

Correlation of Risks between the Government and Banking Sectors: Comparison of Japan, the United States, and Europe

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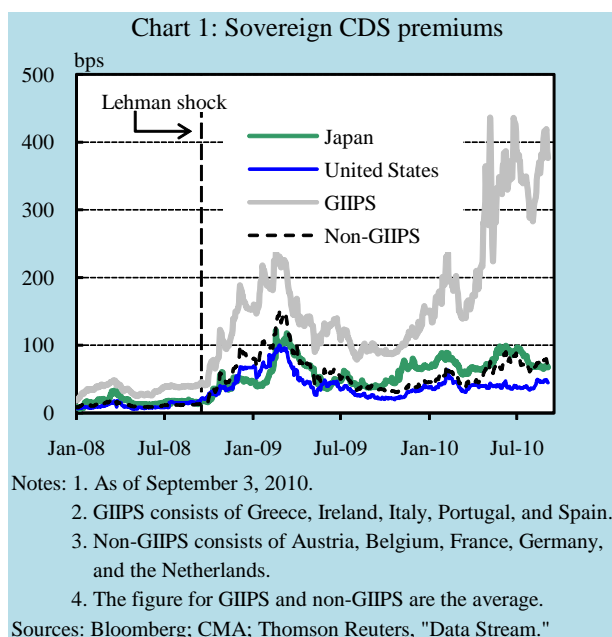
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Following the Lehman shock in autumn 2008, credit default swap (CDS) premiums for banks rose globally. In response to this, while governments in developed economies supported or bailed out financial institutions, they implemented a number of measures to avoid the abrupt contraction of the macroeconomy due to deleveraging in the private sector. As a result, governments' balance sheets expanded. This caused an increase in sovereign CDS premiums through the so-called "shift of risks from the private sector to the government sector." Furthermore, after April 2010, when concerns increased about the fiscal problem in Europe, the decline in government bond prices of peripheral European countries, due to the decrease in confidence in the government sector, made market participants more cautious about European financial institutions that held a large amount of such claims. This led to an increase in both bank and sovereign CDS premiums in peripheral European countries.

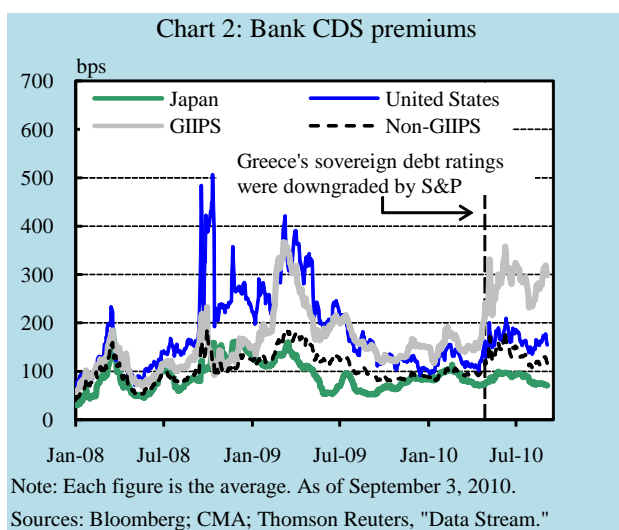
By examining CDS premiums for Japan, the United States, and Europe, this paper analyzes how the financial crisis, a series of policy actions, and the fiscal problem in Europe changed market participants' risk perception on the government and banking sectors, and how the perception was correlated between sectors. The analysis reveals that (1) the shift of risks from the private sector to the government sector was observed evidently in peripheral European countries, and (2) in terms of the changes in risk perception on the government and banking sectors, the spill-over effects of the fiscal problem in Europe to other regions such as the United States and Japan were relatively limited.

Introduction

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 in the form of guarantees on bank debt and capital injections, they implemented various fiscal expenditures to avoid the abrupt contraction of the macroeconomy due to deleveraging in the banking sector. As a result, governments' balance sheets expanded,¹ and sovereign CDS² premiums for countries and regions, which had been stable at low levels, clearly widened (Chart 1). Many market participants viewed this as a growing awareness of the so-called "shift of risks from the private sector to the government sector."



After late April 2010, confidence decreased in the fiscal conditions of peripheral European countries, such as Greece, Ireland, Italy, Portugal, and Spain (GIIPS), and their government bond prices declined. Consequently, market anxiety grew about the financial soundness of European financial institutions that held a large amount of such claims.³ This created a pattern in which the fiscal problem in turn brought about a credit problem in the banking sector, and some market participants expressed the view that risks absorbed by the government reverted to the private sector. In fact, during this period, bank CDS premiums increased as a whole, albeit with differences among countries and regions (Chart 2).



In what follows, in order to more accurately grasp the changes in market participants' risk perception on the government and banking sectors in Japan, the United States, and Europe, we measure the sensitivity to risks of sovereign and bank CDS premiums. We then examine the correlation of risks between the government and banking sectors and the differences in the degree of correlation among regions.

Outline of Analytical Methods

In this paper, we extract the sensitivity (the changes in risk perception) of sovereign and bank CDS premiums to market fundamentals in Japan, the United States, and Europe. The resulting series indicates, for example, how deterioration in the macroeconomic environment would heighten investors' risk perception on specific financial instruments. When carrying out the measurement, first of all it is important to decide what to select as

the market fundamentals. In this paper, we chose nonfinancial-sector CDS premiums in each region as the market fundamentals, or common risk factors (Chart 3).⁴ Nonfinancial-sector (individual firms') CDS premiums sometimes fluctuate based on micro information relating to individual companies, and it would appear that there are arbitrage transactions between financial- and nonfinancial-sector CDS premiums. Therefore, nonfinancial-sector CDS premiums have a certain limit as the independent index of the market fundamentals. However, considering their advantage of being common data for each region that are available in a time series at the same frequency as sovereign and bank CDS premiums, we decided to use nonfinancial-sector CDS premiums as the market fundamentals.

Next, we measured the changes in the sensitivity of sovereign and bank⁵ CDS premiums to changes in nonfinancial-sector CDS premiums by using the Kalman filter, a time-series analytical method.⁶ Specifically, we set the following model ($\Delta CDS(t)$ is a weekly average change in each CDS premium in the period $[t - 1, t]$, $\Delta F(t)$ is a weekly average change in common risk factors [market fundamentals] in the period $[t - 1, t]$, and $N(\mu, \sigma^2)$ is the normal distribution with mean μ , variance σ^2):

$$\Delta CDS(t) = \gamma(t) \cdot \Delta F(t) + v(t), v(t) \sim N(0, r^2)$$

$$\gamma(t) = \gamma(t - 1) + w(t), w(t) \sim N(0, s^2)$$

We estimated the parameters r and s by using the Kalman filter with the data from December 31, 2007 to September 3, 2010, and extracted the sensitivity $\gamma(t)$ in week t .

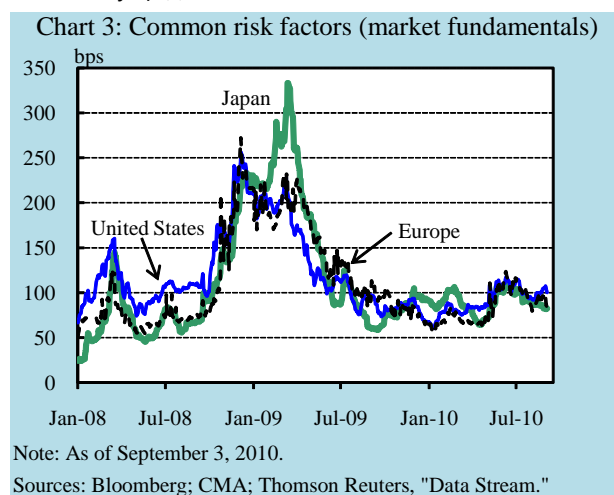
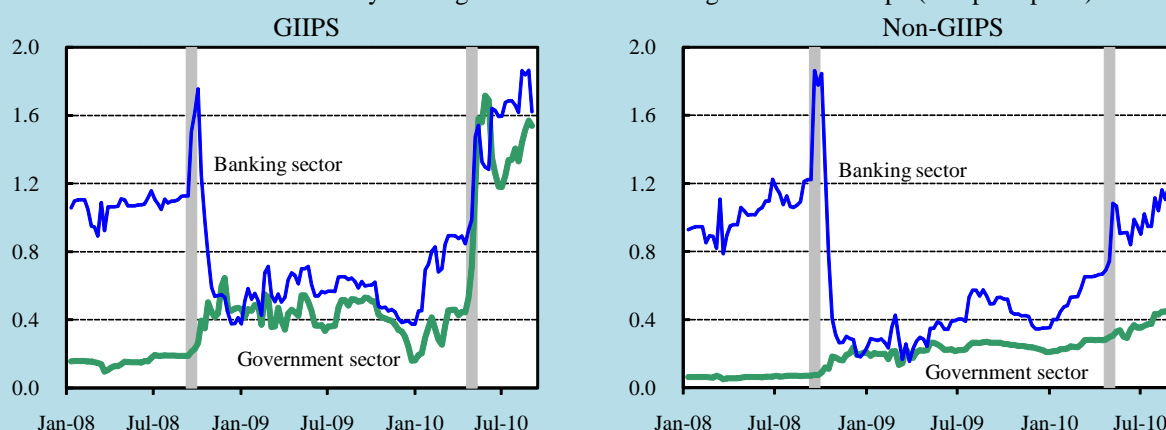


Chart 4: Sensitivity of the government and banking sectors in Europe (risk perception)



Notes: 1. As of September 3, 2010.

2. Sensitivity of bank CDS premiums is the median of sensitivities of each bank's CDS premium.

3. Shaded areas indicate the Lehman shock (September 2008) and the downgrading of Greece's sovereign debt ratings by S&P (April 2010).

Sources: Bloomberg; CMA; Thomson Reuters, "Data Stream"; Bank of Japan.

Results of the Analysis

This section deals with the developments in the sensitivity to risks concerning the government and banking sectors by region, namely, Europe, the United States, and Japan, while focusing on correlation among sectors.

(1) Europe

Regarding Europe, let us first look at developments in GIIPS and non-GIIPS (Chart 4). Following the Lehman shock in September 2008, the sensitivity to risks of the banking sector increased rapidly in both GIIPS and non-GIIPS. This suggested growing concerns over counterparty risk among financial institutions and the financial system as a whole as well as market participants' heightened risk perception on the banking sector. The sensitivity to risks of the banking sector then dropped sharply given the various measures taken by the governments and central banks. On the other hand, the sensitivity to risks of the government sector increased, particularly in GIIPS. Such correlation of the sensitivity to risks between the banking and government sectors seemed to imply that the subject of market participants' risk perception shifted, to some extent, from the banking sector to the government sector.

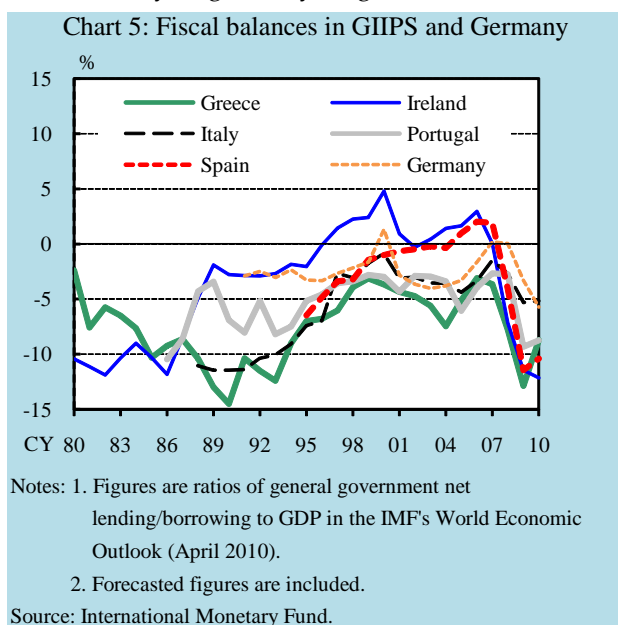
During this period, to address the heightened concerns about financial system stability, central banks around the world lowered their policy rates in succession and increased the provision of liquidity to interbank markets (for instance, enhancements in measures to provide U.S. dollars

and an increase in the amount and frequency of term-funding operations). Governments in Europe announced measures to ensure financial system stability one after another.⁷ For example, the German government enacted the Act on the Implementation of a Package of Measures to Stabilise the Financial Market, which included the injection of public funds and the acquisition of risky assets that accounted for 80 billion euros in total. It also injected public funds into individual financial institutions upon their request. The French government also enacted the Law on Finance, which included capital injection of up to 40 billion euros and injected public funds into six major French banks at once in a preventive manner. Moreover, the Greek government announced financial system stability measures that included the injection of public funds totaling 5 billion euros. Such movements were seen all over Europe, in both GIIPS and non-GIIPS. As a result, it seemed that while a further heightening of concerns about the banking sector was restrained, market participants became more aware of an increase in sovereign risk due to the expansion of the government sectors' balance sheets.

Looking at subsequent developments, the sensitivity to risks as a whole remained within a certain range in both GIIPS and non-GIIPS during 2009. After the turn of the year, however, the sensitivity to risks of the government and banking sectors simultaneously soared in GIIPS. On the contrary, in non-GIIPS, while the sensitivity of the banking sector increased, that of the government

sector showed only a moderate increase.

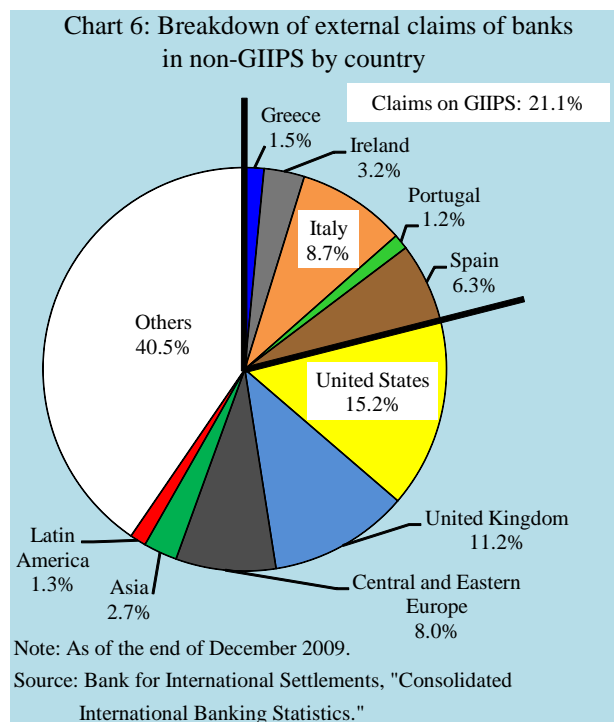
As for GIIPS, in October 2009, the outlook for Greece's fiscal deficit in 2009 was revised upward significantly, and this heightened market participants' concern over a severe deterioration in the fiscal situation, low reliability of fiscal statistics, and sluggishness in economic conditions. Furthermore after the turn of the year, market participants became 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 ratings. In response to this, regarding the banking sector in GIIPS, concerns grew over the expansion of losses incurred by government bond holdings and over funding through use of these government bonds. This resulted in the significant increase in the sensitivity to risks in the banking sector. Furthermore, a rapid deterioration in the fiscal balances in GIIPS (Chart 5) following the Lehman shock prompted market participants to think that additional government support for the banking sector would be difficult. In this sense, the risks of the banking sector absorbed by the government sector reverted to the banking sector, and risk perception on both sectors was synergistically heightened.



Subsequently, the fiscal problem in Europe subsided temporarily reflecting stringent measures, such as the establishment of the European Financial Stabilisation Mechanism by the European Union (EU) and the International Monetary Fund (IMF)

and completion of the stress test exercise that examined the soundness of financial institutions (on July 23). The sensitivity of both government and banking sectors has remained at high levels to date, suggesting that concerns have not abated over the future path of fiscal restructuring and stability of the financial soundness.

On the other hand, in non-GIIPS, in response to the worsening of the Greek problem after the turn of the year, the sensitivity of the banking sector increased markedly, but that of the government sector showed only a moderate increasing trend. This could be because unlike GIIPS, market participants maintained their confidence in the government sector to some extent, but regarding the banking sector, they were concerned about losses from exposures to GIIPS given the high interdependence of banks in Europe. In fact, looking at the breakdown of external claims of banks in non-GIIPS, external claims on Central and Eastern Europe accounted for 8.0 percent, while those on GIIPS accounted for a relatively high share of 21.1 percent (Chart 6).

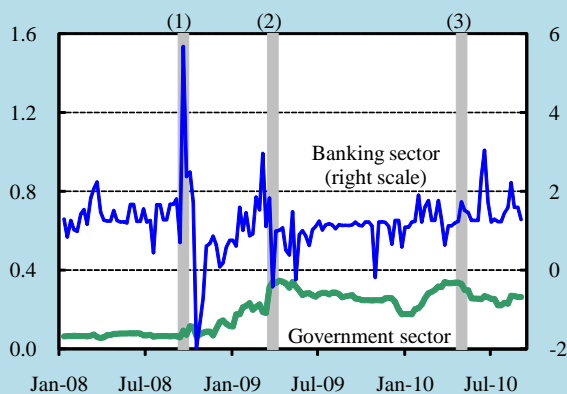


(2) United States

Next, let us examine the changes in risk perception on both sectors in the United States by looking at the sensitivity (Chart 7). Following the Lehman shock, similar to Europe, the significantly heightened sensitivity of the banking sector

dropped sharply, while the sensitivity of the government sector rose, albeit slightly. Although the sensitivity of the banking sector continued to follow an increasing trend thereafter reflecting market participants' growing concerns about the financial soundness of major financial institutions and the financial system stability, from March 2009 onward the sensitivity became stable. This implied that stringent measures to stabilize the financial system, such as the Public-Private Investment Program to purchase legacy loans and legacy securities announced by the U.S. Department of the Treasury on March 23, 2009, had certain effects on the changes in market perception. In fact, during the same period the increase in sensitivity of the government sector was larger than that immediately following the Lehman shock. Thus, the shift of risks from the private sector to the government sector was more evident during this period.

Chart 7: Sensitivity of the government and banking sectors in the United States



Notes: 1. As of September 3, 2010.

2. Sensitivity of bank CDS premiums is the median of sensitivities of each bank's CDS premium.
3. Shaded areas indicate (1) the Lehman shock (September 2008), (2) the announcement of the Public-Private Investment Program (March 2009), and (3) the downgrading of Greece's sovereign debt ratings by S&P (April 2010).

Sources: Bloomberg; CMA; Thomson Reuters, "Data Stream"; Bank of Japan.

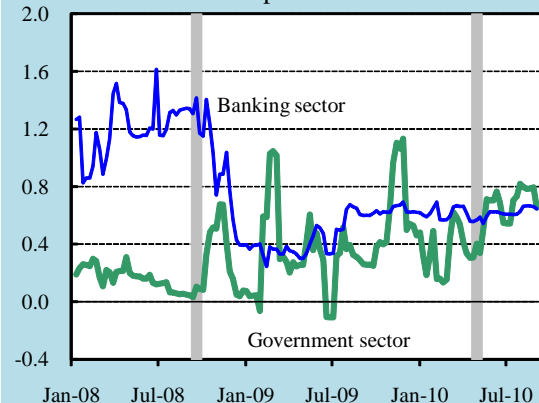
Later in the United States, the sensitivity of the government sector remained more or less unchanged as support for the banking sector reduced concerns about the continued deterioration in fiscal conditions. Meanwhile, the sensitivity of the banking sector also remained more or less flat as a whole, although it rose significantly for a short time. Therefore, based on the understanding that a

series of deteriorations in the fiscal problem in Europe was caused mainly by the financial and economic structure peculiar to Europe, it could be said that its effects on the government and banking sectors in the United States were limited.

(3) Japan

Finally, let us look at the sensitivity of both sectors in Japan (Chart 8). Unlike in the United States and Europe, the sensitivity of the banking sector in Japan did not rise significantly immediately following the Lehman shock. This might reflect the fact that the direct and immediate effects of the failure of Lehman Brothers on the banking sector in Japan were somewhat limited and did not lead to financial system instability.⁸ The sensitivity to risks of the banking sector, however, declined markedly following the Lehman shock, similar to the United States and Europe. At that time, the significant rise in the sensitivity to risks of the government sector was also seen temporarily. This suggested that there might be a shift of risks from the private sector to the government sector. During the same period, the sensitivity to risks of the government sector remained more or less flat or continued to rise in the United States and Europe. On the contrary, it declined rapidly in Japan toward the beginning of 2009. It is also unique that the sensitivity to risk of the government sector has fluctuated widely in Japan.

Chart 8: Sensitivity of the government and banking sectors in Japan



Notes: 1. As of September 3, 2010.

2. Sensitivity of bank CDS premiums is the median of sensitivities of each bank's CDS premium.
3. Shaded areas indicate the Lehman shock (September 2008) and the downgrading of Greece's sovereign debt ratings by S&P (April 2010).

Sources: Bloomberg; CMA; Thomson Reuters, "Data Stream"; Bank of Japan.

Japan did not carry out measures such as guarantees on bank debt and capital injections for major financial institutions. Thus, it is unlikely that the shift of risks from the private sector to the government sector occurred. Under these circumstances, the heightening of risk perception on the government sector following the Lehman shock might relate to the correlation through arbitrage transactions with sovereign CDSs for major countries. For instance, CDS premiums for Japan and the United States showed significantly higher correlation until around the end of 2008, when the financial system instability in the United States was a focus of international financial markets, compared with the period after 2008 (Chart 9).

Chart 9: Correlation between U.S. and Japanese sovereign CDS premiums

During 2008	Start of 2009-Jul. 30, 2010
0.889	0.493

Sources: Bloomberg; CMA; Thomson Reuters, "Data Stream."

The large fluctuations in the sensitivity of the Japanese government sector seem to have occurred against a background of expansions and reductions of speculative transactions by foreign investors who were concerned about the severe fiscal conditions. For example, the sensitivity to risks of the government sector rose rapidly, as foreign investment funds increasingly built up their positions in view of the possible deterioration in the Japanese government's fiscal conditions in autumn 2009. This suggested that changes in the sensitivity to risks of the government sector in Japan were motivated by factors different from those in the United States and Europe.

The sensitivity of the banking sector declined significantly following the Lehman shock and remained stable within a certain range thereafter. This was consistent with the fact that Japan's bank CDS premiums remained stable at a lower level than those for the United States and Europe (Chart 2). This also implied that market participants' risk perception on Japanese financial institutions was stable compared with that on the U.S. and European financial institutions.

Conclusion

By extracting the sensitivity to market fundamentals of the government and banking

sectors, this paper analyzed how various events such as the financial crisis, a series of policy actions, and the fiscal problem in Europe changed market participants' risk perception on the government and banking sectors in each country and region.

Careful attention should be paid to the fact that CDSs used in this analysis might not reflect views of a wide range of market participants due to the low liquidity in the market. Nonetheless, regarding the Lehman shock and a series of problems in Europe, the government sector's ability to control the situation and the changes in markets' confidence regarding the government sector's ability were the essential factors determining financial market stability. In this sense, while recognizing the limits of the indicators, it is worthwhile to quantitatively analyze the changes in investors' sentiment and to assess the broad structure of the financial markets by using CDSs.

¹ For information on policy responses of central banks and governments following the Lehman shock, see the March 2009 issue of the Bank of Japan's *Financial Markets Report*, and the March 2009 issue of the Bank of Japan's *Financial System Report*.

² A CDS is a type of credit derivative and a derivative transaction that involves purchases and sales of protection against credit risks of a firm or country. A CDS that deals with risks of a country is called a sovereign CDS.

³ For information on the fiscal problem in peripheral European countries, see the August 2010 issue of the Bank of Japan's *Financial Markets Report*.

⁴ We chose the median of the nonfinancial entities of Markit iTraxx Japan CDS premium as the market fundamentals for Japan. For the United States, we chose the Markit CDX.NA.IG CDS premium multiplied by the number of all entities minus the Markit CDX.NA.IG.FIN CDS premium, a CDS premium index of the financial sector, multiplied by the number of its entities, divided by the number of nonfinancial-sector entities of the Markit CDX.NA.IG CDS premium. For Europe, we chose the Markit iTraxx Europe Non-Financial CDS premium.

⁵ We used CDS premiums for three major banks for Japan, five major banks for the United States, eleven major banks for GIIPS, and 13 major banks for non-GIIPS.

⁶ For details, see J. Ejsing and W. Lemke, "The Janus-Headed Salvation: Sovereign and Bank Credit Risk Premia during 2008-09," ECB Working Paper No. 1127, European Central Bank, 2009.

⁷ For details on individual bank rescue measures taken by European countries, see, for example, A. Petrovic and R. Tutsch, "National Rescue Measures in Response to the Current Financial Crisis," ECB Legal Working Paper No. 8, European Central Bank, 2009.

⁸ It should be noted that bank CDS premiums in Japan used in this paper do not include foreign financial institutions. For example, with regard to the developments in Japan's money markets immediately following the Lehman shock, it was pointed out that interest rates came under upward pressure reflecting the rise in concerns over counterparty risk, especially against foreign financial institutions, and the decrease in market transactions. For details, see the March 2009 issue of the Bank of Japan's *Financial Markets Report*.

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