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This report covers the market developments during the first half of 2010, unless otherwise stated.

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Financial Markets Department, Bank of Japan

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## **Executive Summary**

### **Heightened Uncertainty Stemming from the Fiscal Problem in Europe**

In the international financial markets, from spring 2009, investment in risky assets continued against the background of the gradual recovery in the world economy, especially in emerging economies and resource-rich economies and the heightened expectation of a continuation of the low interest rate policy in the developed economies. In the beginning of 2010, however, due mainly to the growing fiscal problem in Europe that started in Greece, uncertainties about the international financial markets increased, and investors became cautious about investment.

The fiscal problem in Greece worsened due mainly to the skepticism about the feasibility of fiscal restructuring in Greece, and this spread to other peripheral European countries where the fiscal conditions were also deteriorating. Decline in government bond prices of peripheral European countries, due to the decrease in confidence in the public sector, made market participants' views more cautious toward European financial institutions that held a large amount of such claims, leading to heightened anxiety about the financial soundness of these financial institutions. Reflecting the growing fiscal problem in Europe, the strains in U.S. dollar funding markets increased, and together with the announcement of new financial regulations, market participants' uncertainties mounted.

In particular, from late April 2010, when developments surrounding the fiscal problem in Europe became increasingly tense, the financial market environment -- which had been generally stable -- changed significantly, and the prices of risky assets became unstable, often fluctuating widely. The growing fiscal problem in Europe deeply shocked the financial markets, which had grown used to a stable environment. As market participants strongly believed that it was not easy to resolve the structural problem in the euro area, investors became cautious in taking on risks.

### **Developments in Domestic Financial Markets in the First Half of 2010**

Although the effects of the heightened uncertainty in overseas financial markets on Japanese financial markets were relatively limited, nervousness was seen in some domestic markets, such as stock markets.

Effects from abroad on each domestic market varied depending on the supply and demand conditions and activities of foreign investors. For example, short-term interest rates remained stable at low levels reflecting the Bank of Japan's provision of ample liquidity, and credit spreads on corporate bonds were generally on a decreasing trend in the first half of 2010 given investors' steady demand for investment. Although some adverse effects were seen in the corporate bond market from May 2010, these effects were limited compared with those in the United States and Europe. On the other hand, stock prices fluctuated widely in both directions and showed unstable developments, as they were directly affected by risk aversion among foreign investors amid growing concern about the fiscal problem in Europe. In foreign exchange markets, the yen appreciated substantially against the euro due to the fiscal problem in Europe. The yen's exchange rate against the U.S. dollar had been more or less flat, but then appreciated to below 90 yen and heightened instability toward the end of June 2010, as an expectation of a rise in interest rates in the United States was further reduced.

### **Points to Be Noted in the Financial Markets for the Foreseeable Future**

Financial markets at home and abroad are facing increased uncertainties. As for the outlook, financial markets are likely to remain nervous, fluctuating widely depending on the economic indicators and information on the financial system. In particular, the following warrants attention: whether actions taken by governments in the euro area and the European Union will help alleviate concerns about the fiscal problem in Europe; whether ensured confidence in the European financial sector will prevent an adverse feedback loop between economic and financial activities from operating; and, while major developed economies are expected to recover only moderately, whether emerging economies will achieve a sustainable growth path by conducting appropriate macroeconomic policies and continue to play the role of the engine for the world economy.

Attention should also be paid to long-term interest rates of major developed economies that have recently declined significantly. Long-term interest rates of major developed economies, excluding peripheral European countries, generally have followed a declining trend in the second half of 2009 and the first half of 2010, due to the growing expectation of continued low interest rate policy and to increased risk aversion of global investors reflecting the

credit problem in Europe, respectively. In this regard, some market participants have expressed concern that a decline in long-term interest rates might imply the prolonged stagnation of the real economy. Based on Japan's experience after the bursting of the economic bubble, it has been pointed out that the recovery of major developed economies might be very slow for an extended period since they face balance-sheet adjustment pressure after the financial crisis. On the other hand, as fiscal conditions of major developed economies have significantly deteriorated, it also continues to be pointed out that a risk remains that government bond prices might peak out and start to drop (i.e., that government bond yields might rise).

Therefore, careful attention should be paid to the developments in long-term interest rates in countries around the world as well as the mechanism behind these developments.

## **I. Heightened Uncertainty Stemming from the Fiscal Problem in Europe**

### **A. Worsening of the Fiscal Problem in Europe and Reactions of the International Financial Markets**

In the international financial markets, from spring 2009, while the anxiety concerning the financial system continued to ease,<sup>1</sup> investment in risky assets continued against the background of the gradual recovery in the world economy, especially in emerging economies and resource-rich economies and the heightened expectation of a continuation of the low interest rate policy in the developed economies. Market participants' risk tolerance increased, as seen in the continued rises in prices of many financial instruments, such as stocks, commodities, and credit products. From January 2010, however, the fiscal problem in Greece spilled over to concerns about fiscal conditions in other peripheral European countries and the financial soundness of European financial institutions. Under these circumstances, the prices of risky assets became unstable, often fluctuating widely.

#### *Worsening of the Greek problem*

The Greek fiscal problem triggered by the significant revision of fiscal statistics by the Greek government in October 2009 started to worsen in the beginning of 2010, increasing uncertainties surrounding the international financial markets.

The yield spread between Greek and German government bonds and the sovereign credit default swap (CDS) premium started to widen significantly, reflecting the downgrading of Greece's sovereign debt ratings by rating agencies in December 2009 (charts 1-1 and 1-2). From January 2010, the yield spread and the sovereign CDS premium widened further due to the skepticism about the feasibility of fiscal restructuring in Greece and anxiety concerning large-scale redemptions of government bonds from April to May 2010. The widening of yield spreads and sovereign CDS premiums spread to other peripheral European countries such as Portugal, where the fiscal conditions were also deteriorating (Chart 1-3). Together with the announcement in the United States around that time of a new financial reform bill including the so-called Volcker rule (to be discussed later), these developments in Europe adversely affected investors' sentiment and led to an adjustment of

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<sup>1</sup> For more details, see the March 2010 issue of the *Financial System Report*, Bank of Japan.

prices of risky assets (Chart 1-4). At this stage, however, many market participants took the view that the European Union (EU) would ultimately handle the situation and the spillover effects of Greece to other countries would be avoidable. Thus, prices of risky assets started to pick up.

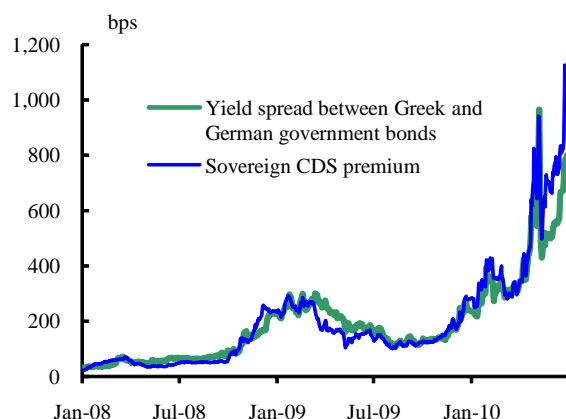
In this way, the international financial markets were temporarily in a lull but rapidly became unstable as the Greek problem worsened again around late April 2010. In other words, given that the Greek fiscal deficit for 2009 turned out to be larger than the government's projection and demonstrations against the Greek austerity measures intensified, market participants became increasingly concerned about the feasibility of fiscal restructuring in Greece. Reflecting this, the yield spread between Greek and German government bonds and the sovereign CDS premium widened extremely<sup>2</sup> (Chart 1-1). Meanwhile, on April 23, 2010, Greece requested financial assistance from the EU and the International Monetary Fund (IMF). This, however, could not ease markets' heightened anxiety because the public sentiment and governments' and central banks' stance on providing assistance to Greece varied significantly, and some market participants believed that there was considerable uncertainty about the implementation of specific assistance. Moreover, market participants considered that the steps to bring the problem under control in Greece -- with its limited economic size -- were not being taken smoothly at the EU level, and this heightened their anxiety. As a result, government bond yields and sovereign GDS premiums for peripheral European countries, such as Greece, Ireland, Italy, Portugal, and Spain (GIIPS), increased markedly (charts 1-1 and 1-3). Concurrently, stock prices of European financial institutions that seemed to hold large claims on GIIPS plunged, and the strains in U.S. dollar funding markets increased due to uncertainty about funding conditions of these institutions. The fiscal problem in Europe spread to the problem in the financial sector. Reflecting this, investors became increasingly risk averse, and prices of risky assets fell significantly (Chart 1-4).

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<sup>2</sup> The government bond yields in some peripheral European countries including Greece rose extremely, partly because the already low liquidity in the government bond markets decreased further.



**Chart 1-1: Yield spread between Greek and German government bonds and the Greek sovereign CDS premium**



Notes: 1. Yield spread of 10-year government bonds.  
 2. 5-year sovereign CDS premium denominated in U.S. dollars.  
 Source: Bloomberg.

**Chart 1-2: Sovereign debt ratings**

S&P

Ratings	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-
Corresponding major countries	Canada, France, Germany, U.K., U.S.	Hong Kong	Japan	Taiwan	Korea, China	Poland	Thailand	Brazil	Iceland	India	Indonesia	Latvia	Venezuela
Greece						●	→	▲	→	→	Apr. 27		
Ireland	●	→	▲										
Italy					●▲								
Portugal				●	▲	→	Apr. 27						
Spain	●	▲	Apr. 28										

Moody's

Ratings	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3
Corresponding major countries	Canada, France, Germany, U.K., U.S.	Belgium	Japan, Hong Kong	Taiwan	Korea, China	Poland	Malaysia	Russia	Tunisia	Iceland	Egypt	India	Uruguay
Greece					●	▲	Apr. 22	→	→	→	Jun. 14		
Ireland	●	▲											
Italy			●▲										
Portugal			●▲										
Spain	●▲												

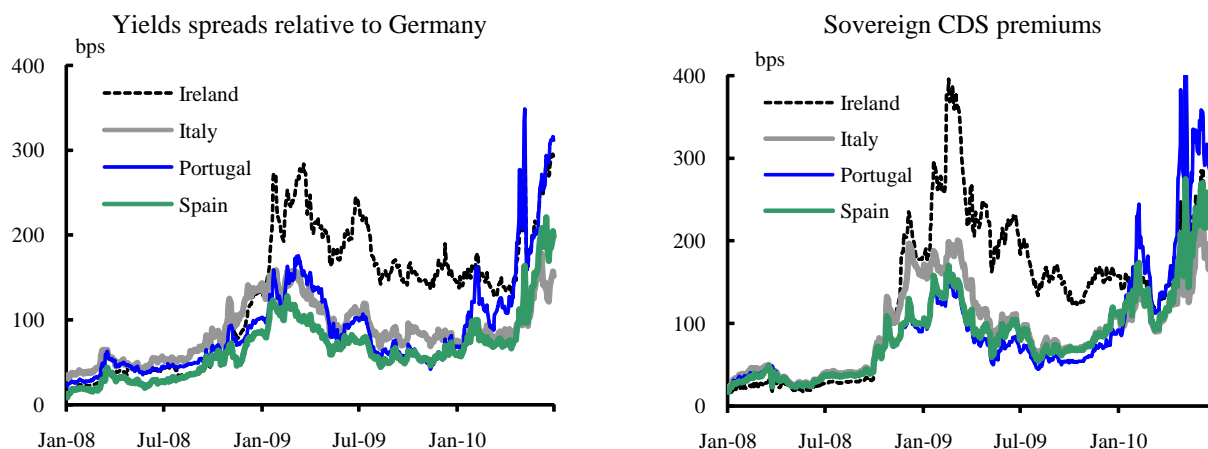
Fitch

Ratings	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-
Corresponding major countries	Canada, France, Germany, U.K., U.S.	Hong Kong, Belgium	Taiwan, Korea	Japan, China	Slovakia	Malaysia	Thailand	Iceland	Russia	India, Egypt	Indonesia	Uruguay	Kenya
Greece						●	→	▲	→	Apr. 9			
Ireland	●	→	→	▲									
Italy				●▲									
Portugal			●	▲									
Spain	●▲	May 28											

Notes: 1. Ratings of long-term debt denominated in local currencies. ● and ▲ indicate ratings before the failure of Lehman Brothers and at the start of January 2010, respectively.  
 2. The date indicates the day when a rating was changed. Ratings of corresponding major countries are as of the end of June 2010.

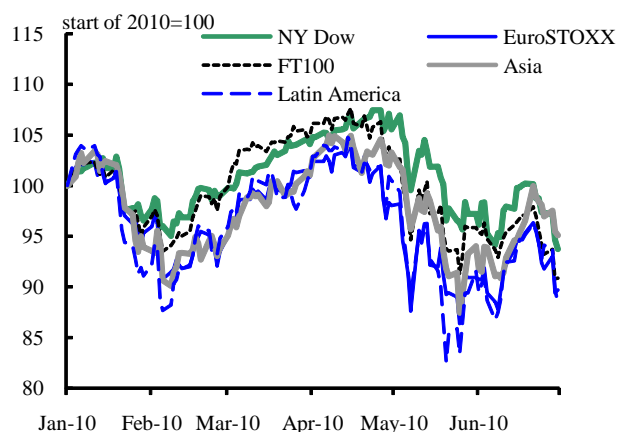
Sources: Bloomberg; Fitch; Japan Center of Economic Research; Moody's; S&P.

**Chart 1-3: Peripheral European countries' yield spreads and sovereign CDS premiums**



Notes: 1. Yield spreads of 10-year government bonds.  
 2. 5-year sovereign CDS premiums denominated in U.S. dollars.  
 Sources: Bloomberg; Credit Market Analysis.

**Chart 1-4: World stock indices**



Note: The indices for Asia and Latin America are MSCI emerging indices denominated in U.S. dollars.  
 Source: Bloomberg.

In response to this situation, toward early May 2010, more stringent measures, such as the establishment of the European Financial Stabilisation Mechanism by the EU and the IMF and interventions in debt markets by the European Central Bank (ECB), were decided and announced. (For information on the policy actions of governments and central banks around the world in response to the heightened sovereign risk in Greece, see Box 1.) Reflecting this, market participants started to express the view that these measures relieved Greece's funding concerns for the time being. In addition, the ECB intervened in government bond markets. As a result, the Greek government bond yield declined significantly from its peak

(Chart 1-1). Moreover, given that central banks around the world coordinated to reestablish temporary U.S. dollar liquidity swap facilities that had been completed in February 2010, deterioration in conditions in dollar funding markets came to a halt. Market participants, however, still expressed a severe view that the fiscal deficit problem in countries such as GIIPS, which had grown due to the structural factors peculiar to the euro area, could not be solved easily, and thus, there remained considerable uncertainty about the outlook for financial markets. (For information on views about structural problems in the euro area, see Box 2.)

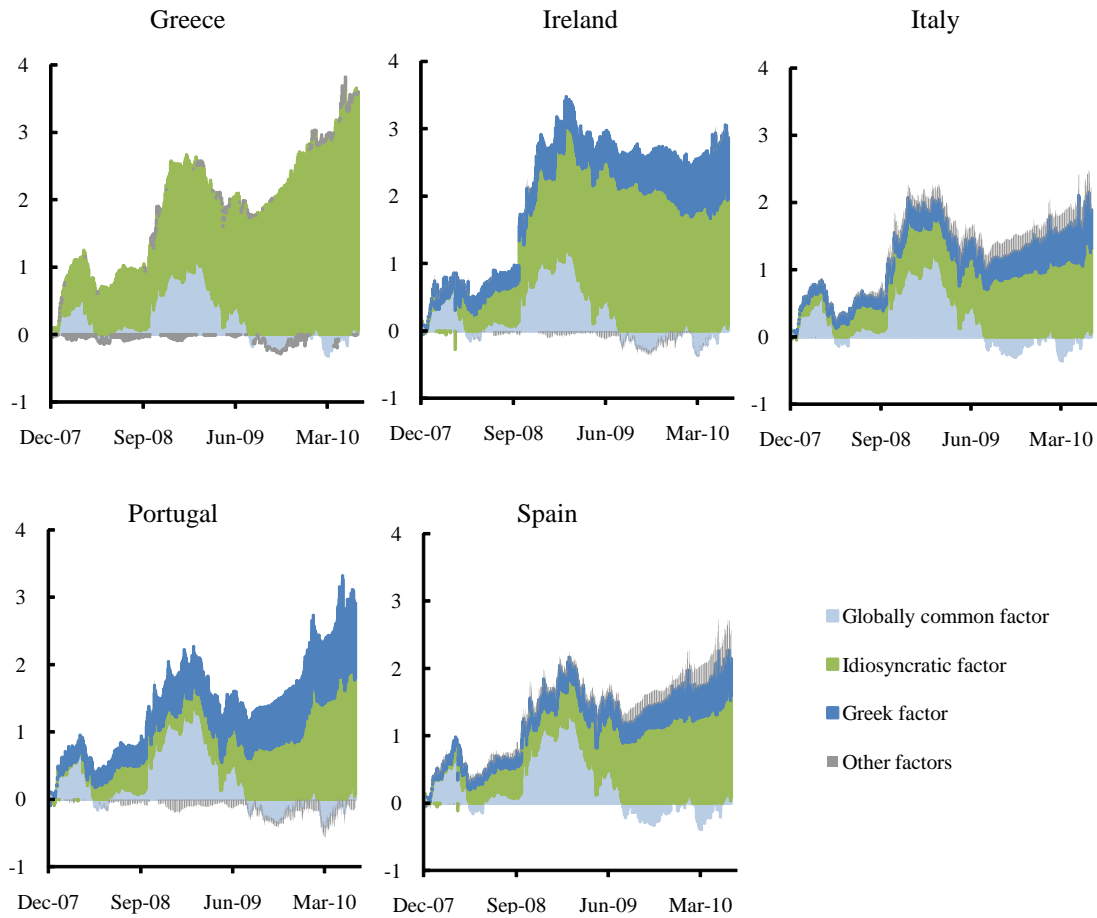
### *Spillover of the fiscal problem*

Such spillover of the problem that started in Greece could be clearly confirmed based on the statistical methods which measured how strongly the shocks that occurred in each country (the factors behind price changes) affected sovereign CDS premiums for GIIPS<sup>3</sup> (Chart 1-5). The results showed that the increase in Greek sovereign CDS premiums in early 2009 was caused largely by the global increases in sovereign CDS premiums reflecting the absorption of risks in the financial sector by the public sector in developed economies such as the United States, or, in other words, the globally common factors. On the other hand, the current increases in premiums could be explained mostly by shocks that occurred only in Greece. Although in GIIPS other than Greece, idiosyncratic factors had relatively strong effects due to the deterioration in their fiscal conditions, the effects of Greece on these countries seemed to increase gradually. In particular, as in Greece, sovereign CDS premiums for Ireland and Portugal -- with their relatively small economic size -- fluctuated easily, given their direct association with Greece. This showed once again that the series of fiscal problems in Europe stemmed from the problem in Greece. Under these circumstances, reflecting the downgrading of sovereign debt ratings, market participants' views on GIIPS grew more severe (Chart 1-2).

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<sup>3</sup> For details, see Shino and Takahashi (2010) and Takahashi (2010). Estimations were made for ten countries: GIIPS, Japan, the United States, United Kingdom, Germany, and Brazil.

**Chart 1-5: Factors affecting sovereign CDS premiums**



Note: Cumulative changes of natural logarithm of CDS premiums from December 2007.  
Sources: Credit Market Analysis; Bank of Japan.

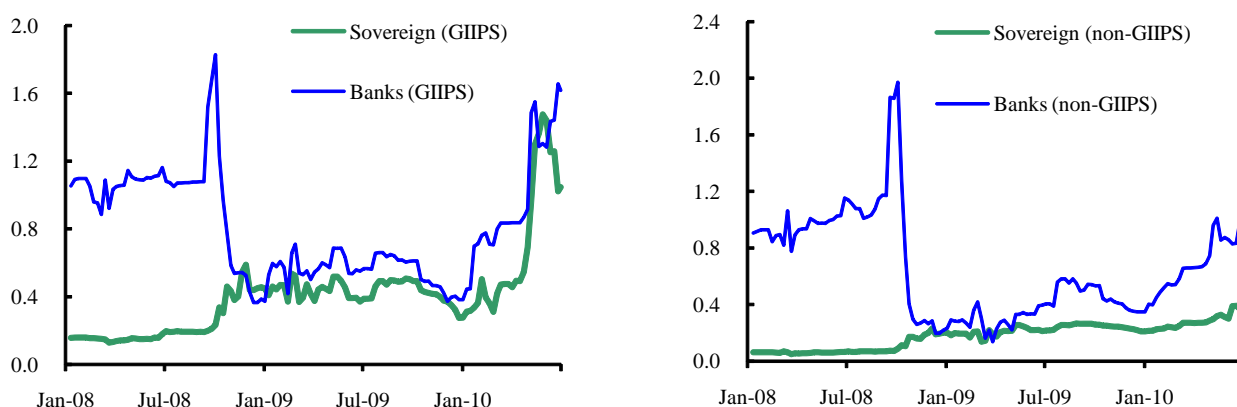
*Correlation of risks between the public and banking sectors*

In response to the financial crisis after the failure of Lehman Brothers Holdings Inc., while governments in developed economies supported or bailed out financial institutions, they implemented various measures to avoid the abrupt contraction of the macroeconomy due to deleveraging in the private sector. As a result, governments' balance sheets expanded. In other words, the governments tried to ease the turmoil in financial and economic activities after the failure of Lehman Brothers Holdings Inc. by shifting private-sector risks to public-sector ones. In order to analyze the changes in risks in the public and banking sectors perceived by market participants, we examined how sovereign and bank CDS premiums reacted to the changes in fundamentals in financial markets (the sensitivity to risks) and

confirmed the difference between GIIPS and other European countries.<sup>4</sup>

Immediately after the failure of Lehman Brothers Holdings Inc., the sensitivity of sovereign CDS premiums for both GIIPS and non-GIIPS increased slightly and fluctuated easily when the significantly heightened sensitivity of bank CDS premiums dropped sharply (Chart 1-6). This suggested that the public sector absorbed the risks of the private sector. On the other hand, recently in GIIPS, bank and sovereign CDS premiums simultaneously plummeted.

**Chart 1-6: Sensitivity of CDS premiums to market fundamentals**



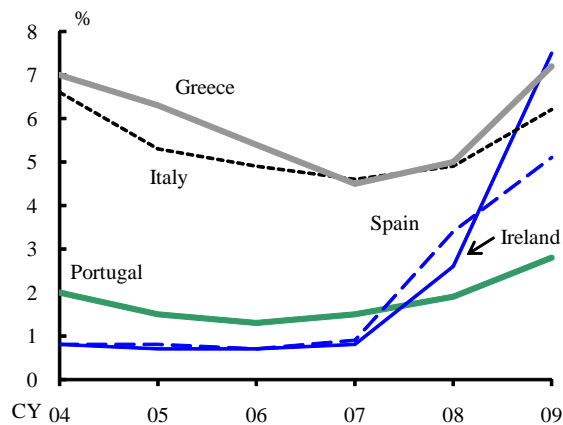
Note: Non-GIIPS includes Austria, Belgium, France, Germany, and the Netherlands.  
Sources: Bloomberg; Credit Market Analysis; Bank of Japan.

Among GIIPS, in Ireland and Spain, the ratio of nonperforming loans to the construction and real estate sectors rose significantly from around 2007 to 2008, when home prices started to fall; concurrently, the fiscal balances deteriorated rapidly (charts 1-7, 1-8, and 1-9). Therefore, it could be concluded that when market participants became less confident about the sound management of fiscal balances by the government, they could not expect the fiscal measures to support the economy and the fiscal problem was easily linked to the credit problem in the banking sector.

<sup>4</sup> Specifically, we chose the Markit iTraxx Europe Non-Financial CDS premiums as market fundamentals, or common risk factors, and measured the changes in the sensitivity of sovereign and bank CDS premiums to changes in common risk factors by using the Kalman filter. This method allowed us to understand how the deterioration in macroeconomic environment would affect the investors' risk aversion toward specific financial instruments. For details, see Ejsing and Lemke (2009).

It should be noted that sovereign CDS premiums might not reflect views of a wide range of market participants due to the low liquidity in the market.

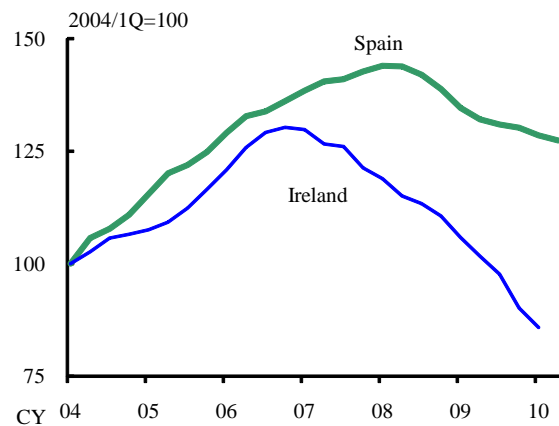
**Chart 1-7: Ratio of banks' nonperforming loans to total loans in GIIPS**



Note: For 2009, figures in Italy and Portugal are as of June, in Greece and Ireland are as of September, and in Spain are as of December.

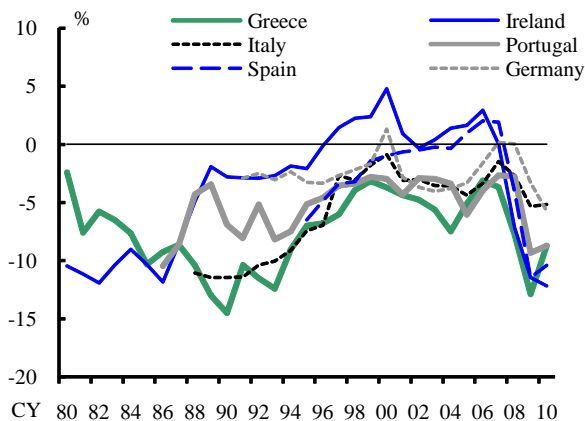
Source: International Monetary Fund.

**Chart 1-8: Home price indices**



Note: Figures for Ireland are up to the first quarter of 2010.  
Source: Bloomberg.

**Chart 1-9: Fiscal balances in GIIPS and Germany**



Notes: 1. Figures are ratios of general government net lending/borrowing to GDP in the IMF's World Economic Outlook (April 2010).  
2. Forecasted figures are included.

Source: International Monetary Fund.

Around the time of the failure of Lehman Brothers Holdings Inc., the imbalance of funding and management of funds by Greek banks had been pointed out, as they increased their funding from central banks by submitting Greek government bonds as collateral while actively managing funds in Central and Eastern Europe. (For information on the current situation of the Greek banking sector, see Box 3.) Therefore, it could be said that while yields on Greek government bonds rose given heightened concerns about fiscal conditions as well as those about increases in nonperforming loans due to economic deterioration at home and abroad, concerns grew over the expansion of losses incurred by government bond

holdings and over funding through use of these government bonds. Such concerns spread not only to Greece but also to the other GIIPS.

On the contrary, in European countries other than GIIPS, while the sensitivity of bank CDS premiums increased markedly, that of sovereign CDS premiums showed only a moderate increasing trend. This could be because unlike GIIPS, market participants maintained their confidence in the public sector to some extent, but they were concerned about losses from exposures to GIIPS given the high interdependence of banks in Europe. As described above, the heightened Greek sovereign risk spread to the fiscal and financial problems in GIIPS and further to concerns over the financial soundness of financial institutions in some European core countries.

#### **Box 1: Policy Actions in Response to Sovereign Risk in Greece**

In response to the strains in the international financial markets triggered by the growing problem in Greece, the EU, the IMF, the ECB, and other central banks around the world decided and announced various policy measures.

On May 10, 2010, the Economic and Financial Affairs Council (Ecofin Council) of the EU established the European Financial Stabilisation Mechanism. Through this mechanism, a total of up to 500 billion euros would be provided. In addition, the IMF would participate in the financing arrangements and was expected to provide at least half as much as the euro area countries' contributions through its usual facilities.

On May 3, 2010, the ECB announced the suspension, until further notice, of the application of the minimum credit rating threshold in the collateral eligibility requirements in case of marketable debt instruments issued or guaranteed by the Greek government. On May 10, 2010, the ECB decided to (1) introduce the Securities Markets Programme, (2) strengthen long-term refinancing operations (LTROs) such as three-month LTROs, and (3) reactivate the temporary U.S. dollar liquidity swap lines. Regarding the first decision, the objective of the Securities Markets Programme was to address the malfunctioning of securities markets and restore an appropriate monetary policy transmission mechanism. The central banks would conduct interventions in the euro area public and private debt securities markets to ensure liquidity in those market segments that were dysfunctional. In order to sterilize the

impact of the above interventions, specific operations would be conducted to reabsorb the liquidity injected through the Securities Markets Programme. As for the second decision, the ECB would adopt a fixed-rate tender procedure with full allotment in the regular three-month LTROs that had been conducted through a variable rate tender procedure since April 2010 (on May 26 and June 30, 2010)<sup>5</sup> and conduct a six-month LTRO for the first time since the end of March 2010 (on May 12, 2010). With regard to the third decision, the facility was designed to help improve liquidity conditions in dollar funding markets and to prevent the spread of strains to other markets and other financial centers. The ECB decided to reactivate, in coordination with other central banks, the temporary dollar liquidity swap lines with the Federal Reserve that had expired in February 2010 and would provide dollar funds obtained through the swap lines to the markets by carrying out repurchase operations against ECB-eligible collateral as fixed rate tenders with full allotment.

#### **Box 2: Views on Structural Problems in the Euro Area**

Many market participants and academia expressed the view that the worsening of the fiscal problem in GIIPS was caused by structural factors peculiar to the euro area. For example, looking at the current account balance of euro area countries by particularly focusing on that of GIIPS and Germany, current account imbalances expanded significantly after the introduction of the euro (Chart 1 for Box 2). Many people pointed out that this reflected the gap in productivity and competitiveness as intra-regional trade in the euro area expanded due to the introduction of a common currency, the euro.<sup>6</sup> Based on the savings-investment identity in the macroeconomy, when it was appropriate to assume that net savings of the domestic private sector were generally unaffected by the changes in the external environment, a current account deficit would result in a fiscal deficit.

In addition, some market participants expressed the following concern. Fiscal expenditure tended to increase because, instead of monetary policy that aimed at the euro area as a whole, the fiscal policy of each country played a role in stabilizing demand (Chart 1-9).

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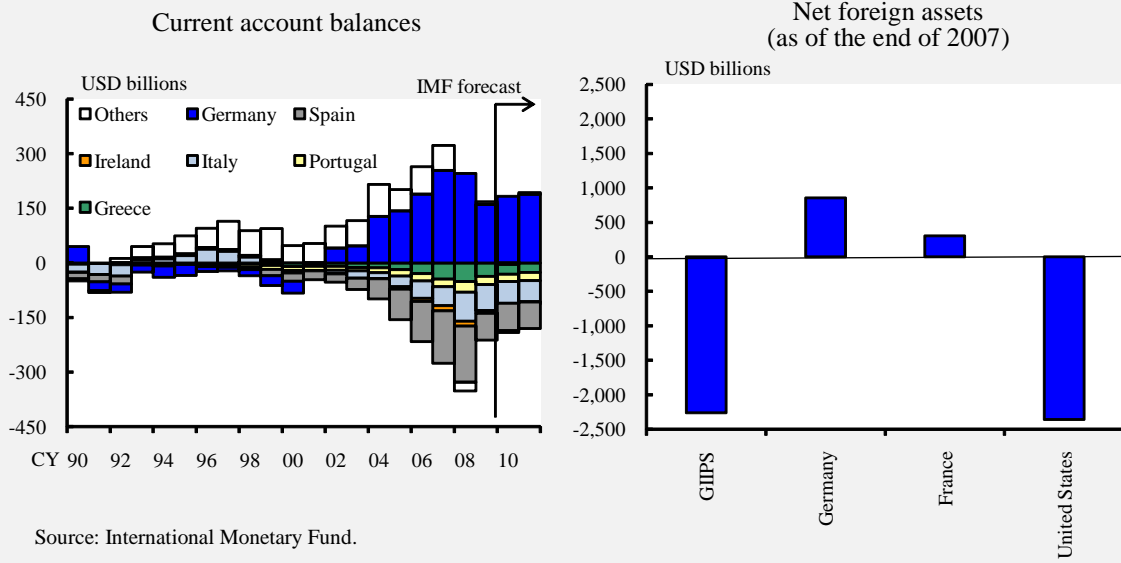
<sup>5</sup> On June 10, 2010, the ECB decided to adopt a fixed rate tender procedure with full allotment in the regular three-month LTROs to be allotted on July 28, August 25, and September 29, 2010.

<sup>6</sup> The net foreign assets (stock) at year-end 2007 varied among euro area countries. It was possible to confirm that the external imbalances of GIIPS were quite large compared to those of the United States.



Fiscal conditions deteriorated in most euro area countries after the introduction of the euro. Looking at the projections for 2010, almost no country could pass the EU fiscal rule of the Treaty of Maastricht (Chart 2 for Box 2). In particular, GIIPS increased their fiscal expenditure during the current crisis and moved to the upper right of the chart.

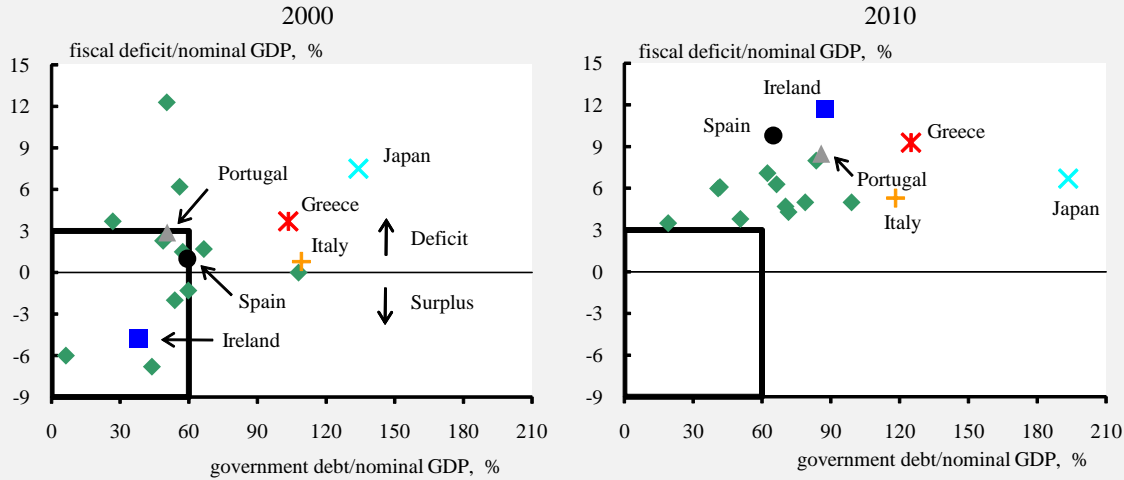
**Chart 1 for Box 2: Imbalances in European countries**



Source: International Monetary Fund.

Source: External Wealth of Nations Statistics 1970-2007.

**Chart 2 for Box 2: Fiscal conditions in European countries**

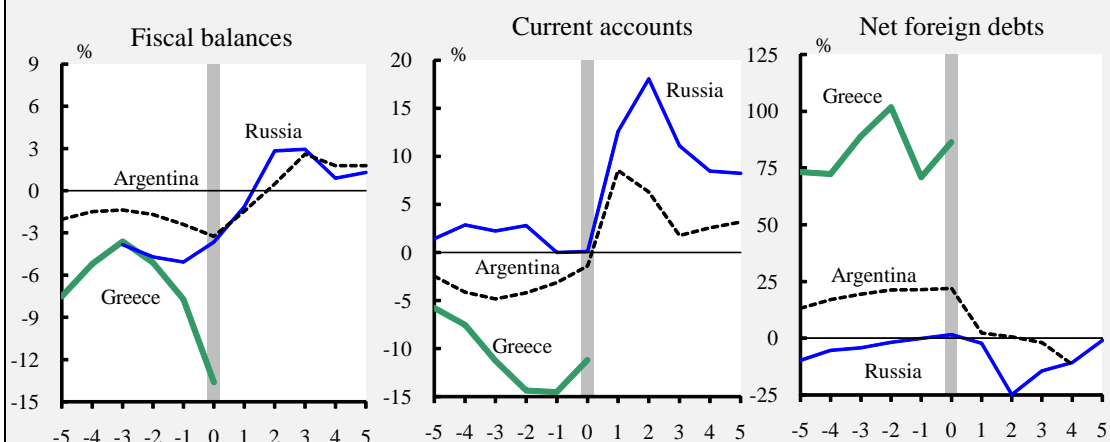


Note: Bold lines indicate the criteria of the Stability and Growth Pact in the Treaty of Maastricht.  
Sources: European Commission, "European Economic Forecast, Spring 2010"; Eurostat.

For reference, comparing the financial and economic environment in Greece recently with that in Russia and Argentina during their debt crises, the fiscal deficit, current account

deficit, and net foreign debt of Greece appeared much worse than in Russia and Argentina<sup>7</sup> (Chart 3 for Box 2). In Greece, a debt crisis similar to that of Russia and Argentina did not occur at an earlier stage. This may be because market participants were confident about the euro as a common currency or expected support from other euro area countries. On the contrary, it cannot be denied that because Greece is a member of the Eurosystem, emergence and recognition of the problem took time and thus, implementation of policy measures was delayed and vulnerability increased further.

**Chart 3 for Box 2: Comparison of macroeconomic environment related to sovereign risk**



Notes: 1. Shaded areas indicate the periods of the debt crises that correspond to 2009 in Greece, 1998 in Russia, and 2001 in Argentina.

2. All figures are ratios to GDP.

Sources: CEIC; Eurostat; International Monetary Fund.

### **Box 3: The Current Situation of the Banking Sector in Greece**

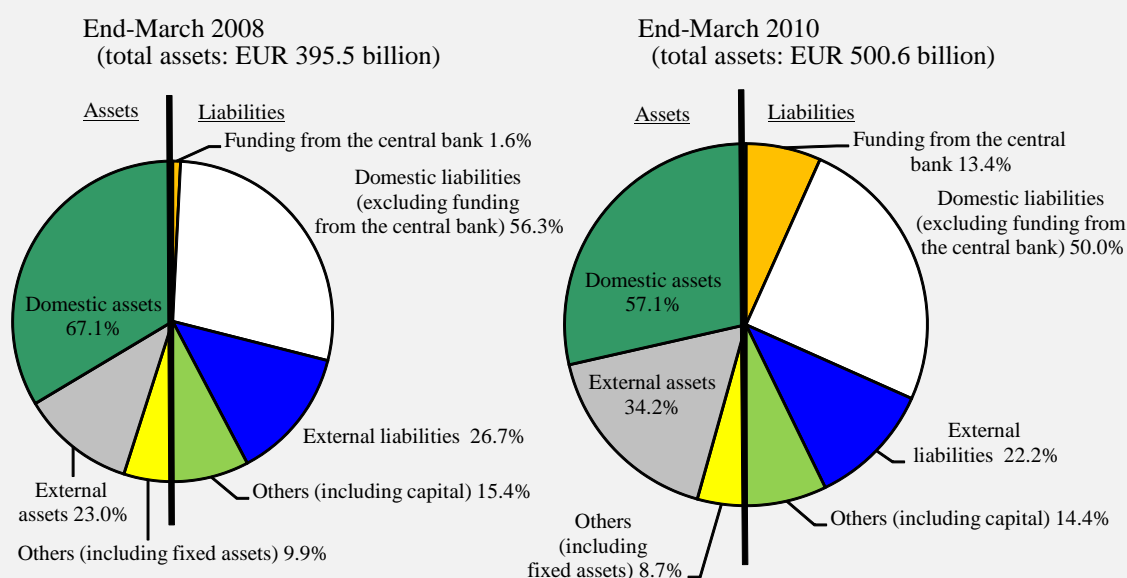
The size of the balance sheet of the banking sector in Greece expanded by about 100 billion euros (26.6 percent) during the two years from the end of March 2008 to the end of March 2010 (Chart 1 for Box 3). This mainly reflected the fact that banks significantly increased their funding through operations conducted by the Bank of Greece and managed these funds in other countries (mainly through interbank lending and investment in corporate bonds). After the failure of Lehman Brothers Holdings Inc. in autumn 2008, many banks

<sup>7</sup> Differences in exchange rate regimes, such as fixed foreign exchange (FX) rate, currency board system, and currency unification, might affect the financial and economic environment during the debt crisis.

accelerated deleveraging, but Greek banks actively expanded their balance sheets.

Next, the maturity and currency composition of external assets and liabilities in the Greek banking sector showed that maturity and currency mismatch did not increase. All in all, the high percentage of domestic funding through operations conducted by the central bank was noticeable (Chart 2 for Box 3). When funding through these operations, banks actively used domestic assets such as government bonds, and thus their funding became susceptible to changes in the government's credibility.

**Chart 1 for Box 3: Balance sheet of the banking sector in Greece**

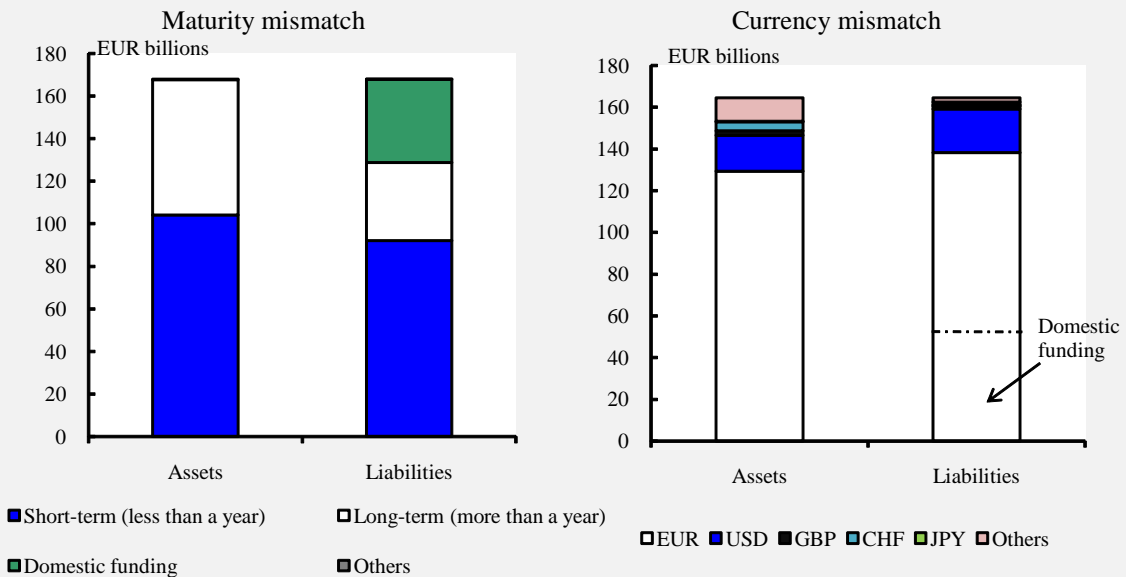


Note: The area of a circle indicates the size of the balance sheet.

Source: Bank of Greece, "Aggregate Balance Sheets of Monetary Financial Institutions."

Finally, external assets and liabilities of the Greek banking sector by country at the end of December 2009 showed that both assets on and liabilities to European countries accounted for around 90 percent of the total (charts 3 and 4 for Box 3). In particular, external assets on emerging European economies and external liabilities to the United Kingdom, Germany, and France accounted for a high percentage of the share, around 60 percent of the total in each case. Among countries on which the Greek banking sector held external assets, it was worth noting that Turkey, Romania, Bulgaria, and Cyprus depended for around 20-40 percent of their funding through banks in Greece. Therefore, such strong interdependence of Greece and other European countries seemed to be a cause of the worsening of the Greek problem.

**Chart 2 for Box 3: Mismatches in external assets**

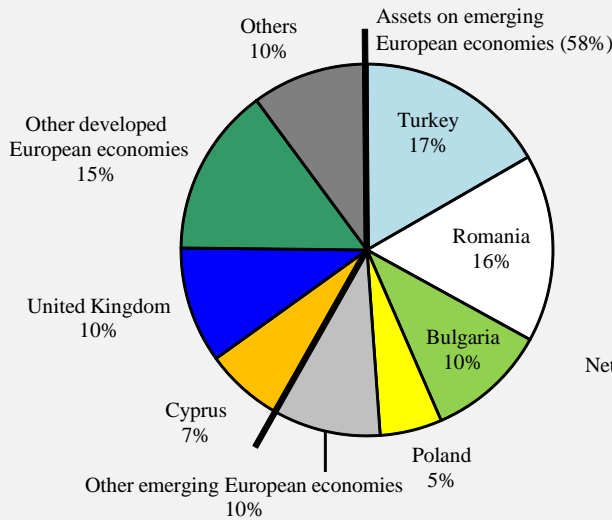


Notes: 1. As of the end of December 2009.

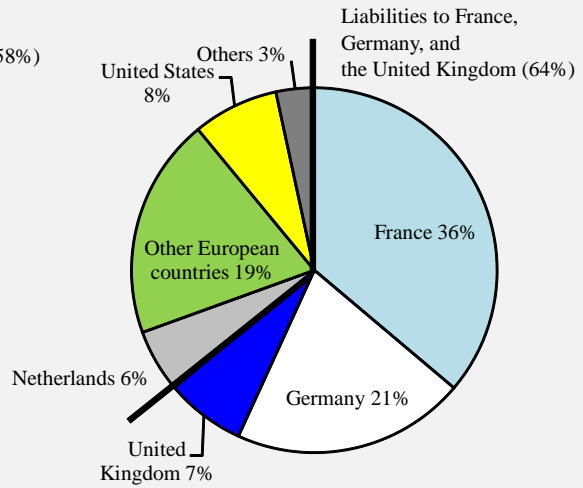
2. The domestic funding is the difference between external assets and liabilities.

Sources: Bank for International Settlements, "Locational International Banking Statistics"; Bank of Greece, "Aggregate Balance Sheets of Monetary Financial Institutions," "External Debt," "Financial Accounts."

**Chart 3 for Box 3: Breakdown of external assets by country**



**Chart 4 for Box 3: Breakdown of external liabilities by country**



Note: The shares of external liabilities are the figures reported by the 23 countries that participated in the statistics.

Source: Bank for International Settlements, "Consolidated International Banking Statistics."

## B. New Uncertainties Surrounding Financial Institutions

The growing fiscal problem in Europe was the main cause of the heightening of uncertainty

in the financial markets during the first half of 2010. At the same time, the increased strains in the financial institutions' funding conditions while interacting with the problem in Europe and the announcement of a series of new measures to strengthen financial regulation also heightened concerns over financial institutions' activities and increased uncertainties in the international financial markets.

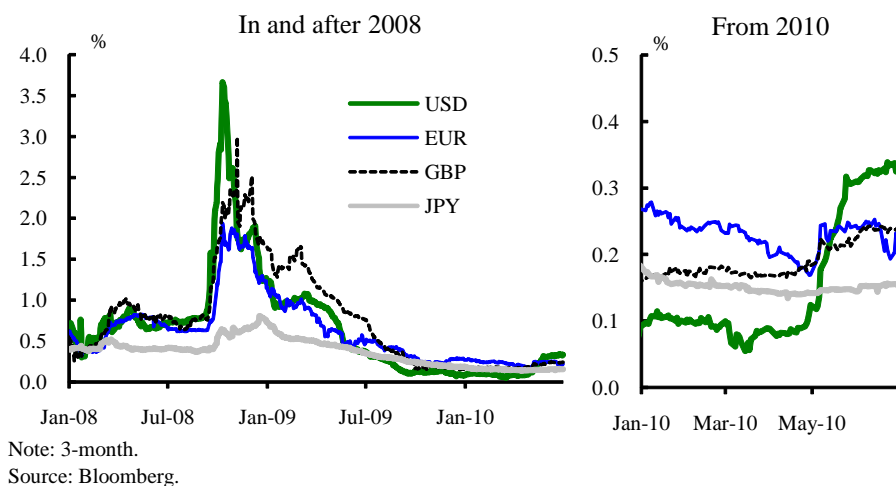
#### *Tightening of supply and demand conditions in U.S. dollar funding markets*

The London Interbank Offered Rate (LIBOR)-Overnight Index Swap (OIS) spread, an indicator for counterparty risk and liquidity risk in interbank transactions, generally remained stable at a low level after autumn 2009 (Chart 1-10). This was against the following background: (1) the turmoil triggered by deterioration in the financial soundness of financial institutions after the failure of Lehman Brothers Holdings Inc. eased given the support and bailout plan by the government and the financial institutions' efforts to stabilize their financial soundness; and (2) the liquidity conditions were accommodative reflecting active liquidity provisions by central banks. After late April 2010, however, market participants became concerned about deterioration in the assets held by European financial institutions with large exposure to GIIPS and started to be aware of the counterparty risk. As a result, the U.S. dollar LIBOR-OIS spread widened markedly. Given the increase in dollar funding costs of term instruments, the dollar funding premiums in foreign exchange (FX) swaps -- which seemed to be a major dollar funding tool for non-U.S. financial institutions -- and basis swap markets increased sharply (charts 1-11 and 1-12). The further deterioration of this situation came to a halt reflecting the reestablishment of temporary dollar liquidity swap facilities by major central banks and a series of policy actions such as the establishment of the European Financial Stabilisation Mechanism by European authorities, both of which were decided on May 10, 2010. (For information on the formation of market expectations for U.S. dollar LIBOR in the options markets, see Box 4.)

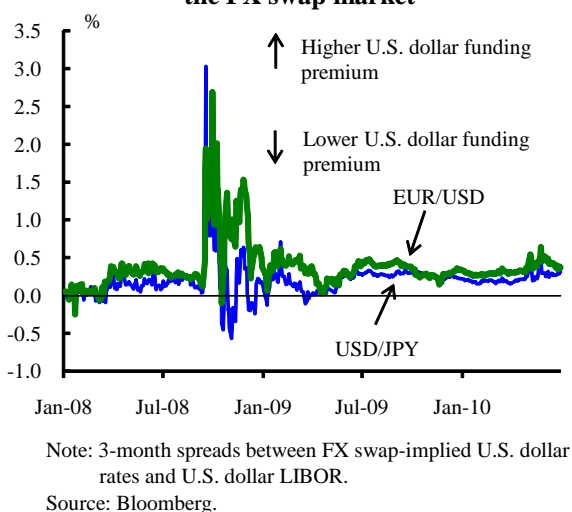
In the U.S. dollar funding markets, many entities seemed to be concerned about the financial soundness of European financial institutions. U.S. dollar LIBOR quoted by European reference banks did not show any clear differences from that quoted by all reference banks (Chart 1-13). This was quite different from the situation in which Japanese financial institutions faced the so-called "Japan premium" due to concern over Japan's

financial system. Meanwhile, the rise in the euro LIBOR-OIS spread was limited compared to the U.S. dollar LIBOR-OIS spread. Therefore, it could not be said with absolute certainty that anxiety over European financial institutions heightened rapidly and noticeably.

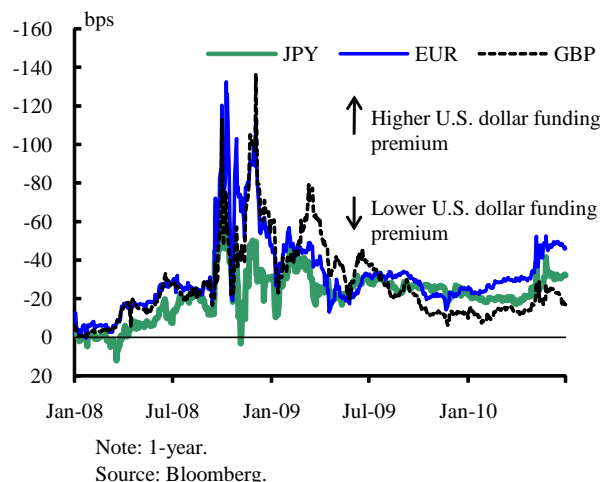
**Chart 1-10: LIBOR-OIS spreads**



**Chart 1-11: U.S. dollar funding premiums in the FX swap market**



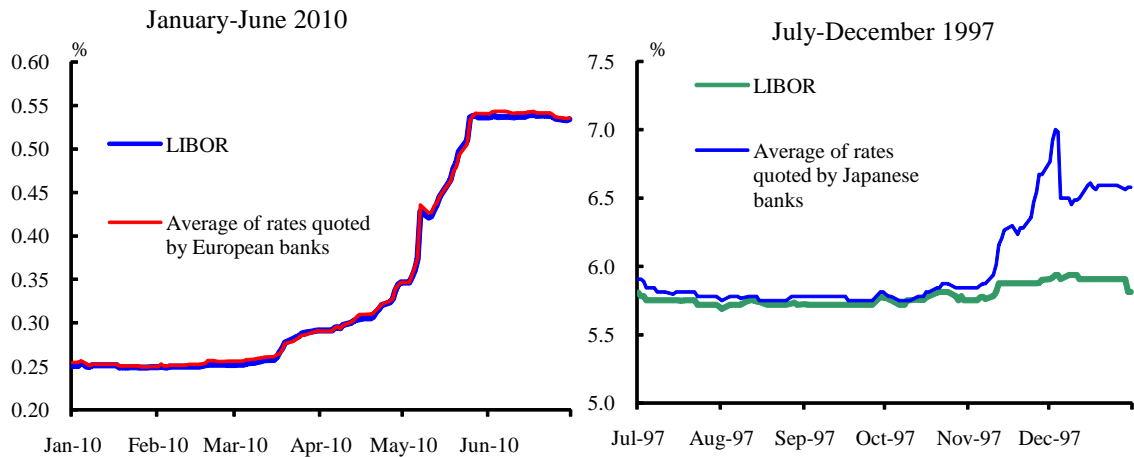
**Chart 1-12: Basis swaps**



This implied that the increase in U.S. dollar LIBOR reflected the preemptive action to secure dollar funds as investors became increasingly risk averse due to the growing fiscal problem in Europe. In addition, many European financial institutions were traditionally active in expanding overseas business activities and were functioning as hub parties in international financial transactions, and thus had large external liabilities (Chart 1-14). Therefore, as uncertainties grew about the financial soundness of these institutions, market

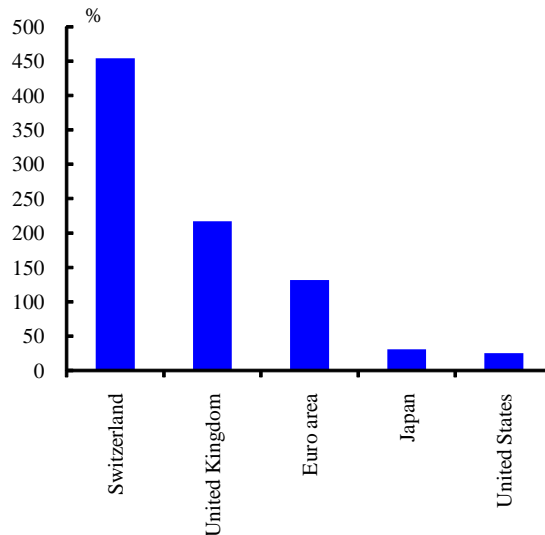
participants started to be aware of the supply and demand conditions of dollar funding markets as a whole. This might be another background factor behind the increase in U.S. dollar LIBOR.

**Chart 1-13: Comparison of 3-month U.S. dollar LIBOR among countries of residence of reference banks**



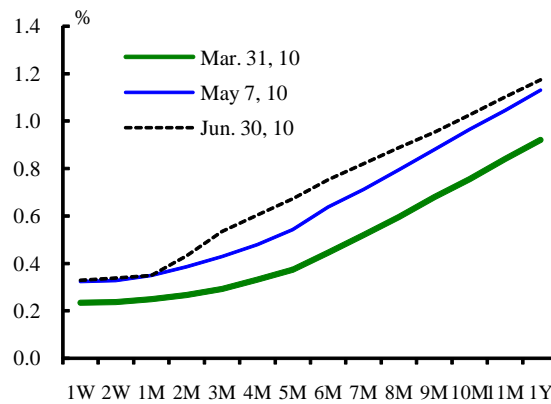
Note: On the left-hand chart, the number of European reference banks is ten. On the right-hand chart, Japanese reference banks include the Bank of Tokyo-Mitsubishi and Fuji Bank.  
Source: Bloomberg.

**Chart 1-14: Gross external liabilities/GDP of the banking sector in Japan, the United States, and Europe**



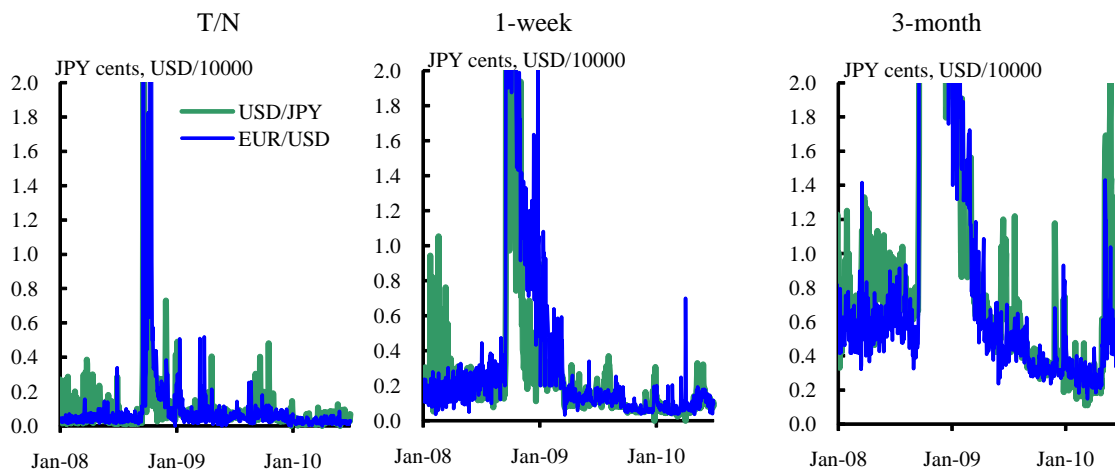
Notes: 1. As of the end of December 2009.  
2. The figures (based on the country of residence) exclude the interoffice accounts and include the liabilities to local residents denominated in local currencies.  
3. The figures for the euro area are the simple average of nine countries for which data are available (Belgium, France, Germany, Greece, Ireland, Italy, Portugal, Spain, and the Netherlands).  
Source: Bank for International Settlements, "Consolidated International Banking Statistics," "Locational International Banking Statistics."

**Chart 1-15: U.S. dollar LIBOR curves**



Source: Bloomberg.

**Chart 1-16: FX swap market liquidity**



Note: The daily average of bid-ask spreads in the FX swap market.  
Source: Bloomberg.

At the same time, among currencies, U.S. dollar funds providers became distinctly cautious, and U.S. dollar LIBOR tended to fluctuate widely when stress was exerted. In this regard, it was pointed out that the money market mutual funds (MMMFs), active funds providers in the U.S. money markets, became cautious in providing longer-term funds in order to prepare for compliance with new rules designed to strengthen the regulatory requirements governing short-term safe assets.<sup>8</sup> In fact, U.S. dollar LIBOR continued to rise for some

<sup>8</sup> The new rules require MMMFs to have a certain percentage of their assets in highly liquid securities and to shorten the average maturity limits (effective from May 28, 2010).



time even after the above-mentioned reestablishment of temporary dollar liquidity swap facilities by major central banks, but the rise was limited to those with a maturity of more than one month (Chart 1-15). Therefore, the markets for term instruments were clearly segmented by maturity, and this seemed to reflect the shorter maturity limits of MMMFs.

Looking at the spillover effects of the strains to FX swap markets, although the bid-ask spread, an indicator of market liquidity, for longer-term maturity rates, such as three-month maturity rates, widened significantly (i.e., liquidity decreased), no marked effects were seen in that for short-term maturity rates, such as overnight and one-week maturity rates (Chart 1-16). This would also suggest the segmentation of markets by maturity.

In the U.S. dollar funds-supplying operation conducted by, for example, the ECB, the Bank of England (BOE), and the Swiss National Bank (SNB) reflecting the reestablishment of temporary dollar liquidity swap facilities, the total value of bids was limited (Chart 1-17). Given lessons learned from the failure of Lehman Brothers Holdings Inc., swift policy actions taken by governments and central banks around the world provided a backstop and seemed to succeed in easing the strains in money markets.

**Chart 1-17: Responses to U.S. dollar funds-supplying operations after the reestablishment of temporary dollar liquidity swap facilities**

1-week					USD billions, %	
Auction date	BOJ	ECB	BOE	SNB	Loan rate	1-week LIBOR
May 11	-	9.2	0	0	1.22	0.32
May 19	-	0	0	0	1.22	0.32
May 26	-	5.4	0	0	1.23	0.33
Jun. 2	-	0	0	0	1.21	0.33
Jun. 9	-	0	0	0	1.20	0.33
Jun. 16	-	0	0	0	1.17	0.33
Jun. 23	-	0	0	0	1.19	0.33
Jun. 30	-	0	0	0	1.20	0.33

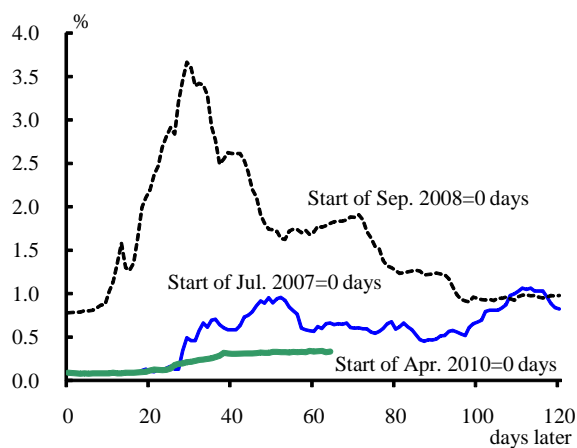
3-month				USD billions, %	
Auction date	BOJ	ECB	Loan rate	3-month LIBOR	
May 18	0.2	1.0	1.24	0.46	
Jun. 15	0.003	-	1.23	0.54	

Sources: Bank of England; Bloomberg; European Central Bank; Swiss National Bank; Bank of Japan.

Strains in money markets remained at low levels compared with those immediately after the BNP Paribas shock and the Lehman shock (Chart 1-18). In fact, in the U.S. dollar funding markets, liquidity of transactions, including very short-term ones such as overnight transactions, did not decline considerably, and there were no dollar funding concerns.

Market functioning, however, declined noticeably as seen in the decrease in transactions in term instruments.

**Chart 1-18: Comparison of U.S. dollar LIBOR-OIS spreads by period**



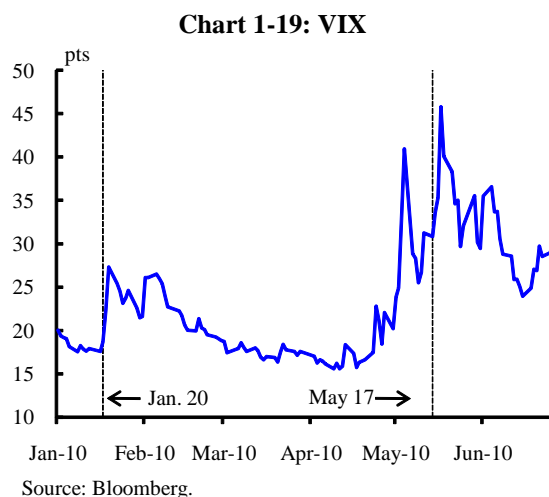
Note: 3-month LIBOR-OIS spreads.  
Source: Bloomberg.

### *Market reactions to financial regulations*

In the first half of 2010, international financial markets reacted adversely to a series of financial regulations designed to restore the financial soundness of financial institutions and stabilize the financial markets. On January 21, 2010, a new financial reform bill was announced including the so-called Volcker rule, which aimed at limiting the scope of financial institutions' banking activities. This invited market speculation about a contraction in risk money and led to a sharp fall in stock prices, particularly in the financial sector. On May 18, 2010, in order to respond to the volatility of debt securities of and widened CDS premiums for euro area countries, the German Federal Financial Supervisory Authority (BaFin) temporarily prohibited naked short sales (short-selling transactions of financial instruments without ensuring that underlying securities or stocks could be borrowed) of debt securities of euro area countries, stocks of ten German companies from the financial sector, and CDSs in which the reference liability was a liability of a euro area country and was not used to hedge default risks. It was pointed out that this caused a sharp fall in stock prices globally<sup>9</sup> (Chart 1-4). Regarding uncertainties faced by market participants after

<sup>9</sup> It was also pointed out that markets reacted because Germany introduced a ban without sufficiently consulting other European countries.

releases of such information, the implied volatility of U.S. stock prices (VIX<sup>10</sup>) remained at a high level after rising sharply. This suggested that the announcement of these regulations heightened concerns in the markets<sup>11</sup> (Chart 1-19).



Some market participants reacted calmly to the announcement of financial regulations, as they expected that the final impact on the financial markets would be limited. On the other hand, many market participants commented that details such as the scope of transactions and ways to regulate them were unclear and raised concerns that financial regulations would be further strengthened in the political process. In this regard, right after the announcement of regulations, considerable uncertainties about details of regulations might have provoked nervous reactions from market participants. At the same time, the following factors also seemed to contribute to increased reactions by the market participants: (1) when market sentiment had already deteriorated due to the growing problem in Greece, financial regulations caused additional uncertainties; and (2) from spring 2009, market participants became increasingly aware of possible price adjustments caused by a contraction in risk money as prices of risky assets had been firm mainly due to the active investment by financial institutions based on the expectation of continued low interest rates.

<sup>10</sup> VIX is an index of implied volatility on the S&P 500 index.

<sup>11</sup> When estimating a simple time-series model that included dummy variables for five business days from the announcement of regulations (autoregressive [AR] model and generalized autoregressive conditional heteroskedasticity [GARCH] model), the results showed that such an announcement caused a decline in stock prices of Japan, the United States, and Germany of about 2 percent on the date of announcement and more than 5 percent for five business days in total.

#### **Box 4: Formation of Market Expectations for U.S. Dollar LIBOR in the Options Market**

As concerns heightened about the growing problem in Greece, the spot rate for U.S. dollar LIBOR rose. From a medium-term perspective, however, LIBOR is not always expected to rise in response to sovereign risk. It can be projected that concerns about financial institutions' credit risk will intensify further through a decline in the market value of sovereign exposure and LIBOR will rise for a long period of time. On the other hand, it can also be projected that a rise in LIBOR will come to a halt as monetary policies remain accommodative or are eased further reflecting concerns about the creditworthiness. In what follows, the distribution of LIBOR for one year later (implied distribution) is calculated<sup>12</sup> from the market value of interest rate caps,<sup>13</sup> interest rate derivatives with embedded options that use LIBOR as an underlying asset. This calculation allows us to confirm the effects of the heightened sovereign risk on the formation of market expectations for U.S. dollar LIBOR for one year later.

First, the spot LIBOR was compared with the forward LIBOR (Chart 1 for Box 4). The spot LIBOR was on a moderate increasing trend from the middle of March 2010, and rose markedly in late April 2010 triggered by the growing problem in Greece. On the other hand, the forward LIBOR declined during the same period. This reflected the increasing expectation of continued low interest rates.

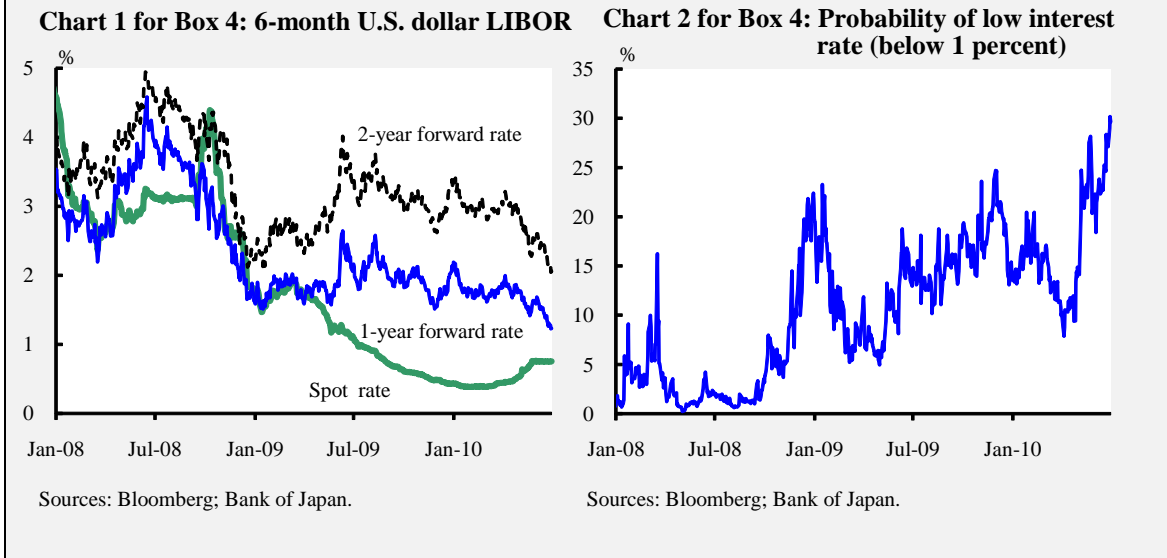
In order to see the more detailed developments, the probability of U.S. dollar LIBOR to be below 1 percent was calculated from the implied distribution (Chart 2 for Box 4). The results indicated that the probability rose sharply from late April 2010, suggesting that the expectation of continued extremely accommodative monetary conditions spread rapidly

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<sup>12</sup> By using option prices of various exercise prices, the implied distribution of underlying asset prices that do not depend on the models can be calculated. It should be noted, however, that implied distribution does not always reflect the subjective views of market participants, as it is calculated based on a risk-neutral probability measure. For details, see, for example, Nakamura and Shiratsuka (1999).

<sup>13</sup> Interest rate caps are interest rate derivatives that use LIBOR as an underlying asset. They were developed for borrowers of floating-rate loans to hedge the risk of a rise in interest rates. They bear cash flow every six months (or three months). Each cash flow has the same payoff function as a call option that uses six-month (or three-month) LIBOR as an underlying asset. Therefore, interest rate caps are options, and as mentioned in the box, the implied distribution of LIBOR can be calculated.

reflecting the fiscal problem in Europe.

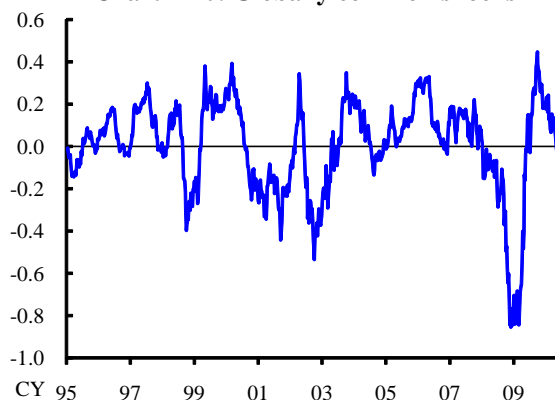


### C. Transition from Stability

As mentioned above, a stable trend in the international financial markets that generally continued from spring 2009 changed after the turn of the year. Let us review this point by using the indicators that reflected the developments in financial markets as a whole. When shocks that affected the financial markets simultaneously (globally common shocks) were extracted by applying the statistical methods, the estimation results showed that these globally common shocks adversely affected safe assets (for example, government bonds), while positively affecting risky assets (for example, stocks).<sup>14</sup> Therefore, it could be concluded that the globally common shocks indicated global investors' risk tolerance (attitude toward investment) based on, for example, changes in the macroeconomic environment (Chart 1-20). Looking at the developments, the indicator of globally common shocks turned considerably negative after the failure of Lehman Brothers Holdings Inc. Then, against the background of policy actions taken by authorities around the world, the indicator picked up and returned to a high positive figure around autumn 2009. Reflecting the growing concerns due to the fiscal problem in Europe, however, the indicator declined markedly and became negative recently, suggesting that investors became increasingly risk averse.

<sup>14</sup> For details, see Takahashi (2010).

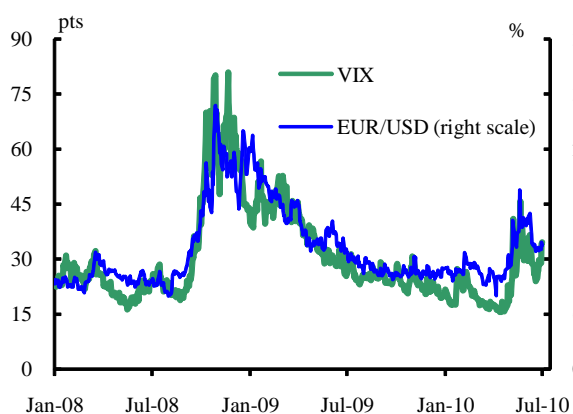
**Chart 1-20: Globally common shocks**



Note: 30-week moving average.  
Sources: Bloomberg; Bank of Japan.

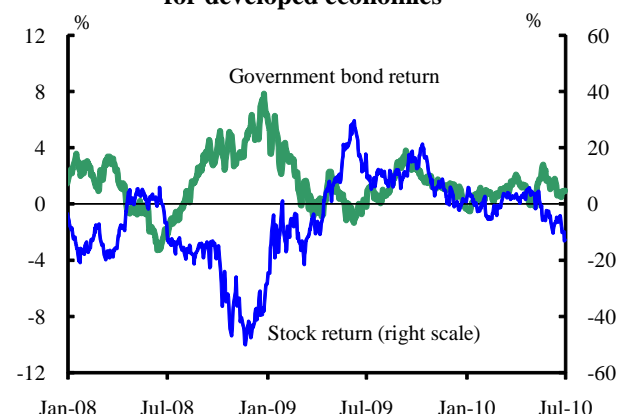
Next, the implied volatility, which showed uncertainties faced by investors, of stock prices (U.S. stocks) and FX rates (euro/U.S. dollar) was stable in the second half of 2009 after the financial crisis triggered by the failure of Lehman Brothers Holdings Inc. From late April 2010, however, the implied volatility started to increase sharply (Chart 1-21). Moreover, comparison of returns on stocks and government bonds in developed economies indicated that government bonds and stocks were purchased concurrently from around autumn 2009 toward the end of 2009, against the background of the expectation of continued low interest rates globally (Chart 1-22). On the contrary, albeit not as clearly as during the period after the failure of Lehman Brothers Holdings Inc., prices of government bonds (safe assets) rose recently due to the flight to quality, while prices of stocks (risky assets) dropped. Hence, they returned to an inverse correlation.

**Chart 1-21: Implied volatilities**



Note: 1-month for EUR/USD volatility.  
Source: Bloomberg.

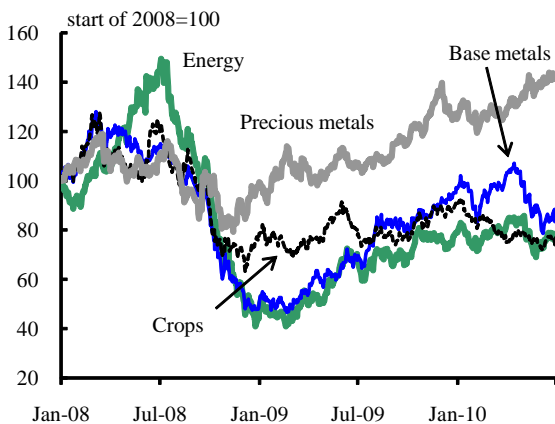
**Chart 1-22: Government bond and stock returns for developed economies**



Note: Simple average of 3-month returns on government bonds and stock indices for 20 developed economies.  
Sources: Barclays Capital; Bloomberg.

International commodity prices had risen thus far against the background of the expectation of continued low interest rates in developed economies and robust recovery in emerging economies. However, they also followed a declining trend -- the same trend as stock prices -- from the beginning of 2010 (Chart 1-23), reflecting the increasing risk aversion among global investors. Prices of precious metals such as gold, on the other hand, continued to rise (Chart 1-24) due to the increasing flight to quality and the growing demand for gold as safe assets. Particularly when the fiscal problem in Europe worsened, the price of gold rose further, marking a new record high (1,258.30 U.S. dollars/ounce) on June 18, 2010. Meanwhile, in financial markets in emerging economies, stock prices also fell. An evaluation of the stock prices in emerging economies relative to those in developed economies, however, shows that relative stock prices (stock prices in emerging economies/stock prices in developed economies) continued to rise, and the yield spreads between their sovereign bonds and U.S. Treasuries were generally stable (charts 1-25, 1-26, and 1-27). This seemed to reflect the continued favorable economic conditions and relatively sound fiscal conditions in many emerging economies. Thus, it was possible that conventional views that assets in emerging economies were risky assets with extremely high uncertainties had changed during the current phase.

**Chart 1-23: International commodity prices**



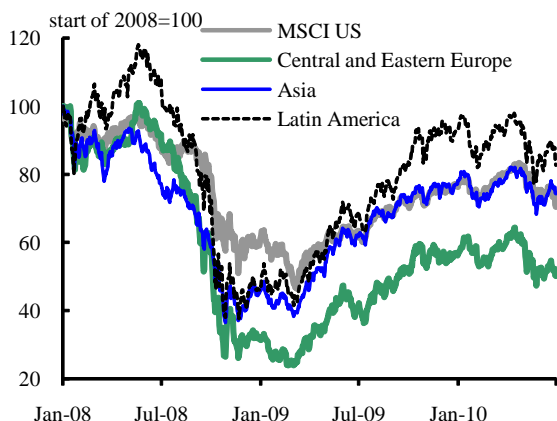
Note: S&P GSCI.  
Source: Bloomberg.

**Chart 1-24: Gold price**



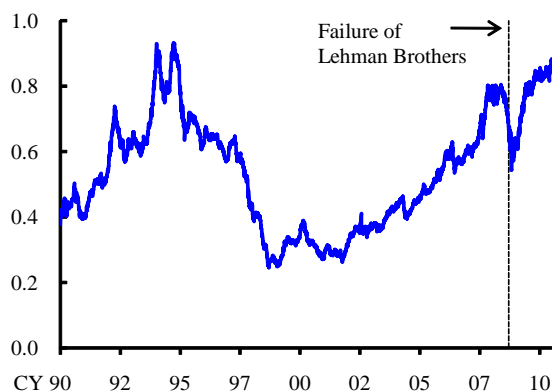
Note: The CME price of the nearest contract months.  
Source: Bloomberg.

**Chart 1-25: Stock market indices in emerging economies**



Note: MSCI stock indices denominated in U.S. dollars.  
Source: Bloomberg.

**Chart 1-26: Relative stock price in emerging economies to the price in the developed economies**



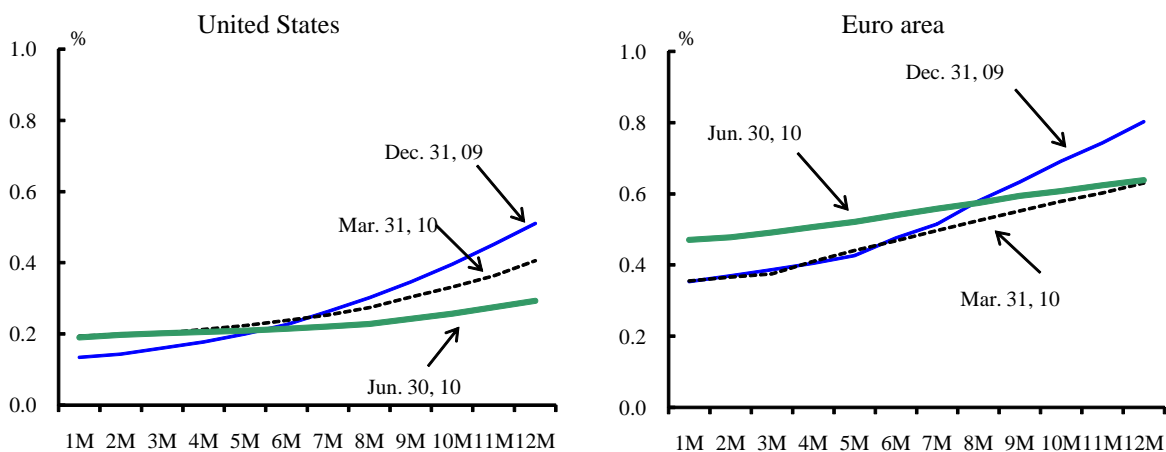
Note: The figures are calculated by dividing the stock index for emerging economies (MSCI EM) by that for developed economies (MSCI WORLD).  
Source: Bloomberg.

**Chart 1-27: Yield spreads between sovereign bonds in emerging economies and U.S. Treasuries**



Note: JPMorgan EMBI Global index.  
Source: JPMorgan.

**Chart 1-28: OIS curves for United States and the euro area**



Source: Bloomberg.



Steady developments in prices of risky assets from spring 2009 reflected the fact that investors could take on risks motivated by a certain sense of safety under the strong expectation of continued low interest rates and low volatility. (For information on the relationship between the expectation of continued low interest rates and stock prices, see Box 5.) The expectation of continued low interest rates increased further during the first half of 2010 (Chart 1-28), as evident in a flattening of the yield curve for short-term interest rates, mainly forward rates, in the United States and Europe. Under these circumstances, the growing fiscal problem in Europe deeply shocked the financial markets, which had grown used to an environment of stable recovery. As for the outlook, as it did not seem easy to resolve the structural problem in Europe, market participants projected some downside risks. As a result, market volatility increased, and investors had to become cautious about taking on risks.

#### **Box 5: Expectation of Continued Low Interest Rates and Stock Prices**

In response to the global turmoil in the financial markets after the failure of Lehman Brothers Holdings Inc. and the subsequent deterioration in economic conditions, central banks in major developed economies lowered their policy interest rates to exceptionally low levels and made efforts to maintain the accommodative financial environment by implementing various policy measures. Market participants expressed the view that from 2009 such accommodative financial environment supported the economic recovery and simultaneously contributed to the rises in stock and commodity prices. These views, however, seemed to begin to wane after April 2010.

It is not theoretically clear whether the increasing expectation of low interest rates leads to a rise or a fall in stock prices. For example, when the expectation of continued low interest rates grows reflecting the outlook for sluggish economic activity, stock prices fall. Meanwhile, stock prices rise when the outlook for the economic activity remains unchanged and the expectation of low interest rates is perceived as a decline in the future discount rates. In this box, the effects of the expectation of low interest rates on stock prices in the

United States are examined using a time-series analysis.<sup>15</sup>

Specifically, by using the gap between the federal funds (FF) futures rate (12-period forward rate) and the current target for the FF rate as a proxy<sup>16</sup> for the projection of policy interest rates, a time-varying vector autoregression (VAR) model was estimated for five variables (daily data for January 2009 to June 2010): namely, the proxy, U.S. stock index (S&P 500), the U.S. dollar/yen exchange rate, and yields on two-year and ten-year U.S. treasuries.<sup>17</sup>

Calculating the matrix that indicated the correlation of simultaneous shocks -- that is, the short-run effects -- and the matrix that indicated the long-run effects<sup>18</sup> enables us to analyze the time-series shifts of the short-run effects (simultaneous effects of shocks) as well as the long-run effects (permanent effects of shocks) of the changes in the projection of policy interest rates (shocks to the projection of policy interest rates) on stock prices. The negative parameter of the estimation means that the reduced (heightened) expectation of interest rate increases leads to the rise (fall) in stock prices. On the other hand, the positive parameter of the estimation means that the heightened (reduced) expectation of interest rate increases leads to the rise (fall) in stock prices.

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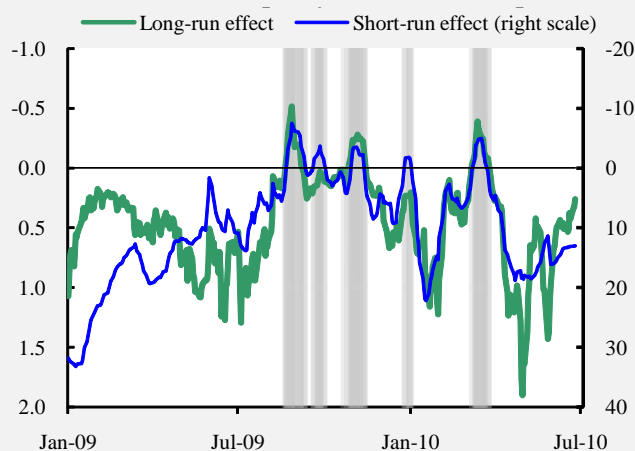
<sup>15</sup> The projection of policy interest rates depends on macroeconomic variables such as inflation rates. Therefore, it is desirable to estimate the projection by including macroeconomic variables, but it is difficult to obtain these data on a daily basis. In this analysis, it is assumed that changes in market participants' views on daily macroeconomic variables are recognized as shocks to endogenous variables of the model.

<sup>16</sup> Strictly speaking, the FF futures rate does not necessarily indicate the pure expectation of the future target for the FF rate. This is because the spot rate corresponding to the FF futures rate is not a target for the FF rate but an effective FF rate and there are risk premiums. For details, see Kuttner (2001).

<sup>17</sup> The model was estimated by using Markov Chain Monte Carlo methods (with one lag). As for the data, the difference was used for the projection of policy interest rates and government bond yield, and the rate of changes was used for the stock index and U.S. dollar/yen exchange rate. The order of explanatory variables was the same order as listed in the box. In order to check the robustness, the order of the second to the fifth variables was switched, but there were no big differences in the results. In a time-varying VAR model used in the box, volatilities as well as parameters were assumed to be time varying. For details on such a time-varying VAR model, see Primiceri (2005) and Nakajima, Kasuya, and Watanabe (2009).

<sup>18</sup> Long-run effects are the aggregate effects of shocks of a variable occurred at  $t$  on other variables until  $t \rightarrow \infty$ .

**Chart for Box 5: Relations between shocks to projection of policy rates and stock prices**



Notes: 1. Shaded areas indicate the periods when the reduced (heightened) expectation of policy rate increases contributed to the rise (fall) in stock prices.

2. The vertical axis is inverted.

Sources: Bloomberg; Bank of Japan.

Estimation results confirm the strong tendency that in the second half of 2009 the reduced expectation of policy interest rate increases contributed significantly to the rise in stock prices (a liquidity-driven rally in the stock market) (Chart for Box 5). Moreover, around March 2010, when the expectation of continued low interest rates heightened due to the fiscal problem in Europe, the financial market seemed to have followed similar developments.

Later, the heightened expectation of low interest rates became more attributable to the fall in stock prices. This was consistent with the fact that the heightened expectation of continued low interest rates reflecting the growing fiscal problem in Europe and concerns about the subsequent persistent global economic stagnation, as well as price adjustments of risky assets, were observed simultaneously. Therefore, although uncertainties about financial markets grew, the heightened expectation of continued low interest rates did not lead directly to the rise in stock prices.

## **II. Developments in Domestic Financial Markets in the First Half of 2010**

Although the effects of the heightened uncertainty in international financial markets on Japanese financial markets were relatively limited, nervousness was seen in some domestic markets, such as stock markets. Effects from abroad on each domestic market varied depending on the supply and demand conditions and activities of foreign investors. For example, short-term interest rates remained stable at low levels, and credit spreads on corporate bonds were generally on a decreasing trend in the first half of 2010 given investors' steady demand for investment. Although some adverse effects were seen in the corporate bond market from May 2010, these effects were limited compared with those in the United States and Europe. On the other hand, stock prices fluctuated widely in both directions and showed unstable developments, as they were directly affected by risk aversion among foreign investors amid growing concern about the fiscal problem in Europe. In FX markets, the yen appreciated substantially against the euro due to the fiscal problem in Europe. The yen's exchange rate against the U.S. dollar had been more or less flat, but then appreciated to below 90 yen toward the end of June 2010, as an expectation of a rise in interest rates in the United States was further reduced. The appreciation of the yen heightened instability in domestic financial markets, as seen in a decline in stock prices.

### **A. Money Markets**

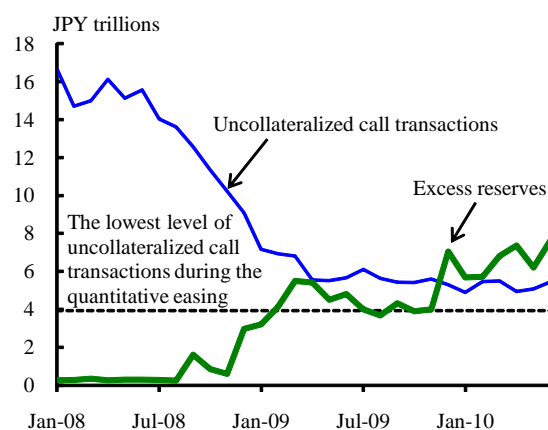
Conditions in Japan's money markets were generally stable, as the Bank of Japan provided ample funds. At the Monetary Policy Meeting held in March 2010, in order to expand the measure to encourage a decline in longer-term interest rates, the Bank decided to substantially increase the amount of funds to be provided through the fixed-rate funds-supplying operation against pooled collateral (hereafter the fixed-rate operation) that had been introduced in December 2009. This largely resulted in a growing sense of abundance of liquidity. Meanwhile, no significant developments were observed after the completion of the special funds-supplying operation to facilitate corporate financing<sup>19</sup> at the end of March 2010.

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<sup>19</sup> These are operations in which unlimited amounts of funds are supplied against the value of corporate debt pledged as pooled eligible collateral at an interest rate equivalent to the target for the uncollateralized overnight call rate.

While increasing the amount of longer-term funds provided through funds-supplying operations such as the fixed-rate operation, the Bank reduced the amount of short-term funds-supplying operations and left adjustments of the daily funds imbalance among market participants to the market.<sup>20</sup> Although this caused temporary fluctuations in interest rates, the Bank's conduct of money market operations seemed to have played a role in ensuring the market functioning, as seen in the fact that the amount outstanding in the call market remained above the lowest recorded during the period of quantitative easing and major banks tried to control their accumulation of reserves (Chart 2-1).

**Chart 2-1: Excess reserves and call market transactions**



Note: Monthly average of the amount outstanding (excess reserves are the average during the reserve maintenance period).  
Source: Bank of Japan.

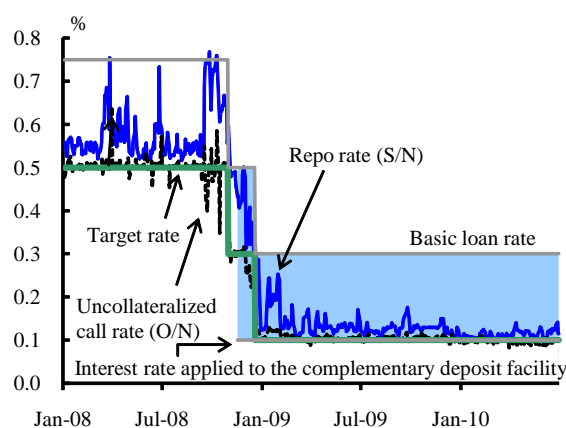
From May 2010, given the increased strains in overseas money markets stemming from the growing fiscal problem in Europe, the Bank conducted three same-day funds-supplying operations. The Bank also carried out the U.S. dollar funds-supplying operation that was reestablished in coordination with central banks around the world. Given these operations conducted by the Bank, the effects of the increased strains in money markets in the United States and Europe were limited.

<sup>20</sup> At the end of March 2010, the outstanding balance of short-term funds-supplying operations, including the fixed-rate operation, reached 50.9 trillion yen. Although it remained at a high level, it decreased somewhat from the end of fiscal 2008 (55.3 trillion yen). This mainly reflected the fact that the total amount of short-term funds-supplying operations was reduced partly in response to the increase in outright purchases of Japanese government bonds (JGBs). For more details, see Bank of Japan (2010).

### Overnight market

The uncollateralized overnight call rate remained stable at around the Bank's target of 0.1 percent (Chart 2-2). Looking more closely at developments during this period, on March 31, 2010, the last business day of the fiscal year, the weighted average of the uncollateralized overnight call rate declined to 0.082 percent, recording the lowest level since the Bank decided to set its target rate at 0.1 percent. The daily weighted average rate often registered a little below 0.10 percent. This was because financial institutions that were not eligible for the complementary deposit facility (such as investment trusts and insurance companies) provided their funds below 0.1 percent (the rate applied to the complementary deposit facility), against the backdrop of financial institutions' lower demand for funds as current account balances and reserve balances at the Bank remained at high levels.<sup>21</sup>

Chart 2-2: Overnight rates



Note: Horizontal axis indicates the settlement dates.  
Source: Bank of Japan.

In the repo market, general collateral (GC) repo rates rose slightly, such as when funds providers became cautious about investing at the end of each reserve maintenance period and when securities companies temporarily built excess securities inventories after Japanese government securities (JGSs) auctions. Nevertheless, GC repo rates (for spot/next day

<sup>21</sup> It should be noted, however, that the uncollateralized overnight call rate had never fallen well below 0.10 percent during this period. This was mainly because the following arbitrage mechanism could function even taking into account transaction fees in the uncollateralized call market: when downward pressure was exerted on the uncollateralized overnight call rate to fall substantially below 0.10 percent, financial institutions that were eligible for the complementary deposit facility could raise funds in the uncollateralized call market to manage these funds through this facility.

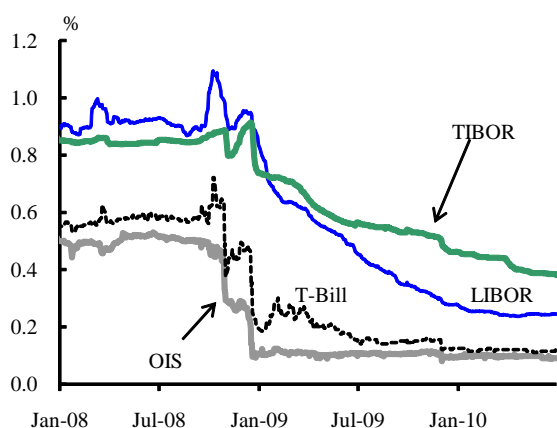
transactions) stayed generally stable in the range of 0.10-0.15 percent. This was because major funds providers, including major banks, in principle managed their excess funds in the market and the Bank provided funds to the market in a flexible manner through purchases of JGSs under repurchase agreements in cases such as when issuance of Japanese government bonds (JGBs) exerted upward pressure on GC repo rates.

*Markets for term instruments, CP market, and foreign currency funds markets*

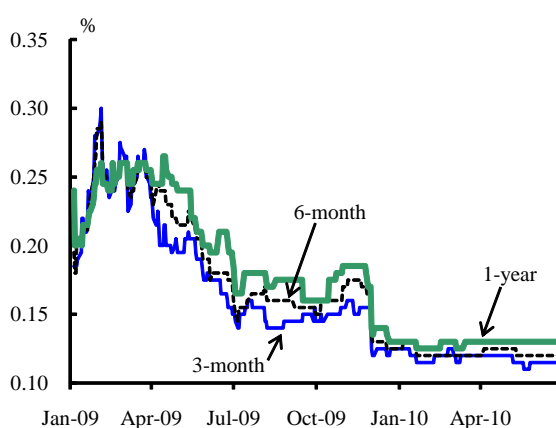
From March 2010, when the Bank decided to substantially increase the amount of funds to be provided through the fixed-rate operation, interest rates on term instruments declined further, reflecting increasing downward pressure on longer-term interest rates (Chart 2-3). These interest rates did not rise markedly for contracts maturing beyond the quarter-end in March 2010.

Yields on treasury discount bills (T-Bills) had declined further in response to the introduction of a fixed-rate operation in December 2009. As Japanese investors such as major banks showed steady demand for investing their excess funds, the yields remained stable in the range of 0.10-0.15 percent (Chart 2-4) partly because concern about possible increases in issuance of T-Bills gradually abated. From April 2010, yields on T-Bills with a three-month maturity declined further albeit slightly. This reflected increased demand for T-Bills from foreign investors against the background of a decline in yen funding costs in FX swap markets and the increasing flight to quality in favor of yen-denominated bonds.

**Chart 2-3: 3-month rates**



**Chart 2-4: Yields on T-Bills**



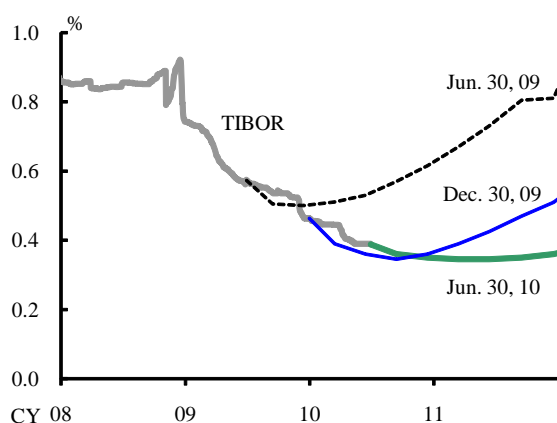
Note: Rate prior to the integration of FBs and TBs in February 2009 is the FB rate.  
Sources: Bloomberg; Japan Bond Trading.

Source: Japan Bond Trading.

The Tokyo Interbank Offered Rate (TIBOR) trended lower after the introduction of a fixed-rate operation in December 2009 (Chart 2-3). Reflecting the increase in the amount outstanding of the fixed-rate operation in March 2010, TIBOR declined further beyond the timing of interest rate novation of loans at the fiscal year-end.

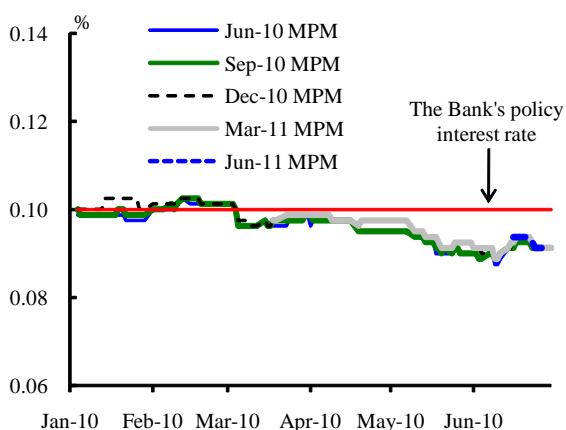
As for the market participants' outlook for interest rates, interest rates on Euroyen futures, particularly those with distant contract months, shifted downward, reflecting a decline in TIBOR and market expectation of continued low interest rates (Chart 2-5). The OIS rate remained in an extremely narrow range close to the Bank's policy interest rate (Chart 2-6).

**Chart 2-5: Forward curves for Euroyen futures**



Sources: Bloomberg; Tokyo Financial Exchange.

**Chart 2-6: OIS rates**



Sources: Meitan Tradition; Thomson Reuters.

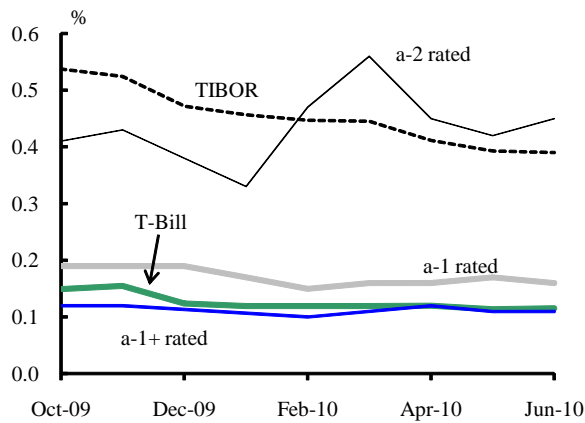
In the CP market, slight rises in issuance rates on some CP were seen (Chart 2-7), reflecting the completion of the special funds-supplying operation to facilitate corporate financing at the end of March 2010 and the suspension of purchases of CP under repurchase agreements. Given these conditions, a situation in which yields on T-Bills exceeded issuance rates on some CP was corrected gradually. However, CP issuance, taken as a whole, was sluggish and CP issuance rates remained stable at low levels (Chart 2-8) mainly because firms' demand for external funds was weak and firms sought to raise funds through, for example, issuance of corporate bonds.

In the foreign currency funds markets, mainly reflecting the increasing U.S. dollar funding needs, particularly from European financial institutions, due to growing concern about the fiscal problem in GIIPS, rapid increases in costs of funding dollars in FX swap markets



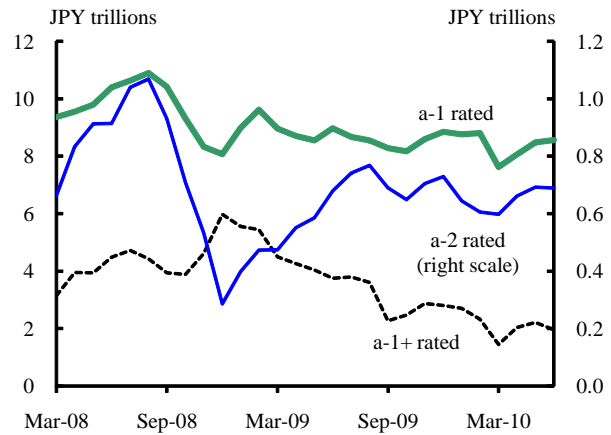
were seen from late April 2010 (Chart 1-11). Nonetheless, the need to conduct such transactions did not increase markedly, as seen in the fact that costs of funding dollars in exchange for yen remained more or less unchanged on average.

**Chart 2-7: CP issuance rates**



Note: 3-month maturity. Monthly weighted average.  
Sources: Bloomberg; Japan Bond Trading; Japan Securities Depository Center.

**Chart 2-8: Amount outstanding of CP**



Note: Data are at the end of the month.  
Source: Finance Facsimile News.

## B. Japanese Government Bond Markets<sup>22</sup>

JGB yields generally stayed within a certain range, given downward pressure from investors' vigorous demand for JGBs and upward pressures from the recovery in business sentiment. During the latter half of the period, JGB yields were on a declining trend, mainly reflecting weak stock prices.

### *Developments in JGB yields*

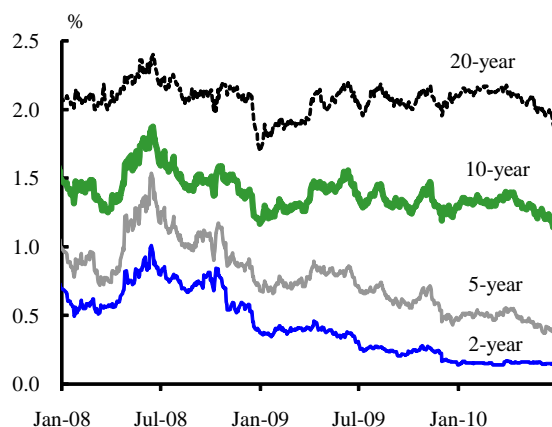
Regarding developments in JGB yields during the first half of 2010, the continued global trend of economic recovery and the consequent rise in stock prices exerted some upward pressure toward April 2010 (Chart 2-9). However, while concern about possible significant increases in issuance of JGSs led by the formulation of a large supplementary budget gradually abated, steady demand for investment by banks facing a wide gap between the amount of their loans and their deposits exerted downward pressure on JGB yields. As a result, the yield on ten-year JGBs generally stayed within a certain range. Subsequently,

<sup>22</sup> For information on enhancement of infrastructure in the JGB market, see the Appendix.

JGB yields were on a declining trend. This reflected increases in the already strong demand of investors supported by (1) a decline in stock prices at home and abroad and rise in market expectation of continued low interest rates globally, due to the growing fiscal problem in Europe and (2) actions taken by the policy authorities to improve future fiscal conditions. Under these circumstances, the yield on ten-year JGBs declined to the 1.5-2.0 percent level in late June 2010 for the first time since summer 2003.

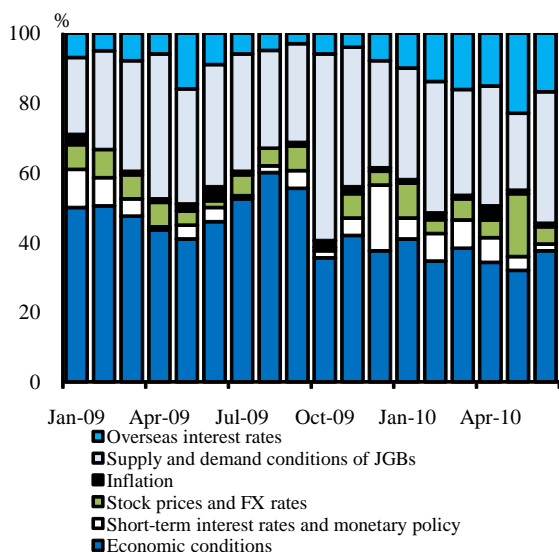
The results of a market survey indicated that in May 2010 market participants focused increasingly on overseas interest rates and stock prices and FX rates as a factor causing downward pressure on JGB yields (charts 2-10 and 2-11). Market participants started to consider the supply and demand conditions of JGBs, which had been previously identified as a factor causing upward pressure on JGB yields, as a factor causing downward pressure on them, although this factor drew less attention as a factor causing changes in JGB prices. Given the severe fiscal conditions in Japan, some market participants pointed out that the fiscal problem in Europe might cause a rise in Japanese long-term interest rates. However, as JGB cash market in fact depended on behavior of its domestic investors, the supply and demand conditions of JGBs seemed to exert downward pressures on interest rates reflecting these investors' strong demand. (For information on the behavior of foreign investors in JGB futures and cash markets, see Box 6.)

**Chart 2-9: JGB yields**



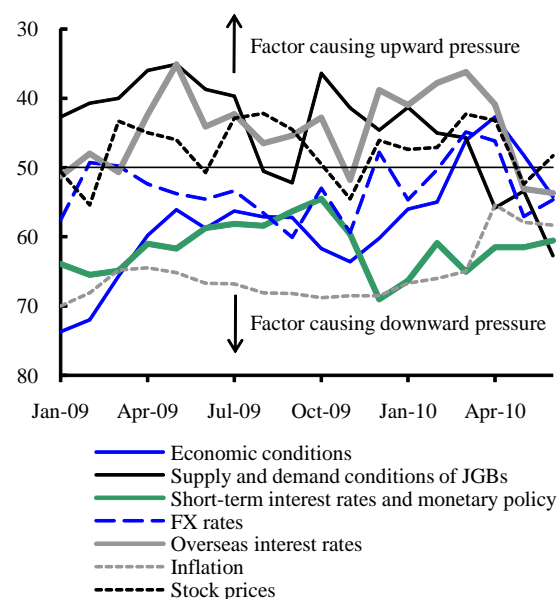
Source: Japan Bond Trading.

**Chart 2-10: Factors affecting JGB yields**



Source: QUICK, "QUICK Survey System Report."

**Chart 2-11: Effects of factors focused on by the market**



Note: Factors causing upward and downward pressure on JGB yields.

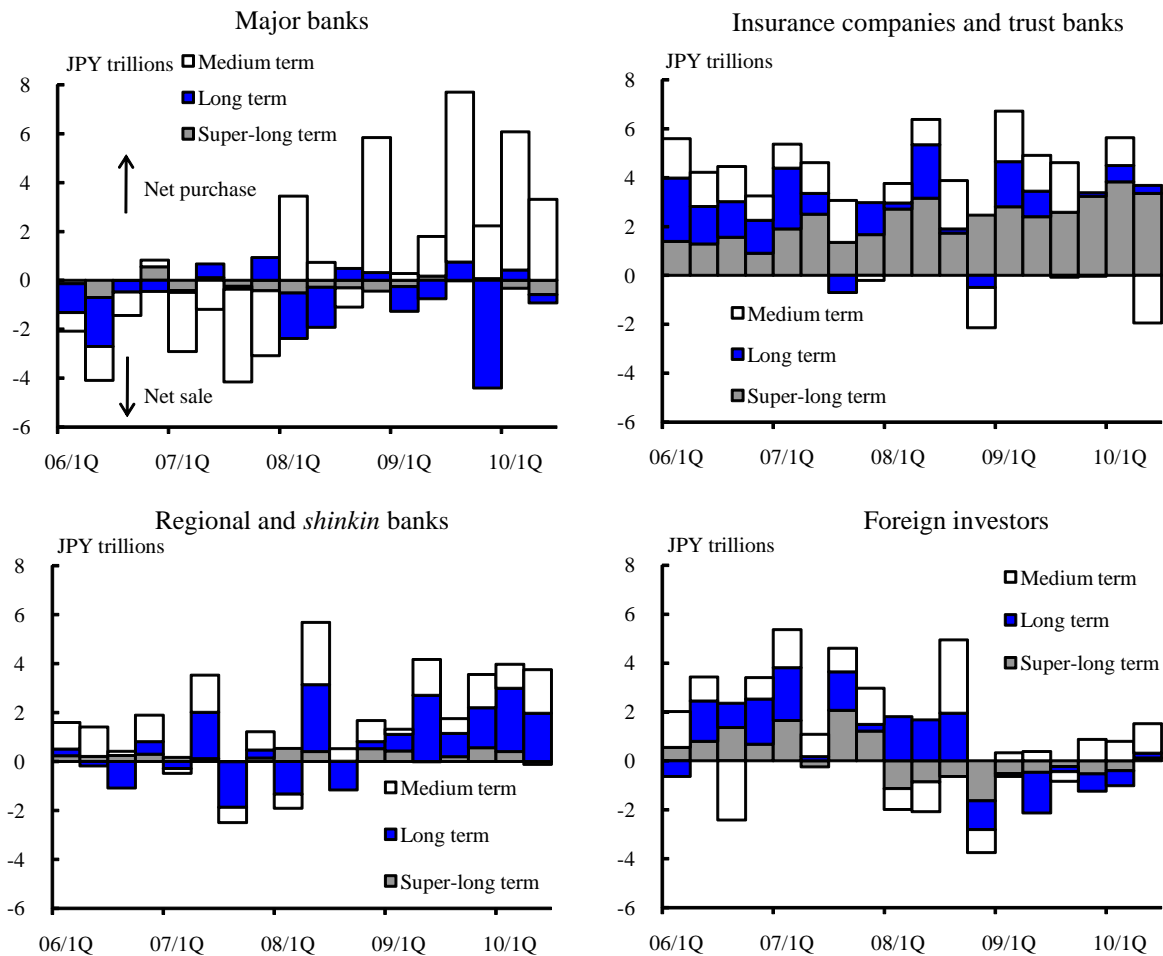
Each factor is indexed with strong downward pressure=100, downward pressure=75, neutral/unknown=50, upward pressure=25, and strong upward pressure=0.

Source: QUICK, "QUICK Survey System Report."

### *JGB trading activity by type of investor*

Looking at JGB trading activity by type of investor in Japan, banks as a whole increased their net purchases of JGBs (Chart 2-12) reflecting a strong need for managing their excess funds, but major buyers differed by maturity. Major banks registered net purchases, mainly of medium-term JGBs, while regional and *shinkin* banks registered net purchases of long-term JGBs. Insurance companies and trust banks continued to register large net purchases, mainly of super-long-term JGBs. This seemed to be because pension funds (through trust banks) extended the duration of their portfolio along with their investment benchmark based on the market indices and life insurance companies increased their purchase of low-risk super-long-term JGBs in view of a tightening in the standard of their solvency margin ratios (i.e., increased their risk exposure to securities such as stocks) and a revision of accounting rules. Meanwhile, foreign investors registered small net purchases, as they shifted the weight in their portfolios from short-term JGBs to medium-term JGBs reflecting the decrease in volatility.

**Chart 2-12: JGB trading by type of investor**



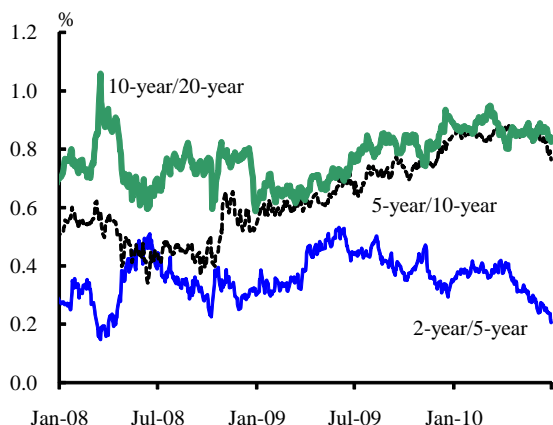
Note: Medium term means 2- and 5-year JGBs, long term means 10-year JGBs, and super-long term means JGBs with maturities of more than 10 years.  
 Source: Japan Securities Dealers Association, "Trends in Bond Transaction (by investor type)."

When looking at separate parts of the JGB yield curve, the 2-5 year spread narrowed (Chart 2-13). This showed that, as the sense of an abundance of liquidity in the market grew due to the continued accommodative financial environment, investors including major banks expanded their investment in medium-term JGBs from short-term JGBs. Meanwhile, the 5-10 year spread and the 10-20 year spread generally remained more or less unchanged. This indicated that active investment was made in ten-year and 20-year JGBs, as in medium-term JGBs. In detail, however, the 5-10 year spread narrowed from late June 2010, reflecting a decline in the yield on ten-year JGBs.

According to a model for the term structure of interest rates, term premiums of five-year interest rates significantly declined, and those of ten-year interest rates also declined from

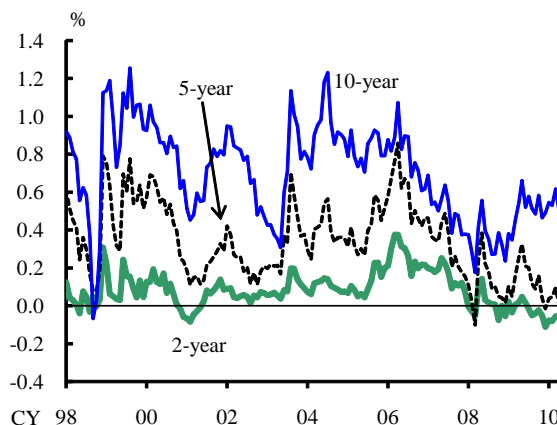
June 2010<sup>23</sup> (Chart 2-14). This suggested that against the background of investors' strong demand, their purchase of medium-term JGBs led to a decline in term premiums they demanded.

**Chart 2-13: JGB yield spreads**



Sources: Japan Bond Trading; Bank of Japan.

**Chart 2-14: JGB term premiums**



Note: Term premium is defined as the difference between the zero coupon rate and the average of expected future short-term rates estimated by the model.

Sources: Japan Bond Trading; Bank of Japan.

### *Foreign investors' activities in derivatives markets*

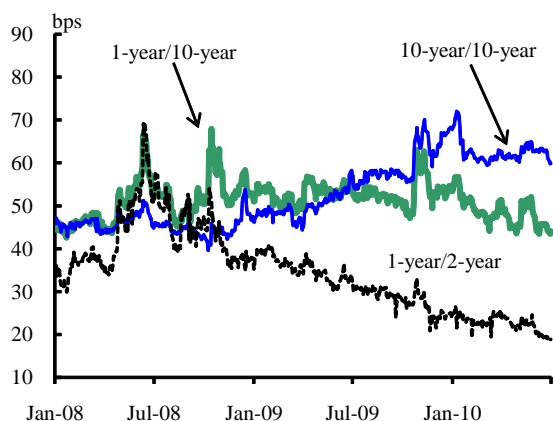
In derivatives markets, from the second half of 2009 to early 2010, foreign investors actively built up their positions in swaptions with the view of the possible deterioration in the Japanese government's fiscal conditions in the long term (Chart 2-15). From spring 2010, when a concern about a deterioration in the supply and demand conditions in the cash bond market abated somewhat, these investors did not seem to build up a position based on the expectation of a rise in interest rates in the long run. In addition, the implied volatility of swaptions did not increase further. On the other hand, Japan's sovereign CDS premiums rose<sup>24</sup> (Chart 2-16). This could suggest that some foreign investors were still concerned about the deterioration in the Japanese government's fiscal conditions. Particular attention should be paid to the developments in Japan's sovereign CDS premiums, because they might not sufficiently reflect views of a wide range of market participants due to the low

<sup>23</sup> Based on Ichiue and Ueno (2007).

<sup>24</sup> For details on the sovereign CDS market, see Box 3 of the Bank of Japan's February 2010 issue of the *Financial Markets Report*, and Shino and Takahashi (2010).

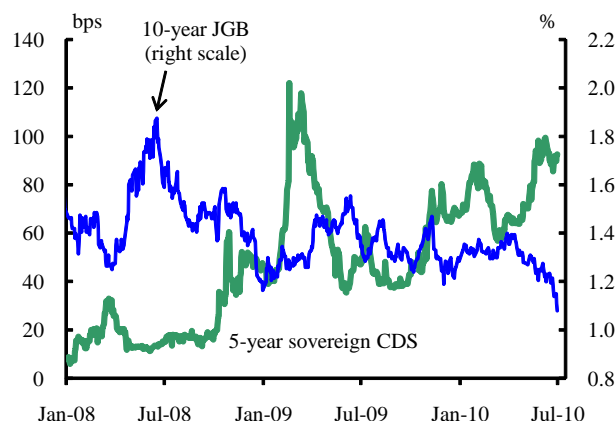
liquidity in the market and the recent rise might reflect the rise in sovereign CDS premiums for European countries and active transactions due to geopolitical risks associated with the Korean peninsula.

**Chart 2-15: Implied volatility of yen swaptions**



Note: *m*-year/*n*-year means the implied volatility of swaption with *m*-year expiry period and *n*-year swap tenor.  
Source: Bloomberg.

**Chart 2-16: Japan's sovereign CDS premium and government bond yield**



Sources: Bloomberg; Japan Bond Trading.

### Box 6: Liquidity in the JGB Futures Market

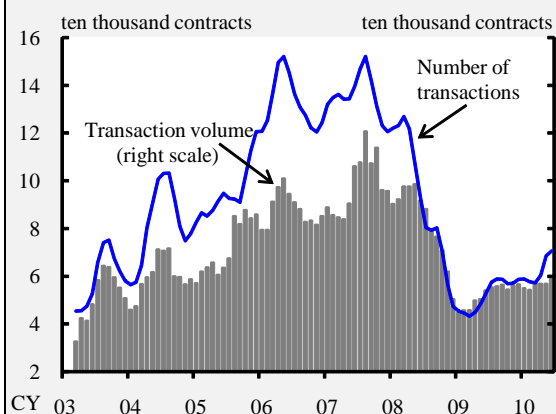
In Japan, it is said that liquidity in the JGB futures market recovered somewhat for about one year after having declined significantly due to a series of financial crises. Market liquidity, however, had not recovered sufficiently, as seen in the following facts. First, transaction volume and the number of transactions in the market remained smaller than those in and before 2007, when active transactions took place. And second, compared to the past several years, changes in the offer-bid spread<sup>25</sup> adjusted by volatility were larger and the level of the spread was generally high (charts 1 and 2 for Box 6).

This could be attributed to the following facts: weak expectation of a rise in long-term

<sup>25</sup> When liquidity was substantial, the difference between the bid and offer prices of dealers narrowed. On the other hand, when it was difficult to conduct hedging and reversing trades in the market due to low liquidity, the offer-bid spread quoted by securities companies widened. It should be noted, however, that the offer-bid spread might be affected by volatility (for example, the spread narrowed when the volatility was low). Thus, the offer-bid spread (20-day moving average) divided by historical volatility (20-day observing period) was used here.

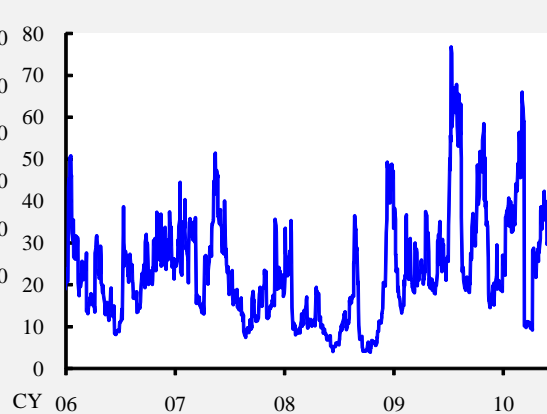
interest rates and low volatility reduced the willingness to conduct transactions of JGB futures as hedging and speculation tools; and relative value trading aimed at the adjustments in the difference between cash and futures prices was limited. In fact, looking at changes in the net basis<sup>26</sup> that indicated the difference between cash and futures prices, the rate of change and the divergence from zero did not narrow sufficiently. This suggested that arbitrage activities between cash and futures markets were not conducted sufficiently (Chart 3 for Box 6).

**Chart 1 for Box 6: Transaction volume and the number of transactions in the JGB futures market**



Note: The number of transactions is the 3-month moving average of the nearest contract month's average. Transaction volume is the 3-months average of all contract months.  
Source: Bloomberg.

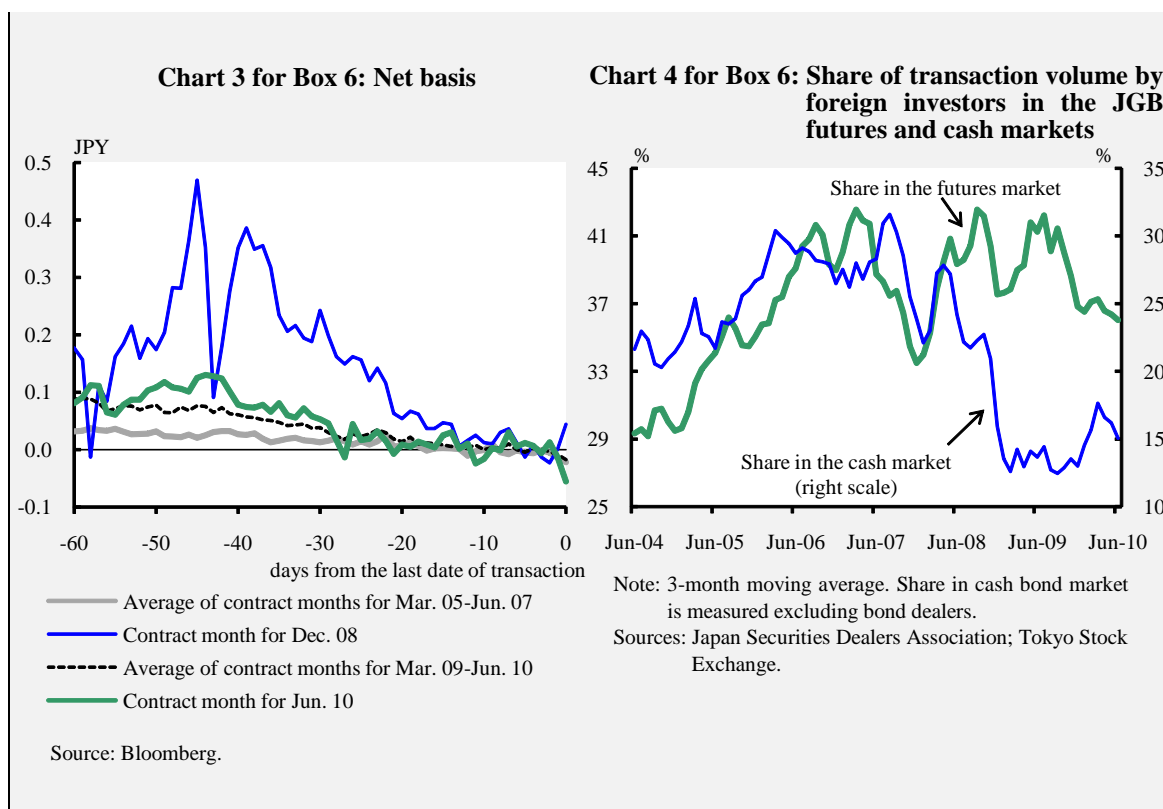
**Chart 2 for Box 6: Offer-bid spread in the JGB futures market**



Note: A base value of 100 for the end of January 2003.  
Source: Bloomberg.

The share of transaction volume by foreign investors showed that the share in the cash market declined significantly while that in the futures market remained at a certain level (Chart 4 for Box 6). This reflected the fact that (1) transactions across cash and derivatives markets by, for example, relative-value hedge funds decreased, (2) while hedge funds such as commodity trading advisors (CTAs) that made use of futures trading in markets other than yen interest rates (such as the stock futures market) conducted transactions somewhat actively.

<sup>26</sup> In a situation where there was sufficiently high liquidity, a widening of the net basis would make investors take a long position in futures and a short position in cash bonds, taking undervalued futures (overvalued cash bonds) into consideration. As a result, downward pressure was exerted on a net basis.



### C. Credit Markets

In corporate bond markets, given investors' steady demand, credit spreads on corporate bonds with high ratings remained stable at low levels. On the other hand, credit spreads on corporate bonds with medium and low ratings, particularly those with room for a decline in yields, were on a moderate decreasing trend. Meanwhile, the environment for corporate bond issuance by firms generally remained benign. From May 2010, credit spreads on some corporate bonds widened due to growing concern about the fiscal problem in Europe, but the widening was limited compared to that in Europe and the United States.

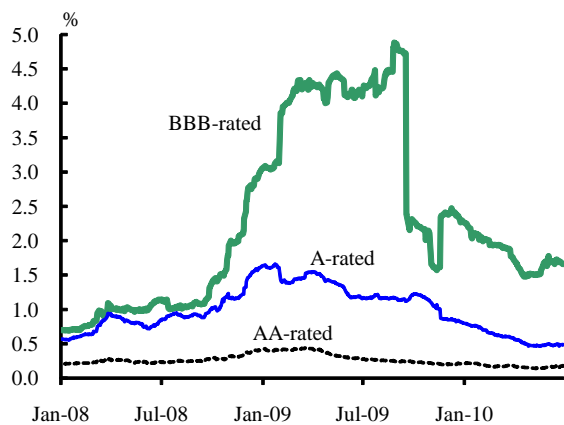
#### *Secondary market for corporate bonds*

In the secondary market for corporate bonds, given investors' steady demand, credit spreads on corporate bonds with high ratings remained stable (Chart 2-17). On the other hand, credit spreads on corporate bonds with medium and low ratings were on a moderate decreasing trend, as some financial institutions -- mainly local banks -- searched for corporate bonds whose prices remained undervalued, in the face of limited investment opportunities. The



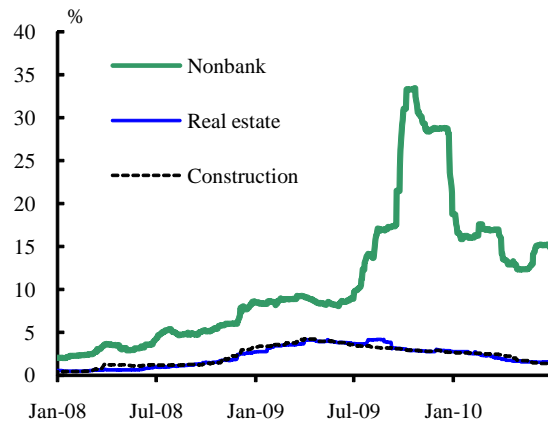
tightening of credit spreads accelerated somewhat against the background of the inflow of investment funds after the turn of the fiscal year in April 2010. Looking at developments by sector, in order to obtain high yields, investors preferred to purchase corporate bonds issued by firms in some industries whose credit spreads had remained at high levels (Chart 2-18).

**Chart 2-17: Corporate bond spreads by rating**



Note: 3- to 7-year maturity. Corporate bond spreads are corporate bond yields minus 5-year JGB yields.  
Source: Japan Securities Dealers Association.

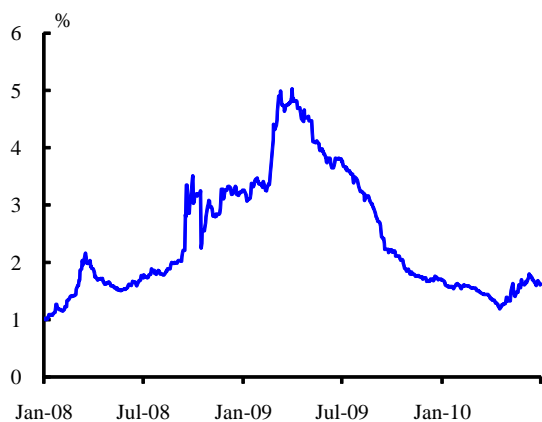
**Chart 2-18: Corporate bond spreads by sector**



Source: Bloomberg.

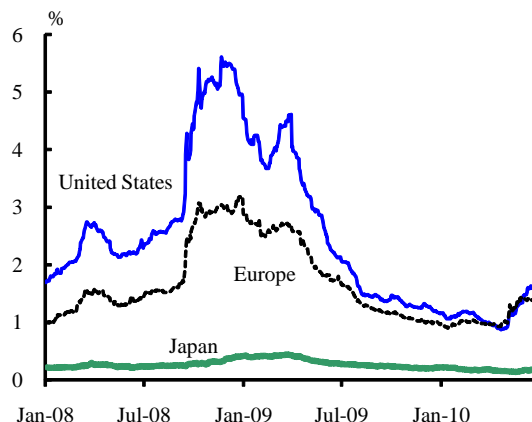
These trends in credit spreads continued until around April 2010. In May, however, due to growing concern about the fiscal problem in GIIPS, the tightening of credit spreads on BBB-rated corporate bonds and corporate bonds issued by firms in some industries paused, and credit spreads widened slightly. As for *samurai* bonds, which were relatively susceptible to credit markets abroad, the above-mentioned factor together with the prosecution of a large financial institution in the United States and heightened geopolitical risks associated with the Korean peninsula led to the widening of credit spreads on related bonds (Chart 2-19). Looking at developments throughout the first half of fiscal 2010, however, spreads on these types of corporate bonds narrowed a little. This was because investors did not engage in "fire sales" of these bonds, and the spreads had already narrowed significantly. In addition, the pace of the widening of credit spreads on corporate bonds with high ratings was limited compared to that in Europe and the United States (Chart 2-20).

**Chart 2-19: Spreads on *samurai* bonds relative to JGBs**



Sources: Bloomberg; Nomura Securities.

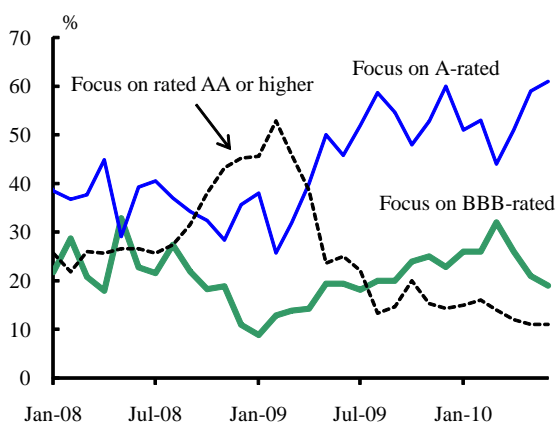
**Chart 2-20: Corporate bond spreads (AA-rated)**



Note: 3- to 7- year maturity for Japan; 3- to 5- year maturity for the United States and Europe.  
Sources: Bank of America Merrill Lynch; Japan Securities Dealers Association.

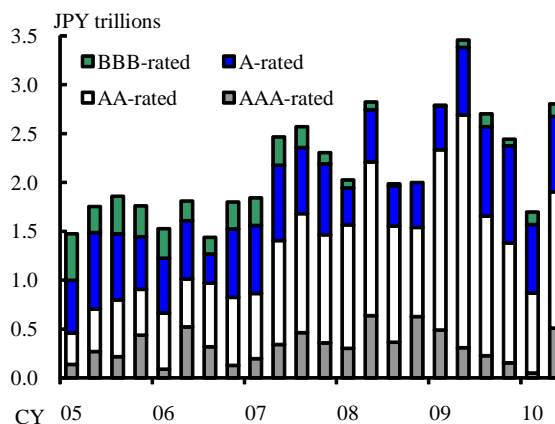
An opinion survey showed that from April 2010 corporate bond investors' interest in purchasing BBB-rated bonds decreased, after having increased (Chart 2-21). This suggested that investors became cautious given the growing fiscal problem in Europe. The survey also indicated that investors' interest in high-rated (rated AA or higher) bonds, which had rapidly increased immediately after the failure of Lehman Brothers Holdings Inc., continued to decrease in line with recent trends. It could be concluded that investors' sentiment was not so bearish as to significantly reduce the risk and provoke a flight to quality.

**Chart 2-21: Corporate bond investors' opinion survey**



Source: QUICK, "QUICK Survey System Report."

**Chart 2-22: Corporate bond issuance by rating**



Sources: Capital Eye; I-N Information Systems.

### *Corporate bond issuance market*

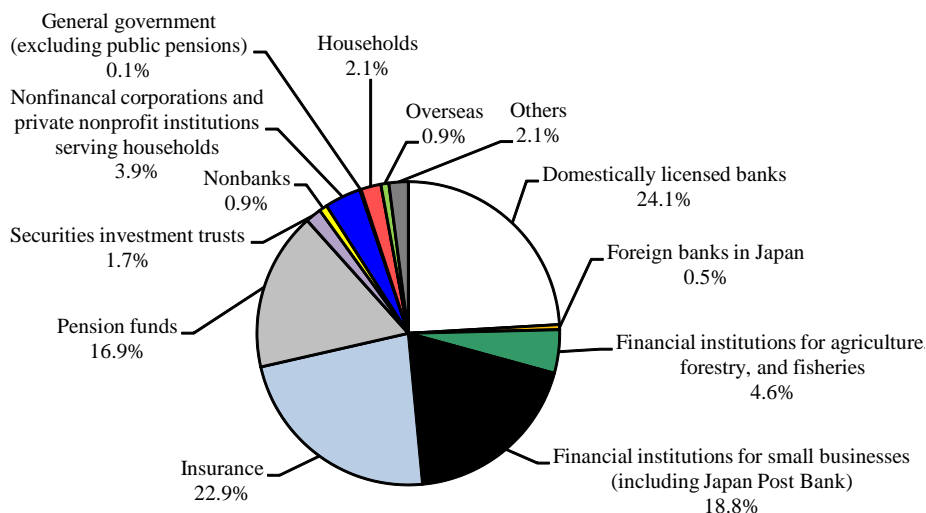
While investors maintained their firm stance of investing in corporate bonds in the face of limited investment opportunities, market participants found that corporate bonds were becoming scarce given firms' sluggish demand for external funds. Under these circumstances, the environment for corporate bond issuance continued to improve. As a result, in the first half of 2010, there were some notable issuances in which the amount exceeded the initial plan and the issuance spread was tight, and issuance of bonds such as real estate investment trust (REIT) bonds was resumed for the first time since the failure of Lehman Brothers Holdings Inc. (Chart 2-22). From May 2010, however, some firms temporarily postponed issuing corporate bonds in response to investors' wait-and-see stance.

### *CDS premiums*

While effects of the fiscal problem in Europe on corporate bond markets were limited as a whole, CDS premiums increased noticeably. Both credit spreads on corporate bonds and CDS premiums reflect firms' credit risk. In Japan's corporate bond markets, however, foreign investors' holdings were limited, and most Japanese institutional investors invested in corporate bonds based on a buy-and-hold strategy (Chart 2-23). Thus, it has been pointed out that the price formation mechanism in the secondary market does not function with sufficient effectiveness. On the other hand, it is known that participants in Japan's CDS market are limited and consist mostly of foreign investors and CDS premiums are sometimes excessively volatile due to investors' arbitrage transactions and speculative motives. The strong correlation between Japan's sovereign CDS premiums and Japanese stock prices is statistically confirmed, given that they are susceptible to the behavior of

foreign investors and a number of arbitrage transactions are conducted between them<sup>27</sup> (Chart 2-24).

**Chart 2-23: Breakdown of corporate bond holders**



Note: As the end of March 2010.  
Source: Bank of Japan, "Flow of Funds Accounts."

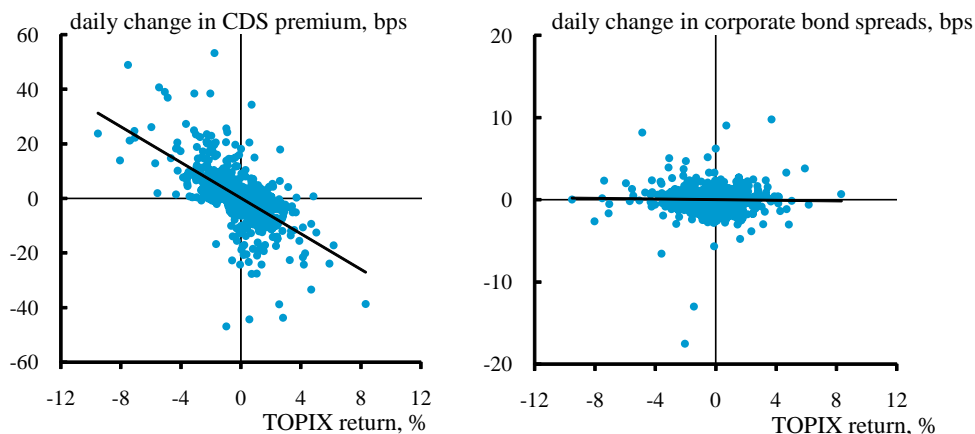
In fact, during the first half of 2010, developments in the CDS market were generally in line with those in Japanese stock prices. Specifically, until around April 2010, CDS premiums narrowed moderately in tandem with steady stock prices. They then widened rapidly with the fall in stock prices globally in response to the growing fiscal problem in Europe from late April 2010 (Chart 2-25).

Meanwhile, following a determination of the credit event of a Japanese firm, the first auction was held to settle CDS contracts. At first, some market participants were concerned about market turmoil stemming from the actual occurrence of a credit event, but no

<sup>27</sup> In Chart 2-24, no clear correlation is confirmed between stock return in a day and the changes in corporate bond spreads on the same day. However, the fact that this does not completely deny any correlation between these variables warrants attention. In general, if conditions of an efficient market are satisfied -- for example, the transaction cost is zero and all information on firms to be invested in spreads simultaneously -- prices in stock and credit markets will be adjusted instantly and simultaneously correlated, and relation will not have lags. On the other hand, if some of the conditions are not satisfied in either market, there is a possibility that the correlation between them will occur at lags reflecting the difference in price adjustment speeds. In fact, when implementing Granger causality tests on stock return and corporate bond spreads, the results show that the past developments in stock prices have an explanatory power to the changes in corporate bond spreads. This implies that there is a certain correlation with lags between them.

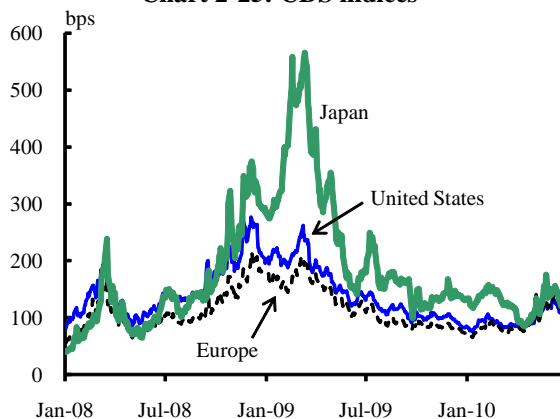
significant turmoil occurred. (For information on credit event settlement in Japan's CDS market, see Box 7.)

**Chart 2-24: Simultaneous correlation between Japanese stock prices and credit variables**



Note: CDS premium is iTraxx Japan. Corporate bond spreads are A-rated with 3- to 7-year maturity. Data for January 2007 to June 2010. Sources: Bloomberg; Japan Securities Dealers Association; Markit Group.

**Chart 2-25: CDS indices**



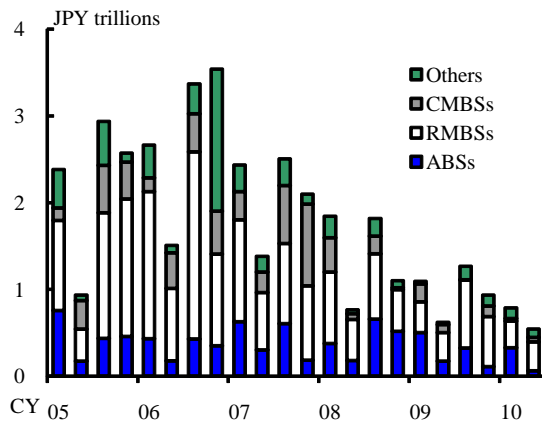
Note: CDX.NA.IG for the United States; iTraxx Europe for Europe; iTraxx Japan for Japan. Source: Markit Group.

*Issuance of securitized products*

The amount of securitized products issued remained at a low level. By product, residential mortgage-backed securities (RMBSs) issued by the Japan Housing Finance Agency continued to be a major securitized product issued (Chart 2-26). There were quite a few downgradings (Chart 2-27) resulting from the deterioration in credit fundamentals in the

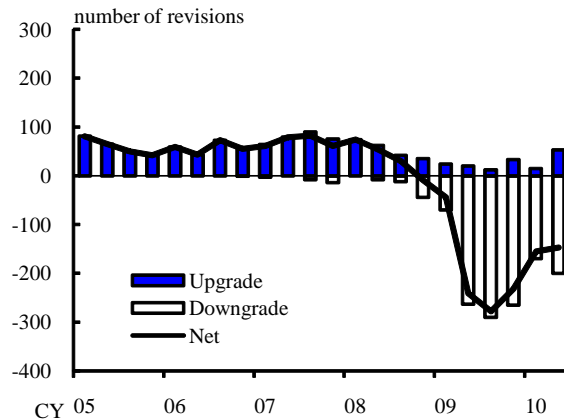
commercial real estate market such as reduced rent of the collateral real estate and a decline in profitability due to the lower occupancy rates. Gradual improvements, however, were also seen in the market environment. For example, in the first quarter of 2010, consumer finance loan asset-backed securities (ABSs) were issued, and the total number of downgradings of securitized products decreased as a whole.

**Chart 2-26: Amount of securitized products issued**



Source: Deutsche Securities.

**Chart 2-27: Credit rating revisions of securitized products**



Source: Deutsche Securities.

**Box 7: Credit Event Settlement in Japan's CDS Market**

In CDS contracts, should a credit event occur such as default of reference entities -- typically firms and countries -- payment of cash, or exchange of cash and obligations of the reference entity, is made between protection buyers and protection sellers. This is called credit event settlement. Although the occurrence of credit events in Japanese market had been limited to a small number of transactions involving a few bankrupt entities, a couple of cases of determination of credit events involving heavily traded entities were observed from the second half of 2009. Credit event settlement was conducted for these entities in the first half of 2010, the first cases of large-scale credit event settlement in Japan. Although a number of market participants had pointed out that the settlement might not be conducted smoothly, as it turned out, the transactions were generally settled without major issues.

One of the reasons why settlement was made smoothly is considered to be the introduction

of the auction settlement mechanism in recent years. Under physical settlement, which used to be the market standard form of settlement (whereby obligations of the reference entity are physically delivered in exchange for cash equivalent to the principal amount), settlement is made bilaterally for each individual contract according to the terms of each contract. On the other hand, under auction settlement, all relevant contracts are cash-settled in accordance with the uniform procedures established by the industry. In addition to cash settlement, market participants wishing to buy or sell obligations of reference entities are allowed to do so up to the amount of the netted positions. Thus, only a minimum amount of obligations physically changes hands under auction settlement.<sup>28</sup>

In the case of auction settlement, however, it has been pointed out that the same legal issues exist as with physical settlement on delivery of loans. For example, obligations including loans need to be delivered free and clear of any right of set off.<sup>29</sup> A protection buyer typically circumvents the right of set off by obtaining consent without objection from the borrower of the loan (i.e., the reference entity of the CDS). The validity of the consent without objection obtained initially from the borrower may be questioned when the loan is transferred several times among various parties in auction settlement. Therefore, it has been pointed out that a protection buyer needs to be aware of the fact that the loan may not become deliverable in certain circumstances.

Issues regarding the fairness of the settlement mechanism have also been raised. Under credit event settlement, buyers have the option of delivering the cheapest obligation (the so-called cheapest-to-deliver option, that is, the protection buyer can choose the obligation to deliver). Thus, as in the case where there is a great difference in price between short-dated corporate bonds expected to be redeemed at par and restructured loans with uncertainties about future payment, it has been pointed out that some protection buyers might take greater advantage of the option. Given that definitions of deliverable obligations have been modified to limit the cheapest-to-deliver option in U.S. and European markets,

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<sup>28</sup> In addition, enhancement of the infrastructure to process business operations by market participants contributed to the smooth settlements. In past years, CDS trades were processed manually, but nowadays they are processed electronically.

<sup>29</sup> For example, the following case is assumed: a loan lender who has bought CDS protection on the loan borrower takes a deposit from the loan borrower. In this case, because the borrower can exercise the right of set off, the lender intending to deliver the loan to the protection seller under CDS needs to obtain an approval from the borrower of the choice not to exercise the right of set off.

some Japanese market participants have asked for the introduction of a similar modification.

The case of credit event settlement that the Japanese market experienced this year was somewhat complicated for the following reasons: the outstanding transaction volume was large; many parties wanted to deliver loans; and there was a great price difference among deliverable obligations because the restructuring event was determined without the company officially filing for bankruptcy. Through this and other events, Japanese market participants seem to have accumulated expertise on credit event settlement, and thus settlement procedures are expected to be conducted more smoothly in the future.

#### **D. Stock Markets**

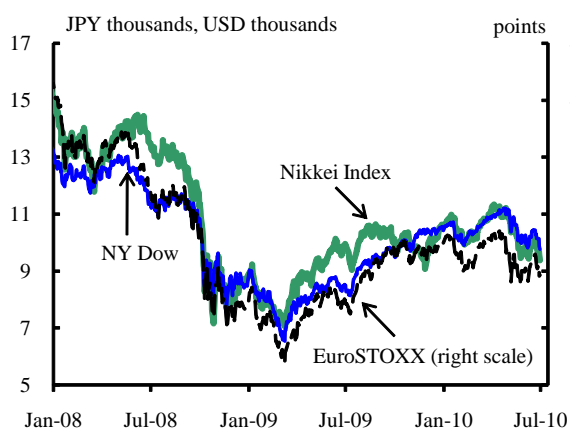
Japanese stock prices fluctuated widely in both directions and showed unstable developments, generally following U.S. and European stock prices that were strongly affected by the fiscal problem in Europe.

##### *Developments in stock prices*

Given the expectation of monetary policy tightening by the Chinese monetary authority, release of the new financial reform bill in the United States, and the sovereign risk problem in Greece, Japanese stock prices underwent adjustment toward February 2010. Subsequently, they temporarily followed a moderate increasing trend, mainly reflecting expectations for improvement in business performance (Chart 2-28). The view that Japanese stock prices lagged behind overseas stock prices in their rise and the gradual depreciation of the yen backed by an increasing trend of U.S. interest rates pushed up stock prices (Chart 2-29). From late April 2010, however, amid the growing fiscal problem in Europe, overseas stock prices plunged, foreign investors became increasingly risk averse, and the yen appreciated. As a result, Japanese stock prices dropped significantly. On April 5, 2010, the Nikkei 225 Stock Average marked 11,339 yen, a new high for 2010. After late April 2010, when downgradings of the long-term sovereign credit ratings of Portugal and Greece were announced in succession, it fell at a faster pace and recorded a decrease since the beginning of 2010 of more than 10 percent.

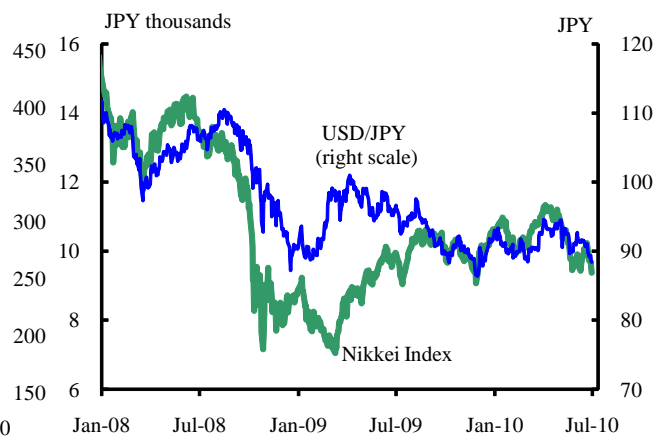


**Chart 2-28: Stock indices**



Source: Bloomberg.

**Chart 2-29: Stock index and FX rate**

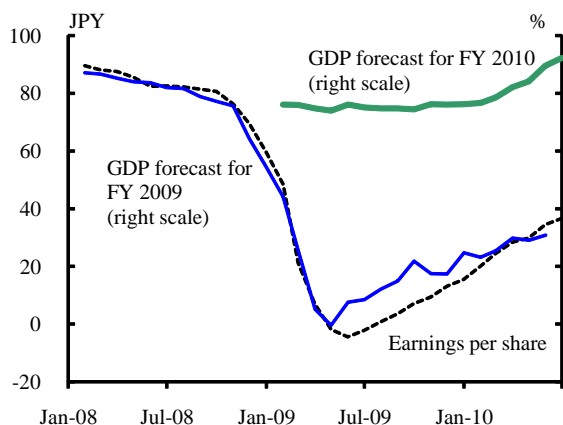


Source: Bloomberg.

*Factors behind the significant effects of events abroad*

After the turn of the year, Japan's economy followed a steady recovery path, albeit at a moderate pace, and corporate profits were also on an improving trend (Chart 2-30). As already mentioned, the effects of the fiscal problem in Europe were limited in money markets and corporate bond markets. Under these circumstances, susceptibility of Japanese stock markets to the behavior of internationally active foreign investors seemed to work as a factor behind the trend in which developments in stock markets were particularly affected by events abroad. To understand the background behind this, we verified correlations between U.S. and Japanese stock prices and between U.S. treasury and JGB yields at the frequency of one day up to 200 days. With regard to government bond yields, although the correlation for shorter frequencies was weak, the correlation for longer frequencies was strong. (For information on the correlation between U.S. and Japanese stock prices and between U.S. treasury and JGB yields, see Box 8.) On the other hand, a stronger correlation was seen between U.S. and Japanese stock prices at shorter frequencies, and the correlation remained at a certain level for longer frequencies. This showed that stock prices were susceptible to global investors' risk tolerance and globally common events even at short frequencies, and Japanese and U.S. stock prices tended to show similar developments. Although this verification did not make a distinction between domestic and foreign investors, an opinion survey conducted on market participants showed that the behavior of foreign investors attracted considerable attention in Japan's stock markets (Chart 2-31). Thus, based on the survey results, it could be inferred that Japanese investors followed the behavior of foreign investors.

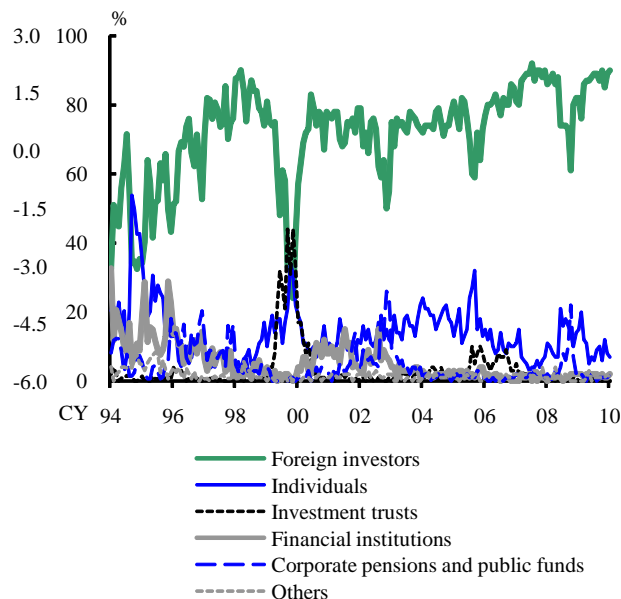
**Chart 2-30: Corporate profits forecast**



Note: Earnings per share means EPS forecast of TOPIX components up to 12 months ahead.

Sources: Economic Planning Association, "ESP Forecast"; Thomson Reuters, "Data Stream."

**Chart 2-31: Investors affecting stock markets**



Note: Percentage based on valid responses. "Others" means nonfinancial corporations and respondents themselves (including arbitrage transactions).

Source: QUICK, "QUICK Survey System Report."

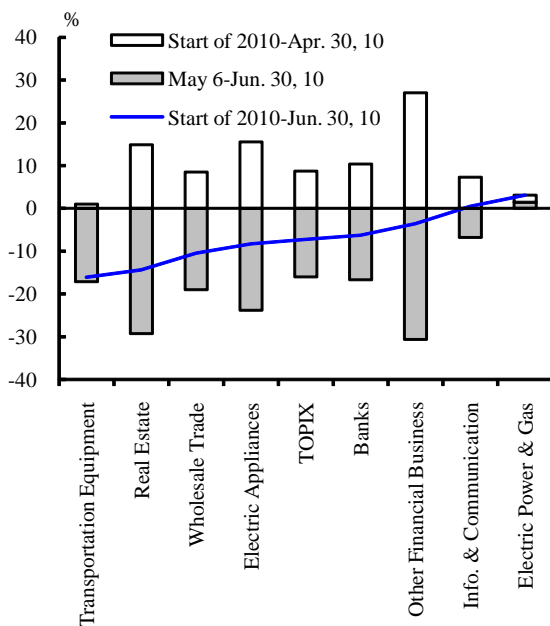
It is well known that Japanese stock prices are closely linked to FX rates. In fact, stock prices and FX rates showed similar developments (Chart 2-29). Minute-by-minute high-frequency data indicated the following relationship between stock prices and FX rates. While the simultaneous correlation was the strongest, changes in stock prices were affected more significantly by the past changes in the U.S. dollar/yen exchange rate than their own changes in the past. (For information on the correlation between stock prices and FX rates in terms of intra-day data, see Box 9.) These results suggested the possibility that a larger number of stock transactions might be conducted with a very high frequency in response to small and short-term changes in FX rates, based on the perception that changes in FX rates significantly affect the profits of exporters. Recently, FX rates changed when, for example, investors became increasingly risk averse and purchased the yen as a safe asset. Effects of the instability in international financial markets stemming from the fiscal problem in Europe spilled over quickly to Japanese stock prices through such channels as (1) reduction of risky asset holdings by foreign investors and the subsequent actions by Japanese investors, and (2) an increase in semi-automatic stock sales in response to the appreciation of the yen.

*Developments by sector*

With regard to the developments in stock prices by sector, stock prices in domestic demand-related sectors such as the banking and real estate sectors, whose rise was relatively limited during 2009, rose significantly until around April 2010, when stock indices remained generally steady reflecting the improvement in the performance of Japanese stock prices relative to overseas stock prices (Chart 2-32). Against the background of improvement in global economic conditions, a rise in commodity prices, and the depreciating trend of the yen, stock prices in the electric appliances sector and the materials and resources sector (wholesale sector) were firm. From May 2010, however, these sectors generally saw a decline in their stock prices. In particular, the sectors that experienced a significant rise in their stock prices recorded a large decline due to a rebound.

The Tokyo Stock Exchange REIT Index rose moderately after having remained more or less unchanged (Chart 2-33). This rise reflected improvements in funding conditions for some individual REIT, expectations for industrial restructuring, and expectations of the peaking out of office vacancy rates. At the end of April 2010, the index rose to its highest level since September 2009. From May 2010, however, reflecting a decline in stock indices, it showed some weakness.

**Chart 2-32: Changes in TOPIX Sector Indices**



Source: Bloomberg.

**Chart 2-33: Tokyo Stock Exchange REIT Index**



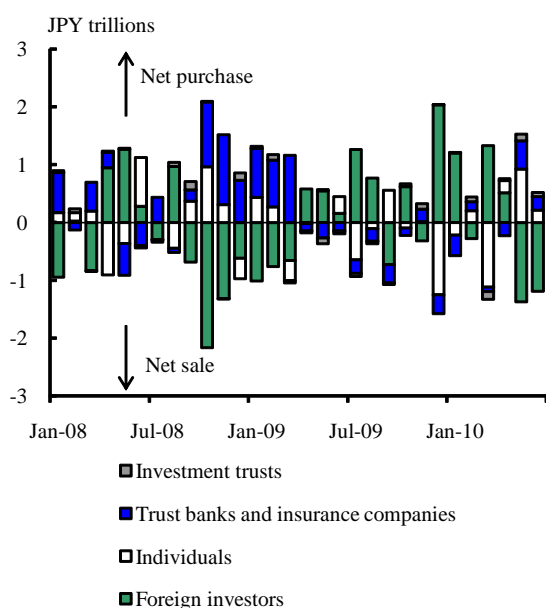
Source: Bloomberg.

### Stock trading activity by type of investor and equity financing

From December 2009 to around April 2010, when stock prices remained firm, investment by foreign investors continued to record net purchases reflecting expectations for recovery in business performance and undervalued Japanese stock prices (Chart 2-34). However, they registered somewhat large net sales when stock prices started to decline in May 2010. On the other hand, the investment stance of individual investors remained unchanged: they registered net sales when stock prices rose, and net purchases when stock prices fell.

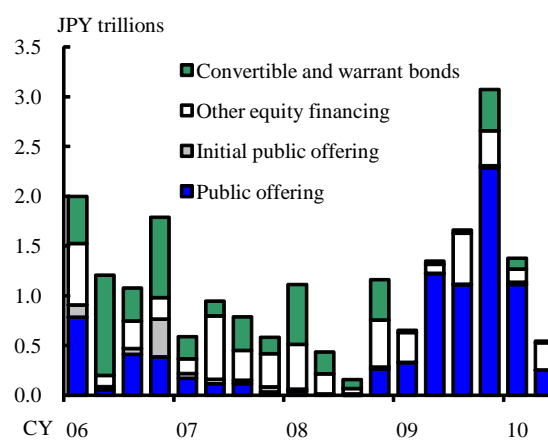
Given firms' weak demand for external funds and completion of large-scale equity financing in 2009, equity financing through public offerings and convertible bonds (CBs) by firms remained at a low level in the first half of 2010, excluding large-scale equity financing by financial institutions in preparation for a possible tightening of capital adequacy regulations (Chart 2-35). Meanwhile, equity financing through initial public offerings (IPOs) continued to be sluggish.

**Chart 2-34: Japanese stock trading by type of investor**



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

**Chart 2-35: Equity financing**



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

### **Box 8: Correlation between U.S. and Japanese Stock Prices and between U.S. Treasury and JGB Yields by Frequency**

As seen in the sharp drop in stock prices at home and abroad after the failure of Lehman Brothers Holdings Inc., the international correlation of financial markets has recently increased. When referring to the correlation between financial assets at home and abroad, the data frequency is not specified in most cases. Given the fact that factors behind price movements of financial assets and background of correlations may differ by data frequency, data frequency should be factored in. For example, news or events of the time may cause changes at a short frequency, while economic fundamentals that determine economic developments may cause changes at a long frequency.<sup>30</sup> Based on this perspective, correlations between the United States and Japan were examined by analyzing changes in Japanese and U.S. stock price indices (the Nikkei 225 Stock Average and the S&P 500 index) and Japanese and U.S. ten-year government bond yields at the frequency of one up to 200 days.<sup>31</sup>

The average correlation coefficient by frequency showed that the correlation between U.S. and Japanese stock prices increased rapidly at the frequency of up to around five days and remained more or less flat at the frequency of five days or longer (Chart 1 for Box 8). On the other hand, the correlation between U.S. treasury and JGB yields increased as the frequency lengthened. Given that stocks are risky assets, a correlation between U.S. and Japanese stock prices would be induced by changes in investors' risk tolerance reflecting news flows.<sup>32</sup> Meanwhile, correlation between U.S. treasury and JGB yields (from a longer-term perspective) would reflect globally common fundamentals.

Looking at the time-series data for changes in the correlation coefficient at the frequency of 200 days, the correlation coefficient of stock prices rose recently, albeit with some fluctuations (Chart 2 for Box 8). It moved in line with the correlation coefficient of the

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<sup>30</sup> For example, see Fama (1990) and Adrian and Rosenberg (2008).

<sup>31</sup> Daily data for October 1987 to June 2010 are used. Chart 1 for Box 8 shows the correlation coefficient calculated from all samples, and Chart 2 for Box 8 shows the correlation coefficient of the past 1,000 days. The natural logarithm of stock returns and the difference in government bond yields are used.

<sup>32</sup> In Adrian and Rosenberg (2008), short-term factors for stock price changes are interpreted as a liquidity constraint, and long-term ones are interpreted as an economic cycle.

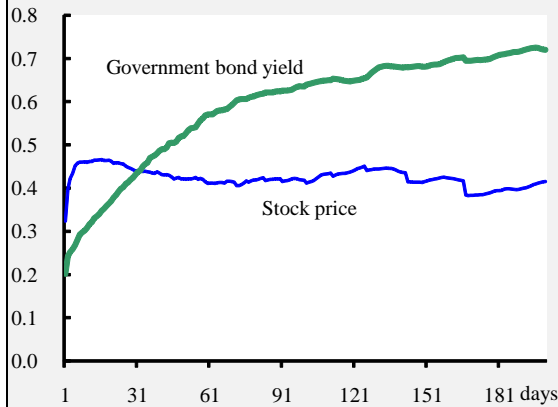
index of industrial production (IIP) for Japan and the United States. This implied that, over the past year, the source of correlation between U.S. and Japanese stock prices indicated cyclical economic developments. Particularly after the failure of Lehman Brothers Holdings Inc., the correlation between U.S. and Japanese stock prices for a longer frequency increased against the background of simultaneous global economic deterioration and the subsequent economic recovery. In contrast, the correlation between U.S. treasury and JGB yields remained over 20 years at a high level regardless of the correlation between U.S. and Japanese industrial production. This implied that (real) long-term interest rates tended to move independently of each other in the short term but follow changes in fundamentals beyond an economic cycle (such as the world's equilibrium economic growth rate). In theory, if there is no constraint on capital movements, it is assumed that real interest rates are balanced worldwide reflecting the arbitrage transactions in the international financial markets.<sup>33</sup> The continued strong correlation between U.S. and Japanese long-term interest rates at a high frequency might suggest that developments in long-term interest rates were in line with theory to some extent.<sup>34</sup>

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<sup>33</sup> International capital flows to countries with high marginal productivity of capital (and interest rates) rather than to those with low marginal productivity of capital (and interest rates). The marginal productivity of capital is expected to decrease gradually with capital inflows. Thus, the marginal productivity of capital of a country that is initially low (high) will rise (decline). Under certain conditions (such as that there are no non-tradable goods), marginal productivity of capital (and the real long-term interest rate) will be consistent worldwide if there is no limit on international capital flows.

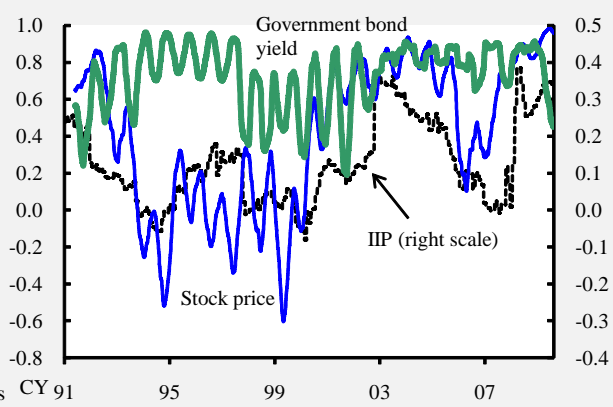
<sup>34</sup> Empirical evidence shows that changes in the government bond yield curve are caused mainly by three factors (i.e., level, slope, and curvature). It is reported that among these three the level factor makes the biggest contribution. Diebold, Li, and Yue (2008) indicate that the level factor of developed economies shows a strong correlation. This would be affected by the fact that not only real interest rates but also long-term expected inflation rates which determine nominal interest rates show similar changes among developed economies.

**Chart 1 for Box 8: Correlation coefficient by frequency**



Source: Bloomberg.

**Chart 2 for Box 8: Correlation coefficient at the frequency of 200 days**



Notes: 1. Past five years' correlation coefficient (monthly data) for IIP.  
 2. 100-term moving average for stock price and government bond yield.  
 Sources: Bloomberg; Federal Reserve; Ministry of Economy, Trade and Industry.

**Box 9: Stock Prices and Foreign Exchange Rates: Analysis Using Intra-Day Data**

Developments in Japanese stock prices and the U.S. dollar/yen exchange rates during the first half of 2010 show a very strong correlation (Chart 2-29).

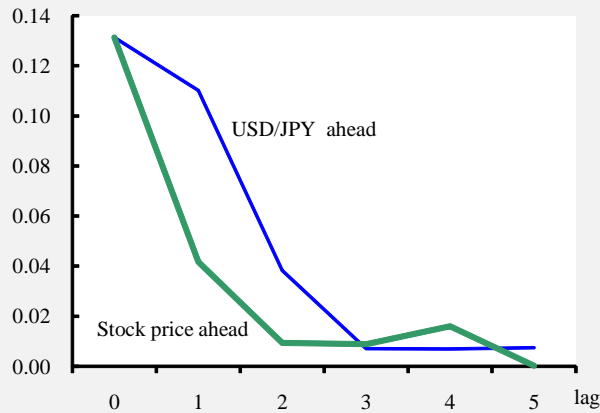
The relationship between stock prices and the U.S. dollar/yen exchange rates was analyzed by using higher-frequency intra-day data, focusing mainly on their intertemporal dependence. Specifically, the correlation coefficient was calculated for the one-minute rate of changes in the Nikkei 225 Stock Average and the dollar/yen exchange rate<sup>35</sup> (during January 2010 to June 2010), and then the regression model was estimated, using lags as explanatory variables.<sup>36</sup>

<sup>35</sup> Such analysis using high-frequency data often uses transaction data collected by electric brokers. For example, Ito and Hashimoto (2004), which examined FX rates, used the data collected by the Electronic Broking System (EBS), which accounted for a high percentage share in interbank transactions.

<sup>36</sup> In order to analyze correlation in Japan's financial markets, data for the opening time for stock markets from 9:00 to 15:00 (excluding the lunch time) were used. When conducting a regression analysis using lags, the following equation for each rate of change is estimated by setting the lag order at five (dependent variable for the U.S. dollar/yen exchange rate is estimated by using a similar method).

$$\text{Stock prices at } t = \sum_{s=1}^5 \{ \beta_{1,s} (\text{stock prices at } t - s) + \beta_{2,s} (\text{U.S. dollar/yen at } t - s) \} + \varepsilon_t$$

**Chart 1 for Box 9: Lag correlation coefficient of stock prices and U.S. dollar/yen exchange rate**

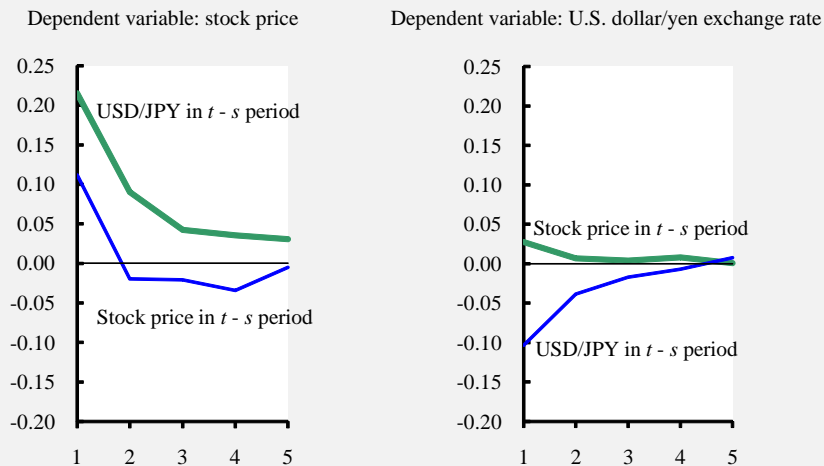


Note: Correlation coefficients are calculated by fixing the point in time of one variable and taking a minute-by-minute lag for another.

Zero in the horizontal axis means the simultaneous correlation coefficient.

Source: Bloomberg.

**Chart 2 for Box 9: Estimated lag coefficient**



Note: Horizontal axis indicates lag denoted by  $s$ .

Sources: Bloomberg; Bank of Japan.

The correlation coefficient by minute indicated that the simultaneous correlation was the strongest (Chart 1 for Box 9). This showed the possibility that some investors actively conducted transactions across markets by following price changes in a very short frequency of time, such as milliseconds, and factored in various shocks to both asset prices at once (with a frequency of higher than daily). Turning to the estimated lag coefficient, stock prices were affected more by lags for the U.S. dollar/yen exchange rate than their own lags, while the effects of lags for stock prices on the dollar/yen exchange rate were very small (Chart 2 for Box 9). This implied that there were a considerable number of investors who



invested in stocks by looking at the dollar/yen exchange rate.<sup>37</sup>

## **E. Foreign Exchange Markets**

In the first half of 2010, the euro depreciated substantially against major currencies due to the growing fiscal problem in Europe. The yen's exchange rate against the U.S. dollar remained more or less unchanged reflecting an interest rate differential between Japan and the United States. Toward the end of June 2010, the yen appreciated to below 90 yen reflecting further reduced expectation of a rise in interest rates in the United States. The yen depreciated against high-interest-rate currencies and currencies of resource-rich countries when market participants perceived the improvement in global economic conditions. On the other hand, the yen appreciated against these currencies when concerns over sovereign risk heightened and global investors became increasingly risk averse.

### *Developments in FX rates*

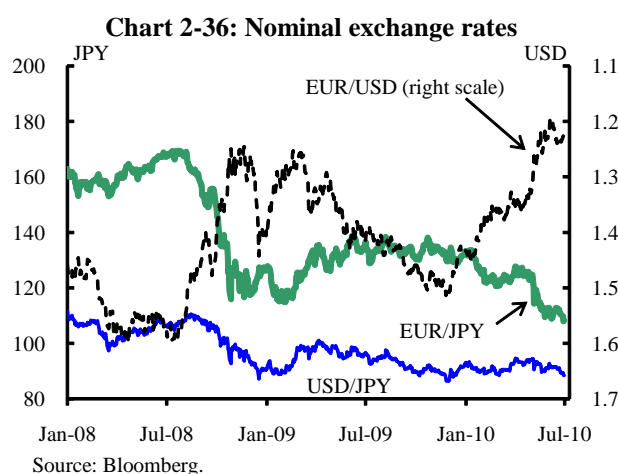
The depreciation of the euro was the major development in FX markets (Chart 2-36). Against the background of such factors as the fiscal problem in Greece, the euro started to depreciate from autumn 2009. It continued to do so against the yen and the U.S. dollar toward March 2010, as the liquidity concern of the Greek government heightened with the approach of redemption of government securities. As the EU and the IMF agreed on conditions for support measures for Greece and the ECB announced the Securities Markets Programme, the euro temporarily stopped depreciating. From the middle of May 2010, however, it generally depreciated again.

The euro remained weak even after liquidity concerns in Greece temporarily abated given the support measures taken by the European policy authorities. The following background was pointed out. First, there was a persistent view that even if liquidity was provided temporarily, it was difficult to improve long-term debt repayment capacity and resolve the structural fiscal deficit problem in a short period of time. Second, market participants were

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<sup>37</sup> As the external environment changes every day, the relationship between stock prices and the U.S. dollar/yen exchange rate may also change. Thus, it should be borne in mind that the results of this analysis showed solely the relationship during the sample period and did not necessarily show the relationship in the population.

aware of how deep the structural problem was not only in Greece but also in other peripheral European countries, as seen in the downgrading of Southern European countries' sovereign debt and concerns about the financial soundness of financial institutions. And third, market participants re-acknowledged that it was difficult for European countries with different political and economic conditions to implement a unified fiscal policy and swiftly make decisions under a common currency -- that is, the euro. Under these circumstances, in the first half of 2010, both the yen and the U.S. dollar appreciated substantially against the euro. The yen temporarily appreciated to its highest level for the first time in about nine years, since November 2001, and was traded at 107.30 yen on June 29, 2010. The dollar appreciated to the 1.15-1.20 dollar level for the first time since March 2006.



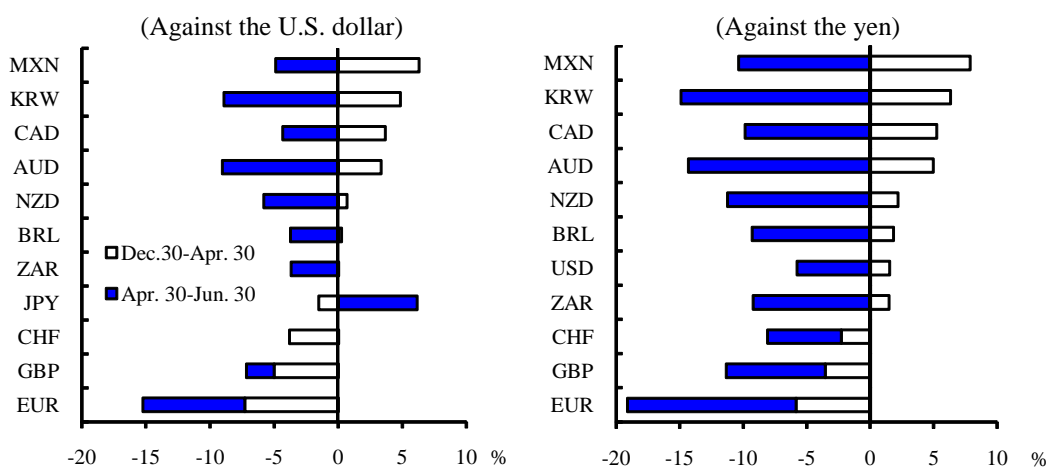
From January 2010 to around April 2010, the yen depreciated against the U.S. dollar because of the following reasons. As global investors' willingness to invest recovered reflecting favorable corporate results and economic indicators, market participants gradually increased their expectation that the Federal Reserve would raise its policy interest rate. Meanwhile, market participants kept their expectation of the continued low interest rates in Japan. From May 2010, however, as stock prices declined globally and an interest rate differential between Japan and the United States narrowed due to a decline in U.S. interest rates, the yen appreciated somewhat against the dollar. The yen was traded at below 90 yen toward the end of June 2010. (For information on the relationship between an interest rate differential and FX rates, see Box 10.)

Until around April 2010, high-interest-rate currencies and currencies of resource-rich countries appreciated against the yen and the U.S. dollar. They then depreciated as investors

became increasingly risk averse reflecting heightened concerns about the fiscal problem in Europe (Chart 2-37).

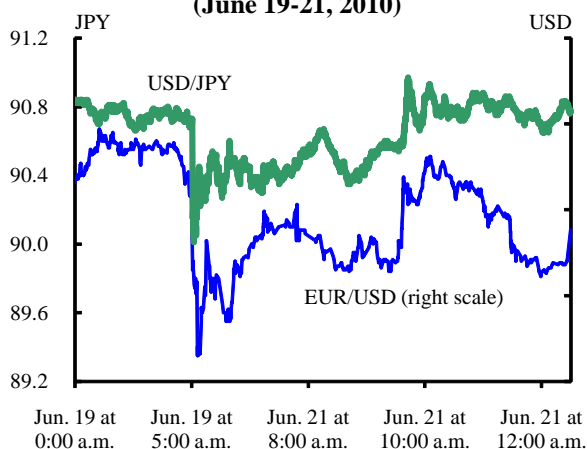
On June 19, 2010, the People's Bank of China decided to proceed further with reform of the renminbi (RMB) exchange rate regime and to enhance the RMB exchange rate flexibility. Immediately after the announcement, the RMB was traded at the 6.7-6.8 RMB level against the U.S. dollar, a new record high since July 2005 when the RMB was revalued. Although the yen appreciated temporarily against the dollar and other Asian currencies also appreciated in response to the appreciation of the RMB, the trend in FX rates did not change significantly (charts 2-38 and 2-39). This was partly because the central parity of the RMB that the People's Bank of China announced daily was not raised substantially.

**Chart 2-37: Change in FX rates against the U.S. dollar and the yen**



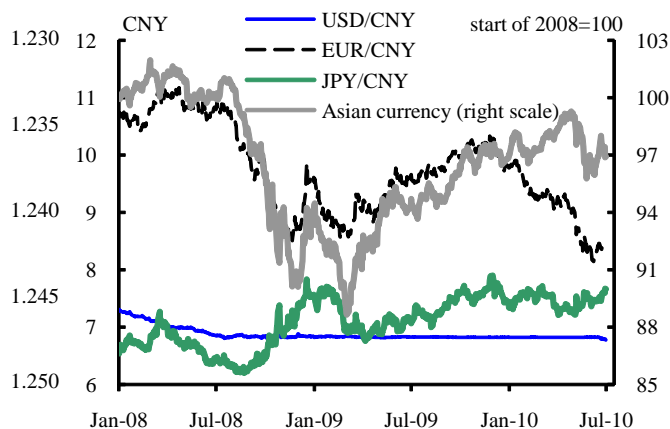
Source: Bloomberg.

**Chart 2-38: Intra-day exchange rates (June 19-21, 2010)**



Source: EBS.

**Chart 2-39: RMB exchange rates**

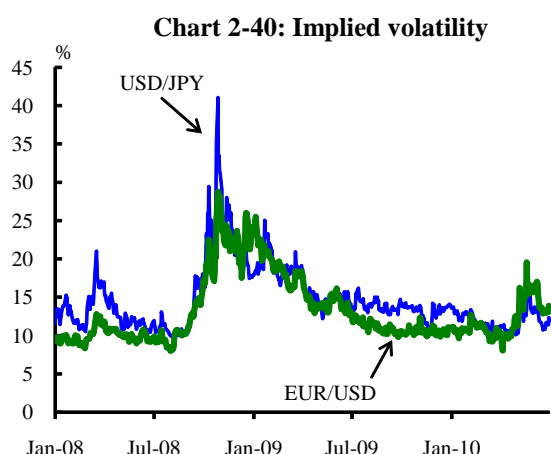


Notes: 1. CNY denotes the Chinese yuan or renminbi.  
2. JPY/CNY rate per 100 yen.  
3. Asian currency (against the U.S. dollar) is Bloomberg/JPMorgan Asian currency index.

Source: Bloomberg.

### *FX options markets*

In FX options markets, implied volatility of the U.S. dollar/yen and the euro/dollar was on a moderate decreasing trend from the beginning of 2010 to April 2010, but then increased significantly from May 2010, reflecting large fluctuations in the spot market (Chart 2-40). Looking at the risk reversal of the dollar/yen, influenced by the outlook for U.S. interest rates, the dollar put-over position -- a need to hedge the risk of an appreciation of the yen -- was on a decreasing trend from the beginning of 2010 to around spring 2010, but then started to increase again from May 2010 (Chart 2-41). This suggested that market participants saw risks as tilted to the future appreciation of the yen. In contrast, looking at the risk reversal of the euro/dollar, the dollar call-over position increased to the level recorded immediately after the failure of Lehman Brothers Holdings Inc., reflecting the depreciation of the euro in the spot market. It was observed that investors were factoring in the risk of a possible sharp depreciation of the euro.



Note: 1-month.  
Source: Bloomberg.



Note: 1-month.  
Source: Bloomberg.

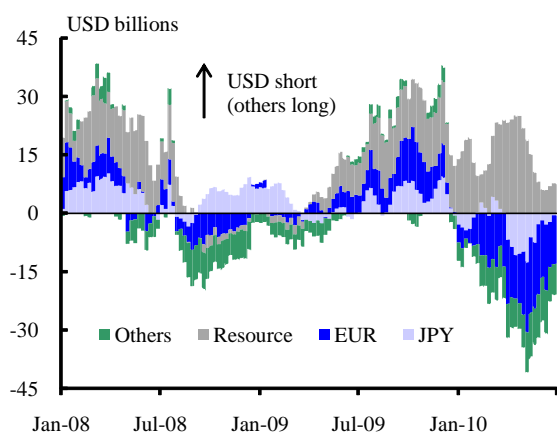
### *Speculators' positions and Japanese retail investors' FX trading*

The International Monetary Market (IMM) futures net positions of noncommercial investors on the Chicago Mercantile Exchange showed that speculators' short positions in the euro against the U.S. dollar reached a record-high level, reflecting the depreciation of the euro (Chart 2-42). Against the background of growing expectations, particularly held by foreign investors, of the depreciation of the yen due to a widening of interest rate

differential between Japan and the United States, short positions in the yen increased but subsequently declined. From May 2010, when concerns about the fiscal problem in GIIPS heightened, a reduction was seen in long positions in currencies of resource-rich countries against the dollar.

Looking at Japanese retail investors' trading behavior, FX margin traders continued to take contrary positions and unwind these positions (Chart 2-43). In early May 2010, when the yen appreciated, it was said that transactions to cut losses in the short positions in the yen accelerated the depreciation of the U.S. dollar against the yen.

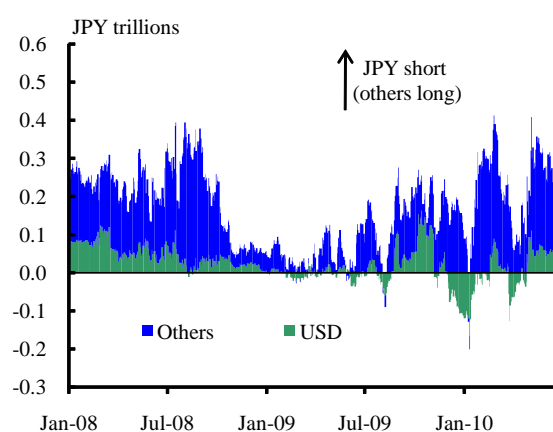
**Chart 2-42: IMM futures net position against the U.S. dollar**



Note: "Resource" consists of AUD, NZD, CAD, and MXN.  
"Others" consists of GBP and CHF.

Source: Bloomberg.

**Chart 2-43: Trading volume of FX margin trading on the Tokyo Financial Exchange**



Note: Net long position of "others" and "USD" against the yen (excluding market makers).

Source: Tokyo Financial Exchange.

### **Box 10: Interest Rate Differential at Home and Abroad and Foreign Exchange Rates**

In efficient markets, at least in *ex ante* expectation, returns from the yen and the U.S. dollar investments are equal. Or, prices (FX rates and interest rates) should be adjusted to such a level. Uncovered interest rate parity suggests that with  $(i_t)$  and  $(i_t^*)$  indicating Japanese interest rates and U.S. interest rates, respectively, changes in FX rates ( $S_t$ ) are determined to meet the following arbitrage condition (the left-hand value shows returns from yen interest rates, and the right-hand value shows returns from dollar interest rates denominated in

yen).<sup>38</sup>

$$\overbrace{1 + i_t}^{\text{returns from yen interest rates}} = \overbrace{\frac{s_{t+1}}{s_t} (1 + i_t^*)}^{\text{returns from U.S. dollar interest rates (denominated in yen)}}$$

Following this equation, high-interest-rate currencies depreciate on average. Uncovered interest rate parity, however, is often statistically rejected. The opposite effects that high-interest-rate currencies tend to appreciate on average are usually obtained. In fact, FX rates during the first half of 2010 showed a strong correlation between the U.S. dollar/yen exchange rate and a two-year swap rate differential between Japan and the United States: when U.S. interest rates are high, the dollar/yen exchange rate tended to rise (i.e., the dollar tended to appreciate) (Chart 1 for Box 10).

Although a correlation was generally strong, when we regressed the U.S. dollar/yen exchange rate on an interest rate differential between Japan and the United States, we found some errors that cause significant deviations toward an appreciation of the yen -- a sharp appreciation of the yen that is not easily explained by the model<sup>39</sup> (Chart 2 for Box 10). The question arises as to which factors caused such a sharp appreciation of the yen that cannot be explained by an interest rate differential. As one attempt, when picking up the data for days in which an index of volatility (VIX) fluctuated particularly widely from the previous day (i.e., changed more than twice the standard deviation), the days with a huge error were often the days with large fluctuations in VIX (the shaded areas in Chart 2 for Box 10).

The February 2010 issue of the *Financial Markets Report* stated that the carry trade could be considered as an investment in risky assets to acquire a premium for taking the risk of unwinding such as an abrupt depreciation of the investment currency. In this regard, the above result implies that the actual developments in FX rates can be better explained by combining the carry trade and uncovered interest rate parity. In other words, FX rates fluctuate through two channels: (1) the carry trade conducted when risk tolerance is high and high-interest-rate currencies appreciate; and (2) unwinding of the trade when risk

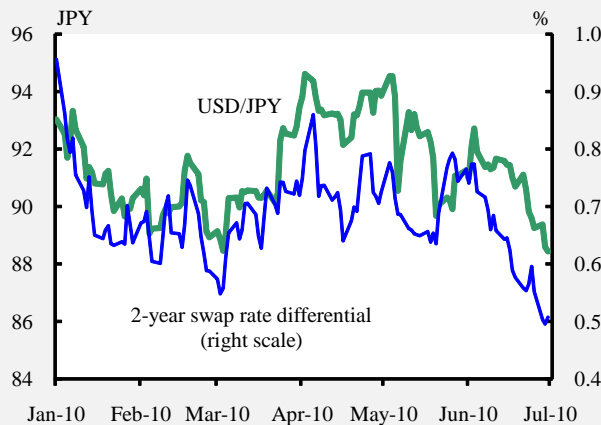
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<sup>38</sup> The equation below can be interpreted as the expected rate of return including capital gain associated with short-term purchases and sales of bonds.

<sup>39</sup> In theory, although changes in FX rates should be explained by an interest rate differential, such a model is used as this model fits well with the U.S. dollar/yen exchange rate in the first half of 2010.

tolerance decreases rapidly and high-interest-rate currencies depreciate abruptly.<sup>40</sup>

**Chart 1 for Box 10: U.S. dollar/yen exchange rate and interest rate differential between Japan and the United States**

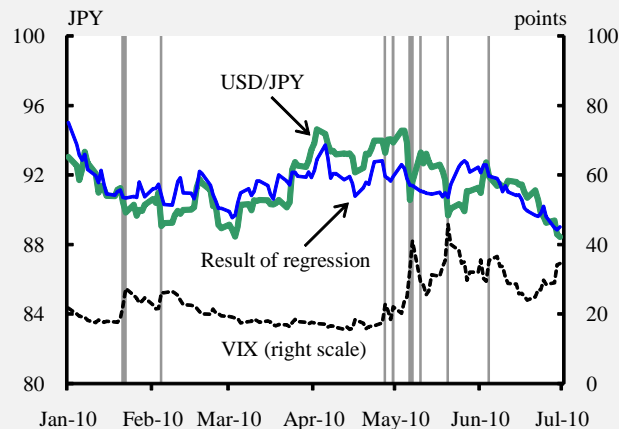


Jan-10 Feb-10 Mar-10 Apr-10 May-10 Jun-10 Jul-10

Note: 2-year swap rate differential means the U.S. dollar swap rate minus the Japanese yen swap rate.

Source: Bloomberg.

**Chart 2 for Box 10: Result of regression analysis and VIX**



Jan-10 Feb-10 Mar-10 Apr-10 May-10 Jun-10 Jul-10

Note: Shaded areas indicate when VIX changed more than twice the standard deviation.

Source: Bloomberg.

<sup>40</sup> Ronald and Soderlind (2010) state that the Swiss franc and the yen become safe-haven currencies and tend to appreciate in times of crisis. As background, they point out the unwinding of the carry trade.

It should be noted, however, that the phase of unwinding of carry trade does not necessarily take place in one day and may continue for a long time. For example, Shiozawa, Koga, and Kimura (2009) analyze the developments after the financial crisis from the third quarter of 2007 to the fourth quarter of 2008 as the phase of unwinding of the carry trade.

### **III. Points to Be Noted in the Financial Markets for the Foreseeable Future**

Financial markets at home and abroad are facing increased uncertainties reflecting the growing fiscal problem in Europe, and market participants have begun to focus more on risk aversion.

For about one year from spring 2009, market sentiment generally continued to improve, mainly due to the recovery in the real economy and financial system from the worst phase immediately after the failure of Lehman Brothers Holdings Inc. Under these circumstances, financial markets started to regain stability. During the first half of 2010, however, these trends changed. Before late April 2010, the relationship between U.S. stock prices and implied volatility as a proxy for market sentiment confirmed that stock prices rose as market participants became optimistic, showing a stable downward slope (Chart 3-1). From late April 2010, however, market sentiment deteriorated rapidly as seen in the sharp increase in implied volatility. In addition, the carry-to-risk ratio (the spread between long-term and short-term rates/volatility<sup>41</sup>), which indicated the spread between long-term and short-term rates -- that is, financial institutions' major source of earnings -- relative to risk, rose significantly and then dropped rapidly due to the increase in volatility (Chart 3-2). Improvements in market sentiment were halted by the fiscal problem in Europe, and market participants' concerns grew.

Under these circumstances, financial markets are likely to remain nervous, fluctuating widely depending on the economic indicators and information on the financial system. In particular, the following warrants attention: whether actions taken by governments in the euro area and the EU will help alleviate concerns about the fiscal problem in Europe; and whether ensured confidence in the European financial sector will prevent an adverse feedback loop between economic and financial activities from operating.

With regard to the fiscal problem in Europe, at least funding concerns have abated significantly due partly to the enhancement of funding support such as through the establishment of the European Financial Stabilisation Mechanism. Market participants, however, are paying attention to whether fiscal restructuring in European countries will

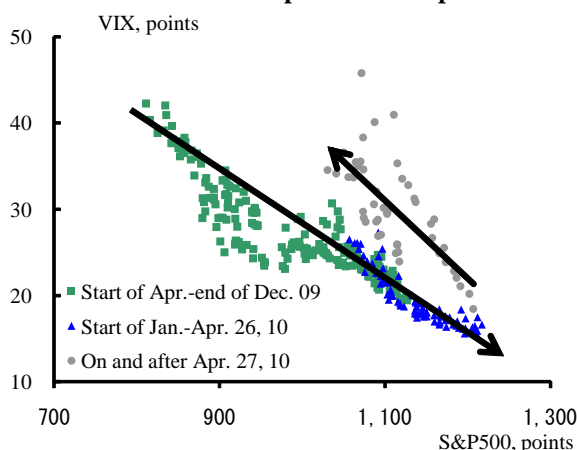
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<sup>41</sup> The implied volatility of swaptions used here tended to increase as investors built up a position with an expectation of deterioration in fiscal risk.



proceed smoothly by overcoming various political obstacles and whether European countries can swiftly take coordinated actions at the EU level in case of a specific country's default. Therefore, it is important that the conduct of fiscal policy in European countries build confidence in order to stabilize the financial markets. The future path of fiscal restructuring will also affect the market participants' views on the European financial sector, as market participants are aware of the correlation of risks with the public sector through the reaction capacity when purchases of government bonds and other additional measures need to be taken. If concerns over the financial system in Europe heighten and banking activities are restrained, the economy will fall into a negative feedback loop in which downward pressures on the economy cause an increase in the financial institutions' nonperforming loans and create more fiscal difficulties, and this, in turn, further heightens concerns over the financial system stability. The primary causes of fiscal and financial problems in Europe share the common factors of the global investment boom and the subsequent bursting of the credit bubble, and many European countries face balance-sheet problems. Thus, the fiscal and financial problems in Europe may continue to bring uncertainties to the financial markets over a somewhat longer period of time.

**Chart 3-1: U.S. stock prices and implied volatility**

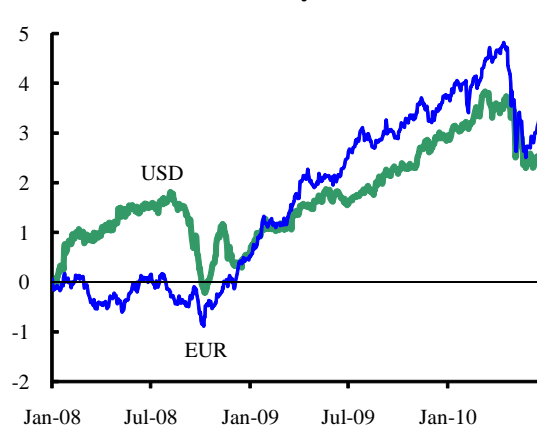


Notes: 1. April 27, 2010 was the day on which Portugal's and Greece's sovereign debt ratings were downgraded by S&P.

2. The arrow indicates the time-series trend.

Source: Bloomberg.

**Chart 3-2: Carry-to-risk ratio**



Note: Spreads between long-term and short-term rates/implied volatility of swaptions (3-month expiry period and 10-year swap tenor).

Source: Bloomberg.

While major developed economies are expected to recover only moderately, attention should also be paid to whether emerging economies will achieve a sustainable growth path by conducting appropriate macroeconomic policies and continue to play the role of the

engine for the world economy. In major developed economies, while balance-sheet adjustment pressure is expected to continue to weigh on domestic private demand, policy interest rates are being kept at extremely low levels. Such low interest rates in major developed economies have increasingly exerted pressures on the inflow of funds to emerging economies with high expectation of potential economic growth and contributed to the monetary easing of these emerging economies. The expectation of continued low interest rates in major developed economies has recently grown further reflecting the growing fiscal problem in Europe and the subsequent concerns about the prolonged global stagnation. If such views grow that an expectation of continued low interest rates will lead to significant fluctuations in the growth path of emerging economies and inhibit their sustainable growth, the price fluctuations in the international financial markets will become larger.

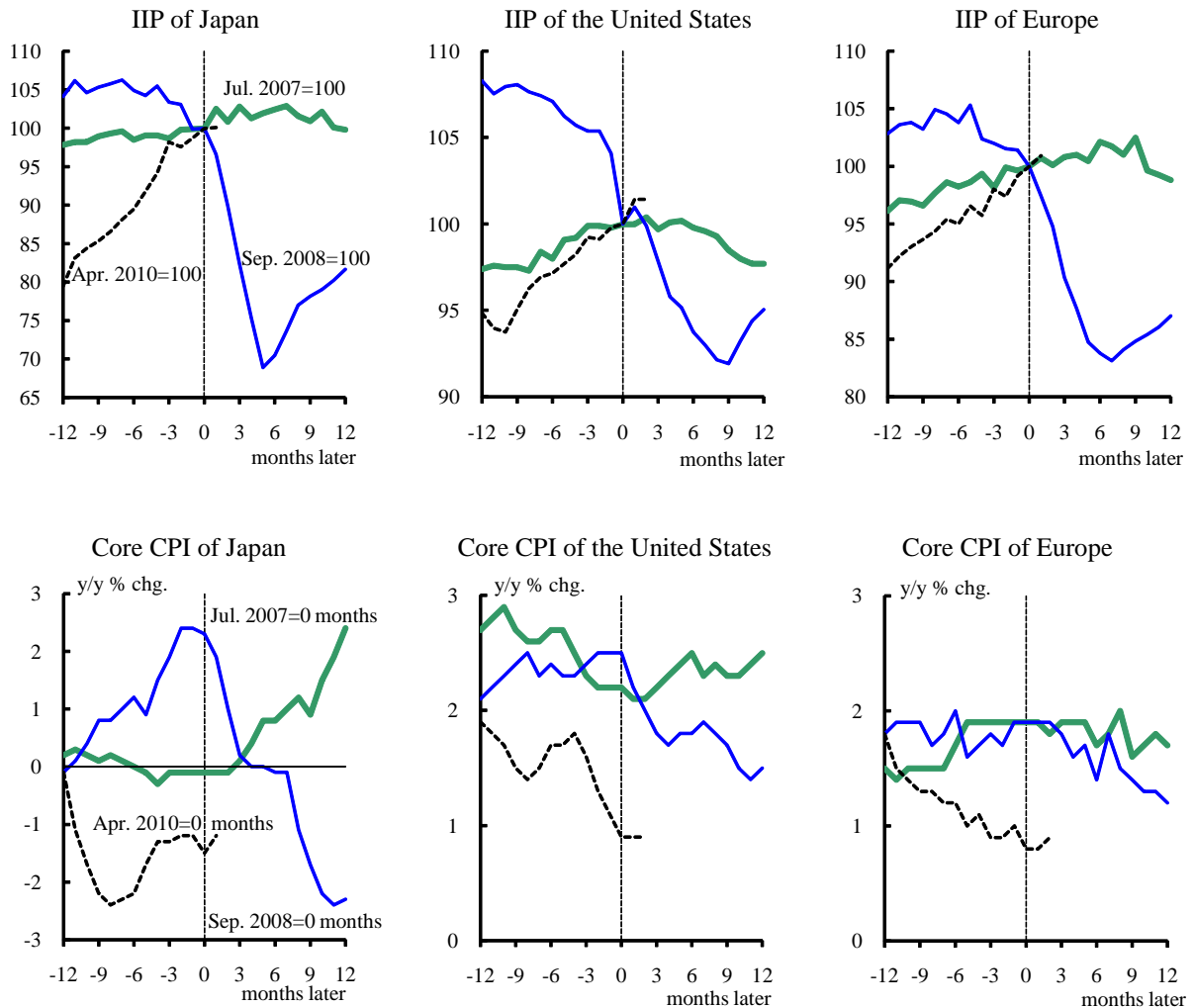
Moreover, attention should be paid to long-term interest rates of major developed economies that have recently declined significantly. The long-term interest rates of Japan, the United States, and Germany generally have followed a declining trend in the second half of 2009 and the first half of 2010, due to the growing expectation of continued low interest rate policy and to increased risk aversion of global investors reflecting the credit problem in Europe, respectively. In this regard, some market participants have expressed concern that a decline in long-term interest rates might imply the prolonged stagnation of the real economy. Based on Japan's experience after the bursting of the economic bubble, it has been pointed out that the recovery of major developed economies might be very slow for an extended period since they face balance-sheet adjustment pressure after the financial crisis. The world economy has recently followed a recovery trend supported by strong growth in emerging economies. Compared to economic developments after the failure of Lehman Brothers Holdings Inc., however, the current phase of the economy with the fiscal problem in Europe features low inflation under the recovery in production (Chart 3-3). Given these points, some market participants have expressed concern about global deflationary risk caused by an additional negative demand shock.

On the other hand, in the government bond markets of these major developed economies, it continues to be pointed out that a risk remains that government bond prices might peak out and start to drop (i.e., that government bond yields might rise). Global investors are

becoming increasingly risk averse and continue to purchase government bonds of major developed economies, as these bonds are considered safer assets than those of GIIPS. Fiscal conditions of countries around the world, however, have significantly deteriorated since the failure of Lehman Brothers Holdings Inc. In the United States and Europe, balance-sheet adjustment pressure persists. Thus, if some stress is exerted on the financial system, the possibility cannot be ruled out that the risk correlation between public and financial sectors will also become a focus in these developed economies.

Therefore, careful attention should be paid to the developments in long-term interest rates in countries around the world as well as the mechanism behind these developments.

**Chart 3-3: Comparison of economic developments**



Note: July 2007 indicates the BNP Paribas shock, and September 2008 indicates the Lehman shock.  
Sources: Eurostat; Federal Reserve; Ministry of Economy, Trade and Industry; Ministry of Internal Affairs and Communications; U.S. Department of Labor.

## **Appendix: Review of Market Practices in the Secondary Market for JGBs**

After the failure of Lehman Brothers Japan Inc. in September 2008, followed by the default of the company, an unprecedented number of fails occurred in JGB transactions. Liquidity in Japan's money markets and the JGB markets decreased. Particularly in the JGB repo market, which had been affected significantly, the following were recognized as priority issues by all relevant parties in the markets: (1) improving market practices, mainly establishing and reviewing the fails practice; (2) enhancing the functions of and promoting the utilization of the Japan Government Bond Clearing Corporation (JGBCC); and (3) improving risk management by shortening the JGB settlement cycle.

### **A. Establishing and Reviewing the Fails Practice**

In Japan, the fails practice was introduced in January 2001 along with the introduction of the settlement of JGB transfers on a real-time gross settlement (RTGS) basis; however, it has not been well established. This is because market participants do not have sufficient understanding of the meaning and role of the fails practice (such as recognition of fails as defaults) and cannot cope with fails due to a lack of adequate operation schemes and systems. Under these circumstances, market participants, who experienced the turmoil in the JGB market after the failure of Lehman Brothers Japan Inc., recognized the importance of establishing the fails practice. In May 2009, the Working Group concerning Review of Fails Practice for Bond Trading was founded as a subordinate organization of the Japan Securities Dealers Association (JSDA).

It is essential to establish the fails practice in order to not only maintain and improve market liquidity at normal time, but also prepare for emergency situations, such as natural disasters, system disruptions, and defaults of market participants, where fails are likely to occur. Therefore, the working group discussed specific measures with the intention of further establishing the fails practice while preventing frequent occurrence of fails after the practice became well established. The JSDA released the final report of the working group in April 2010. Following the recommendations of the final report, the JSDA revised "The Japanese Government Securities Guidelines for Real Time Gross Settlement" in June 2010. Revisions included the introduction of fails charges in order to prevent frequent occurrence of fails

under low interest rate conditions and the moving forward of the cut-off time (the time to confirm a fail) to improve the business operations that take the occurrence of a fail into account. These revisions will be effective from November 1, 2010.

These revisions of fails practices are applied to a wide range of market participants that conduct JGB transactions (outright transactions and repo transactions) at home and abroad. It is necessary for market participants to further establish the fails practice by promptly developing business operations to handle fails, such as the claim for and payment of fails charges.

## **B. Enhancing the Functions of and Promoting the Utilization of the JGBCC**

Challenges for the JGBCC are enhancing the functions and promoting further utilization so that market participants receive the benefit of utilizing the central counterparty (CCP) features, such as the guarantee to perform delivery and payment obligations, which facilitate the reduction of counterparty risk, as seen in the case of the failure of Lehman Brothers Japan Inc.

Given the experience that the pace of JGB settlement was delayed since it took a long time to deal with the operations related to the failure of Lehman Brothers Japan Inc. and resolve settlement fails, the JGBCC has been working to prepare manuals and improve infrastructures to cope with extraordinary cases. Moreover, the road map to reduce settlement risk in JGB transactions was released in June 2010 by market participants and the JGBCC. The road map stated that the JGBCC's governance would be strengthened. It also stated that the JGBCC together with relevant parties would take actions in order to enhance the funding arrangements in emergency situations such as defaults of market participants and to improve transparency concerning how to allocate bonds subject to settlement fails. As for promoting further utilization of the JGBCC, in the road map, it was decided that the JGBCC and trust banks, which are the major player in the JGB market, should analyze the issues regarding the operational arrangements with due consideration to the characteristics of trust banks.

## **C. Shortening the JGB Settlement Cycle**

While coping with the market turmoil resulting from the failure of Lehman Brothers Japan

Inc., market participants became well aware of the liquidity risk that they could not receive funds and bonds as scheduled due to default and settlement fails. Market participants have recognized that the JGB settlement cycle should be shortened in order to reduce settlement risk by decreasing the amount of unsettled outstanding positions, which are exposed to the risk of default and settlement fails, and reducing the time required to resolve settlement fails.

For this reason, a working group was set up in September 2009 under the Promotion Meeting for Reform of Securities Clearing and Settlement System. The working group is currently studying the fundamental issues to achieve the shortening of the JGB settlement cycle and the way settlement practice and trading management should operate. In June 2010, the working group released an interim report on the progress of the shortening of the JGB settlement cycle and guidelines for future efforts. The working group will discuss business operations on the premise that the T+3 settlement cycle will be shortened to the T+2 settlement cycle for outright transactions in the JGB markets, starting from the first half of 2012. At the same time, the working group will discuss the T+1 settlement cycle for outright transactions and arrange the framework about shortening the settlement cycle including the T+2 settlement cycle.

The Bank hopes that market participants will continue to take initiatives related to improving market practices and infrastructure in financial markets, and the Bank will continue to support such private-sector initiatives.

## **Annex: Financial Market Related Reports**

This annex lists all reports released by the Bank of Japan since the previous *Financial Markets Report*, as follows.

### *Bank of Japan Research Paper Series*

Financial Markets Department, "Money Market Operations in Fiscal 2009," July 30, 2010.

### *Bank of Japan Review Series*

Financial Markets Department, "Wagakuni Fail Kanko no Saranaru Teichaku ni Muketa Minaoshi ni Tsuite -- Nisshokyo WG Saishu Houkoku wo Fumaeta Shijo Kanko Minaoshi no Ugoki (Review to Further Establish the Fails Practice in Japan -- Initiatives Taken by Market Participants to Review the Fails Practice Based on the Final Report of the JSDA Working Group)," June 25, 2010 (in Japanese).

Ookawa, R., Y. Takada, E. Tamura, S. Aoki, M. Higashi, and Y. Inamura, "Shinkoukoku wo Meguru Shikin Flow to Keizai Doukou (Flow of Funds and Economic Developments in Emerging Economies)," International Department, July 23, 2010 (in Japanese).

Shino, J., and K. Takahashi, "Sovereign Credit Default Swaps: Market Developments and Factors behind Price Changes," Financial Markets Department, April 14, 2010.

Takahashi, K., "Kin'yu Shijo no Kokusai Rendousei ni Tsuite (International Correlation in the Financial Markets)," Financial Markets Department, May 27, 2010 (in Japanese).

### *Monetary and Economic Studies Released by the Institute for Monetary and Economic Studies (IMES)*

Kaneko, T., and H. Nakagawa, "Shin'yo Portfolio no Risk Keiryō: Kinri Henka Mitoushi to Kobetsu Kigyo Kakaku Hendo wo Kouryoshita Top-Down Approach (Credit Portfolio Risk Measurement: Top-Down Approach Based on Projection of Changes in Interest Rates and Price Changes of Individual Firms)," July, 2010 (in Japanese).

Morota, T., "Commodity Kakaku Hendo no Tokucho to Pricing Model no Tenkai (Features of Changes in Commodity Prices and Developments in Pricing Model)," April, 2010 (in Japanese).

Shintani, K., T. Yamada, and T. Yoshida, "Kin'yu Kikiji ni Okeru Shisan Kakaku Hendo no Sougo Izon Kankei; Copula ni Motozuku Hyouka (Interdependence of Changes in Asset Prices during the Financial Crisis: Evaluation Based on the Copula)," July, 2010 (in Japanese).

Sugihara, Y., "Wagakuni Kabushiki Shijo no Model Free Implied Volatility (Model Free Implied Volatility in Japan's Stock Markets)," April, 2010 (in Japanese).

Yamada, T., "Teikinrika ni okeru Kigyo no Tousei Koudou to Shin'yo Risk: Real Option Model ni yoru Kousatsu (Firms' Investment Behavior and Credit Risk under Low Interest Rates: Analysis Based on Real Option Model)," April, 2010 (in Japanese).

*IMES Discussion Paper Series*

Adam, K., and A. Marcet, "Booms and Busts in Asset Prices," February, 2010.

Allen, F., and E. Carletti, "Financial Regulation Going Forward," July, 2010.

Fujiki, H., "Policy Measures to Alleviate Foreign Currency Liquidity Shortages under Aggregate Risk with Moral Hazard," March, 2010.

Ota, H., "Markov Kansu Model ni yoru Kinri Option no Kakakuzuke no Jitsuyouka (Practical Application of Price Formation for Interest Rate Options by Markov Function Model)," May, 2010 (in Japanese).

Sugihara, Y., and N. Oda, "An Empirical Analysis of Equity Market Expectations in the Recent Financial Turmoil Using Implied Moments and Jump Diffusion Processes," June, 2010.



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