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**Re-evaluating Japan's Quantitative Easing Policy (2001–2006):
An Application of the TVP-VAR Model.**

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ABSTRACT

This study is the first to examine the changes in the effectiveness of Japan's quantitative easing policy (QEP) at a monthly frequency, using time-varying parameter VAR estimation. The results are significantly different from those obtained in previous studies. First, it is shown that the QEP's effects on the real economy have varied over time. The QEP effectively influenced production through most of the observation period, but its exact impacts varied throughout. However, with some exceptions, the QEP had limited effects on prices. Second, the QEP influenced stock price significantly all through the observation period. This result suggests that the stock price channel, might have been the effective transmission channel for the QEP.

Keywords: Quantitative easing policy (QEP), Bank of Japan (BoJ), Time-Varying Parameter vector autoregressive (TVP-VAR) model, monetary policy, transmission mechanism.

JEL Classification: E44, E52, E58

1. Introduction

Many advanced countries, including Japan, adopted short-term interest rates as operating targets in the 1990s. However, the central bank of each country experienced the so-called zero bound problem, in which banks could not lower short-term nominal interest rates any further. Japan faced the zero limit in the late 1990s, earlier than other countries. Therefore, Japan's quantitative easing policy (QEP), implemented by the Bank of Japan (BoJ) from March 2001 to March 2006, deserves thorough examination.

As shown in Table 1, although researchers have extensively examined the effects of the QEP, they have not yet reached a consensus. Many previous studies used fixed parameter estimation and evaluated the QEP without considering whether its effectiveness changed over time. Because it was a totally new policy regime and the financial structure of the Japanese economy was changing radically, however, the QEP's effectiveness is likely to have varied over time. By adopting a time-varying parameter vector autoregressive (TVP-VAR) model, this study verifies that the effectiveness of the QEP varied throughout its implementation. Specifically, I apply the TVP-VAR model to monthly data and use production levels, prices, the BoJ's current account balance (CAB) and stock price as variables for the estimation. This study's results will offer an accurate basis for exploring future directions for monetary policy in advanced countries, including Japan.

The main findings are as follows. First, the QEP's effects on the real economy have varied over time. The QEP effectively influenced production throughout most of the observation period, but its exact impacts varied. However, the QEP had limited effects on prices, with some exceptions. Second, the QEP influenced stock price significantly all through the observation period. This result suggests that the stock price channel, might have been the effective transmission channel for the QEP. This finding is similar to the suggestion of Honda et al. (2013).

The remainder of this paper is structured as follows. Section 2 reviews previous studies, after which the TVP-VAR model is explained in Section 3. In Section 4, an outline is then provided of the estimation technique. Estimated results are explained in Section 5, with the conclusions presented in Section 6.

2. Background

In the early 1990s, following the collapse of its financial bubble, Japan experienced a long period of economic stagnation. Consequently, the BoJ introduced a zero interest rate policy in February 1999 and reduced the call rate, which was the operating target, to a level close

to zero. Moreover, it introduced the QEP in March 2001 as an additional step of monetary easing. The defining new characteristic of this policy was that the operating target was changed from the call rate to the BoJ's CAB.¹ The BoJ raised the CAB target repeatedly and supplied funds to the market by purchasing Japanese government bonds from banks. In addition, the BoJ declared that it would continue its QEP until the inflation rate became positive and stable. In March 2006, the BoJ announced the termination of the QEP.

The QEP has certain unique characteristics that have been neglected by previous studies. First, it was a new policy regime when it was introduced. As such, its potential effects were not known at the time of its implementation. Evaluations of its effectiveness evolved through time in the financial markets, and its impacts on asset prices are thus expected to have changed accordingly. Second, during the QEP implementation, the Japanese government changed its prudence policy and forced financial institutions to actively dispose of bad loans. At the same time, corporations tried to reduce their debts levels. Thus, the QEP's impacts on bank lending are also expected to have changed over time. In sum, financial structures were changing substantially during the QEP implementation period, and the QEP's effectiveness is consequently expected to have varied significantly. This study focuses on these points.

By neglecting these important points, previous studies of the QEP suffer from two problems.² The first problem is that most of the previous studies estimated parameters that were fixed during the QEP implementation period.³ In contrast, the present study employs the TVP-VAR model, established by Primiceri (2005), in order to measure the changes in the effectiveness of the QEP and to capture the structural changes in the economy.

Prior studies that analyzed the QEP using the TVP model captured the aforementioned structural changes.⁴ However, these examinations suffer from a second problem, which stems from the frequency of the data employed in the studies. The BoJ revised its CAB target at its monthly policy committee meetings. In effect, the CAB target was often adjusted on a monthly basis.⁵ Thus, monthly data should be used to evaluate the changing effectiveness of the QEP policy actions. However, all of the previous TVP studies used quarterly data. This study employs monthly data to perform a more detailed and accurate analysis of the QEP with the TVP-VAR model and thus to re-evaluate the effectiveness of the QEP. This is done in order to avoid the aforementioned two problems. Following Honda et al. (2013), who completed a detailed evaluation of the QEP's effects, this study uses a three-variable base model that includes the industrial production index, the core consumer price index, and the

BoJ's CAB. Further, in order to examine the transmission mechanisms of the QEP, the stock price is added to the base model.⁶

3. The TVP-VAR model

This section introduces the TVP-VAR model. The model is employed in a manner similar to that in, Nakajima (2011), Nakajima & Watanabe (2011) and Primiceri (2005). The model is formulated as follows:

$$A_t y_t = C_{1t} y_{t-1} + C_{2t} y_{t-2}, \dots + C_{st} y_{t-s} + \epsilon_t, \\ \epsilon_t \sim N(0, V_t), \quad t = s + 1, s + 2, \dots, T,$$

where y_t is a vector of economic variables ($n \times 1$); A_t and C_{it} are matrices of time-varying coefficients ($n \times n$) ($i = 1, 2, \dots, s$); ϵ_t is a vector of the structural shocks ($n \times 1$); and V_t is a variance-covariance matrix ($n \times n$).⁷ The reduced form of this model is then

$$y_t = B_{1t} y_{t-1} + B_{2t} y_{t-2}, \dots + B_{st} y_{t-s} + u_t, \\ u_t \sim N(0, A_t^{-1} V_t A_t^{-1'}),$$

where $B_{it} = A_t^{-1} C_{it}$, $u_t = A_t^{-1} \epsilon_t$. u_t is an error term vector ($n \times 1$). Then, regarding the variance of u_t , I perform a Cholesky decomposition and impose recursive restriction,

$$A_t^{-1} V_t A_t^{-1'} = A_t^{-1} \Sigma_t \Sigma_t' A_t^{-1'},$$

where A_t is a lower triangular matrix in which the diagonal elements are equal to one, and Σ_t is the diagonal matrix. I then define $\beta_t = \text{vec}[B'_{1t}, \dots, B'_{st}]$ and $X_t = I_s \otimes (y'_{t-1}, \dots, y'_{t-s})$,

$$y_t = X_t \beta_t + A_t^{-1} \Sigma_t e_t, \\ e_t \sim N(0, 1),$$

where $u_t = A_t^{-1} \epsilon_t = A_t^{-1} \Sigma_t e_t$.⁸ Here, I define the lower triangular elements of A_t as $a_t = (a_{21,t}, a_{31,t}, a_{32,t}, \dots, a_{nn-1,t})'$ and the natural logarithm for diagonal elements of Σ_t as $h_t = (h_{11,t}, \dots, h_{nn,t})'$. From the above considerations, the time-varying parameters of this model are (β_t, a_t, h_t) . Then, the dynamics of these parameters are specified as follows:

$$\beta_{t+1} = \beta_t + u_t^\beta, \\ a_{t+1} = a_t + u_t^a, \\ h_{t+1} = h_t + u_t^h.$$

Moreover, the error term vector of each of the variables is

$$\begin{pmatrix} u_t^\beta \\ u_t^a \\ u_t^h \end{pmatrix} \sim N \left(0, \begin{pmatrix} w_\beta & 0 & 0 \\ 0 & w_a & 0 \\ 0 & 0 & w_h \end{pmatrix} \right),$$

where it is assumed that (w_β, w_a, w_h) are diagonal matrices.⁹ The next section provides an outline of the technique used for estimating this model.

4. Methods

4.1. Data

This study uses monthly data from April 1998 to March 2008.¹⁰ The variables include the index of industrial production (y), the consumer price index (p), the BoJ CAB (m) and the Nikkei stock average (s).¹¹ This study estimates two forms of the model: the basic model (y, p, m); the stock price model (y, p, m, s).¹²

4.2. Bayesian estimation

This section presents the process for estimating the models.¹³ The estimation of the TVP-VAR model is described in detail in Nakajima (2011) and Nakajima & Watanabe (2011). The present study conducts a Bayesian estimation using the Markov chain Monte Carlo (MCMC) method based on Nakajima (2011). First, $y = \{y_t\}_{t=s+1}^T, \beta = \{\beta_t\}_{t=s+1}^T, h = \{h_t\}_{t=s+1}^T$ and $w = (w_\beta, w_a, w_h)$ are defined. Moreover, a sample is obtained from the posterior probability density function $\pi(\beta, a, h, w|y)$ by the following order based on the data and prior probability density function of each parameter. An initial sample of 30,000 is generated; then, it is discarded and another sample of 30,000 generated. Next, the sampling frequency is defines as $j = 1, 2, \dots, 30,000$. The steps of this process are as follows:

1. Set initial values of β^0, a^0, h^0, w^0
2. Sample β^{j+1} from $\pi(\beta|a^j, h^j, w_\beta^j, y)$
3. Sample a^{j+1} from $\pi(a|\beta^{j+1}, h^j, w_a^j, y)$
4. Sample h^{j+1} from $\pi(h|\beta^{j+1}, a^{j+1}, h^j, w_h^j, y)$
5. Sample w_β^{j+1} from $\pi(w_\beta|\beta^{j+1})$
6. Sample w_a^{j+1} from $\pi(w_a|a^{j+1})$
7. Sample w_h^{j+1} from $\pi(w_h|h^{j+1})$
8. Perform sampling repeatedly from step 2 to step 7 until $j=30,000$.

The initial state of the time-varying parameters is assumed as follows:

$$\beta_0 \sim N(0, 10I),$$

$$a_0 \sim N(0, 10I),$$

$$h_0 \sim N(0, 10I),$$

where $\tilde{w}_{\beta_k}^2, \tilde{w}_{a_k}^2, \tilde{w}_{h_k}^2$ are k -th diagonal elements of w_{β}, w_a, w_h . The priors of the basic model and stock price model are assumed as follows:

$$\tilde{w}_{\beta_k}^2 \sim IG(50, 0.001),$$

$$\tilde{w}_{a_k}^2 \sim IG(5, 0.001),$$

$$\tilde{w}_{h_k}^2 \sim IG(5, 0.001).$$

Two lags are set in each model.¹⁴ The estimated results are given in the following section.¹⁵

5. Estimation results

The changes in the impulse responses for each model are shown in Figure 1 and Figure 2. These impulse responses change over time since the estimated parameters change over time in the TVP-VAR estimation. The following section is solely focused on the QEP implementation period and examines the impulse responses in each model.

Figure 1 illustrates the responses to the monetary policy shock in the basic model. Since the QEP is implemented as an easing policy, it is expected that production will respond positively. The empirical results conform to this expectation, but the size of the impulse responses varies across sub-periods. The first sub-period is from the start of QEP implementation to the end of 2002, the second is from early 2003 to mid-2004, and the third runs from mid-2004 until the end of QEP. The magnitude of the impulse responses in the first sub-period was larger than those in the second and third sub-periods. These are among the most interesting and unique findings based on the TVP-VAR estimation applied in this study. Positive responses were expected for prices, as well. However, the results show that the price responses are relatively small and unstable in most sub-periods. This may partially reflect the price puzzle. The BoJ's CAB shows significant positive responses to the monetary policy shock throughout the period of QEP implementation, with its significance level gradually decreasing. This result is as expected and can be considered as a natural response with a lag. Therefore, this study focuses on the responses of production to the QEP in the following analysis.

Figure 2 illustrates the impulse responses of the stock price model. As in the basic model, production shows significant positive responses in all sub-periods starting from 2 months afterwards. Throughout the QEP period, the responses of stock price are generally positive and significant 1 month later. Moreover, stock price responds more quickly than does production. These results suggest that the stock price channel might have contributed to production responses throughout the QEP period.

6. Conclusions

The results obtained in this study are substantially different from those of previous studies. Most previous studies, using fixed parameter estimation, evaluated QEP without considering the dynamic nature of its effectiveness. Moreover, although some previous studies used TVP-VAR estimation, they failed to consider substantial monthly changes in the QEP implementation and in the economic structure, by making use of quarterly data only. This study is the first examination to evaluate changes in policy effectiveness at a monthly frequency. In addition, previous studies that also made use of the TVP-VAR model focused on certain time points during the QEP period and did not examine changes in policy effectiveness over time. Consequently, the present study is the first to reveal changes in effectiveness spanning the entire QEP period.

The main findings are as follows. First, QEP's effects on the real economy varied over time. QEP effectively influenced production throughout the QEP period, but the size of the effect was largest from the start of QEP implementation until late 2002 (the first sub-period). On the other hand, it had limited effects on prices through the QEP. Second, the QEP influenced stock price significantly all through the observation period. This result suggests that the stock price channel, might have been the effective transmission channel for the QEP. These findings are critically important for any countries implementing monetary easing policies under a zero interest rate regime.

7. Appendix

Figure 3 and 4 show the sample autocorrelations of samples generated in the basic model and stock price model. They illustrate that the autocorrelation of each parameter attenuates sufficiently, indicating that the sampling method efficiently produces samples with low autocorrelation. Furthermore, in Table 2, I confirm whether the sample converges sufficiently in the posterior probability density function and present Geweke (1992)'s convergence diagnostics (CD) for a number of parameters for each model. In Table 2, I express the p -value of the CD statistics under the null hypothesis that the sample converges in the posterior distribution of the parameter in each model. The hypothesis cannot be rejected at the 10% significance level. These results suggest that the estimated samples for each model are efficiently generated.

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NOTES

1. For more details about the QEP, please see Honda et al. (2013).
2. Numerous studies of the QEP have been undertaken, but the present study focuses on those using VAR models in order to consider the macroeconomic effects.
3. Representative previous researches that has estimated fixed parameters are Honda et al. (2013), Iwata (2010), Kamada & Sugo (2006), Kimura et al. (2003), Schenkelberg and Watzka (2013). On the other hand, Fujiwara (2006), Inoue & Okimoto (2008) and Girardin & Moussa (2010) adopted a Markov-switching (MS) VAR model. They find that one of the regimes prevails throughout most of the QE period, and thus I could consider the VAR parameters to be constant during the QE period even if the MS-VAR model is estimated. Furthermore, Iwata & Wu (2006) is representative of research on zero interest rate policy implementation, and Miyao (2002) offers an example before the zero interest rate policy and the QEP.
4. Representative examples of the research that has analyzed the QEP using the TVP model are Franta (2011), Kimura & Nakajima (2013), Michaelis & Watzka (2014), Nakajima et al. (2011) and Moussa (2010). In Kimura et al. (2003), the coefficient matrices of the VAR model are time varying, but the variances of the structural shock fixed across time.
5. During the QEP period, the target figure of the BoJ's CAB was changed nine times, out of which three instances were due to the previous changes occurring within the quarter.

6. Honda et al. (2013) suggests that stock price channel is effective through the whole period of QEP implementation.
7. A_t indicates the simultaneous relations among the economic variables.
8. I is an identity matrix.
9. The dimensions of w_β, w_a and w_h are $(n^2s \times n^2s)$, $((n^2 - n)/2 \times (n^2 - n)/2)$ and $(n \times n)$.
10. All data are in log form and de-meant. I followed Honda et al. (2013) in using the level of variables rather than first-difference. They justified this approach based on the consistency of the estimated parameters and the richness of the contained information.
11. This study uses the consumer price index except for fresh foods (core CPI). The Nikkei Stock Average is an end-of-month value. Regarding the sources of the data, the prices were originally obtained from the Statistics Bureau and the Ministry of Internal Affairs and Communications; other data were sourced from Datastream. In addition, these data use the index of industrial production and core CPI, seasonally adjusted. The CAB is seasonally adjusted using X-12 ARIMA (Eviews).
12. The orders of variables are specifically described.
13. This study used the TVP-VAR model (Matlab) as given in Nakajima (2011) to estimate each parameter. In addition, the package was modified to simulate the impulse responses.
14. In impulse response analysis, the estimated results when setting three lags are similar to those using two lags.
15. The stability of the estimated results is discussed in the Appendix.

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Table 1. QEP evaluation

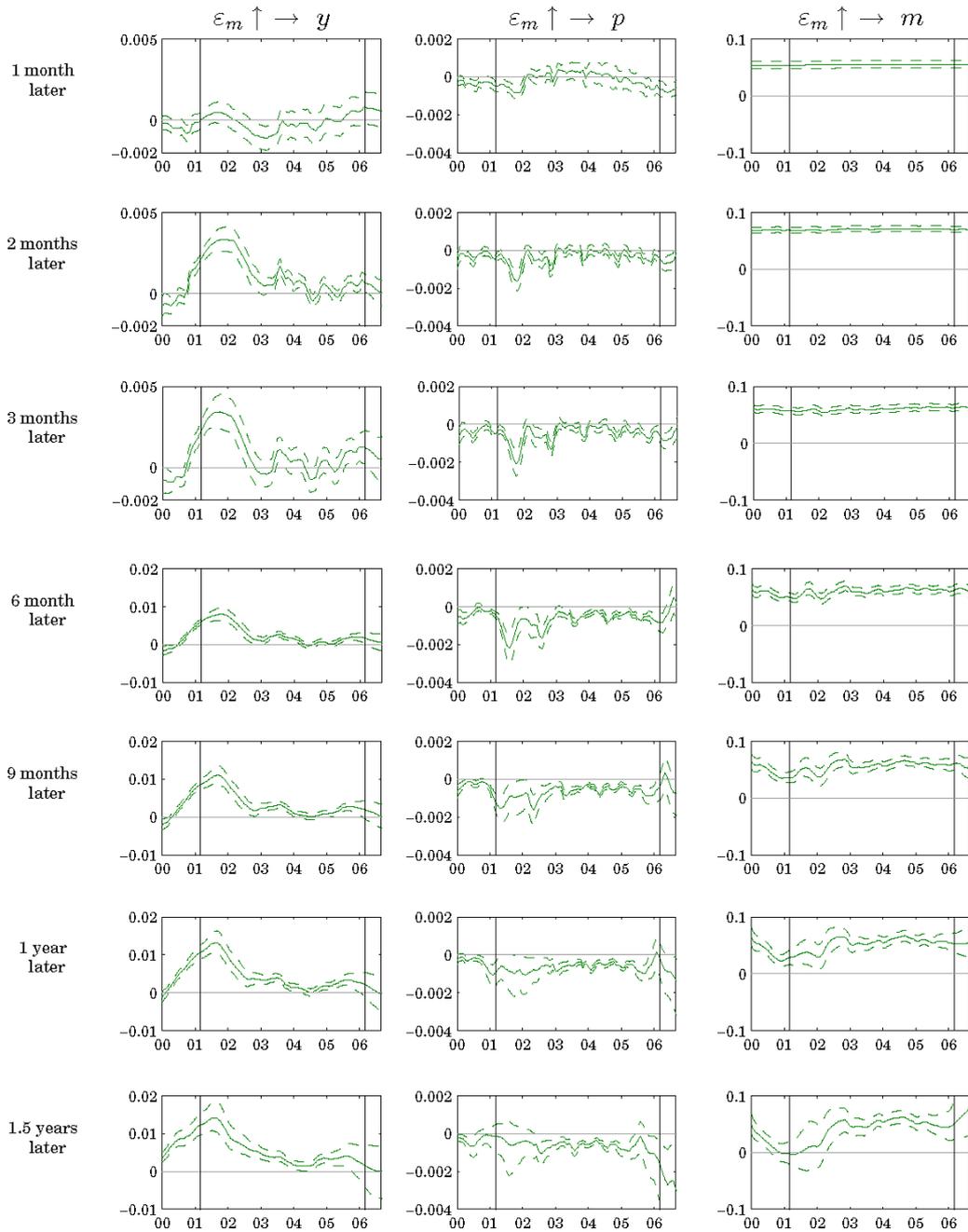
	Production (significance)	Prices (significance)
Schenkelberg and Watzka (2013)	limited (partial)	effective (exist)
Girardin and Moussa (2011)	effective (exist)	effective (exist)
Iwata (2010)	effective (exist)	limited (nothing)
Honda et al. (2013)	effective (exist)	limited (nothing)
Kamada and Sugo (2006)	limited	limited
Fujiwara (2006)	limited (partial)	limited (partial)
Kimura et al. (2003)	limited	limited
Inoue and Okimoto (2008)	effective (exist)	limited (partial)
Franta (2011)	effective (exist)	effective (exist)
Nakajima et al. (2011)	limited (nothing)	
Kimura and Nakajima (2013)	limited (nothing)	limited (nothing)
Michaelis and Watzka (2014)	limited (nothing)	effective (exist)
Moussa (2010)	effective (exist)	effective (exist)

Table 2. CD statistics (p -value)

Parameter	β	a	h	w_β	w_a	w_h
Basic model	0.495	0.273	0.508	0.266	0.292	0.339
Stock price model	0.724	0.204	0.158	0.575	0.992	0.456

(β, a, h) are element (1, 1) of each parameter in November 1999. Moreover, (w_β, w_a, w_h) are the elements (1, 1) of each parameter.

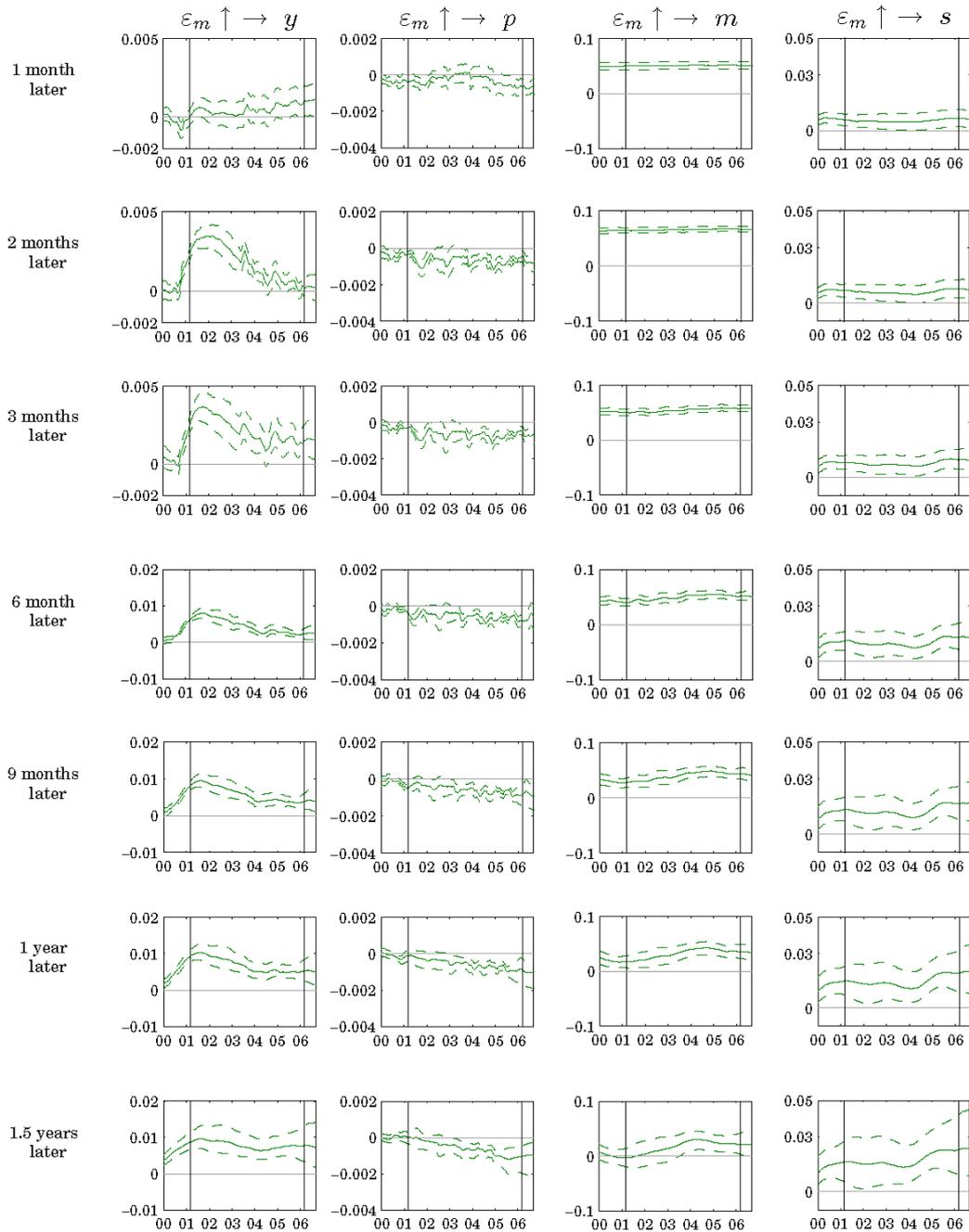
Figure 1. The impulse responses of the basic model



The figure illustrates the responses of each variable (columns) to the monetary policy shock at specific periods after the shocks (rows): 1, 2, 3, 6, and 9 months and 1 and 1.5 years. $\epsilon_m \uparrow \rightarrow x$ is the impulse response of variable (x) to the monetary policy shock. The horizontal axis represents the time period from January 2000 to September 2006; the impulse

responses are calculated with parameters estimated for each point in time. The vertical axis expresses the size of the response. Based on 30, 000 samples, the solid lines indicate the posterior medians of the impulse responses, and the dashed lines represent the 25th and 75th percentiles, indicating the significant influences, as in Nakajima & Watanabe (2011). The two solid vertical lines show the starting and ending dates of QEP implementation (March 2001 and March 2006, respectively). The monetary policy shock is represented by one standard error of the estimated structural shocks, averaged over all the periods in each model.

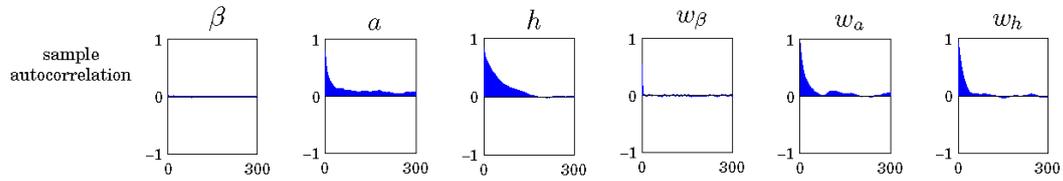
Figure 2. The impulse responses of the stock price model



The figure illustrates the responses of each variable (columns) to the monetary policy shock at specific periods after the shocks (rows): 1, 2, 3, 6, and 9 months and 1 and 1.5 years. $\epsilon_m \uparrow \rightarrow x$ is the impulse response of variable (x) to the monetary policy shock. The horizontal axis represents the time period from January 2000 to September 2006; the

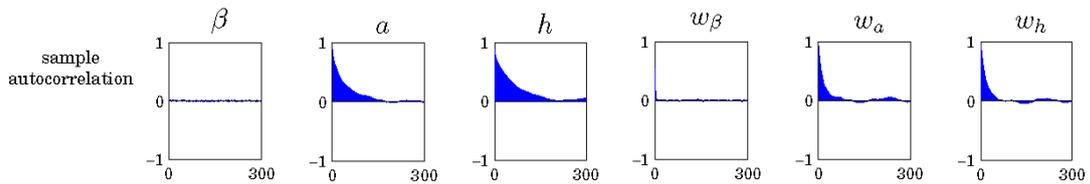
impulse responses are calculated with parameters estimated for each point in time. The vertical axis expresses the size of the response. Based on 30,000 samples, the solid lines indicate the posterior medians of the impulse responses, and the dashed lines represent the 25th and 75th percentiles, indicating the significant influences, as in Nakajima & Watanabe (2011). The two solid vertical lines show the starting and ending dates of QEP implementation (March 2001 and March 2006, respectively). The monetary policy shock is represented by one standard error of the estimated structural shocks, averaged over all the periods in each model.

Figure 3. Estimation results of the basic model for selected parameters



(β, a, h) are element (1, 1) of each parameter in November 1999. Moreover, (w_β, w_a, w_h) are the elements (1, 1) of each parameter. The vertical line shows the autocorrelation function, and the transverse axis shows sampling frequency (300 of 30,000 samples).

Figure 4. Estimation results of the stock price model for selected parameter



(β, a, h) are element (1, 1) of each parameter in November 1999. Moreover, (w_β, w_a, w_h) are the elements (1, 1) of each parameter. The vertical line shows the autocorrelation function, and the transverse axis shows sampling frequency (300 of 30,000 samples).

International portfolio flows in the post-global financial crisis period

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ABSTRACT

This paper focuses on gross international capital flows and analyzes how their scale and structure changed before and after the global financial crisis. Evidence clearly shows that inflows and outflows of international capital rapidly increased before the financial crisis, expanding both foreign assets and liabilities, but after the financial crisis each experienced a dramatic decline. Our analysis of the Coordinated Portfolio Investment Survey leads to three key observations: (1) global securities investors generally turn risk averse in the wake of financial crises and reduce allocations to stocks but increase investments in long-term bonds; (2) European investors have tried to repatriate capital from overseas investment destinations, but US foreign securities investments have not recovered to the pre-crisis levels until recently; and (3) the resulting vacuum this has created offers an opportunity for Japanese investors to join the European and US investors as global suppliers of risk capital.

Keywords: Global financial crisis, international securities investment position, gross capital flows

JEL Classification: F32, G15

1. Introduction

International capital transactions expanded rapidly from the 1980s, alongside the advancement of economic and financial globalization and deregulation. From the early 2000s, supported by global monetary easing and a stable financial environment, international capital flowed into risky assets in search of higher returns. In particular, from 2004, a bubble in the US housing market provided a fair wind that encouraged gains in the global values of financial assets and led to a significant expansion of international assets and liabilities. Inevitably, the bubble collapsed, following which the flow of capital reversed direction, leading to a financial crisis and plunging the global economy into a major recession.

Bernanke (2005) proposed the global savings glut hypothesis to explain “global imbalance,” a phenomenon characterized by large current account deficit of the United States and large capital account surplus of emerging Asia and the oil producing countries¹. If the United States, the largest capital importer, were the main source of expansion of the current account imbalance, the real interest rates ought to increase. However, in reality, the long-term interest rates have been decreasing, and this could be due to the global glut in savings. In contrast, Iwamoto (2013) argued that the global savings glut hypothesis focused on the behavior of the net capital flows from countries with excess savings, such as the emerging Asian economies, rather than from countries with saving shortages such as the United States, but this argument could not explain the expansion of gross capital flows before the 2008 financial crisis. He noted that when emphasis was placed on gross capital flows, the flow from Europe, a current account deficit region (or balanced region), to the United States, a current account deficit country, played an important role².

Following the gross expansion of the flow of capital between Europe and the United States in the few years leading to the financial crisis, Iwamoto (2013) assumed that Europe’s approach to the United States was “short-term borrowing, then, long-term lending.” In other words, Europe’s banks procured capital from the US short-term money market and remitted the funds to their parent banks in their home countries and regions, their loanable funds situation based on their balance sheets improved, and they entered not only the European market but also the private sector lending market in the United States. Thus, European banks contributed to the housing bubble in the United States, but, ultimately, as the subprime crisis triggered, they substantially decreased both their borrowing of short-term funds and lending of long-term funds with the United States. Gourinchas et al. (2011) focused on the composition of gross capital flows. They showed that during a financial crisis, wealth is reallocated between the United States, which holds many high-risk and low-liquidity assets among its foreign assets, and various countries that, in contrast, hold many highly stable assets among their US assets in the form of long-term Treasury bonds, due to fluctuations in asset prices³.

In this study, we focus on gross capital flows and examine the changes in scale of international portfolio investment flows between countries and regions during the 2008 and 2009 global financial crisis. Specifically, we divide the portfolio investments flows (stocks, long-term bonds, and short-term bonds) between the major countries and regions into time periods of before, during, and after the financial crisis, and analyze the changes that took place in the scale and composition of portfolio investment flows. First, we summarize the trends in the main financial assets markets before, during, and after the financial crisis. Behind the strengthening linkage between the global economy and finance, the prices of stocks and bonds in the major nations synchronized after 2000. However, the prices began to trend in various ways following differences in business conditions and levels of confidence between countries after the financial crisis. Next, we analyze the gross securities investment flows between major countries and regions using the International Monetary Fund’s (IMF’s) Coordinated Portfolio Investment Survey (CPIS) on securities investments. The assets and liabilities of international securities had been expanding before the financial crisis in the backdrop of the increase in securities investment flows between Europe and the United States. During the financial crisis,

the assets and liabilities decreased rapidly initially but then recovered to their pre-crisis levels after about two years. In this study, we examine the changes in direction and composition of international portfolio investment flows between major countries and regions.

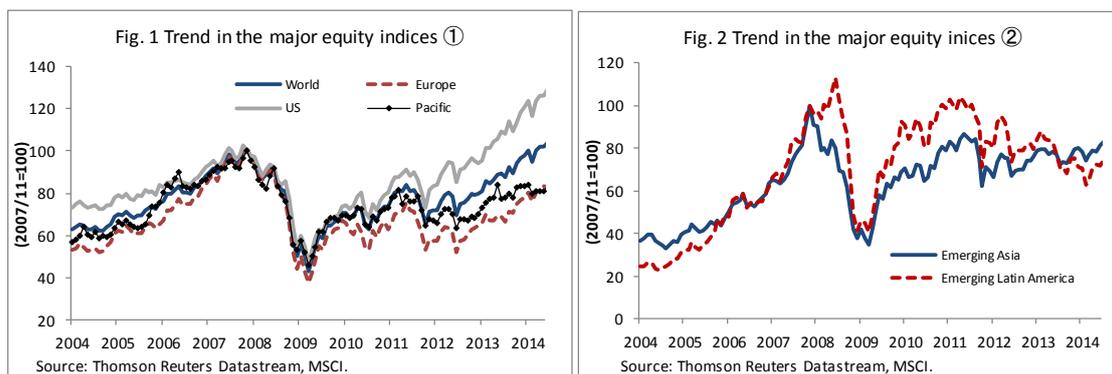
2. Trends in global financial assets markets before and after the financial crisis

Here, we summarize the trends in the main asset markets having comparatively high liquidity. Specifically, we examine the trends in the stock, bond, commodities, and foreign exchange markets from 2004 onward.

2.1. Stock markets

From the MSCI ACWI FM Index (an index of the listed companies of 23 developed, 21 emerging, and 26 frontier market countries) provided by Morgan Stanley Capital International (MSCI), the global stock prices made major gains from 2004, and at their peak in November 2007 were approximately three times the level of January 2004. Of the 59.5% gains indicated by the MSCI World Index, which includes the share of companies from developed countries, the stock price index of emerging market countries increased by two to four times (the MSCI EM Asia, which includes the stocks of the emerging Asian nations, shows an increase by 175.4%, whereas the MSCI EM Latin America, which includes the stocks of the emerging Latin American nations, shows an increase by 363.9%). Among the developed countries, Europe (with an increase of 87.9%) and the Pacific (with an increase of 75.3%) outperformed the United States (with an increase of 39.9%) (see Figures 1 and 2).

While most of the stock price indexes recovered rapidly up to 2010 following their crashes after the Lehman shock of September 2008, the subsequent pace of recoveries varied. Among the developed countries, the United States' stock prices recovered comparatively steadily and continued to rise to a record high, but the European and Pacific stock indexes lagged behind, and they still remain below their pre-financial crisis level. For emerging countries, while the recovery in Asia has been slow compared to Latin America, the Latin American market too has been dragging its feet since 2012.

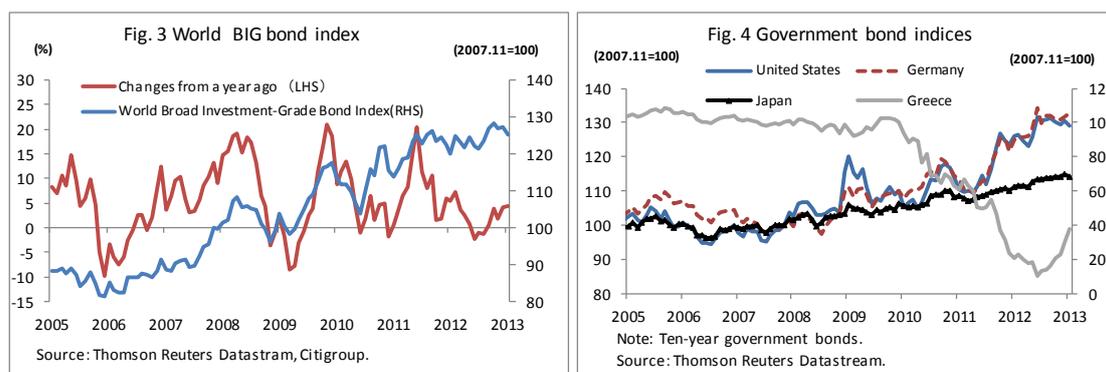


2.2 Bond markets

For bond markets, we examine the trends in government bond prices from the World Broad Investment Grade Bond Index⁴, prepared by the Citigroup, and the Government Bond Index, prepared by Thomson Reuters' Datastream by country (see Figures 3 and 4). The World Broad Investment Grade Bond Index targets public bonds in the four major currency spheres: the US dollar, the euro, the yen, and the pound sterling. However, the Government Bond Index targets government bonds by country, but as the data on regions and emerging markets are limited, it mainly concentrates on the government bond markets of developed countries.

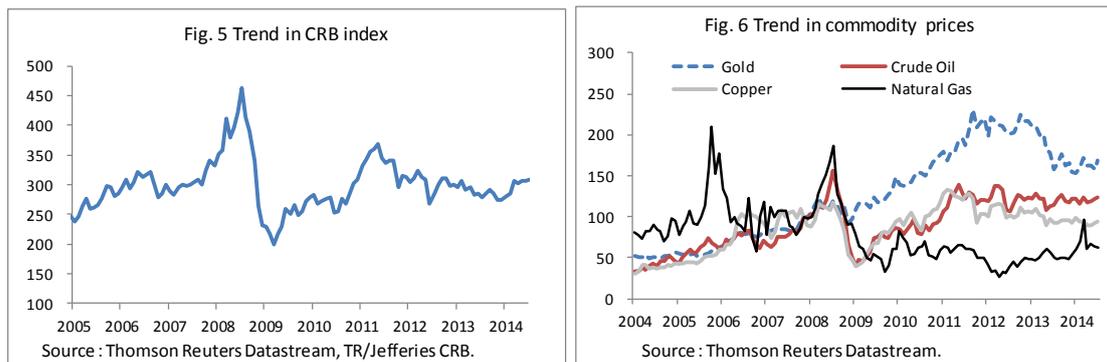
First, if we examine the World Broad Investment Grade Bond Index up to the Lehman shock of the fall of 2008, the bond market trended bearishly between 2005 and 2007 following the

economic recovery and interest rate hikes by various central banks. Thereafter, the markets recovered slightly as the subprime mortgage crisis further deteriorated and the central banks implemented monetary easing policies. However, bond prices once again dropped sharply following the Lehman shock and then trended in various ways. If we examine these trends by country, while government bond prices rose significantly in the United States and the United Kingdom, with both countries actively taking up monetary easing measures such as quantitative easing and credit easing, the bond market prices in the Eurozone continued to trend unstably from around the end of 2010. Similarly, while the German government bond prices increased considerably, the bond prices of the southern European nations such as Spain, Italy and Greece declined dramatically.



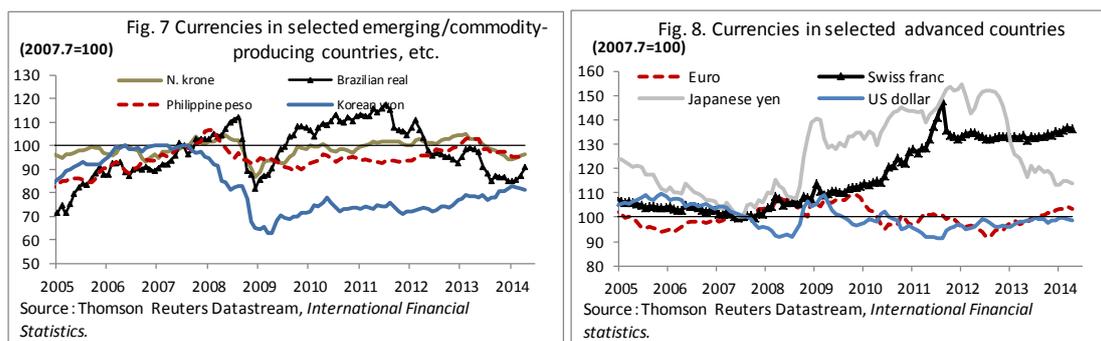
2.3 Commodities markets

For commodities markets, we observe the data of gold, crude oil (Brent), copper, and natural gas obtained from the Commodity Research Bureau (CRB) index and Thomson Reuters Datastream (see Figures 5 and 6). First, the CRB Index increased moderately from the middle of the 2000s following the global economic recovery. From the second half of 2007, although the global economic climate showed signs of slowing down, the excessive liquidity generated by global monetary easing flowed into the commodities markets that gained rapidly up to the fall of 2008. Following the Lehman shock, after a sharp but temporary fall, commodity prices recovered gradually, but their recovery differed considerably depending on the commodity. When the financial crisis occurred, gold initially experienced a small fall in market prices and then gained rapidly from 2009 to the middle of 2011, before subsequently declining sharply in 2013. The prices of crude oil and copper also recovered, although not to their pre-Lehman shock peaks. On the other hand, the price of natural gas fell sharply after the Lehman shock but did not recover and trended practically unchanged. This can be attributed to the lackluster recovery of the real economy and increase in supply of natural gas following the development of shale gas.



2.4 Foreign exchange markets

For foreign exchange markets, we used the International Financial Statistics (IFS) nominal effective index to observe the trends in various currencies. Specifically, in addition to the main currencies of the US dollar, euro, Japanese yen, pound sterling, and Swiss franc, we considered the Australian dollar, Norwegian krone, Swedish krona, Mexican peso, Brazilian real, Russian ruble, South African rand, South Korean won, Philippine peso, Thai baht, Malaysian ringgit, and Chinese yuan. We then divided the currencies by time periods of before and after the financial crisis, roughly as follows: (1) currencies that first appreciated until the second half of 2007, when the subprime crisis further deteriorated, and then depreciated; (2) currencies that gradually depreciated until the crisis and then rapidly appreciated; and (3) other currencies. The appreciation trend up to the summer of 2007 occurred among the emerging-country currencies⁵ that were supported by forecasts of high growth, resource prices, and comparatively high interest rates (such as the Brazilian real, Philippine peso, and Thai baht) and the so-called commodity currencies (such as the Australian dollar and Norwegian krona). However, after the financial crisis, these currencies rapidly declined (Figure 7). In contrast, the US dollar, Swiss franc, and Japanese yen showed a moderately depreciating trend prior to the deterioration of the subprime crisis, but then they appreciated after the crisis (Figure 8). These currencies are procurement currencies for the so-called carry trading, with investors borrowing them at low interest rates and investing them in high interest rate currencies or other financial assets. Such transactions reversed with the financial crisis. For the US dollar, after initial rate hikes at the end of 2004, its official policy rate climbed as high as 5%, but then trended at low levels due to the strong demand for US long-term bonds from global investors, particularly foreign-reserve managers in Europe and Asia. This encouraged the outflow of capital from domestic US investors to foreign risk assets, which in turn contributed to the decline of the dollar index⁶.



The foreign exchange markets after the financial crisis showed a rapid appreciation of the US dollar between October 2008 and March 2009. Following the Lehman shock, the US financial institutions avoided counterparty risk by restricting their supply of dollar funds to the short-term money market. Thus, the dollar cash flow between the global financial institutions procuring dollars in the US short-term money market deteriorated and such factors led to the sudden international shortage of dollars. Subsequently, the Federal Reserve Bank concluded swap agreements with the central banks of various countries and supplied them with dollars, thus restoring calm in the financial markets. However, the risk aversion of international investors remained deep-rooted and the Japanese yen and Swiss franc appreciated as safe assets. The winter of 2012 witnessed a turning point for the Japanese yen when the Abe administration announced a series of new economic packages, called “Abenomics.” This was followed by the introduction of “Quantitative and Qualitative Monetary Easing” policies in April 2013. In the wake of such measures, the yen depreciated sharply against the major currencies.

3 Gross international capital flows before and after the global financial crisis

3.1 Analysis method

From the joint survey of the securities investment conducted by the IMF (subsequently, the CPIS), we set the difference between the balance of securities investment and the previous year's balance as proxy variable for capital flows and analyzed the trends of international capital flows in the major countries before and after the global financial crisis of 2008 and 2009. When analyzing international capital flows, we generally use the balance of international payments statistics. However, these statistics give the totals of capital flows within a fixed period between the relevant countries and their international sectors, and, therefore, except for some countries such as Japan and the United States, we cannot ascertain the capital flows in both directions with an investment destination partner country. On the other hand, the CPIS gives the holding situation of the securities investment, and the sum of each period's securities investment flow and changes in asset values gives the balance at the end of the next period. In other words, we cannot distinguish which part of the difference with the previous year comes from the actual flow and which part comes from fluctuations in prices. However, in CPIS, the holdings of securities between nations are shown from the standpoint of both the creditor and debtor nations, thus enabling us a cross-country analysis. If we consider the scale of expansion and contraction of global capital flows before and after the global financial crisis, even for changes in balance, to a certain extent we might be able to ascertain the direction of and changes in the structure of capital flows between countries and regions in that period.

In our analysis, we set the global financial crisis period as 2008 and 2009, and the difference between the international portfolio investment balance (total, stocks, long-term bonds, and short-term bonds) and the previous year's balance for the six-year period including the two years before and after this period as the proxy variable for capital flow. Next, we calculate the average of each of the respective two-year periods and categorize the flows into before, during, and after the financial crisis. We also add the 2012 data to grasp the recent movement.

We divide the investor countries and investment destinations into seven countries and regions: Europe, the United States, Japan, Asia⁷, Central and South America⁸, tax haven countries⁹, and others (the foreign reserve funds of each country and international institution are not included in the main-region categories). In addition, Europe¹⁰ was split into the Eurozone, Central and Eastern Europe¹¹, and other major countries of Europe¹². This study focuses on the capital flows of four countries and regions, namely, Europe, the United States, Japan, and Asia, which together hold approximately 80% of the total foreign assets and liabilities.

3.2 Definition of gross capital flows

Next, we define capital flows as used in this paper. In international capital transactions, from the residency principle, capital inflows comprise the sales of foreign assets by residents or purchase of domestic assets by nonresidents, while capital outflows comprise the purchase of foreign assets by residents or the sales of domestic assets by nonresidents. Therefore, for net capital flows (capital outflows minus capital inflows), the capital flows generated by residents' foreign investments cannot be distinguished from the domestic investments of nonresidents. Moreover, when foreign capital flows rival domestic capital flows, the scale of actual capital flow can be underestimated. In this study, we emphasize the fact that a rapid increase in foreign capital flow occurred before the financial crisis and therefore, in terms of stock, expansions are considered both for assets and liabilities. Therefore, we define gross capital flow¹³ as follows:

Gross capital outflows = (purchases of foreign assets by residents) — (sales of foreign assets by residents)

Gross capital inflows = (purchases of domestic assets by foreigners) — (sale of domestic assets by foreigners)

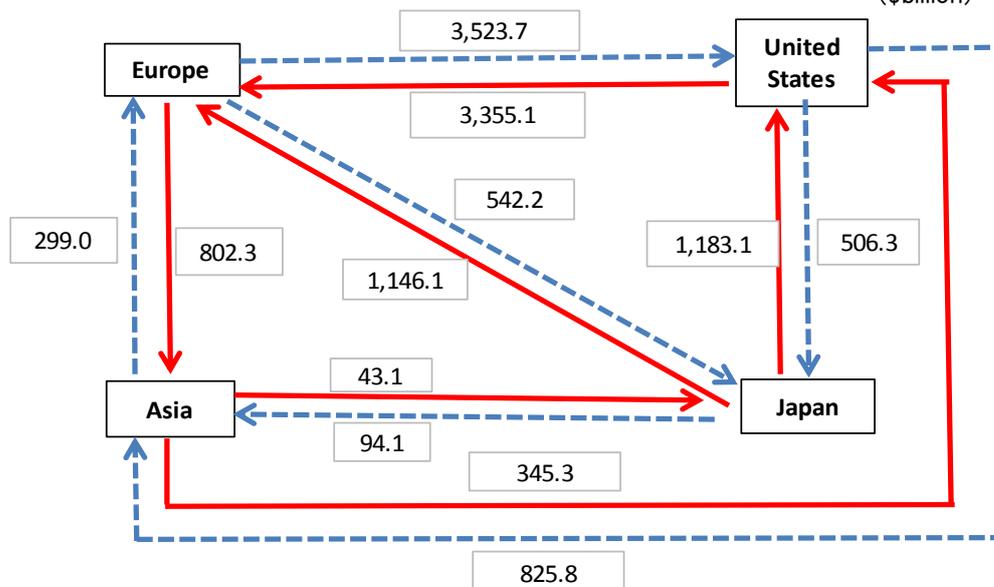
In general, we use a minus symbol for gross capital outflows and a plus symbol for gross capital inflows when they are based on international payments. Since we could not obtain the outflow and inflow data of international asset transactions for the four countries and regions, we use stock statistics, and, for the sake of convenience, we set a plus for increases in foreign assets and liabilities and a minus for decreases, assuming them to be proxy variables for gross capital flows. In other words, we set a plus for an increase in foreign assets (purchases of foreign assets by residents > sales) and a minus for a decrease (sales of foreign assets by residents > purchases). In addition, we set a plus for an increase in foreign liabilities (purchases of domestic assets by foreigners > sales) and a minus for a decrease (purchases of domestic assets by foreigners < sales).

3.3 Overview of international portfolio investments

From the CPIS statistics, the international portfolio investment balance (stocks + long-term bonds + short-term bonds) as at the end of 2012 was \$43.6 trillion, approximately three times the total 10 years earlier, when the figure was \$12.7 trillion. During this period, the global GDP increased by approximately 2 times and the international bank lending balance increased by 2.3 times, indicating that financial transactions increased alongside economic expansion. Within the securities investment balance, if we exclude the holdings of the public sector such as each country's foreign reserves and international institutions, the total comes to \$38.7 trillion. Breaking down by security, stocks comprised 38.9% of the total (\$17.0 trillion), long-term bonds 54.5% (\$23.7 trillion), and short-term bonds 6.6% (\$2.9 trillion). By region, Europe's balance was \$21.6 trillion, or 49.5% of the total, most of which came from the Eurozone (35.2%). Next was the United States, at 18.2%, followed by Japan at 8.1% and Asia at 4.7%.

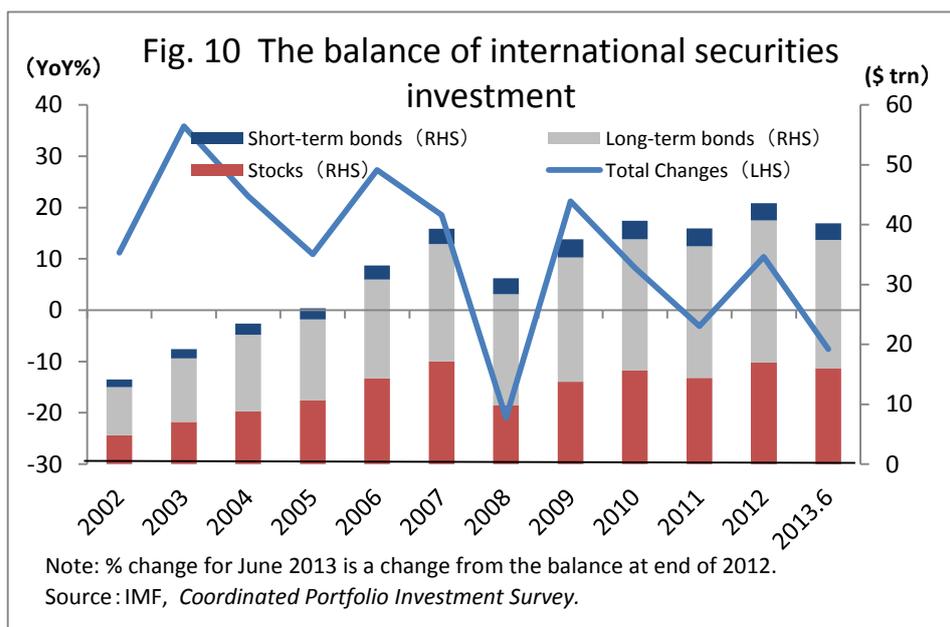
Figure 9 summarizes the CPIS data on the securities investments of the United States, Japan, Europe, and Asia as at the end of 2012. Here, the difference in asset balances between Europe and the United States is less than 1%, whereas that between Europe and the other countries and regions is more than double. Since the country data in the CSPI do not include foreign currency reserves, the US and European securities held by Asian countries is smaller than the Asian securities held by the United States and Europe (note that a large part of the external assets of Asian countries is invested as foreign reserves). In contrast, Japan holds significantly more US and European securities compared to the US and European holdings of Japanese securities. This indicates that Japan has redirected a large part of its current account surplus to securities investment in both regions.

Fig. 9 Balance of international securities holdings between countries and regions (end of 2012)
(\$billion)



Source: IMF, *Coordinated Portfolio Investment Survey*.

Thus, the trends from the early 2000s show that up to 2007, the securities investment balance increased at an annualized average rate of 21%, and then, in 2008, fell by more than 20% year on year following the financial crisis (Figure 10). It then rapidly rebounded the following year, when it increased by 21.2%. Although the balance declined slightly in 2011 after peaking in 2010, it rebounded once again in 2012, reaching a record high. From the breakdown of financial assets, stocks, which constituted 43.7% of the total assets in 2007 before the financial crisis, dropped to 31% in the wake of the financial crisis. The share of stocks subsequently recovered in 2012, but still constituted only 38.7%. Conversely, in conjunction with the increase in share of stocks, the share of long-term bonds fell below 50% by the end of 2007, but then rose again following the financial crisis. By region, the percentages of Europe and the United States have traditionally been high, reaching up to three-quarters of the total after the financial crisis, although their shares did decline slightly. In contrast, Asia's share increased from 2.9% in 2001 to 5.2% in 2012. Foreign securities investment of Asian countries seemed to have become very active following recovery of their current account surplus after the Asian currency crisis in the late 1990s. Most of Asia's foreign securities investment is from foreign reserves (public funds), but the private sector has been showing an upward trend. Tables 1 through 4 show the gross securities investment flows between the four countries and regions before, during, and after the financial crisis. From the figures, we analyze the trends in securities investment flows between the four countries and regions for each period.



3.4 International securities investment flows before the financial crisis (2006 and 2007)

In 2006 and 2007, the international securities investment balance increased by an annualized average of \$6.6 trillion. Of this, stocks increased by \$3.8 trillion and long-term bonds by \$3.0 trillion, indicating that stocks and long-term bonds increased by practically the same amount. By country and region, Europe showed the largest securities investment flow at \$3.6 trillion, or approximately 55% of the total, followed by the United States at \$1.3 trillion, Asia at \$355.6 billion, and Japan at \$204.3 billion. While 64% of the Europe's investment flowed into the European region, the flows from Europe accounted for about 25% of the total international investment flows excluding this factor. This pointed that the Europeans played an important role in the international financial markets before and during the great financial crisis.

Before the financial crisis, the securities investment flows between Europe and the United States were the most active, with the United States' investment in Europe slightly exceeding Europe's investment in the United States. By asset, 60% of Europe's investment in the United States was in long-term bonds, whereas the US investment in Europe was primarily in stocks (70% of the total). At a glance, the structure of securities investment flows between the two regions shows that while the United States is more inclined to invest in high-risk products, the majority of Europe's investment in US bonds have been in risky products such as corporate bonds and US agency securities (mortgage bonds), rather than in safe Treasury bonds¹⁴.

Between Asia and the United States, while the United States shows a larger outflow, the majority of Asian countries' investment in the United States was from their foreign reserve funds, which is statistically categorized as "Foreign reserve funds and international institutions" (in this paper, "Others"). Further, many Asian countries have regulations that restrict private sector investments in foreign securities. Stocks constitute 96% of the United States' investment in Asia and 56% of Asia's investment in the United States. However, much of the Asian investment is from foreign reserves. If we further consider the Asian investment in US Treasury bonds and agency securities, we see that the United States raises funds at low interest rates from Asia and invests these funds in Asia on stocks with high returns. The pattern of Asia's relationship with Europe is basically the same, although the gap is not as much as with the United States.

Japan's international securities transactions during this period were not very active. While Japan's investment in Asia totaled \$22.1 billion, Asia's investment in Japan was only \$12.9 billion. Between Japan and the United States, Japan's investment in the United States was \$32.8

billion, matching the United States' investment in Japan of \$31.1 billion. Between Japan and Europe, while Japan's investment in Europe was \$92.0 billion, Europe's investment in Japan was only \$25.8 billion, indicating a significant outflow from Japan. Japan's investment in Europe was 35% in stocks, and, relative to its investment in the United States, a large share in bonds. The ratio of Europe's investment in Japanese bonds was also high, but while Japan's investment in Europe focused on long-term bonds, Europe's investment in Japan focused on short-term bonds.

Table 1 Gross portfolio investment flow before the financial crisis (2006–07)

Overall

(\$billion)		Investment from								
		Europe	(Eurozone)	US	Japan	Asia	L. America	OFCs *	Others	Total
Investment in	Europe	2,316.7	1,869.3	644.9	92.0	64.5	2.4	33.5	400.6	3,554.6
	(Eurozone)	1,842.3	1,473.0	369.1	56.0	38.9	2.1	17.0	273.4	2,598.9
	US	532.8	348.7	--	32.8	39.0	1.2	60.1	352.1	1,018.1
	Japan	25.8	17.3	31.1	--	12.9	0.0	0.8	28.0	98.7
	Asia	179.2	121.6	152.7	22.1	132.4	1.9	3.6	66.7	558.4
	L. America	41.5	33.4	61.1	3.3	2.7	-0.1	0.3	9.3	118.2
	OFCs *	174.3	120.1	211.7	28.5	71.6	1.6	4.1	41.8	533.7
	Others	371.2	217.3	198.8	25.7	32.5	1.0	4.5	114.7	748.3
	Total	3,641.5	2,727.7	1,300.3	204.3	355.6	8.1	107.0	1,013.1	6,630.0

Equity

(\$billion)		Investment from								
		Europe	(Eurozone)	US	Japan	Asia	L. America	OFCs *	Others	Total
Investment in	Europe	972.4	765.8	455.8	31.8	37.0	0.2	9.0	146.2	1,652.3
	(Eurozone)	777.8	624.6	270.2	20.6	23.4	0.2	2.9	85.2	1,180.3
	US	184.6	112.5	--	14.6	22.0	0.2	15.4	102.8	339.8
	Japan	9.4	4.6	17.9	--	6.6	0.0	2.3	8.9	45.2
	Asia	153.6	98.0	147.4	18.5	110.2	0.0	3.4	60.0	493.0
	L. America	34.6	26.9	65.8	3.0	2.7	0.0	0.1	7.7	113.8
	OFCs *	95.3	66.6	127.1	3.5	68.3	1.6	2.5	27.6	325.9
	Others	105.1	62.3	151.1	11.1	14.5	0.2	0.2	32.8	315.0
	Total	1,555.0	1,136.7	965.1	82.4	261.4	2.2	32.9	386.0	3,285.0

Long-term bonds

(\$billion)		Investment from								
		Europe	(Eurozone)	US	Japan	Asia	L. America	OFCs *	Others	Total
Investment in	Europe	1,270.5	1,024.5	156.2	60.6	15.7	0.9	15.4	226.0	1,745.2
	(Eurozone)	1,020.5	811.7	95.8	36.4	10.6	0.9	9.6	164.6	1,338.5
	US	317.7	210.6	--	17.2	16.4	1.9	35.8	250.3	639.4
	Japan	-10.2	-7.1	11.7	--	4.3	0.0	-1.4	1.6	6.0
	Asia	22.1	16.1	4.6	3.4	16.8	0.3	0.1	8.6	55.9
	L. America	4.5	4.1	-4.9	0.3	0.1	-0.1	0.2	1.9	1.9
	OFCs *	78.0	52.7	78.9	25.8	3.1	0.2	0.7	14.6	201.4
	Others	220.1	149.2	41.3	14.5	13.3	0.6	2.5	61.2	353.5
	Total	1,902.7	1,450.2	287.8	121.9	69.6	3.9	53.3	564.3	3,003.4

Short-term bonds

(\$billion)		Investment from								
		Europe	(Eurozone)	US	Japan	Asia	L. America	OFCs *	Others	Total
Investment in	Europe	93.1	83.2	32.9	-0.3	12.0	1.3	9.2	31.3	179.5
	(Eurozone)	44.7	40.4	3.1	-1.0	5.1	1.1	4.4	25.0	82.3
	US	31.6	25.7	--	0.9	0.5	-0.9	8.9	1.1	42.1
	Japan	16.7	9.9	1.5	--	2.0	0.0	0.0	15.4	35.6
	Asia	1.5	0.4	0.7	0.2	5.2	1.6	0.0	1.0	10.3
	L. America	1.3	1.1	0.2	0.0	0.0	0.0	0.1	0.0	1.6
	OFCs *	-0.3	0.3	5.7	-0.8	0.1	-0.2	0.8	0.4	5.8
	Others	39.9	20.3	6.4	0.1	4.6	0.2	1.7	16.8	69.8
	Total	183.8	140.9	47.4	0.0	24.5	2.0	20.8	65.9	344.6

Note: * Offshore Financial Centers.

Source: IMF, *Coordinated Portfolio Investment Survey*.

3.5 International securities investment flows during the financial crisis (2008 and 2009)

Following the subprime crisis that originated in the United States and the Lehman shock, the global financial markets fell into chaos. Investors began to flee from risky assets, and during 2008 and 2009, the international flow of capital reversed direction in conjunction with a crash in asset prices. The global securities investment declined at an annualized average of \$821.8 billion (on yearly basis, it was \$8.3 trillion in 2008, but after funds had been returned to the creditor countries, it fell back to \$6.6 trillion by 2009, and funds once again began to flow to the investment destination countries). However, by financial asset, while stock investments declined, long-term and short-term bond investments increased. In addition, by country and region, although there was substantial repatriation of capital from the United States (minus \$619.5 billion) and Europe (minus \$510.8 billion), both Japan (\$161.2 billion) and Asia (\$22.8 billion) experienced gross capital outflows (on yearly basis, capital decreased in 2008 in both Japan and Asia, but in 2009, it increased to the extent of cancelling out the previous decreases). Furthermore, roughly 70% of the funds repatriated to Europe went to the Eurozone countries.

Between Europe and the United States, capital repatriations were observed in both directions. While Europe's decrease in investment in the United States was approximately only one-fifth of its outflow before the financial crisis, with regard to the United States, approximately half of its total outflows flowed back into the United States. The repatriation of capital back to Europe was not that significant because of the outflow of funds into US Treasury bonds, which investors considered a safe asset¹⁵. The securities investment flows between Asia and the United States and between Asia and Europe focused on stocks, and capital returned to the United States and Europe. Conversely, Asia's investment in the United States led to increase in stock investments and the total outflow of \$13.1 billion. In contrast, the total Asian investment in Europe was an excess inflow of \$200 million due to the collection of short-term bonds.

During the financial crisis, Japan's securities investment with regard to Asia led to an excess inflow from sales of stocks, compared to its excess outflow of capital to the United States and Europe from increased investment in long-term bonds. In contrast, the United States and Europe focused heavily on stocks investment in Japan, but this shifted as the sale of their holdings saw a return of funds to the domestic markets. The stocks held by the US and European investors dropped by more than their purchases during the two years before the financial crisis.

Table 2 Gross portfolio investment flow during the financial crisis (2008–09)

Overall		Investment from								
		Europe	(Eurozone)	U.S.	Japan	Asia	L. America	OFCs	Others	Total
Investment in	(\$billion)									
	Europe	-39.6	-38.0	-327.4	43.7	-0.2	-2.0	-23.1	90.2	-258.3
	(Eurozone)	10.9	-1.2	-200.8	20.6	-9.3	-1.9	-1.7	115.7	-66.6
	U.S.	-103.6	-95.3	--	53.0	13.1	2.0	-46.2	75.4	-6.2
	Japan	-82.4	-47.2	-88.6	--	2.0	0.0	-5.3	22.1	-152.3
	Asia	-69.5	-38.0	-52.1	-3.8	-2.4	-1.5	7.4	12.2	-109.7
	L. America	9.4	4.8	1.0	10.1	-0.3	0.1	0.9	-0.9	20.4
	OFC	-139.6	-101.1	-163.8	26.3	7.7	0.2	5.0	-26.1	-290.3
	Others	-85.5	-45.1	11.5	31.9	2.9	2.9	1.8	9.2	-25.3
	Total	-510.8	-360.0	-619.5	161.2	22.8	1.8	-59.5	182.2	-821.8

Table 2 Gross portfolio investment flow during the financial crisis (2008–09)(cont'd)

Equity

(\$billion)		Investment from								Total
		Europe	(Eurozone)	U.S.	Japan	Asia	L. America	OFCs	Others	
Investment in	Europe	-573.9	-473.6	-307.1	-8.7	-2.9	-0.2	-3.6	-61.1	-957.6
	(Eurozone)	-427.9	-344.3	-202.3	-6.4	-8.1	-0.3	3.3	-35.2	-676.8
	U.S.	-145.7	-112.0	--	4.2	9.5	-0.4	-5.2	-35.3	-172.9
	Japan	-77.8	-46.3	-79.2	--	-1.5	0.0	-4.9	-13.4	-176.9
	Asia	-59.2	-28.9	-54.9	-4.8	-16.0	0.0	7.0	12.7	-115.2
	L. America	5.2	5.0	-6.3	2.3	-0.4	0.1	-0.1	0.2	0.9
	OFC	-64.6	-45.1	-125.6	14.8	9.9	0.1	7.2	-8.4	-166.5
	Others	-38.0	-15.6	-53.3	2.5	-0.1	0.4	-5.9	4.2	-90.0
	Total	-954.0	-716.4	-626.3	10.3	-1.5	0.0	-5.5	-101.1	-1,678.1

Long-term bonds

(\$billion)		Investment from								Total
		Europe	(Eurozone)	U.S.	Japan	Asia	L. America	OFCs	Others	
Investment in	Europe	418.7	335.6	-26.6	48.1	9.7	-0.6	-3.8	48.3	493.8
	(Eurozone)	311.5	232.7	-5.2	24.1	1.3	-0.5	1.2	56.6	389.1
	U.S.	35.5	4.9	--	50.6	0.6	2.3	-26.9	27.3	89.5
	Japan	-11.8	-7.6	-11.3	--	1.9	0.0	-0.4	15.0	-6.6
	Asia	-3.5	-1.9	3.3	1.3	9.8	0.2	0.4	-3.5	8.0
	L. America	4.6	0.4	7.5	7.8	0.2	0.0	0.7	-1.3	19.5
	OFC	-71.2	-51.0	-22.0	12.3	-2.1	-0.1	0.0	-18.1	-101.1
	Others	-30.5	-27.9	40.7	29.7	5.5	2.5	10.1	43.4	101.4
	Total	232.2	162.2	10.1	132.2	22.2	1.1	10.1	111.1	493.8

Short-term bonds

(\$billion)		Investment from								Total
		Europe	(Eurozone)	U.S.	Japan	Asia	L. America	OFCs	Others	
Investment in	Europe	110.6	97.8	6.4	4.3	-6.8	-1.1	-15.6	90.2	187.9
	(Eurozone)	124.7	110.9	6.7	2.9	-2.5	-1.1	-6.2	88.5	212.9
	U.S.	6.3	11.9	--	-1.9	3.0	0.1	-14.1	83.4	76.9
	Japan	17.0	16.4	1.8	--	1.6	0.0	0.0	21.2	41.7
	Asia	-0.2	0.0	-0.6	-0.3	4.1	-1.7	0.0	0.6	1.9
	L. America	-1.0	-1.2	-0.2	0.0	0.0	0.0	0.3	0.2	-0.6
	OFC	-1.3	-5.1	-16.2	-0.9	0.0	0.2	-2.2	-0.2	-20.7
	Others	-30.0	-15.9	24.0	-0.3	-3.2	0.0	-2.5	-23.2	-35.1
	Total	101.9	92.9	10.3	5.3	1.2	0.0	10.1	111.1	187.9

Note: * Offshore Financial Centers

Source: IMF, *Coordinated Portfolio Investment Survey*

3.6 International securities investment flows after the financial crisis (2010 and 2011)

Thanks to the major countries' active monetary easing and government spending policies, the global economy rapidly recovered in 2010. Financial markets also regained their composure, and, in 2010 and 2011, the annualized average of the international securities investments increased to \$903.5 billion. Mostly because of the debt crisis in the Southern European nations in 2011, the markets once again destabilized, and, by year, following an increase of \$3.1 trillion in 2010, the balance declined by \$1.4 trillion in 2011. Before the financial crisis, international securities investments traced an upward path supported by stable economic trends and financial environment, but after the financial crisis and further to the differences in pace of economic recovery and destabilization of the financial markets, changes occurred in the structure of international securities investment flows.

By region, Europe's foreign securities investment after the financial crisis showed an excess inflow of \$560.6 billion. Practically the whole of this inflow represented investment funds returned to the Eurozone, and, on a non-Eurozone basis, it showed an excess outflow of \$232.8 billion. The United States' foreign securities investment changed from an excess inflow to an excess outflow, while Japan and Asia continued to record gross excess outflows.

Between Europe and the United States, Europe's securities investment in the United States changed to an excess outflow. Concomitantly, the United States' investment in Europe

continued to return to its domestic market. A feature of Europe's investment was a major slowdown in US long-term bonds investment, which before the financial crisis comprised 60% of its total investment, while at the same time increasing its share of stocks. This followed its major retreat from investments in US corporate bonds and agency securities, which it had purchased in large quantities prior to the financial crisis. On the other hand, the United States' investment in Europe shifted in the opposite direction, from stocks before the financial crisis to long-term bonds after it.

Asia's investment in US securities continuously was an excess outflow before, during, and after the financial crisis (however, by year, it recorded an excess inflow of \$45.6 billion in 2008). By asset, a feature of Asian investment was that the percentage of stocks increased compared to before the crisis (from 56% to 80%). On the other hand, the United States' investment in Asia was an excess outflow, but its investment in stocks, which before the financial crisis constituted 96% of the total, was only 53% after it. Between Asia and Europe, the trend of capital repatriation further strengthened, resulting in an excess gross inflow of \$53.7 billion.

Within the trend of international securities investment flows as a whole, Japan's foreign securities transactions in both directions exceeded their pre-financial crisis levels. By country and region, investment in the United States recovered steadily, concentrating on stocks and long-term bonds, but investment in Europe and Asia remained below their pre-financial crisis levels, their investment funds flowing into offshore financial centers (OFCs) and other countries and regions. Thus, Japan's gross capital flow, from the perspective of the investing country, increased from 3% of the total pre-financial crisis transaction values to approximately 30% after it. Japan's investment in stocks increased from 3.5% to 10.4% and long-term bonds from 4.1% to 37.5%, suggesting that Japan's money had started playing an important role in international finance.

Table 3 Gross portfolio investment flow after the financial crisis (2010–11)

Overall		Investment from								
(\$billion)		Europe	(Eurozone)	U.S.	Japan	Asia	L.America	OFCs	Others	Total
Investment in	Europe	-819.1	-760.8	-20.7	6.3	-53.7	1.4	2.2	185.6	-698.0
	(Eurozone)	-785.2	-696.6	-62.8	-24.7	-29.5	1.4	-4.1	130.3	-774.7
	U.S.	99.8	34.5	--	124.5	19.6	15.8	-10.9	323.0	571.8
	Japan	26.8	3.6	43.7	--	-11.7	0.0	-1.0	27.4	85.2
	Asia	52.0	27.6	42.6	6.7	46.8	-0.4	-13.3	-20.5	113.8
	L. America	46.2	2.4	2.1	4.4	-0.2	0.2	4.3	1.2	58.2
	OFC	-56.4	-52.0	180.4	80.9	-0.1	1.4	-19.4	2.7	189.7
	Others	90.0	39.9	183.4	41.9	57.8	1.7	2.1	146.6	523.4
	Total	-560.6	-704.9	431.4	264.7	58.5	20.2	-36.1	666.1	844.1

Equity		Investment from								
(\$billion)		Europe	(Eurozone)	U.S.	Japan	Asia	L.America	OFCs	Others	Total
Investment in	Europe	-117.7	-110.1	-13.2	-5.7	-17.6	1.9	-11.0	26.6	-136.7
	(Eurozone)	-132.9	-113.0	-46.1	-4.7	-6.8	1.7	-9.7	7.9	-190.7
	U.S.	53.4	24.4	--	26.8	15.4	1.1	-18.7	73.9	151.9
	Japan	-12.8	-4.8	10.2	--	-1.1	0.0	-1.0	3.3	-1.2
	Asia	18.8	5.8	22.6	-0.6	-2.6	0.0	-14.9	-31.2	-7.8
	L. America	-1.1	-5.7	-15.7	-2.6	-0.7	0.0	0.2	0.3	-19.5
	OFC	-6.4	-6.1	182.0	15.6	1.2	1.0	-20.1	4.0	177.4
	Others	10.9	8.8	67.1	2.3	20.0	0.3	-4.3	21.8	118.1
	Total	-54.8	-87.5	253.1	35.9	14.5	4.4	-69.7	98.8	282.1

Table 3 Gross portfolio investment flow after the financial crisis (2010–11)(cont'd)

Long-term bonds

(\$billion)		Investment from								Total
		Europe	(Eurozone)	U.S.	Japan	Asia	L.America	OFCs	Others	
Investment in	Europe	-585.0	-579.7	53.6	12.9	-7.9	-0.4	13.8	148.0	-365.0
	(Eurozone)	-545.2	-521.1	12.1	-18.1	-3.2	-0.4	6.4	122.0	-426.3
	U.S.	17.9	-5.0	--	98.6	4.9	13.8	12.1	304.3	451.5
	Japan	38.3	3.8	7.3	--	-5.3	0.0	-0.1	22.6	62.8
	Asia	23.4	13.2	15.3	7.1	10.2	-0.5	1.6	5.5	62.6
	L. America	48.5	10.7	15.9	7.0	0.9	0.1	4.3	1.3	78.0
	OFC	-39.3	-38.8	1.0	65.4	-1.7	0.2	0.7	-1.0	25.4
	Others	41.6	19.7	98.6	38.5	0.5	1.2	6.0	110.6	297.0
Total	-377.7	-376.1	131.5	229.5	1.0	17.7	33.7	331.5	312.7	

Short-term bonds

(\$billion)		Investment from								Total
		Europe	(Eurozone)	U.S.	Japan	Asia	L.America	OFCs	Others	
Investment in	Europe	-88.3	-67.9	-61.0	-0.9	-0.1	-0.1	-0.6	8.0	-143.1
	(Eurozone)	-79.0	-59.9	-28.9	-2.0	2.5	0.1	-0.7	-7.7	-115.6
	U.S.	28.7	15.2	--	-0.9	2.0	0.9	-4.3	-54.9	-28.4
	Japan	1.4	4.6	26.1	--	7.5	0.0	0.0	2.1	37.0
	Asia	9.0	6.1	4.6	0.2	37.8	0.0	0.0	1.7	53.4
	L. America	1.7	0.5	1.8	0.0	0.1	0.2	-0.3	-0.7	2.9
	OFC	-1.4	-0.7	-2.6	-0.1	0.4	0.1	0.0	-0.2	-3.8
	Others	-4.6	1.3	17.7	1.1	0.4	0.2	0.4	20.4	35.6
Total	-53.4	-41.1	-13.4	-0.7	48.1	1.3	-4.8	-23.6	-46.4	

Note: * Offshore Financial Centers

Source: IMF, *Coordinated Portfolio Investment Survey*.

4 International securities transactions after the European debt sovereign crisis

4.1 International securities investment flows in 2012

Stock prices recovered to the pre-financial crisis levels in the United States in 2012. Furthermore, the financial market conditions in Europe gradually improved, thanks to various measures taken by the IMF, European Central Bank, and the European Commission to rescue the Southern European Union member states in heavy debt. While real economic activities remained weak, global gross international securities transactions once again picked up, supported by the major central banks' on-going ultra-easy monetary policies and the general atmosphere contributing to easing financial anxieties.

The international securities investment at the end of 2012 rose by 10.7% from the previous year to a record high of \$43.6 trillion. The excess outflow of \$2.3 trillion from Europe, which recorded a large excess inflow in 2011, was the most significant part of this overall increase. Short-term bonds fell for the second consecutive year by 3.0%, whereas equities and long-term bonds rose by 17.6% and 8.9%, respectively. In terms of destination, the capital flowing into the Eurozone represented about one-third of the overall flows.

Between Europe and the United States, international securities investment transactions showed excess outflows in 2012 in both directions after large-scale fund repatriations in the previous year. While the long-term bond investments from Europe to the United States remained almost unchanged from the previous year, the recovery in stock investment was significant.

Investment flows between Asia and the United States recovered as well. The flows from Asia to the United States showed excess outflows of \$53.5 billion and that from the United States to Asia recovered to show an excess outflow of \$181.0 billion. In both directions, stock investments represented the primary factor behind this shift.

In 2012, Japan's securities investment in Europe represented an excess outflow of \$85.6 billion. This reflected a recovery in outflows to the Eurozone countries. However, capital flows into the other major European countries for the first time since the financial crisis showed excess outflows due to excess sales of long-term and short-term bonds. Meanwhile, Europe's excess securities investment outflows to Japan increased to \$32.4 billion in 2012, from \$22.4

billion in 2011. Regarding securities investments between Japan and the United States, Japan's investments in the United States represented excess outflows of \$14.7 billion, which were almost equivalent to the US investments in Japan (excess outflows of \$13.8 billion). Both the United States and Japan increased their exposure to stocks, with the US investors becoming excess sellers of Japanese short-term bonds for the first time since 2008. Although international securities investments between Japan and Asia (in both directions) had become excess outflows, the investment volume has been relatively small compared to the securities investments between and with other countries and regions.

Table 4 Gross portfolio investment flow after the financial crisis (2012)

Overall

(\$billion)		Investment from								
		Europe	(Eurozone)	U.S.	Japan	Asia	L.America	OFCs	Others	Total
Investment in	Europe	1,414.4	978.4	541.3	85.7	36.9	-2.2	53.3	-158.9	1,970.5
	(Eurozone)	1,102.9	764.9	311.5	97.5	27.7	-2.3	12.3	-154.5	1,395.1
	U.S.	166.4	141.9	--	14.7	53.5	9.5	-93.2	324.9	475.8
	Japan	32.4	17.2	13.9	--	3.0	0.0	-0.1	22.8	72.0
	Asia	148.2	99.7	181.0	11.1	176.6	0.9	0.2	49.0	566.9
	L. America	79.5	44.5	68.5	2.1	8.4	-0.1	6.0	11.0	175.5
	OFC	-17.4	-3.5	105.6	19.8	46.3	-3.1	3.1	2.7	156.9
	Others	458.3	330.7	191.9	16.6	74.1	-2.6	11.0	51.5	800.9
	Total	2,281.8	1,609.0	1,102.1	150.0	398.9	2.4	-19.7	303.0	4,218.5

Equity

(\$billion)		Investment from								
		Europe	(Eurozone)	U.S.	Japan	Asia	L.America	OFCs	Others	Total
Investment in	Europe	735.2	517.9	382.0	4.8	39.4	-2.5	11.6	82.8	1,253.4
	(Eurozone)	569.8	403.3	189.8	0.7	20.2	-2.5	5.0	60.3	843.2
	U.S.	188.9	103.9	--	13.2	42.8	0.3	2.0	123.3	370.4
	Japan	34.2	25.0	35.9	--	4.3	0.0	0.1	14.7	89.2
	Asia	120.6	78.2	169.2	1.7	105.2	0.0	-0.6	17.4	413.4
	L. America	16.1	14.9	12.8	2.1	0.5	0.0	-0.5	1.0	31.9
	OFC	1.3	1.3	100.0	-5.2	42.2	-1.9	0.0	-3.3	133.0
	Others	81.4	41.0	110.2	4.7	28.5	-0.1	5.0	22.1	251.8
	Total	1,177.7	782.2	810.1	21.3	262.9	-4.3	17.5	258.0	2,543.2

Long-term bonds

(\$billion)		Investment from								
		Europe	(Eurozone)	U.S.	Japan	Asia	L.America	OFCs	Others	Total
Investment in	Europe	570.3	278.1	271.6	209.6	39.9	-0.3	33.8	37.7	1,162.7
	(Eurozone)	431.1	191.3	241.3	222.4	46.8	-0.3	9.2	22.9	973.3
	U.S.	14.5	52.9	--	-2.3	5.3	8.8	-82.9	189.3	132.8
	Japan	1.8	-11.4	5.7	--	4.7	0.0	-0.3	7.3	19.2
	Asia	23.5	16.4	6.6	9.7	35.8	0.5	0.7	21.5	98.4
	L. America	44.9	11.8	51.0	0.0	5.2	-0.2	6.3	6.3	113.6
	OFC	-27.7	-15.4	6.0	24.0	4.3	-0.1	2.9	2.3	11.7
	Others	459.5	470.7	-53.5	-113.2	-6.8	-3.5	-6.4	-58.1	218.1
	Total	1,086.9	803.1	287.4	127.8	88.4	5.3	-45.7	206.4	1,756.5

Table 4 Gross portfolio investment flow after the financial crisis (2012)(cont'd)

Short-term bonds

(\$billion)		Investment from								
		Europe	(Eurozone)	U.S.	Japan	Asia	L.America	OFCs	Others	Total
Investment in	Europe	18.2	13.4	24.6	-2.6	-12.5	0.5	15.4	-189.6	-146.0
	(Eurozone)	12.2	3.3	17.4	0.6	0.6	0.6	5.6	-140.9	-104.1
	U.S.	-37.3	-15.0	--	3.8	0.0	0.4	-12.4	11.8	-33.7
	Japan	-3.5	3.5	-27.7	--	1.4	0.0	0.0	1.4	-28.4
	Asia	2.1	3.1	5.2	-0.3	38.4	0.5	0.1	2.9	49.0
	L. America	3.8	3.1	4.7	0.1	5.3	0.1	0.3	2.8	17.0
	OFC	-4.3	-2.8	-0.5	1.0	0.2	-1.0	0.2	0.1	-4.3
	Others	42.7	18.1	-1.8	-1.0	2.9	1.0	4.9	8.4	57.1
	Total	21.6	23.4	4.7	0.9	35.7	1.5	8.5	-162.2	-89.3

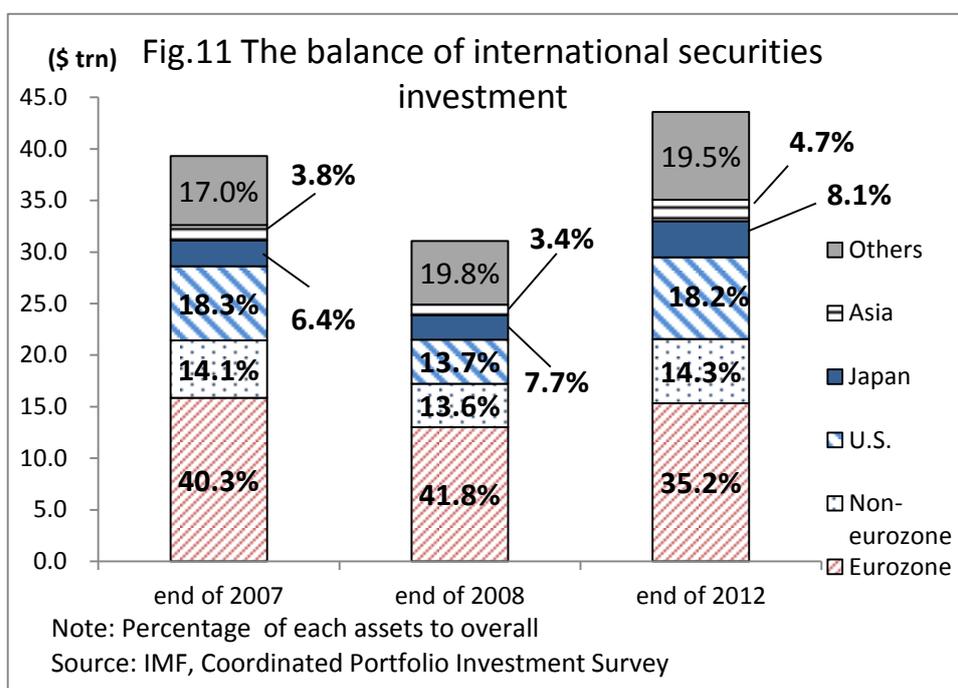
Note: * Offshore Financial Centers

Source: IMF, *Coordinated Portfolio Investment Survey*

4.2 Changes in structure of international securities holdings

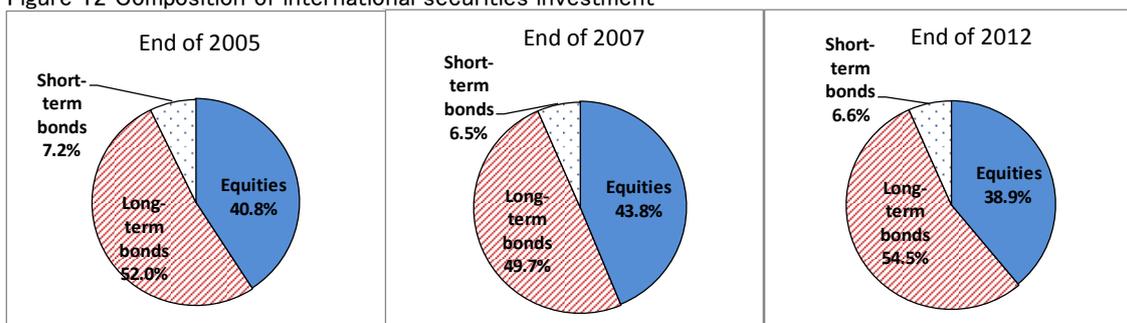
After the setbacks due to the sovereign debt crisis in Europe during the early stages of the recovery and the global financial crisis, international capital flows rebounded by the end of 2012. This was reflected in the level of international securities investments, which finally surpassed the pre-crisis level. The key factor for this was the strong turnaround of inflows and outflows of international securities investments in the Eurozone.

Nevertheless, the international securities investment of Japan rose the highest in the last five years, rising by about 40% since the end of 2007. Figure 11 illustrates the international securities investment among major countries and regions as at the end of 2007 and 2012. During the financial boom between 2005 and 2007, international securities investments were very active in Europe, the United States, and Asia excluding Japan. However, the international investment activities of these countries and regions dropped dramatically after the crisis, whereas the investments flowing from Japan rose gradually. Thus, while the international securities holdings of Europe dropped (from 54.4% in 2007 to 49.5% in 2012), that of Japan rose (from 6.4% to 8.1%).



Besides the changes in share of international securities holdings of countries and regions, the structure of securities changed to some extent. Figure 12 shows the composition of international securities by financial instrument as at the end of 2005, 2007, and 2012. Historically, long-term bonds have always represented the largest share among financial instruments. However, during the financial boom, the share of long-term bonds dropped to less than 50% while the share of stocks rose. After the financial crisis, the share of long-term bonds rose again to 54.5% of the total by the end of 2012 while the share of stocks dropped to 38.9%. This was partly due to the large government bond issuance of the major countries to finance their economic packages during the financial crisis. This also indicates that investors, particularly European investors, became risk averse after the crisis.

Figure 12 Composition of international securities investment

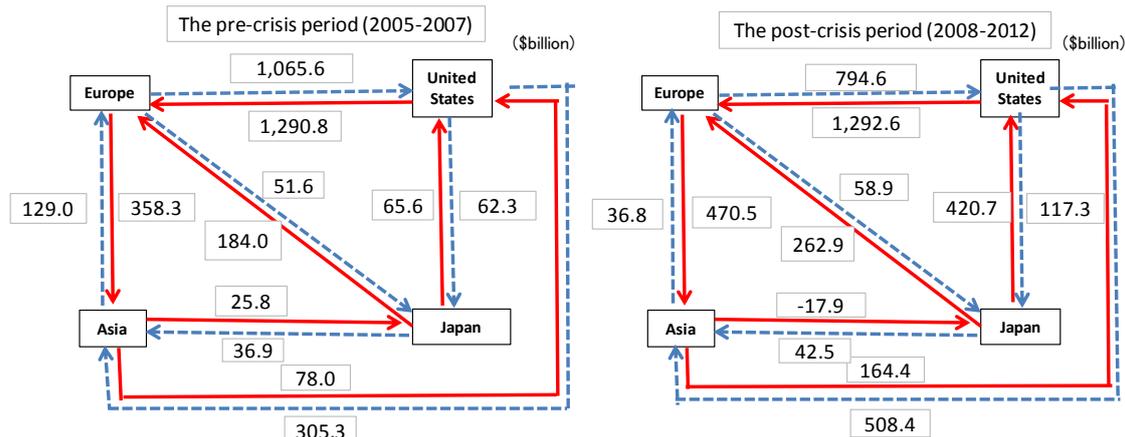


Source: IMF, *Coordinated Portfolio Investment Survey*

To sum up, Figure 13 compares the international securities investment flows during the pre-crisis (2005–2007) and post-crisis (2009–2012) periods. While the international securities investment flows from the United States to Europe recovered, the flows from Europe to the United States have not yet recovered after the sovereign debt crisis. European investors purchased US equities but were very slow in investing in US long-term bonds. Nonetheless, European investments in Asia, including Japan, seem to have normalized, increasing in both Asian equities and bonds¹⁶.

As noted earlier, international securities investment flows from Japan and Asia have picked up since the crisis. In particular, Japan was the single major provider (excluding the public sector) of international capital during the early stages of the post-financial crisis period. While Japan's investments in European equities have yet to fully recover, its long-term bond investments in Europe and the United States have risen significantly. Europe was the major international long-term bond investor before the financial crisis, contributing to almost two-thirds of the global long-term bond investments. However, its share dropped to 30% after the crisis, whereas Japan's share jumped to 16.5% after the financial crisis from 4.1% before the crisis.

Figure 13 Changes in international securities investment flows before and after the global financial crisis



Note: Figures are changes in the balance of securities investment between the end of 2007 and 2005 for the pre-crisis period, and the end of 2012 and 2008 for the post-crisis period.

Source: IMF, Coordinated Portfolio Investment Survey

5 Conclusion

After the global financial crisis of 2008 and 2009, the global players actively implemented fiscal and monetary policies, and, thanks to these policies, the global economy could avoid a great depression, and financial assets recovered at a comparatively early stage. However, the scale and structure of international capital flows between countries and regions changed significantly compared to before the crisis.

In this study, we focus on gross capital flows and the changes in scale of international securities investment flows between countries and regions across the period.

In international securities trading, both outflows and inflows rapidly increased before the financial crisis, and both foreign assets and liabilities expanded. However, this trend decreased significantly during the financial crisis. In spite of the subsequent recovery during 2010 and 2011, the figures have reached only one-seventh of their pre-crisis levels due to the European crisis. In an environment of rapidly recovering global financial asset prices, the continued downward trend of Europe's foreign position indicates that European investors were repatriating their capital from overseas.

Thus, while on the one hand the foreign securities investments of Europe and the United States recovered slowly, on the other hand Japan's riskier money flowed out into the world in the early stage of the post-financial crisis period. This has led to a situation where Japanese investors are offered a window to join the European and US investors as the global suppliers of risk capital.

In this paper, we analyzed the trends of international capital flows after the financial crisis, focusing primarily on securities investment transactions. To capture a broader picture of international capital flows, we intend to include bank lending as well as foreign direct investment in a future work.

NOTES

1. See also Bayoumi, et al(2014), Kregel (2009). Wade (2009) stated that global imbalance have had an important causal role not at the international level, in the form of currency recycling, but at the domestic level, in the form of credit recycling to the agents spending more than their income.

2. See also Cerutti, et al (2014). Taylor (2013) also emphasizes that the credit boom explanation is the most plausible predictor of crisis since the late nineteenth century, while global imbalances have only a weak correlation with financial distress.
3. See also Shin (2012) and Bernanke et. al (2011). Fratzscher (2011) analyzed international capital flows during and after the financial crisis using EPFR data. He found that common shocks, such as crisis events, changes to global liquidity and risk conditions, have exerted a significant effect on global capital flows. Nier, et al.(2014) also analyzed the fundamental factors which affected private capital flows to emerging markets.
4. http://index.citigroupglobalmarkets.jp/cgi-bin/bond/IX_home.cgi
5. Even among the emerging-country currencies, the appreciation phase of the South African rand started early, continued, and peaked out by the start of 2006.
6. During this period, the US dollar weakened against currencies with high interest rates and strengthened against the yen, Swiss franc, and euro.
7. Eleven countries and regions of Hong Kong, Macau, mainland China, India, Indonesia, South Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. Note that mainland China and Taiwan are included only in investment-destination countries. This is why the sum of data for “investment-origination countries” does not match with the data for “investment-destination countries” for Asia.
8. Two countries: Brazil and Mexico.
9. Three regions: Bermuda, Cayman Islands, and the Netherland Antilles. From the gap between the total assets and liabilities, the assets do not include investment funds that flowed in from overseas.
10. In addition to the Eurozone, Europe includes Central and Eastern Europe and the other main countries of Europe.
11. Seven countries: Belarus, Bulgaria, Hungary, Poland, Romania, Russia, and Ukraine.
12. Four countries: Norway, Sweden, Switzerland, and the United Kingdom.
13. Iwamoto (2013), Forbes and Warnock (2011) and Turner (2009)
14. Gourinchas, Rey, and Truemptler (2011) noted that European banks borrowed capital from the US short-term money market and expanded their investments in US private sector bonds of asset-backed commercial paper and asset-backed securities (ABS).
15. From the international portfolio investment statistics of the US Treasury (Treasury International Capital System and TIC data), most of Europe’s (the Eurozone and the United Kingdom) investment in US bonds up to 2007 was in corporate bonds. However, it has been confirmed that after the financial crisis, Europe’s investment in corporate bonds declined and its investment in long-term Treasury bonds rapidly increased.
16. Note that a large part of the international capital flows from Europe includes funds from other surplus countries and regions such as the oil producing countries. During the US housing boom, those funds flowed into the US Treasuries, agencies, as well as ABS. (Bertaut et.al 2011) As the financial anxieties eased and the global economy returned to the recovery phase with a low interest rate environment, those flows might have moved into risky assets other than US long-term bonds. See also Kregel (2008) for analysis on US subprime mortgage market.

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