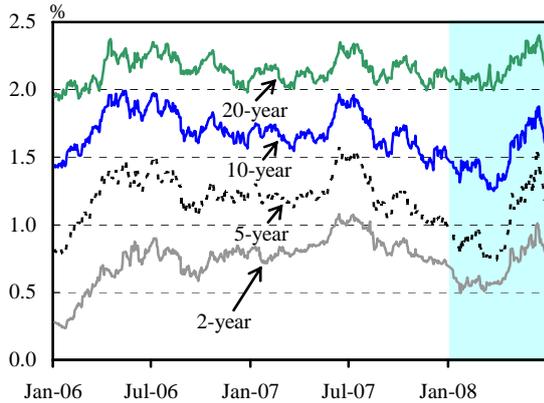
As described above, reflecting changes in market sentiment, long-term yields fluctuated significantly in both the United States and Europe throughout the first half of 2008. Implied volatility derived from options on long-term government bond futures recorded, in the January-March quarter of 2008, its highest level since summer 2007, when the turmoil stemming from the U.S. subprime mortgage problem spread, and it remained at a high level thereafter (Chart II-2-2).

JGB yields followed developments in U.S. and European long-term yields

JGB yields basically followed developments in long-term yields in the U.S. and European markets. Through mid-March, JGB yields were on a declining trend with some fluctuations. Although the pace of decline was not as rapid as that in the United States and Europe, yields on newly issued 10-year JGBs declined to around 1.25 percent, the lowest level since July 2005 (Charts II-2-3 and II-2-4). Then, JGB yields, particularly of the medium-term, rose sharply from April until mid-June, following the increase in U.S. and European yields. The rise in long-term interest rates with a large fluctuation became greater as in the United States and Europe, and yields on newly issued 10-year JGBs rose to a level exceeding 1.8 percent, the highest level since August 2007. Implied volatility also rose to the highest level since the so-called "VaR shock" in 2003, and reached almost the same level as the volatility in the United States in June (Chart II-2-2).⁵⁰

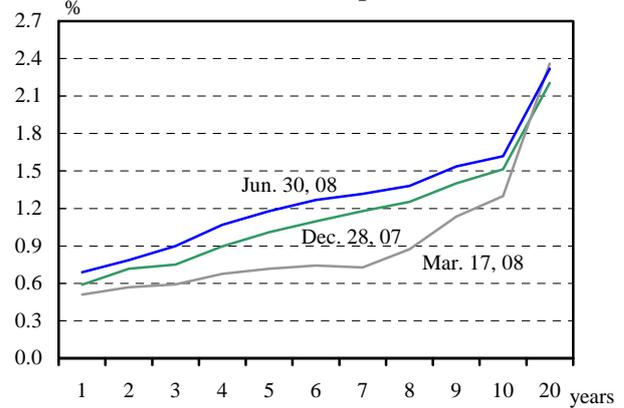
⁵⁰ Financial institutions increased their long positions of JGBs and extended the duration through June 2003, when JGB

Chart II-2-3: JGB yields by maturity



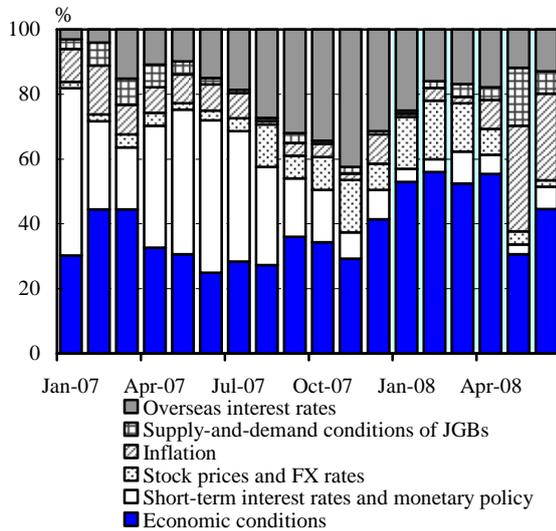
Note: Yields on newly issued JGBs.
Source: Japan Bond Trading.

Chart II-2-4: JGB spot curves



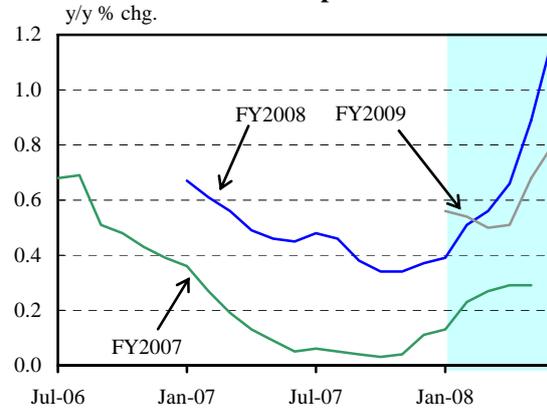
Source: Japan Securities Dealers Association.

Chart II-2-5: Factors affecting JGB yields



Source: QUICK, "QUICK Survey System Report."

Chart II-2-6: Forecasts for Japan's CPI inflation



Source: Economic Planning Association, "ESP Forecast Survey."

The results of a market survey indicated that market participants regarded "economic conditions" as a dominant factor causing downward pressure on JGB yields in the period from January to April 2008. Then, they increasingly came to consider "inflation" and "supply-and-demand conditions of JGBs" as important factors since May 2008, when JGB yields started to rise (Chart II-2-5). Market forecasts for consumer price index (CPI) inflation for fiscal 2008 were steadily revised upward and rose almost by 1 percent during the first half of 2008, although the extent of the rise was smaller than that in the United States and Europe (Chart II-2-6). As for supply-and-demand conditions of JGBs, under

yields were low. However, as the view on global disinflation was revised and U.S. yields rose, many financial institutions that adopted a Value-at-Risk (VaR) method judged that their unrealized losses exceeded their risk limits and started to reduce their positions in JGB markets. This resulted in a sharp rise in 10-year JGB yields from 0.4 to 1.5 percent during the period from June to August 2008.

reduced market liquidity since mid-March, many market participants said that aggressive risk-taking became difficult due to increased volatility, as seen in large fluctuations in yields after only a few investors adjusted their JGB positions. In June, as crude oil prices recorded a historical peak, and concerns for a slowdown in the economy became stronger, two conflicting factors on yields were seen in the markets, namely, "inflation," a factor causing upward pressure, and "economic conditions," a factor causing downward pressure.

JGB market liquidity decreased and yields fluctuated

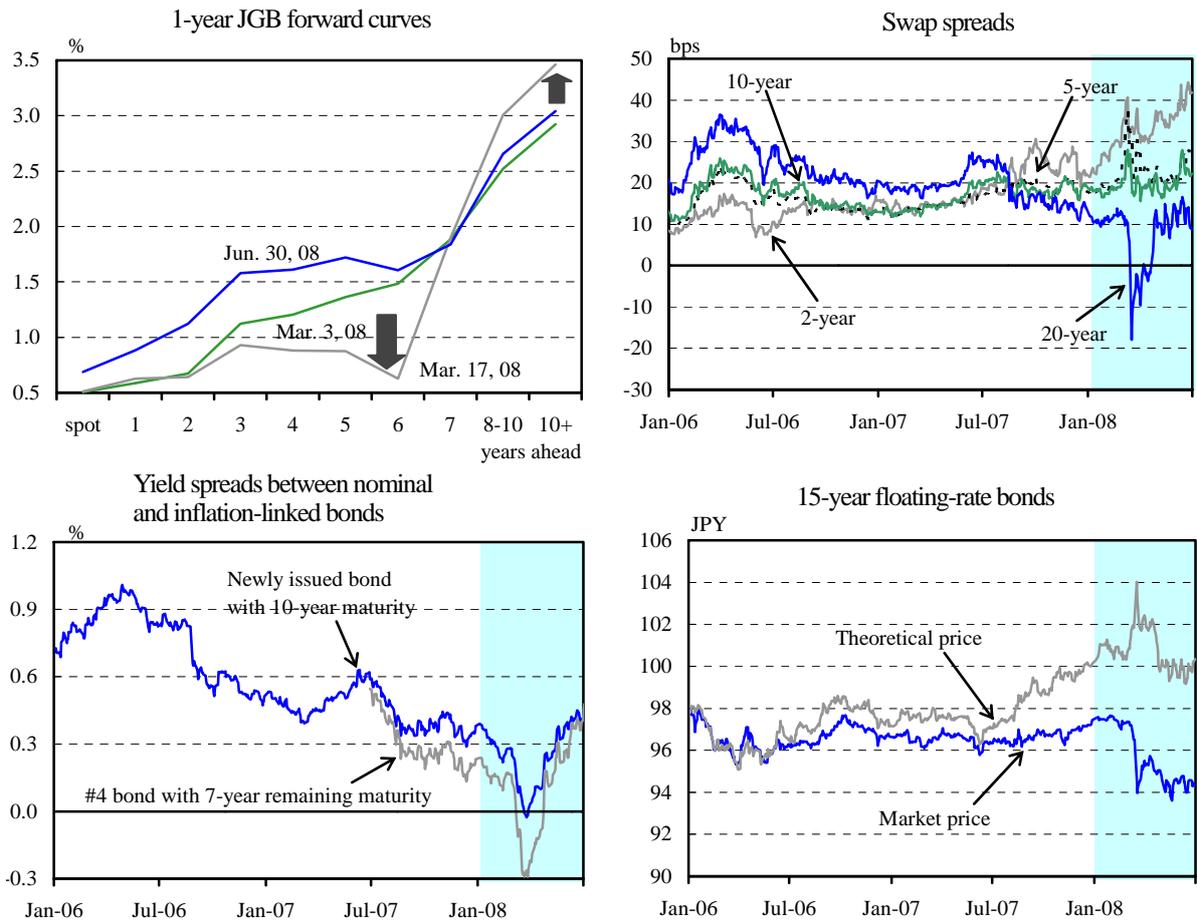
Recently, the proportion of trading by overseas investors had increased in the medium- and long-term fixed income markets, such as the JGB markets. Thus, a change in these investors' positions resulted in significant price fluctuations from March 2008. In particular, unwinding of positions by relative-value hedge funds had a major impact on prices, because they held large positions in the markets. Relative-value hedge funds seek profits in the normalization process of price mismatches by taking long positions in undervalued securities and short positions in overvalued securities. In Japan's fixed income markets since summer 2007, these hedge funds took positions in anticipation of the following: (1) flattening of yield curves; (2) widening of super-long-term swap spreads that had been relatively tight compared with spreads for short- and medium-term spreads; (3) a rise in break-even inflation (BEI, which is the spread between yields on nominal bonds and inflation-linked bonds and indicates future CPI developments), which had stayed at a low level; and (4) convergence to the theoretical price level of 15-year floating-rate bond prices that had been undervalued.

In mid-March, however, U.S. and European financial institutions that faced funding difficulties started to tighten their credit standards against hedge funds, and these hedge funds were then forced to unwind (i.e., deleverage) their positions, due to funding liquidity constraints. As a result, a significant dislocation in yields was generated, including the following: (1) steepening of yield curves for longer than 7-year maturities; (2) negative swap spreads for the super long term; (3) negative BEI; and (4) further divergence from the theoretical price of the floating-rate bonds (Chart II-2-7).

Convergence trading, a typical investment strategy of relative-value hedge funds, generally provides liquidity to the markets, and contributes to market stability, by making opposite transactions with investors, who make use of technical analysis and tend to push yields into one direction. Unwinding of convergence trading positions, however, brought instability to the markets. In addition to the fact that overseas investors such as hedge funds reduced their risk-taking ability, securities

companies, particularly foreign ones that limited the holding of risk assets, faced an involuntary accumulation of inventories, due to fire sales of such assets by hedge funds in the process of unwinding, and hence became less active in their market-making activities. This also accelerated the decline in market liquidity (Box 6). Furthermore, under low market liquidity conditions since late April, some domestic investors reduced their positions significantly, and this caused a rapid increase in price volatility. On April 25, 2008, a circuit breaker was activated and suspended transactions temporarily, because the price of JGB futures fell by more than 2 yen from the previous closing price.⁵¹ After that, some distortions in the JGB markets were gradually eradicated, but other distortions, such as the difference between theoretical and market prices of floating-rate bonds and dislocation in the term structure of swap spreads, still existed at the end of June (Chart II-2-7).

Chart II-2-7: Dislocation in JGB markets

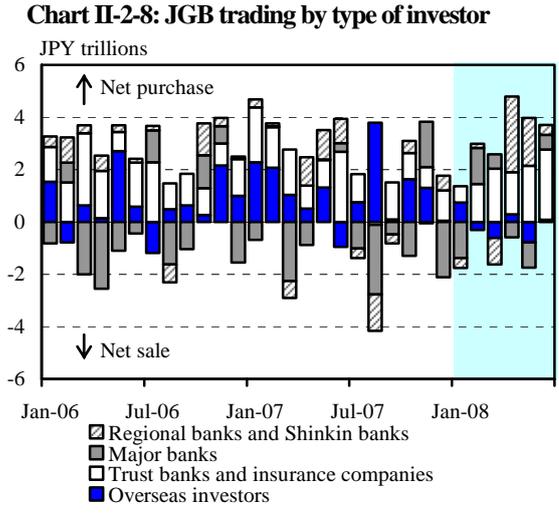


Note: Both market and theoretical prices are averages of prices of #15-48 bonds.
 Sources: Bloomberg; QUICK; Japan Securities Dealers Association; Japan Bond Trading.

⁵¹ This was the first activation ever of a circuit breaker since its introduction on January 15, 2008. The last time when the price of JGB futures moved by more than 2 yen from the previous closing price in a day was September 18, 2002.

JGB trading activity by type of investor

As described above, overseas investors, particularly relative-value hedge funds, reduced their positions as a whole (Chart II-2-8). On the other hand, investors that make use of technical analysis, such as Commodity Trading Advisor (CTA), continued to take large positions in the JGB futures market following market trends, and this increased volatility.



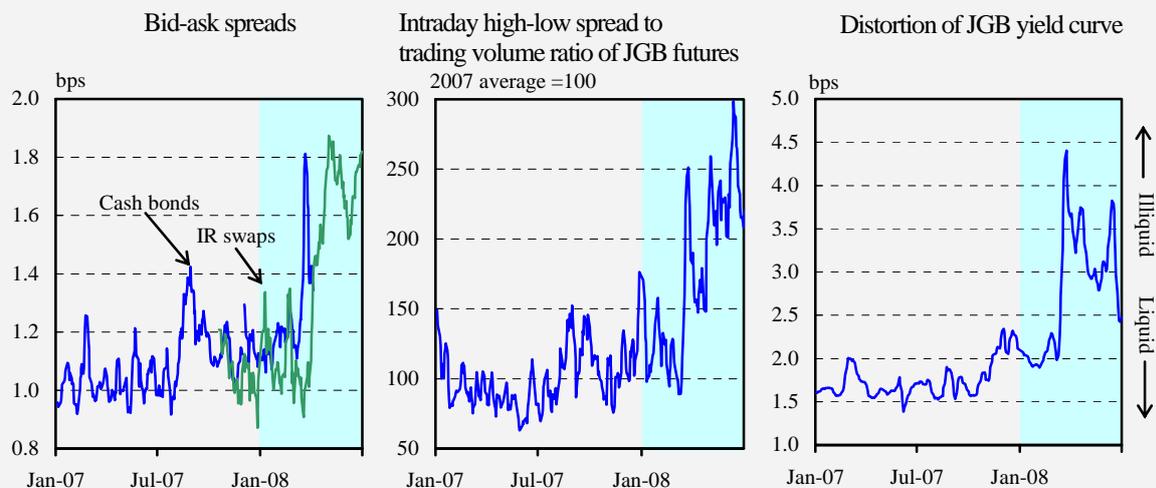
Source: Japan Securities Dealers Association, "Trends in Bond Transactions (by investor type)."

As for domestic investors, major banks increased their purchases of JGBs from February to March 2008 as JGB yields fell, but changed to net sellers, although by a small margin from April as JGB yields rose (Chart II-2-8). When market liquidity was low, major banks generally became more conscious of price risk, and also cautious about taking additional long positions. Regional banks sold JGBs in March before the fiscal year ended, and then bought JGBs on dips from the start of the new fiscal year in April as JGB yields rose, but thereafter became cautious about accumulating their long positions in JGBs. Long-term investors, such as life insurance companies, mainly bought super-long-term JGBs from mid-March when yields rose, and this contributed somewhat to stabilizing yields on super-long-term JGBs.

Box 6: The Decrease in Liquidity in JGB Markets

As noted in Box 3, market liquidity refers to how readily a financial asset can be bought or sold without causing a significant change in its price. Market liquidity is usually measured in three dimensions (tightness, depth, and resiliency), and all the indicators below show that market liquidity declined rapidly from mid-March (Box 6 Chart).⁵²

Box 6 Chart: Liquidity in JGB markets



Notes: 1. 5-day moving averages.

2. Distortion of JGB yield curve is the aggregate of the differences between market rates and theoretical rates estimated using the spline curve.

Sources: Bloomberg; QUICK; Japan Bond Trading.

Bid-ask spreads (indicator of tightness): If the number of both sellers and buyers in a market is large and transactions can be readily executed, bid-ask spreads, the difference between prices quoted by sellers and buyers, will be tightened. Conversely, if market participants cannot easily find trade counterparties and transactions cannot be readily executed, bid-ask spreads offered by securities companies to their customers will be widened.

Intraday high-low spread to trading volume ratio (indicator of depth): If sufficient transaction volume is maintained with abundant and diverse market participants, the markets become deep and the

⁵² The decrease in market liquidity also affected the special collateral (SC) repo market. In the SC repo market, some repo rates, particularly those of newly issued JGBs, plummeted temporarily to below minus 20 percent, mainly because (1) demand for borrowing JGBs increased to cover short sales that were carried out as a hedge against primary auctions, and (2) demand for JGBs concentrated on highly liquid and newly issued JGBs when yields rose. Under these circumstances, the Bank increased its provision of the Securities Lending Facility (SLF) services.

impact on prices for each transaction will be relatively small. Conversely, if sufficient transaction volume is not maintained, prices will tend to fluctuate.

Distortion of yield curve (indicator of resiliency): If arbitrage transactions are sufficiently executed with abundant and diverse participants, distortions of the yield curve will be reduced immediately, i.e., the distorted price will be instantly resolved in the course of transactions. Conversely, if arbitrage transactions are not sufficiently executed, the markets will not be resilient enough, i.e., it will become more difficult to eradicate distortions.

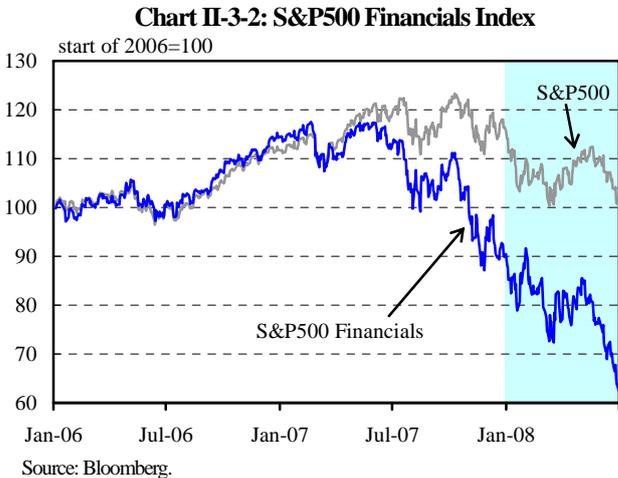
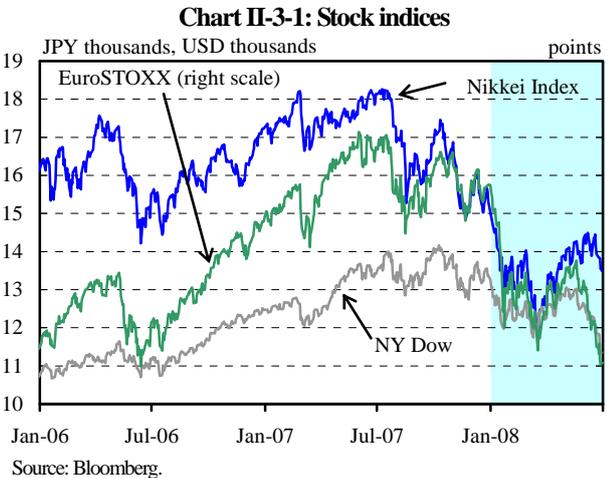
3. Stock Markets

U.S. and European stock price movements were heavily influenced by market participants' cautious views on the financial condition of financial institutions, and anxieties about financial system stability, amid growing concerns about an economic slowdown. Japanese stock prices, in general, tracked the movements of U.S. and European stock prices. From summer 2007 until mid-March 2008, Japanese stock prices dropped more steeply than U.S. and European prices against the backdrop of the yen appreciation, and thereafter switched to a relatively firm note partly because of the yen depreciation. Since mid-June, however, Japanese stock prices trended downward amid the sharp decline in U.S. and European stock prices.

Overseas stock prices declined

U.S. stock prices remained under downward pressure throughout the first half of 2008 due to concerns over the economic slowdown and the deterioration of financial institutions' financial condition (Chart II-3-1). After the Federal Reserve's two consecutive, and substantial, policy rate cuts in late January, temporary abatement of concerns over the deterioration of the U.S. economy led to a brief rebound in stock prices. From late February until mid-March, however, U.S. stock prices, especially in the financial sector, dropped sharply, as rapidly heightened anxieties about the funding conditions of hedge funds and U.S. investment banks developed into deeper concerns about a financial systemic risk. Also, there were wider apprehensions over a recession (Chart II-3-2). Then, after the Federal Reserve took various policy

measures to supply liquidity, uncertainties surrounding the financial system and the extremely pessimistic views on the economic trend receded, and U.S. stock prices started to rise. From late May, with an increase in uncertainties over future economic growth due to rising crude oil prices, clearer symptoms of worsening earnings across a wide range of industries led to another decline in U.S. stock prices. Stock prices of financial institutions, in particular, plunged to a much lower level than the record low for 2008 marked in mid-March. This plunge was due to recurring concerns about financial institutions' earnings, which stemmed from anxieties over the increase in nonperforming loans due to the economic sluggishness and the continued decline in housing prices. Under such circumstances, movements in stock prices and CDS premiums exhibited a high correlation (Chart II-3-3).⁵³



U.S. VIX, which is a volatility index calculated from option prices that refer to the S&P 500 index, stayed high reflecting strong market concerns (Chart II-3-4). The heightened uncertainties over the financial and economic environment were thought to have reduced the risk appetite of investors and put downward pressure on stock prices.

European stock prices basically followed U.S. stock prices, but with additional downward pressure from the euro appreciation, which provoked concerns over the profitability of exporting companies. As for stock prices in emerging economies, those in resource-rich countries, such as Brazil and Russia, remained firm, while those in Asian countries declined mainly due to the accelerated

⁵³ Stock prices and CDS premiums are not always correlated, because of the difference in the length of evaluation period and the profit-loss profile. However, in the United States, from summer 2007, the stock and CDS markets were highly correlated with each other, as these markets reacted simultaneously to news causing price changes, such as the rise in the bankruptcy rate and growing attention to the liquidation value.

inflation, the worsened external balance, and the rise in interest rates (Chart I-4-5).

Chart II-3-3: U.S. stock and CDS indices

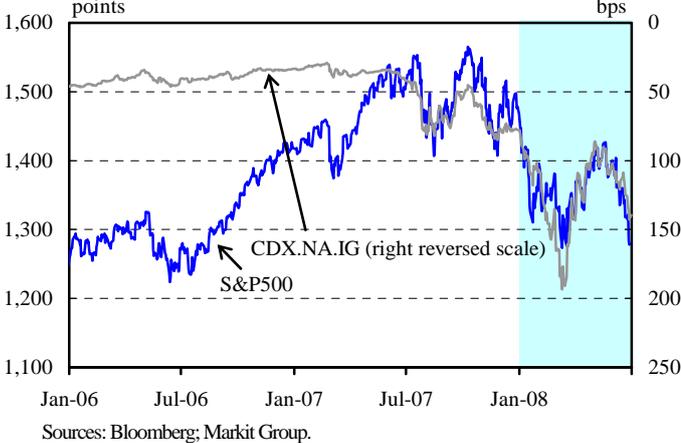


Chart II-3-4: U.S. VIX

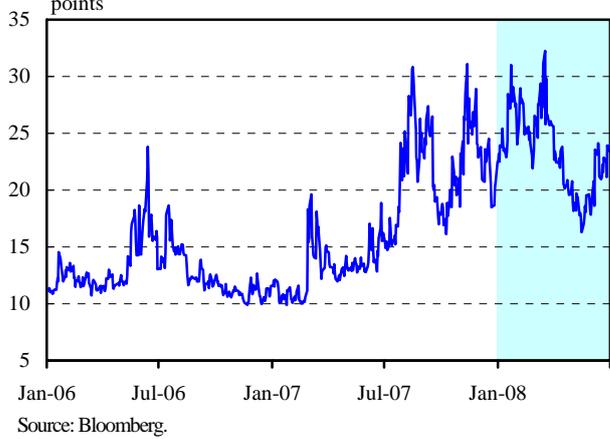


Chart II-3-5: Stock index and FX rate

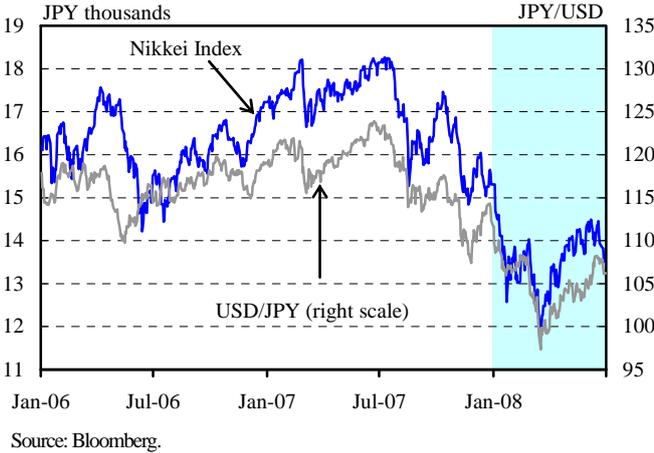
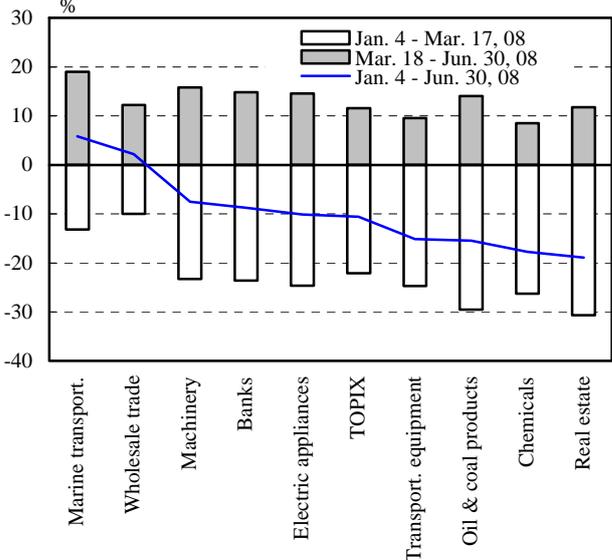


Chart II-3-6: Changes in TOPIX Sector Indices



Japanese stock prices were influenced by U.S. stock prices and FX rates

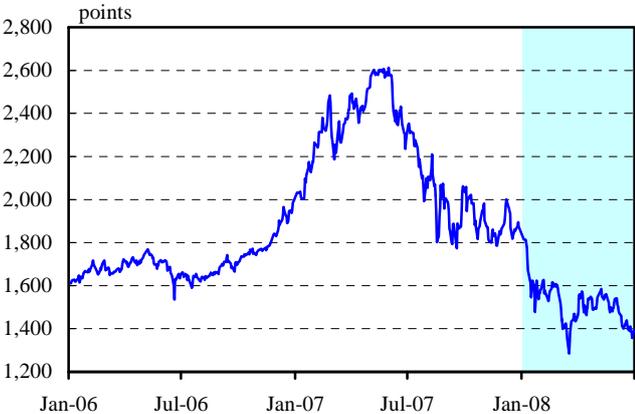
Stock prices in Japan followed the U.S. market trend. Through mid-March, Japanese stock prices fell more sharply than U.S. stock prices because of the yen appreciation, which led to the heightened uncertainties about corporate profitability and the economic condition (Charts II-3-1 and II-3-5).⁵⁴ Then, Japanese stock prices appreciated in tandem with a rebound in U.S. and European stock prices. From

⁵⁴ From the beginning of 2008 to March 17, the Nikkei 225 Stock Average declined by 23.0 percent, and the Dow Jones Industrial Average by 9.7 percent.

late May, despite the price declines in U.S. and European stock markets, Japanese stock prices remained relatively firm, partly supported by the yen depreciation which stemmed from growing anticipation of a policy rate hike in the United States and Europe. From mid-June, however, Japanese stock prices trended downward, amid the sharp drop in prices of U.S. and European stocks.

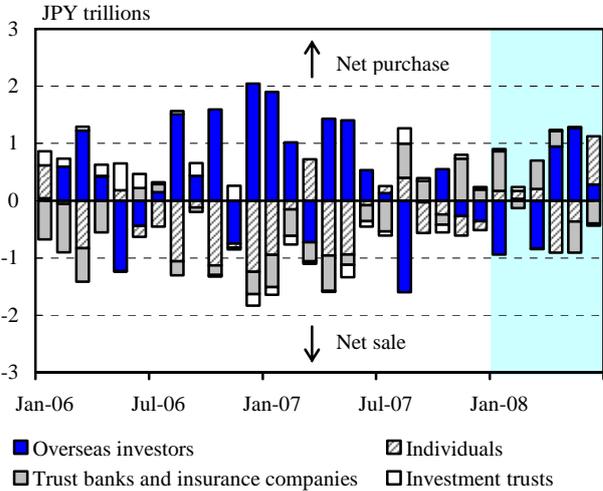
By industry, stock prices of exporters, such as machinery and electric appliance sectors, declined sharply in line with the yen appreciation through mid-March, then rose with the yen depreciation (Chart II-3-6).⁵⁵ Stock prices of industries that benefited from the increase in commodity prices rose, namely, in the marine transportation and wholesale trade sectors (including trading companies). On the other hand, the magnitude of decline in stock prices of chemicals, as well as oil and coal product sectors, was significant due to anxieties over a deterioration in their profitability, stemming from high materials prices. Stock prices of Japanese banks stayed relatively firm in comparison with those of U.S. and European financial institutions, which experienced a severe decline. Stock prices of real estate companies fell against the background of a deterioration in the funding environment, and prices of Japanese real estate investment trusts (J-REITs) followed suit for the same reason (Chart II-3-7).

Chart II-3-7: Tokyo Stock Exchange REIT Index



Source: Bloomberg.

Chart II-3-8: Japanese stock trading by type of investor



Note: Data include both spot and futures transactions.
Sources: Tokyo Stock Exchange; Osaka Securities Exchange.

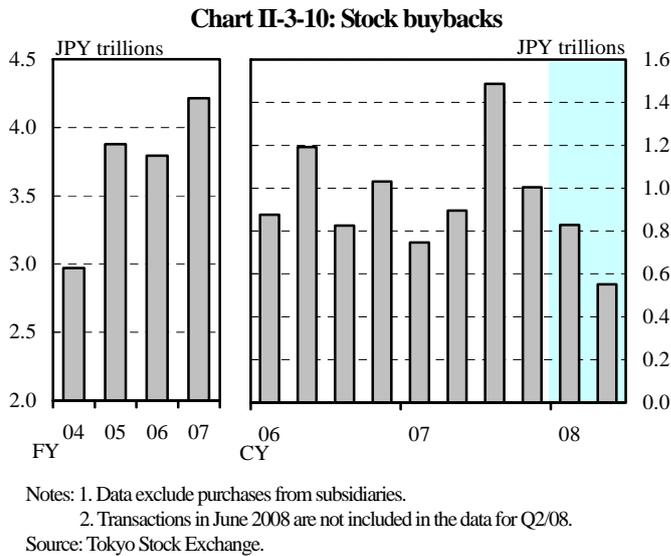
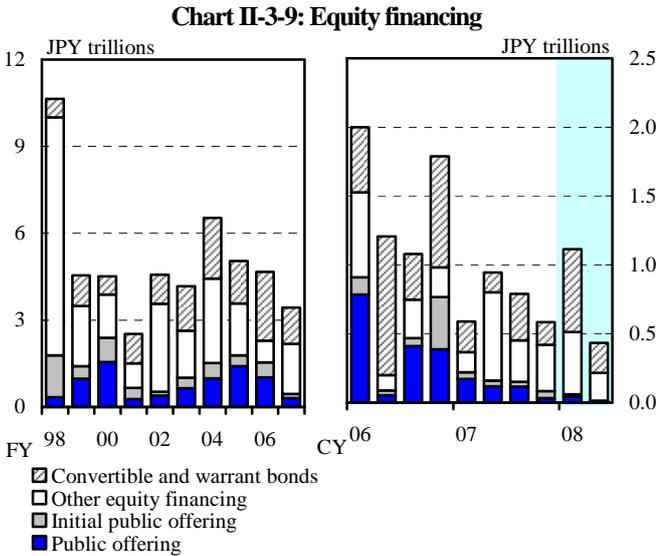
As for trading volume by investor type, overseas investors' trading continued to be conspicuous

⁵⁵ In spite of the yen depreciation, stock prices of transportation equipment companies did not recover as much as those of machinery and electric appliance companies after mid-March. This was partly because the rise in gasoline prices led to stagnant auto sales in the United States.

(Chart II-3-8). They were net sellers through mid-March when stock prices were falling, and then became net buyers as they reviewed their strategies of underweighting Japanese stocks in their portfolios taken since last summer. Overseas investors remained net buyers of Japanese stocks, even when U.S. and European stock prices declined from late May. According to market participants, reasons behind the net buying included expectations of higher performance in exporting companies, due to the yen depreciation, and the renewed interest in resilient Japanese stock prices in comparison with other Asian stock prices, which continued to fall from the beginning of 2008.

Equity financing continued to decrease, while stock buybacks increased

During the first half of 2008, initial public offerings (IPOs) and other public offerings were subdued in the Japanese primary market (Chart II-3-9). One possible reason for this was that it was difficult for companies to lay down business plans to secure sufficient returns that investors expected, as uncertainties about the economic outlook increased.



Note: "Other equity financing" includes allotments to existing shareholders and third parties.
Source: QUICK.

Notes: 1. Data exclude purchases from subsidiaries.
2. Transactions in June 2008 are not included in the data for Q2/08.
Source: Tokyo Stock Exchange.

At the same time, companies increased stock buybacks to a certain degree (Chart II-3-10). These corporate actions were attributable to the fact that an increasing number of companies saw their stock prices as being undervalued, despite an increase in their earnings marked for six consecutive accounting periods, and also, as they focused greater attention on their capital cost and profit distribution to shareholders.

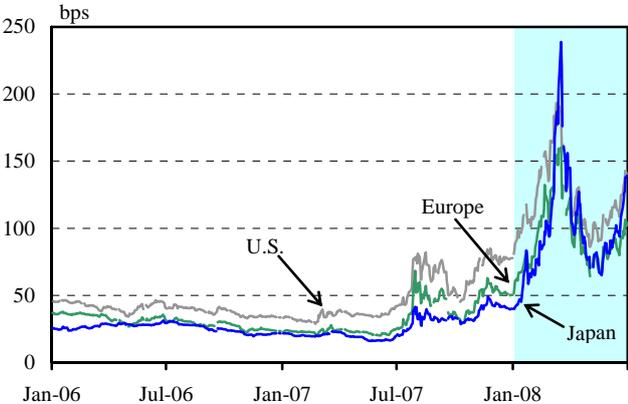
4. Credit Markets

In the U.S. and European credit markets, credit spreads, such as corporate bond spreads over government bond yields, and CDS premiums continued to be volatile reflecting concerns over a U.S. recession and the deterioration in earnings of financial institutions. In Japan, although credit spreads temporarily widened through mid-March and the end of June, they were stable as a whole in comparison with those in the United States and Europe, partly because investors' demand for bonds with a high rating remained firm.

Credit spreads in overseas credit markets widened sharply

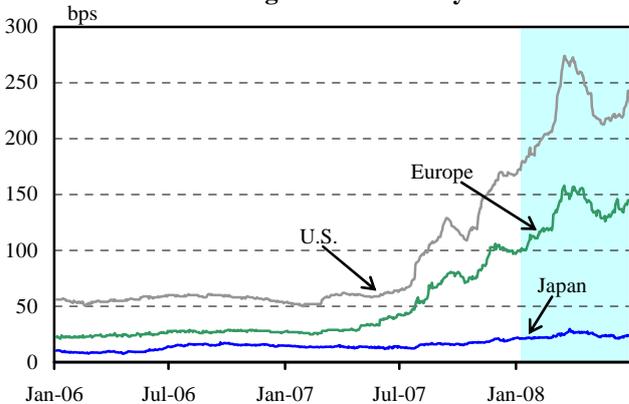
U.S. and European credit markets continued to be unstable since the second half of 2007 (Charts II-4-1 and II-4-2). In particular, from the end of February until mid-March, credit spreads widened sharply not only for securitized products but also for various other assets including municipal bonds and corporate financing such as corporate bonds and loans, as the functioning of the repo market was impaired and the anxieties over liquidity risk of certain financial institutions, as well as concerns about the financial systemic risk, intensified. After mid-March, the excessively pessimistic views retreated owing to the liquidity provision measures taken by the Federal Reserve and a series of capital-raising measures by financial institutions. However, fundamental concerns about the real economy, the profitability of financial institutions, and the effects of the credit crunch were not eradicated, and thus credit spreads in the United States and Europe continued to be unstable and widened again after late May.

Chart II-4-1: CDS indices



Note: CDX.NA.IG for U.S.; iTraxx Europe for Europe; iTraxx Japan for Japan.
Source: Markit Group.

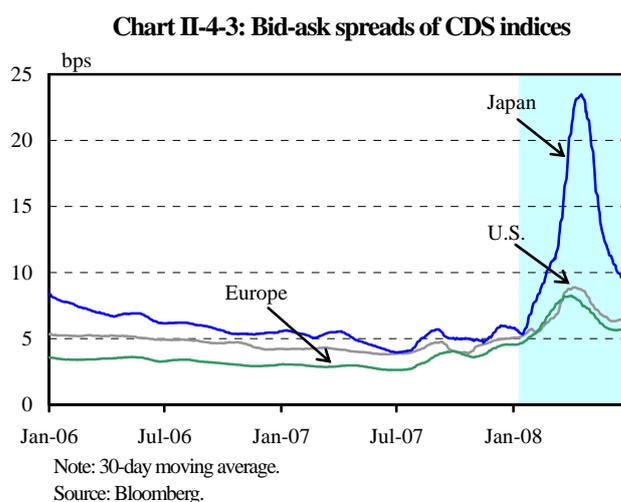
Chart II-4-2: AA-rated corporate bond spreads over government bond yields



Note: Corporate bonds with 3- to 5-year maturity for U.S. and Europe, and those with 3- to 7-year maturity for Japan.
Sources: Merrill Lynch; Japan Securities Dealers Association.

CDS premiums in Japan were also volatile

CDS premiums in Japan remained volatile since January along with those in overseas markets and temporarily exceeded the levels in the United States and Europe through mid-March (Chart II-4-1). These movements were mainly led by risk reduction and arbitrage transactions by overseas investors, which were then followed by domestic investors' risk reduction, and position adjustments in securitized products and structured bonds. Despite the favorable financial condition of Japanese companies as a whole, liquidity in CDS markets shrank rapidly as both overseas and domestic market participants crowded in the same direction to buy protection, which amplified the trading price volatility. Indeed, bid-ask spreads representing the market liquidity of CDSs widened through mid-March in Japan, the United States, and Europe, while their magnitude was most significant in Japan (Chart II-4-3). Thereafter, CDS premiums decreased from late March until mid-May, but then increased again in line with CDS premiums in the United States and Europe.

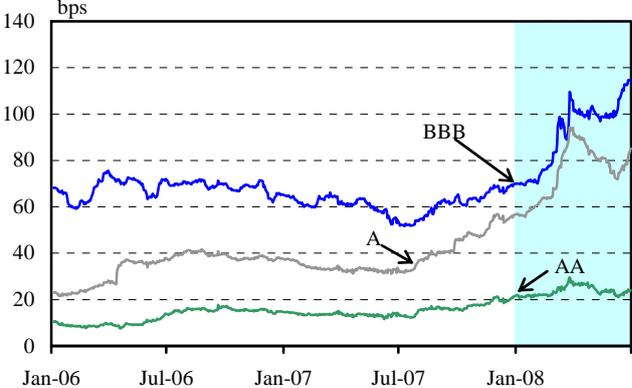


Japan's corporate bond markets were stable

Compared to CDS markets, corporate bond markets in Japan were generally stable (Chart II-4-4). Unlike CDS markets, investors in domestic corporate bond markets were mostly limited to domestic investors, and hence there was little influence from portfolio rebalancing and deleveraging by overseas investors (Chart II-4-5). With this market structure, demand from domestic investors, such as financial institutions and life insurance companies, for corporate bonds remained firm in general, and this might have contributed to maintaining relative stability in Japan's corporate bond markets. Specifically,

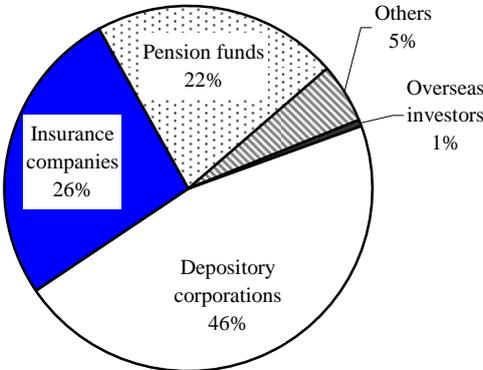
domestic firms' creditworthiness and financial fundamentals remained sound as a whole, and domestic investors with relatively small losses arising from subprime-related products were able to maintain their positive stance of investing in credit assets without facing financial or liquidity constraints. In addition, the relative stability of Japan's money markets kept investors' funding costs and market makers' inventory costs low, which maintained sufficient liquidity in the corporate bond markets (Box 7). All these factors contributed to keeping corporate bond spreads in Japan at low levels, compared to those in the United States and Europe (Chart II-4-2).

Chart II-4-4: Corporate bond spreads over JGB yields



Note: 3- to 7-year maturity.
Source: Japan Securities Dealers Association.

Chart II-4-5: Corporate bond holders



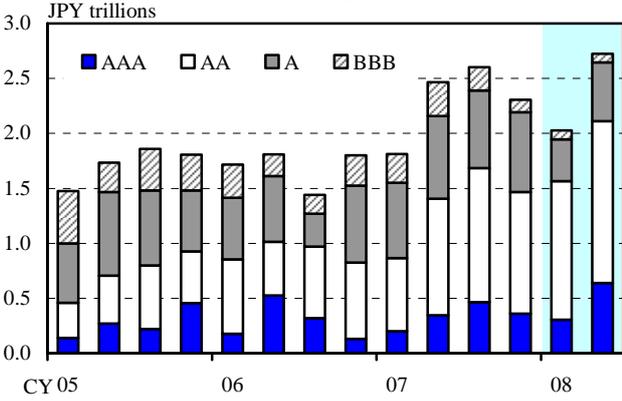
Note: As of the end of 2007.
Source: Bank of Japan, "Flow of Funds."

Although Japan's corporate bond markets were generally stable, domestic investors became more selective about bond issues for investment and conducted stricter screening (Chart II-4-4). Credit spreads of corporate bonds with a high rating temporarily expanded somewhat through the end of March, because of the supply-and-demand imbalance caused by the inventory-averse stance of securities companies and profit-taking sales by investors, but these spreads tightened in April and remained stable thereafter due to investors' firm demand. On the other hand, expansionary pressure on credit spreads lingered for corporate bonds with lower credit ratings, and investors adopted a risk-averse stance on investment in these bonds.

The total amount of primary issuance of corporate bonds was larger in the first half of 2008 than a year earlier, against the background of the decline in long-term interest rates, but the stricter screening by investors clearly had some impact on the amount of issuance (Chart II-4-6). Issuance of corporate bonds with an AA rating or higher increased and pushed up the total amount issued, while the issuing

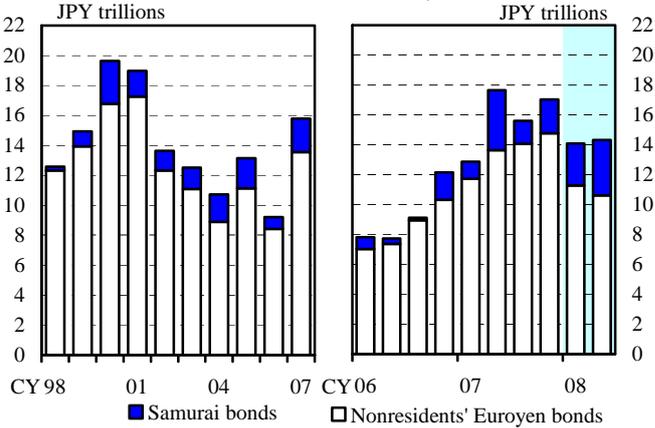
environment for BBB-rated corporate bonds worsened, as issuance spreads widened and the amount issued decreased.

Chart II-4-6: Corporate bond issuance by rating



Sources: I-N Information Systems; Capital Eye.

Chart II-4-7: Issuance of samurai bonds and nonresidents' Euroyen bonds



Notes: 1. Annualized amount based on payment date.
 2. Issuance in June 2008 is not included in the data for Q2/08.
 Source: Ministry of Finance Japan, "International Transactions in Securities."

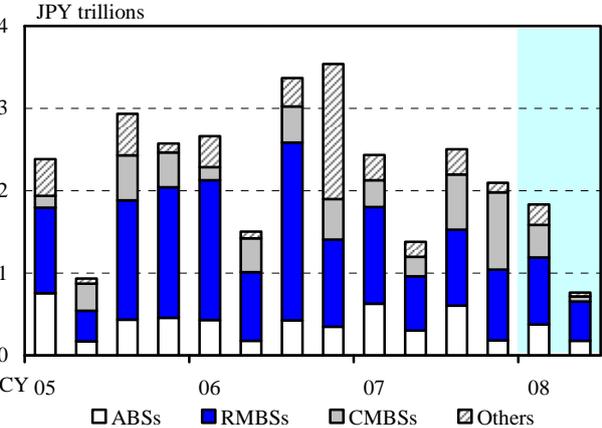
Issuance of samurai bonds increased

Interest rate movements and investors' demand for corporate bonds in Japan were relatively stable even with the stricter screening by domestic investors, and this led to an increase in yen-denominated bonds issued by overseas financial institutions and corporations (Chart II-4-7). As global financial markets experienced turmoil, overseas issuers, especially financial institutions, had strong incentives to fund in the yen markets, in order to expand their global funding capacity, and domestic investors became more aware that investment in samurai bonds (yen-denominated bonds issued by nonresidents in the Japanese market) was attractive in terms of credit ratings and the level of yield. The amount of samurai bonds issued in the first half of 2008 exceeded the high level of the same period a year earlier, and from April samurai bonds were issued for retail investors as well. The amount of issuance of nonresidents' Euroyen bonds (yen-denominated bonds issued in the Euroyen market) also remained high in 2008, although it did not exceed the level of 2007, when the issuance volume largely increased.

Issuance of securitized products decreased

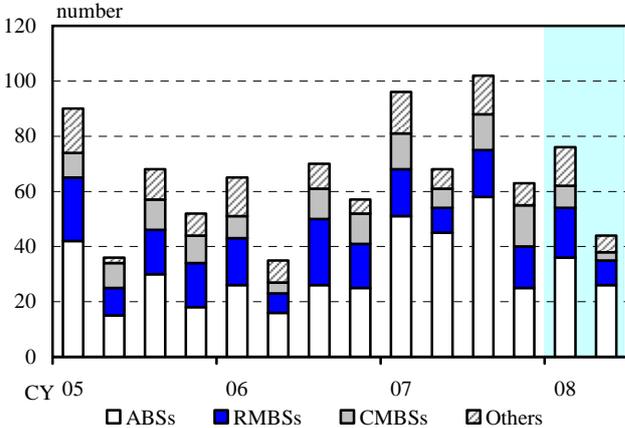
The value and number of issuances of securitized products decreased on a year-on-year basis especially with CMBSs and RMBSs originated by private financial institutions (Charts II-4-8 and II-4-9). This is mainly because (1) large-scale issuance of RMBSs by private financial institutions dwindled after years of rapid growth, and (2) domestic investors became somewhat cautious about investment in securitized products, as prices of similar products in overseas markets declined. As regards spreads of securitized products in the secondary market in Japan, a case of widening was observed in the CMBS market, but such movements were limited on the whole, compared with those in overseas markets.

Chart II-4-8: Notional amount of securitized products issued



Source: Deutsche Securities.

Chart II-4-9: Number of securitized products issued



Source: Mizuho Securities.

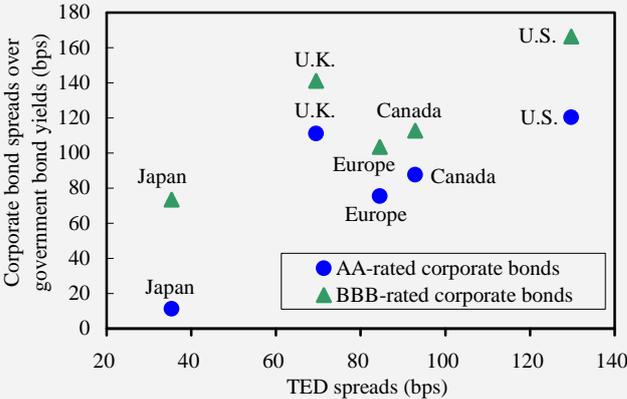
Box 7: Stability in Money Markets and Corporate Bond Markets

In major countries, there is a positive cross-country correlation between corporate bond spreads (over government bond yields) and TED spreads (the spread between LIBOR and the rates on FBs/TBs), as shown in Box 7 Chart 1.⁵⁶ These spreads indicate the premiums for liquidity risk and credit risk in the

⁵⁶ The TED spread originally referred to the spread between U.S. Treasury bills and Eurodollars, but now the term refers to the difference between LIBOR and the rates on FBs/TBs, regardless of the currency. Although the positive correlation, as shown in the chart, can be identified by using the LIBOR-OIS spreads as well, the TED spread is used in this box, in order to analyze longer time-series data for the VAR model.

corporate bond markets and money markets, respectively. The positive correlation between the two spreads implies that the more stable the money market for a country, the more stable the corporate bond market in terms of risk premiums for that country.

Box 7 Chart 1: Credit spreads and TED spreads



Note: Both axes indicate changes between the average of Jan.-Jul. 2007 and that of Aug. 2007-Jun. 2008.
 Sources: Bloomberg; Japan Securities Dealers Association; Japan Bond Trading; Merrill Lynch.

In order to statistically verify the interdependence between these two spreads, we estimate the two bivariate VAR models for the United States and Japan using weekly data from April 1999 through March 2008.⁵⁷ Results of the Granger causality test show a clear causality from the TED spread to the corporate bond spread for both Japan and the United States (Box 7 Chart 2). On the other hand, there is no statistically significant causality from the corporate bond spread to the TED spread. That is, the TED spread moved ahead of the corporate bond spread.

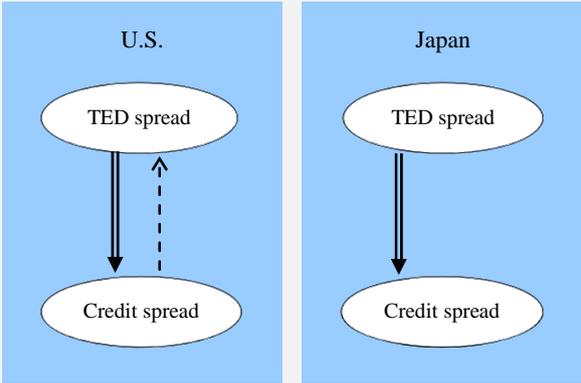
The results of variance decompositions, which provide information about the relative importance of each shock in affecting the spreads, suggest that over 60 percent of the variance of the corporate bond spread is attributed to the TED spread for Japan and the United States (the left-hand chart of Box 7 Chart 3), while only 10-20 percent of the variance of the TED spread is attributed to the corporate bond spread (the right-hand chart of Box 7 Chart 3). These results imply that the TED spread significantly affects the corporate bond spread, but is hardly affected by the corporate bond spread.

Based on these results, fluctuations in term rates in money markets are considered to have a

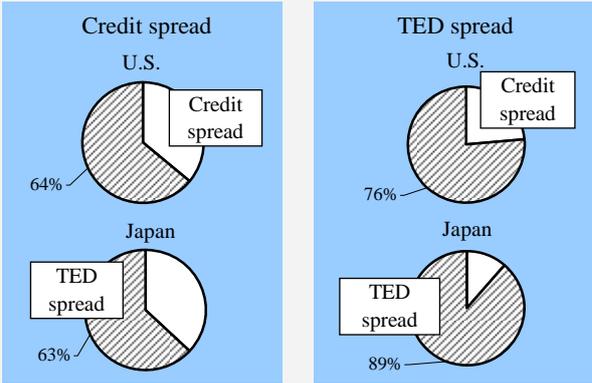
⁵⁷ Data used are as follows: spreads on corporate bonds with a high rating with 3- to less than 5-year maturity for the United States and those with 4- to less than 6-year maturity for Japan; and TED spreads with 3-month maturity for both countries. The VAR model is identified by using the Cholesky decomposition, with the order being corporate bond spreads and then TED spreads.

significant impact on corporate bond spreads through changes in funding costs of investors and inventory costs of market makers. Therefore, the recent relative stability in Japan's money markets can be interpreted to contribute toward the relative stability in its corporate bond markets.

Box 7 Chart 2: Granger causality



Box 7 Chart 3: Variance decomposition



Note: The double and dotted arrows indicate that the null hypothesis of no causality can be rejected at the 1% and 10% significance level, respectively.

5. Foreign Exchange Markets

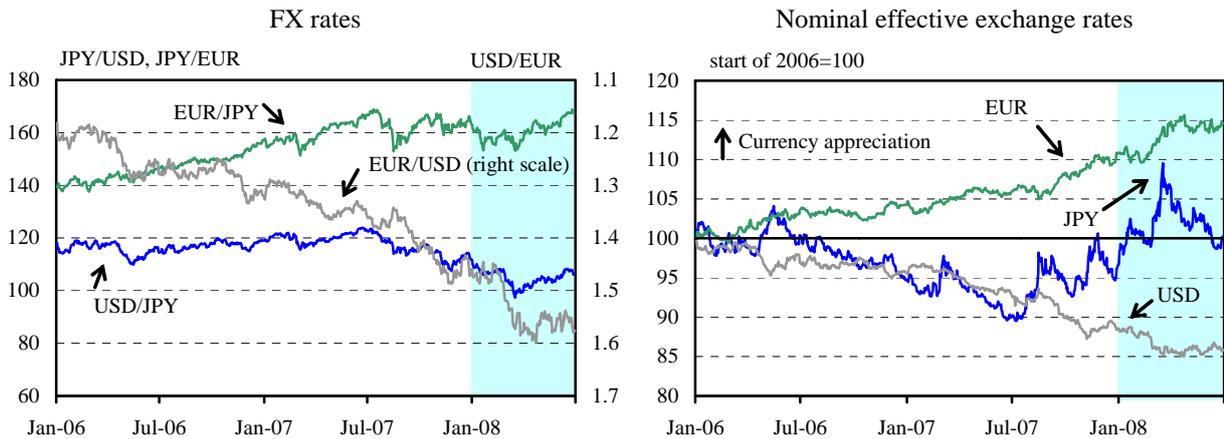
In the FX markets, the U.S. dollar depreciated against other major currencies until mid-March, reflecting continued uncertainties about the outlook for the U.S. economy. Thereafter, the U.S. dollar remained weak, but stopped depreciating as the overly pessimistic views about the U.S. economy were alleviated and expectations about a policy rate hike emerged due to inflationary concerns. Meanwhile, the Japanese yen appreciated with some fluctuations from summer 2007 until mid-March 2008, and depreciated afterward.

The U.S. dollar depreciated

The U.S. dollar continued to depreciate into 2008, and this trend accelerated until mid-March, due to increased concerns about the U.S. recession and financial systemic risk (Charts II-5-1 and II-5-2).

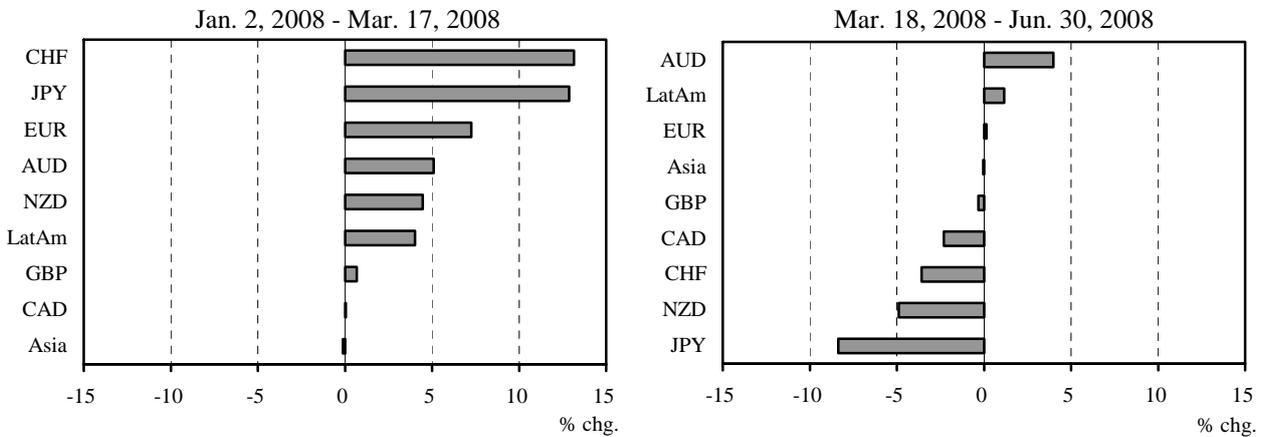
Under such circumstances, the nominal effective exchange rate of the U.S. dollar reached its lowest level since November 1995. The U.S. dollar against the yen fell to 95-96 yen, the weakest level since August 1995, while the U.S. dollar recorded a historical low against the euro.

Chart II-5-1: FX rates of three major currencies



Note: The effective rate of the U.S. dollar refers to the broad index. The rate of the Japanese yen is calculated by the Financial Markets Department of the Bank of Japan.
Sources: Bloomberg; Bank of Japan.

Chart II-5-2: Changes in FX rates against the U.S. dollar

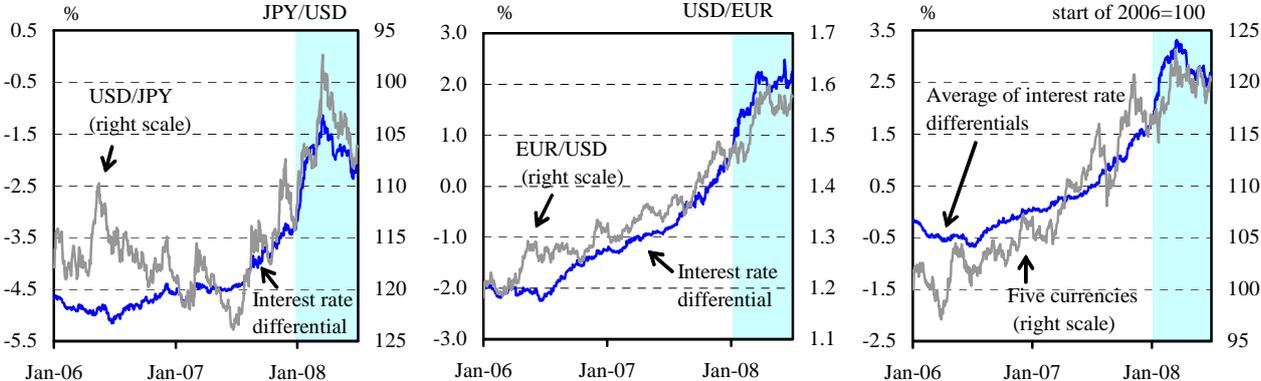


Note: "Asia" indicates Asian Currency Index and "LatAm" indicates Latin American Currency Index.
Source: Bloomberg.

A strong positive correlation between FX rates of major currencies against the U.S. dollar and 1-year interest rate differentials was observed, which indicated that the depreciation of the U.S. dollar was caused by the continuous fall in U.S. interest rates until mid-March (Chart II-5-3). From mid-March until mid-June, the depreciation of the U.S. dollar paused, as U.S. interest rates rose, reflecting the fact that the overly pessimistic views about U.S. recession were alleviated, and

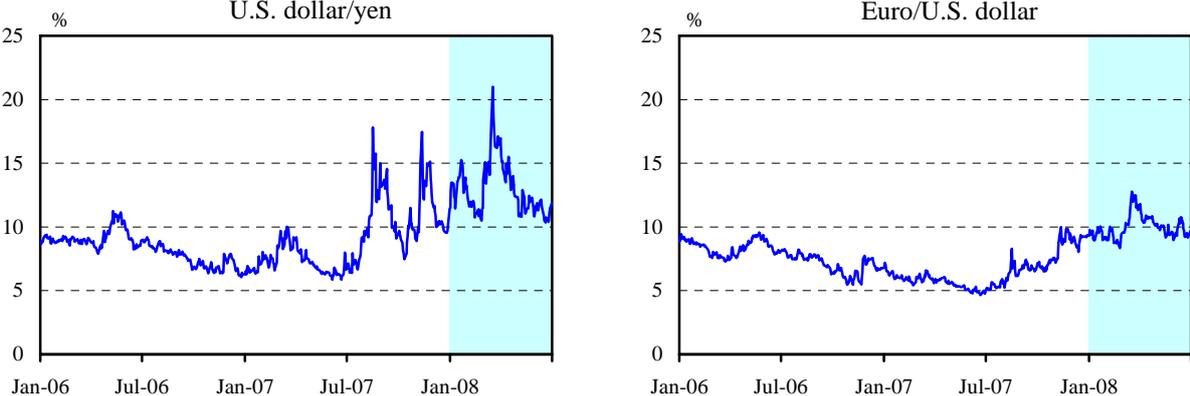
inflationary concerns became stronger. However, volatility remained high and the U.S. dollar depreciated once again in late June against the background of continued fundamental concerns about U.S. economic slowdown and the financial condition of U.S. banks (Chart II-5-4). By currency pair, the volatility of the U.S. dollar against the yen soared up to 21 percent in mid-March, the highest level since September 1999, and that of the euro against the U.S. dollar similarly surged to the level recorded in September 2001.

Chart II-5-3: Interest rate differentials and FX rates against the U.S. dollar



Notes: 1. "Interest rate differential" refers to 1-year IR swap rate differential against the U.S. dollar.
 2. "Five currencies" refers to the average of spot rates for CAD, GBP, CHF, AUD, and NZD against the U.S. dollar.
 Source: Bloomberg.

Chart II-5-4: Implied volatility of FX options (1-month)



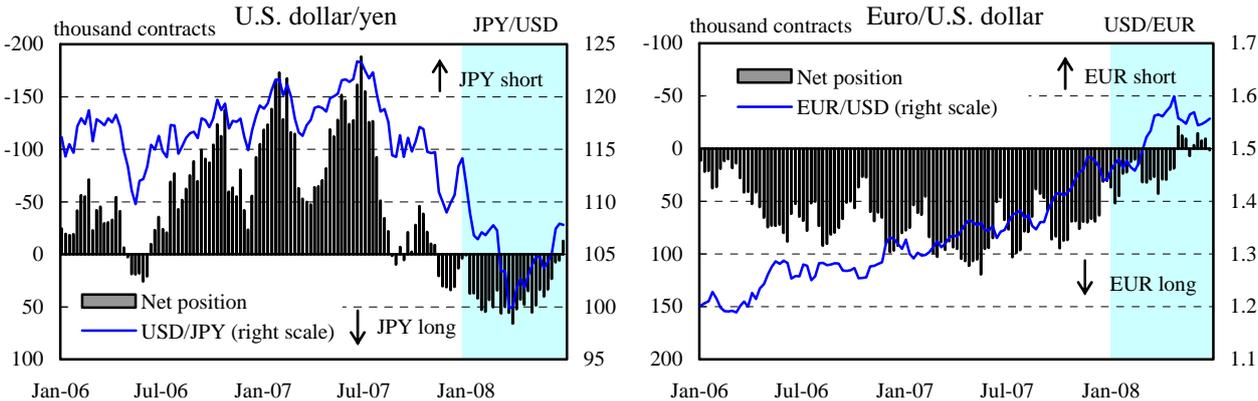
Source: Bloomberg.

Speculators' positions and Japanese retail investors' FX trading

The International Monetary Market (IMM) futures net positions of noncommercial investors on the Chicago Mercantile Exchange show that speculators increased their long positions in yen gradually

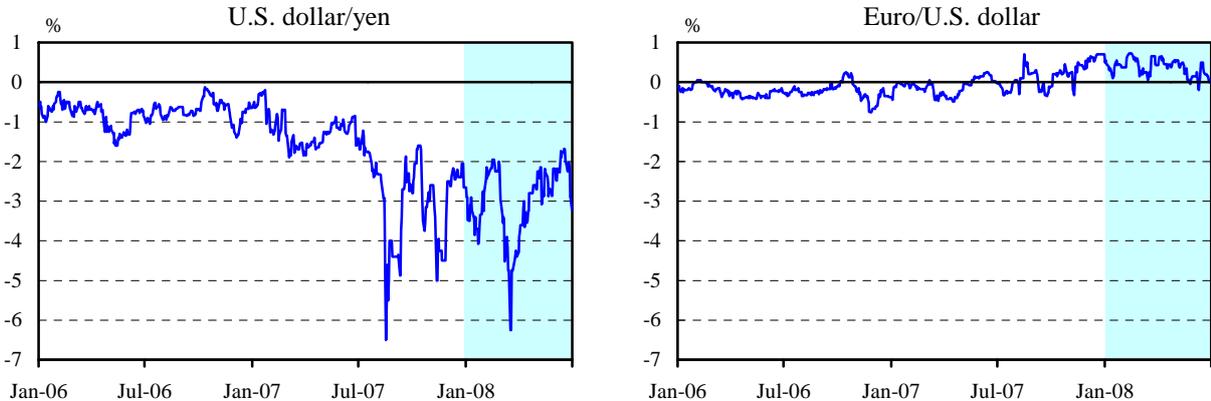
until mid-March 2008, after reducing their yen-carry positions (short positions in yen and long positions in U.S. dollars) in summer 2007 (Chart II-5-5). From mid-March, they reduced their long positions in yen when the U.S. dollar rebounded, and their net positions in yen became almost neutral by the end of June. These developments suggest that there was a relatively high correlation between movements of the U.S. dollar/yen rate and trading of speculators. Meanwhile, amid the euro appreciation, speculators had reduced their long positions in euros since last summer, and their net positions in euros became almost neutral after April. This reduction in speculators' positions was considered to reflect their cautiousness about a reversal of the appreciation of the euro, i.e., future depreciation of the euro. Indeed, looking at a risk reversal of the euro/U.S. dollar, there remained small premiums for U.S. dollar calls over in the first half of 2008 (Chart II-5-6).

Chart II-5-5: IMM futures net positions against the U.S. dollar of non-commercial investors



Source: Bloomberg.

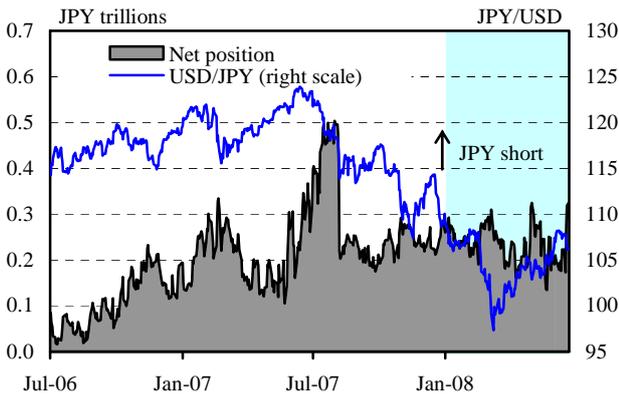
Chart II-5-6: Risk reversal (1-month)



Note: Positive and negative premiums indicate U.S. dollar calls over and puts over, respectively.
Source: Bloomberg.

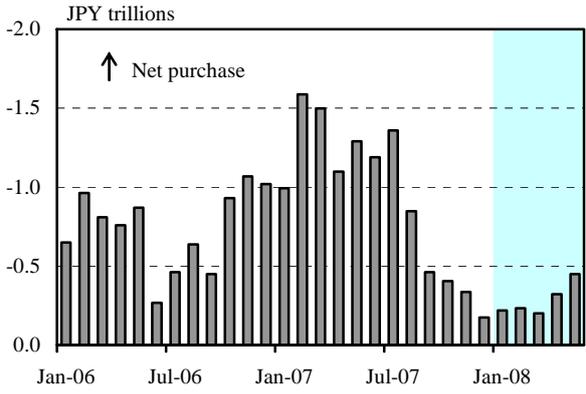
There was no notable change in the trading behavior of Japanese retail investors in the first half of 2008. First, FX margin traders, who sought profits over a relatively short-term horizon, reduced their short positions in yen by almost half as the yen began to appreciate in summer 2007, and had basically maintained this level of position thereafter (Chart II-5-7). In the past, even when the yen came under upward pressure, as seen during February-March 2007 when stock prices declined globally, FX margin traders had maintained their accumulated short positions in yen. This had kept the yen from further appreciation. However, against a backdrop of the U.S. subprime mortgage problem and high volatility in FX markets, FX margin traders stopped increasing their short positions in yen. Second, with regard to retail investment in foreign currency-denominated assets through investment trusts for longer-term horizons, the net purchase of these assets had increased slightly since March. However, compared with the level of the first half of 2007, its amount remained low, due to increased volatility of FX rates (Chart II-5-8). Thus, accumulation of short positions in yen by retail investors, which had once served as a factor contributing to the depreciation of the yen, slowed after summer 2007. This, coupled with the downward pressure on the U.S. economy, seemed to be a factor causing upward pressure on the yen. Meanwhile, looking at the risk reversal of the U.S. dollar/yen, premiums for U.S. dollar puts over remained high on average after summer 2007, indicating strong concerns about the U.S. dollar depreciation and the yen appreciation (Chart II-5-6).

Chart II-5-7: FX margin trading on the Tokyo Financial Exchange



Sources: Bloomberg; Tokyo Financial Exchange.

Chart II-5-8: Foreign securities investment through domestic investment trusts



Source: Ministry of Finance Japan, "Balance of Payments."