Factors driving International Capital Flows and the Change after the Global Financial Crisis*

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Abstract

This paper investigates factors that drive international capital flows. In particular, we focus on the three points of view on factors that affect gross capital flows: the difference between the periods before and after the outbreak of the Global Financial Crisis (GFC), the difference by capital flow type, and the difference between developed and emerging economies. Therefore, the analysis employs the estimation for panel data of three types of gross capital inflows and outflows (direct investment, portfolio investment, and other investment). In addition, we divide the total sample into subsample periods before and after the GFC and subsample countries of developed and emerging economies. The regression result suggests that the capital flow factors have changed since the GFC and particularly external factors, such as global money supply, foreign stock price, and global risk, have become influential. Global risk influenced inflows of portfolio investment to both emerging and developed economies in all sample periods. In emerging economies, capital flow factors tend to be unclear in the period before the GFC, unlike in developed economies. In addition, we find that only relatively strong capital control measures restricted portfolio investment inflows during and after the GFC when capital flows and their volatility were large.

Keywords: Gross capital flows, Global financial crisis, Emerging economies
JEL Classification codes: F21, F32, F38, O16

I. Introduction

While international capital flows can play a part of optimum international monetary allocation, they have been one of the factors that invite international financial crises. Many articles suggest that massive capital inflows and outflows could have influenced macroeconomic booms and turbulence before and after the Asian crisis of 1997 and the Global Financial Crisis (GFC) of 2008. From this perspective, the exploration of factors affecting capital flows is valuable to help avoid economic turmoil and financial crisis. To investigate these driving factors of capital flows, this paper focuses on three differences: the difference before and after the GFC in which capital flows and their volatility increased, the difference of

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three categories of capital flows, and the difference between emerging and advanced economies.

First, the exploration of the difference of capital factors before and after the GFC can suggest if factors affecting large capital flows are different from that of normal capital flows. Large international capital inflows and outflows can result in more fluctuation in a country's macro economy compared to the usual capital flows. Previous articles point out that massive capital inflows and outflows before and after the crisis were crucial factors in past financial crises including the Asian crisis of 1997 and the GFC of 2008. There are also some studies that investigated the factors associated with large capital flows (Forbes and Warnock (2012), Agosin and Huaita (2012), Fratzscher (2012), and Molnar et al. (2013)). For instance, Forbes and Warnock (2012) classified large fluctuations of gross international capital inflows and outflows into four categories[1]. They showed that global factors could be important for large gross flows.[2] However, those previous articles used a dummy variable that takes the value of one if there is a large capital flow, and then regressed this occurrence's dummy variable on explanatory variables of capital flow factors. Therefore, they did not identify the difference between factors that drive large capital flows and those that drive the usual capital flows. The existence of that difference would conduct a suggestion of the need for specific responses to large capital flows in emerging economies. This paper analyzes how factors of capital flows changed before and after the GFC, because capital flows and their volatility were larger after the GFC than before. Though Ahmed and Zlate (2014) also focused on the difference of driving factors of capital flows before and after the GFC, their research objects are chiefly net capital inflows to emerging economies. Meanwhile, our regression explores gross capital outflows and inflows in emerging and advanced economies.

Second, this study explores factors affecting three types of foreign capital flows: foreign direct investment, portfolio investment, and other investment. Most previous articles focus on the specific type of flows. For instance, Forbes and Warnock (2012) discussed the total capital flows and Ahmed and Zlate (2014) also analyzed the total flows in addition to portfolio capital flows. The reason why we investigate three types of capital flows is that factors can differ among types. A shock of global factors may have larger influences on portfolio investment flows than direct investment flows, because foreign investors may decide direct investment in the long-run perspective and portfolio investments in the short-run. Some studies claim that it is necessary to analyze different categories of capital flows. Mercado and Park (2011) also used three types of capital inflows (foreign direct investment, portfolio investment, and other investment) and examined the determinants of their size and volatilities in emerging economies.[3] While Mercado and Park (2011) focus on only capital inflows to emerging economies, we investigate gross inflows and outflows and our sample includes

[1] Forbes and Warnock (2012) identify episodes of "surges" (sharp increases in inflows), "stops" (sharp decreases in inflows), "flight" (sharp increases in outflows), and "retrenchment" (sharp decreases in outflows).

[2] In addition to global factors, Forbes and Warnock used contagion factors and domestic factors as explanatory variables.

[3] Mercado and Park (2011) implied that the principal driver of the volatility of capital inflows was domestic factors in the case of Asian emerging economies.

both advanced and emerging economies, because gross capital inflows and outflows can respond to the investment behavior of foreign investors and domestic investors, respectively.[4] Forbes and Warnock (2012) used also data on gross capital flows and claimed that net inflows are inadequate targets in the investigation of factors which drive capital flows.[5] While Ahmed and Zlate (2014) principally targeted the net capital flows, they added the analysis for gross capital flows.

Finally, this paper examines the difference of factors affecting capital flows in emerging economies and those in developed economies. Because emerging economies have smaller and less mature economic and financial systems than developed economies, the impact of capital flows can be larger in emerging economies. This means that exploration of factors affecting capital flows should be valuable especially for the authorities of emerging economies. According to previous studies, capital inflows and outflows have been larger and more volatile in emerging economies than in advanced countries. For example, Broner and Rigobon (2005) found that capital inflows are more volatile in emerging countries. They claimed that this difference could be attributed to external shocks and country characteristics, rather than to economic fundamentals.

The regression result suggests that factors affecting gross capital inflows and outflows depend on the types of capital flows, the period before and after the GFC, and the difference between emerging and developed economies. The impacts of external factors such as global risk, foreign stock price, and global money supply have become large after the GFC in which the size of capital flows and their volatility were large. Compared to regression results for developed economies, the results for emerging economies tend not to be robust in the period before the GFC and imply that external factors had influences on capital flows after the GFC. We found that the global risk variable which was based on the VIX was an important factor affecting gross portfolio investment inflows before and after the GFC and in emerging and developed economies. In addition, the analysis maintains that only stronger capital regulation could restrain capital inflows from increasing during and after the GFC. This means that the weak capital control cannot be effective in large capital flows.

The remainder of the paper is structured as follows. Section 2 graphically illustrates the fluctuation of gross capital flows in our sample countries. Section 3 discusses the methods used to estimate the factors that influence capital flows and describes the regression results and their implications. Section 4 provides some concluding remarks.

II. Fluctuations of gross capital flows

This section graphically illustrates the fluctuations in gross capital inflows and outflows

[4] We use the standard balance of payments accounting that comes from the International Monetary Fund (IMF) and has been employed in most previous articles. It defines "gross capital inflows" as the difference between foreign investors' purchases and sales of domestic assets, while "gross capital outflows" is defined as the difference between domestic residents' purchases and sales of foreign assets.

[5] They pointed out that net capital inflows and gross capital inflows have fluctuated differently from the late 1990s.

(the ratio to GDP) of our sample countries in the period from the first quarter of 1991 to the third quarter of 2016. Gross capital outflows (inflows) generate an increase in foreign assets (liabilities) in the possession of domestic (foreign) investors. Sample countries are Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Colombia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, India, Israel, Italy, Japan, Korea, Latvia, Malaysia, Morocco, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, United Kingdom, and United States. Figures 1 to 6, Figures 7 to 12, and Figures 12 to 17 show three types of gross capital flows in all sample countries, developed economies, and emerging economies, respectively.[6]

Figures 1 and 2 demonstrate fluctuations in gross capital outflows (foreign assets) and inflows (foreign liabilities) of foreign direct investments (FDI) in the total sample countries, which show that the gross capital outflows and inflows fluctuates similarly. They increased from the fourth quarter of 2001 to the fourth quarter of 2007 and declined dramatically from the first quarter of 2008 to the second quarter of 2009. The volatilities of capital outflows and inflows have been smaller since the third quarter of 2009 than the period during the GFC, while they have still been larger in the period from 1991 to 1995. In addition, the volatilities were large from the third quarter of 1998 to the third quarter of 2001.

Figures 3 and 4 present how gross capital outflows and inflows of portfolio investments change in the total sample countries. While both foreign assets and liabilities went up in the period from around the third quarter of 2002 to the second quarter of 2007, the size of increase in foreign liabilities (Figure 4) were larger than that of foreign assets (Figure 3). After the GFC, foreign assets and liabilities fell into negative flows in the fourth quarter of 2008. Compared to foreign direct investment flows, the volatility of portfolio investment flows was larger after the GFC.

Figures 5 and 6 depict fluctuations in gross capital outflows and inflows of other investments in the total sample countries. Foreign assets and liabilities exhibit a similar trend. After the peak increase in the first quarter of 2007, they declined and became negative flows from the second quarter of 2008 to the fourth quarter of 2009, except for the third quarter of 2008. They exhibited lower volatilities before 1996.

Figures 7 to 12 illustrate fluctuations in foreign assets (gross outflows) and liabilities (gross inflows) in developed economies. They exhibit similar trends to those of total sample countries. It suggests that capital flow fluctuations of the total sample countries reflect those of the developed economies.

Meanwhile, Figures 13 to 18 show that capital flow fluctuations in emerging economies are different from those of developed economies. Figure 13 and 14 present fluctuations in

[6] We follow the IMF's definition based on the level of per capita income when classifying countries as developed or emerging economies. Developed economies in the sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Israel, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom, and United States. Emerging economies are Brazil, Bulgaria, Colombia, Czech Republic, Hungary, India, Latvia, Malaysia, Morocco, Poland, Russia, Slovakia, Slovenia, South Africa, and Thailand.

Figure 1. FDI assets (ratio to GDP)

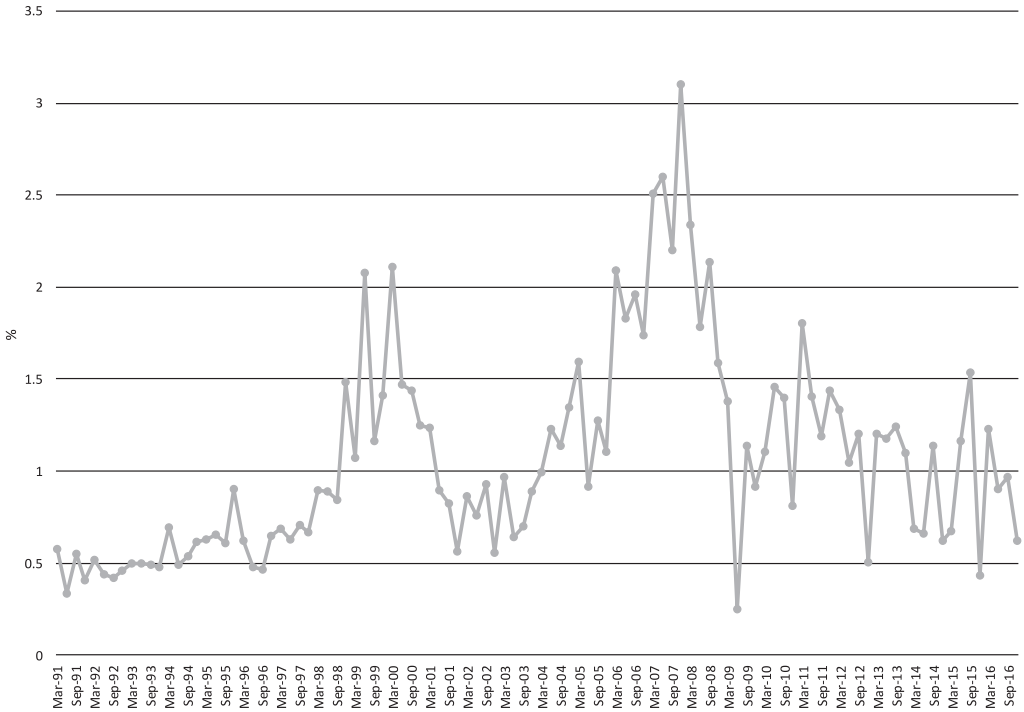


Figure 2. FDI liabilities (ratio to GDP)

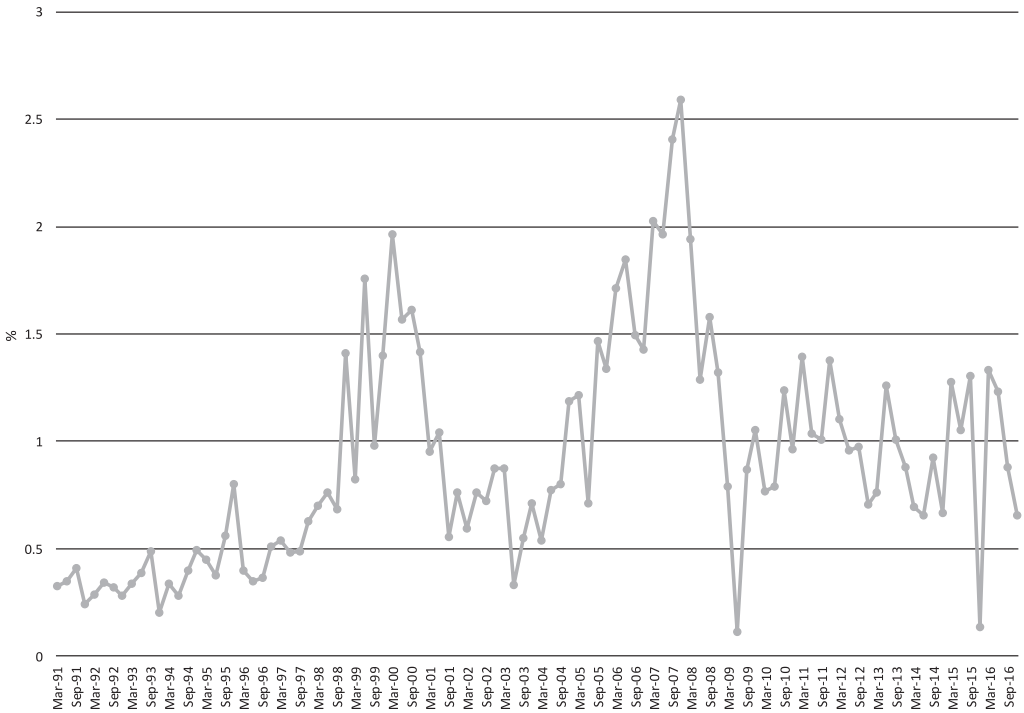


Figure 3. Portfolio investment assets (ratio to GDP)

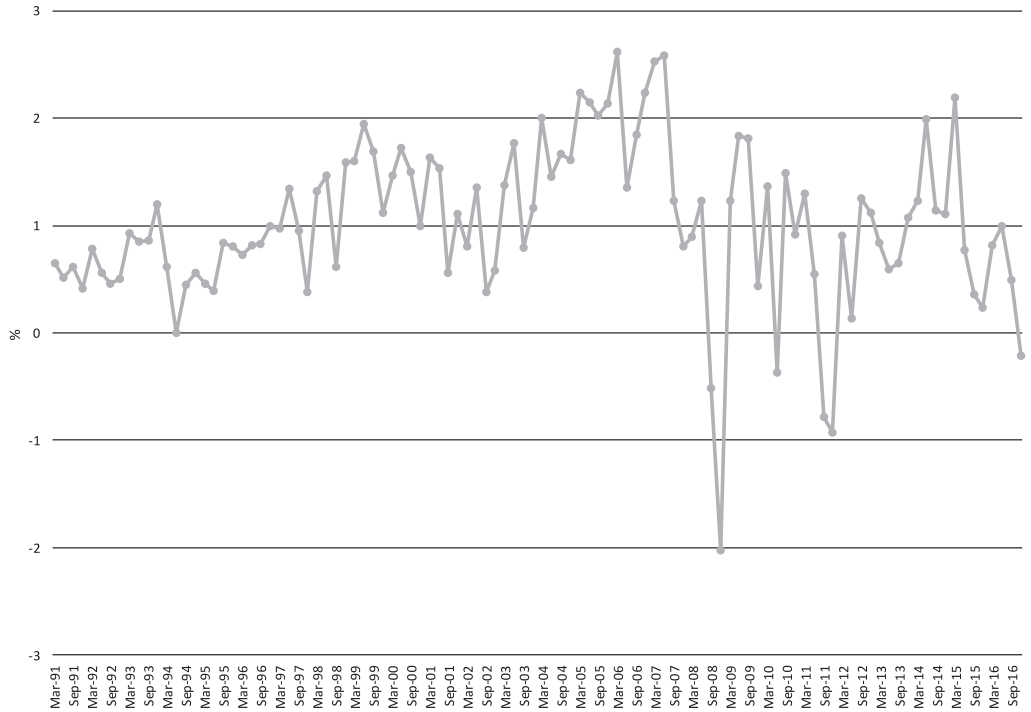


Figure 4. Portfolio investment liabilities (ratio to GDP)

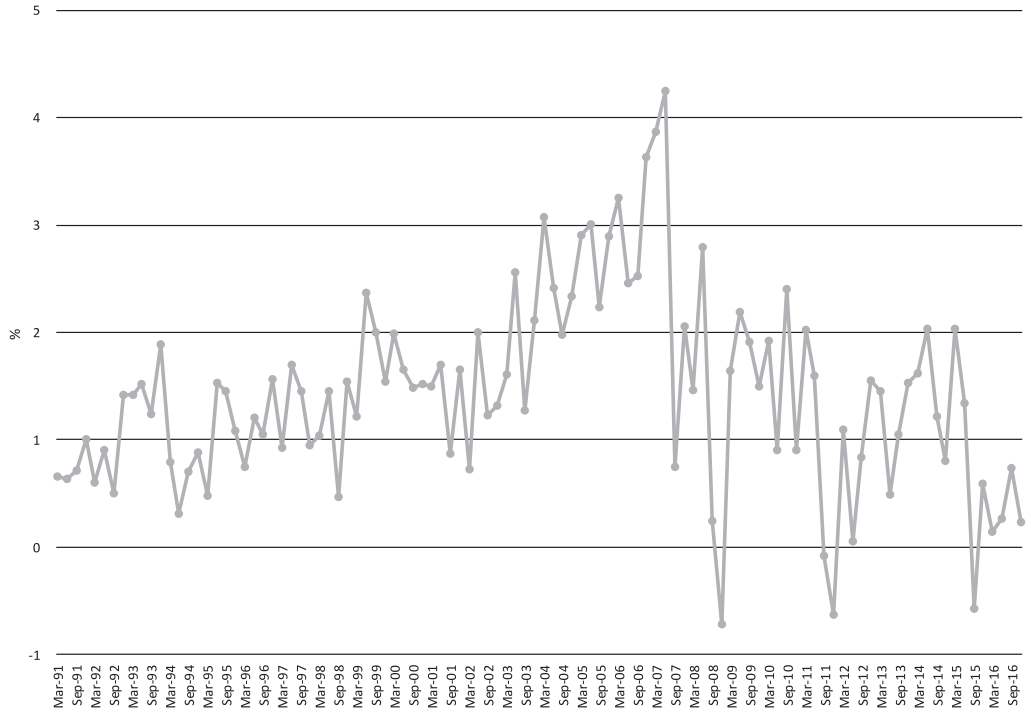


Figure 5. Other investment assets (ratio to GDP)

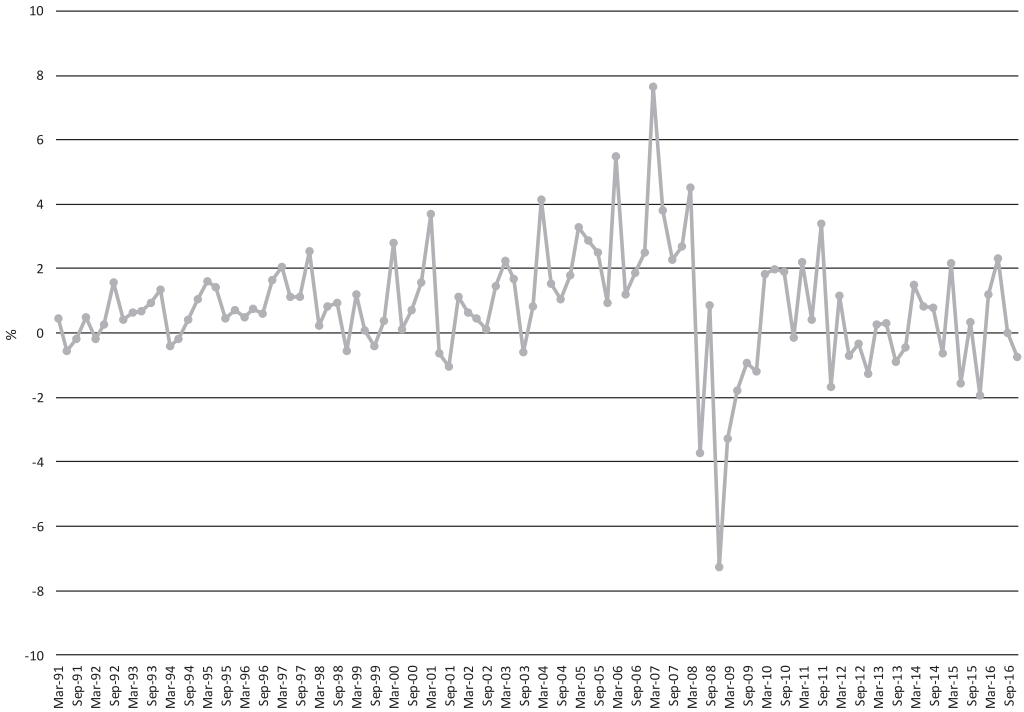


Figure 6. Other investment liabilities (ratio to GDP)

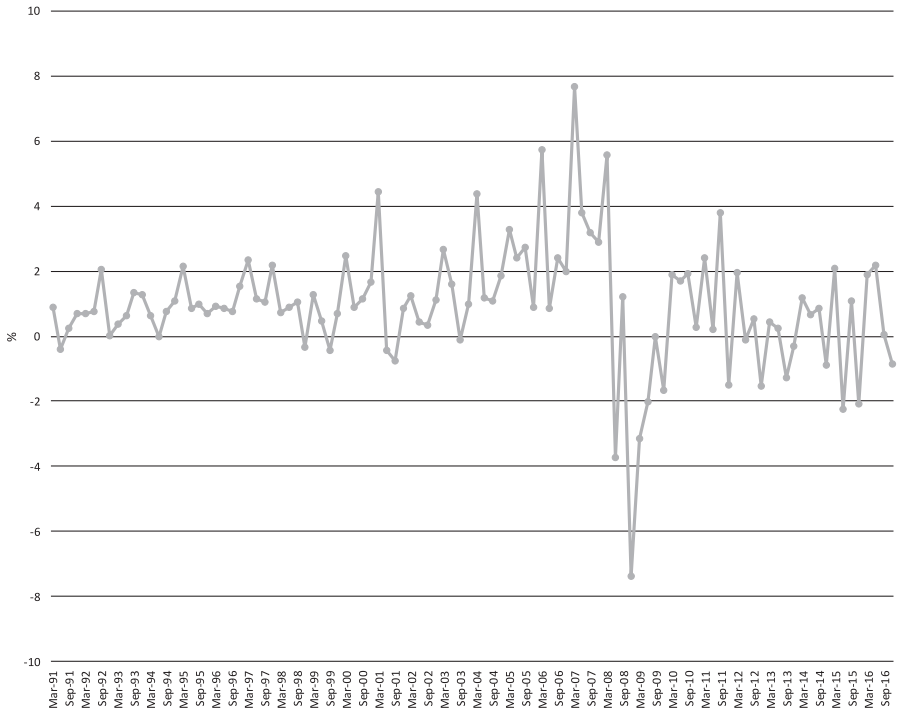


Figure 7. FDI assets (ratio to GDP): developed economies

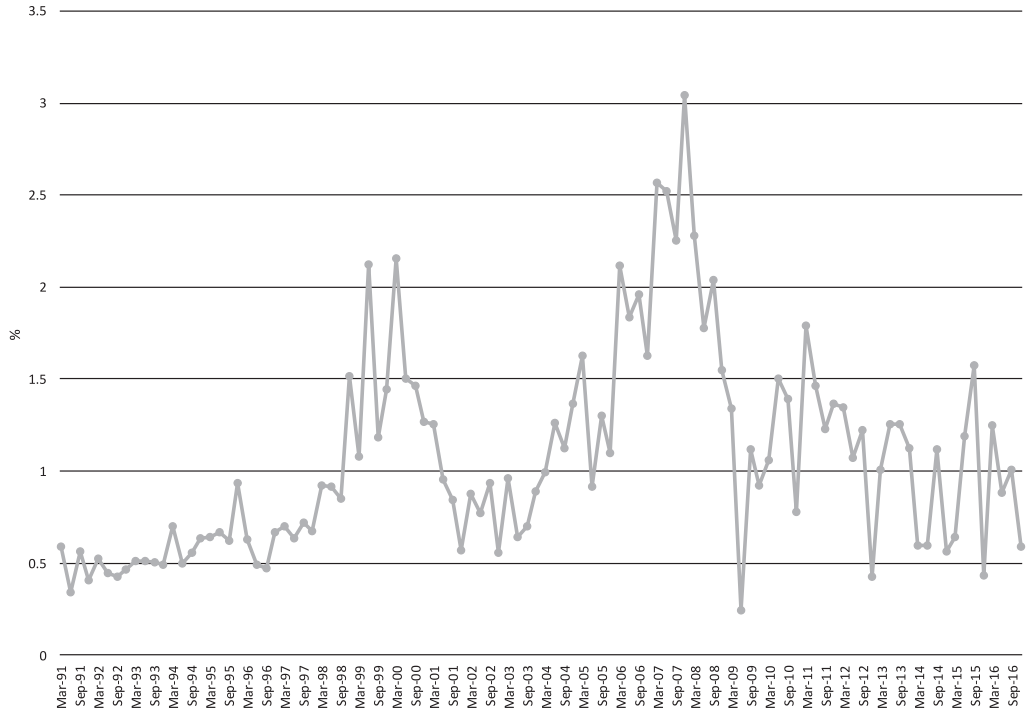


Figure 8. FDI liabilities (ratio to GDP): developed economies

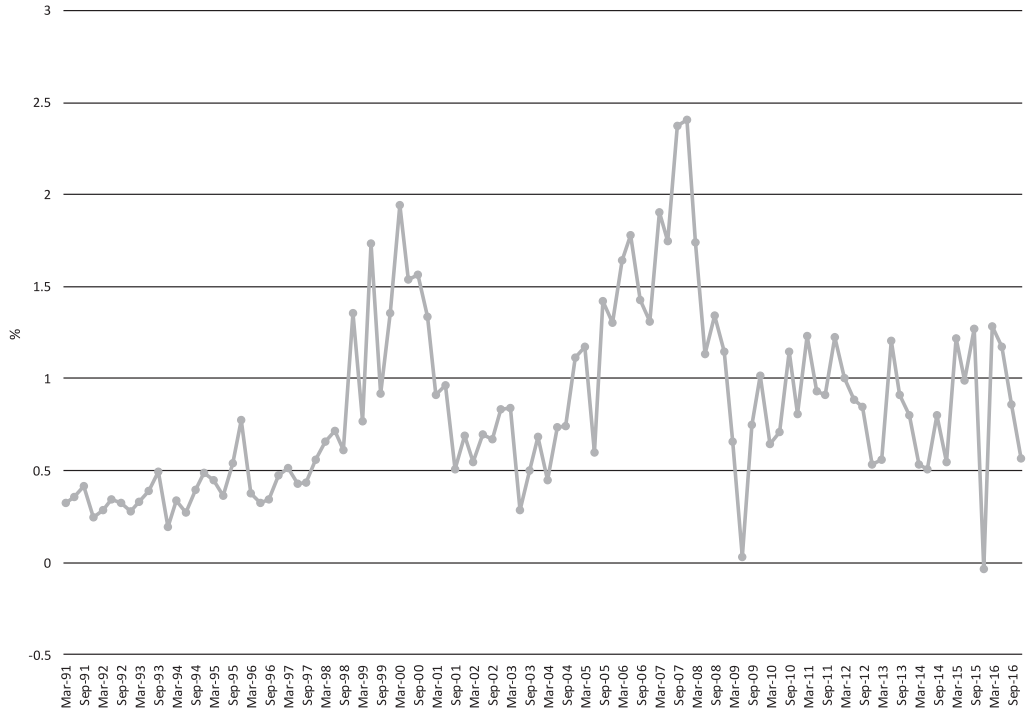


Figure 9. Portfolio investment assets (ratio to GDP): developed economies

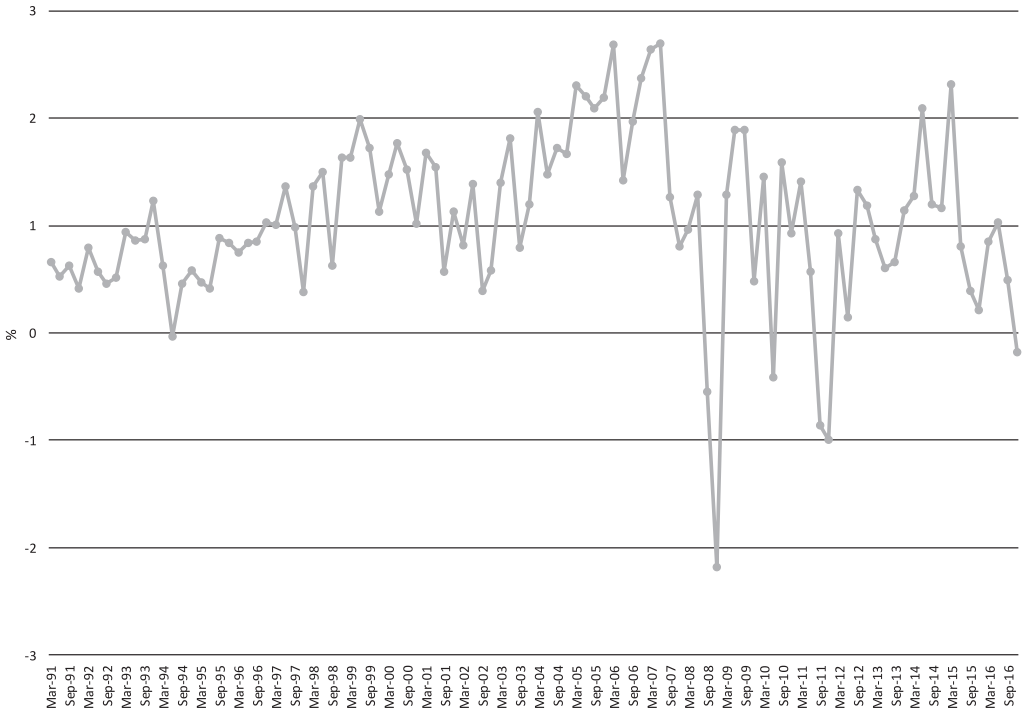


Figure 10. Portfolio investment liabilities (ratio to GDP): developed economies

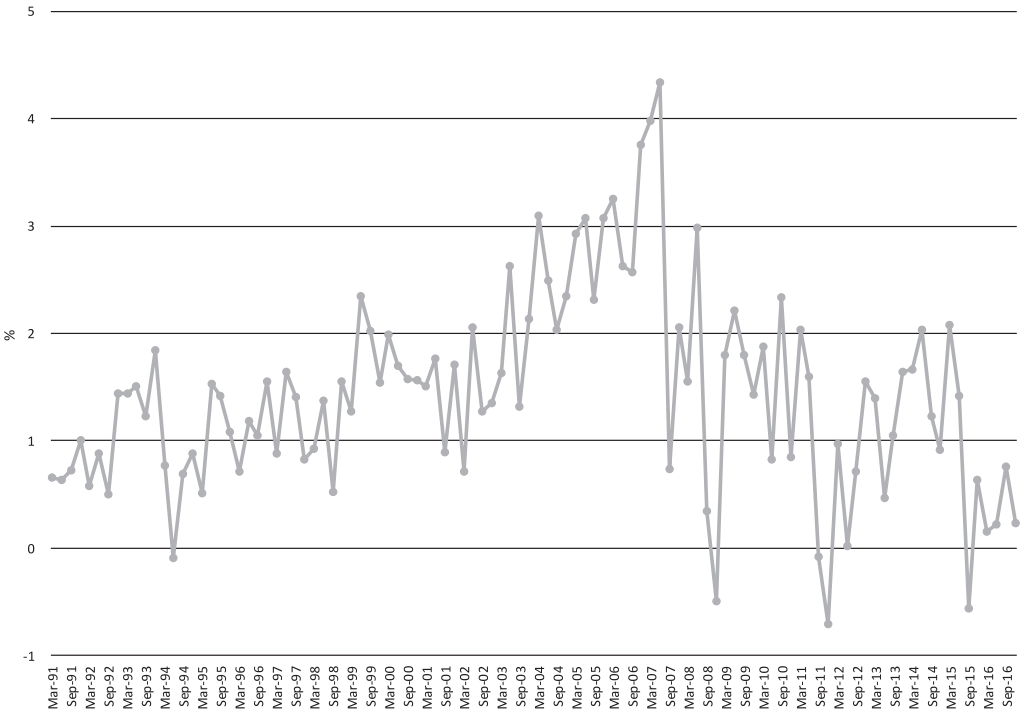


Figure 11. Other investment assets (ratio to GDP): developed economies

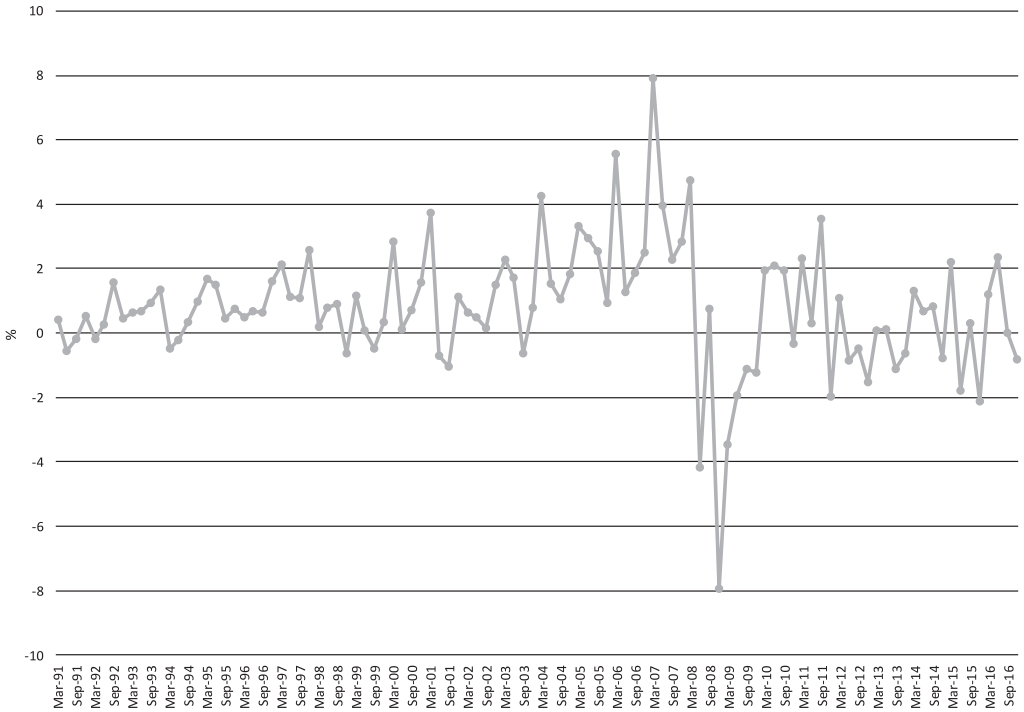


Figure 12. Other investment liabilities (ratio to GDP): developed economies

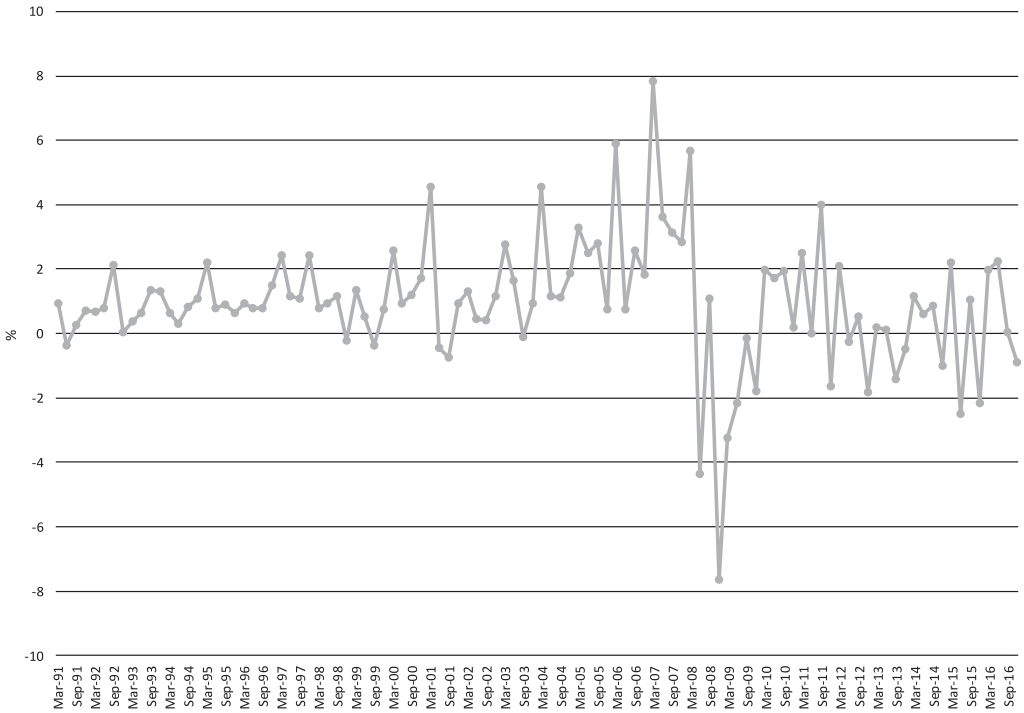


Figure 13. FDI assets (ratio to GDP): emerging economies

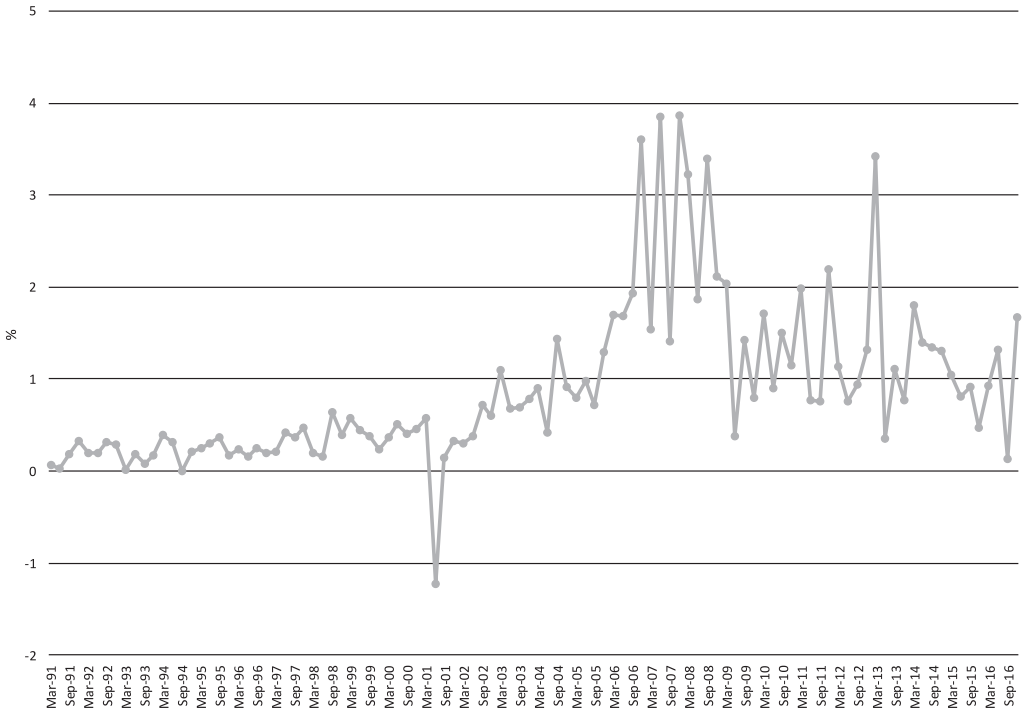
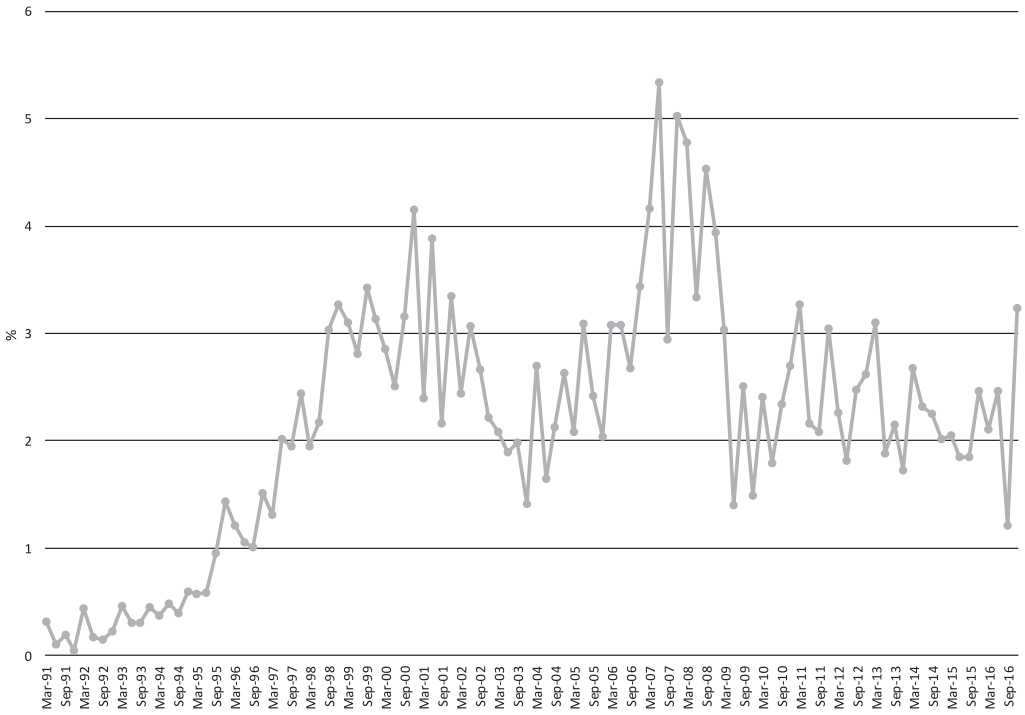


Figure 14. FDI liabilities (ratio to GDP): emerging economies



gross capital outflows and inflows of FDI in emerging economies. Foreign assets of FDI trend upwards until the fourth quarter of 2006 after negative inflows in the second quarter of 2001 (Figure 13). They exhibited low volatility from 1991 to 2000, compared to other periods, but large volatility after 2007. Foreign liabilities of FDI trended upwards from 1991 to 2000 and their volatility was multiplied after this period (Figure 14). Capital inflows declined from 2001 to 2003, increased until the second quarter of 2007, and subsequently decreased.

Figures 15 and 16 illustrate how capital outflows and inflows of portfolio investment in emerging economies have changed. It is worth noting that capital flows fluctuate greatly during sample period and sizes and volatilities of foreign assets and liabilities do not exhibit any specific trends, although the foreign liabilities of portfolio investment showed a large negative flow in the fourth quarter of 2008. Figure 17 illustrates that foreign assets of other investment in emerging economies also exhibited large volatility in the entire period. Figure 18 shows the fluctuation in foreign liabilities of other investment and the large capital inflows from the fourth quarter of 2006 to the third quarter of 2008. After those rises, capital inflows were negative in the fourth quarter of 2008 and the first quarter of 2009, while they also fell into negative territory frequently from 1991 to 2002.

The statistical overview of capital flows (the ratio to GDP) suggests that fluctuation of gross capital flows, especially portfolio investment and other investment, in emerging economies are different from those of developed economies. Capital flows in emerging econo-

Figure 15. Portfolio investment assets (ratio to GDP): emerging economies

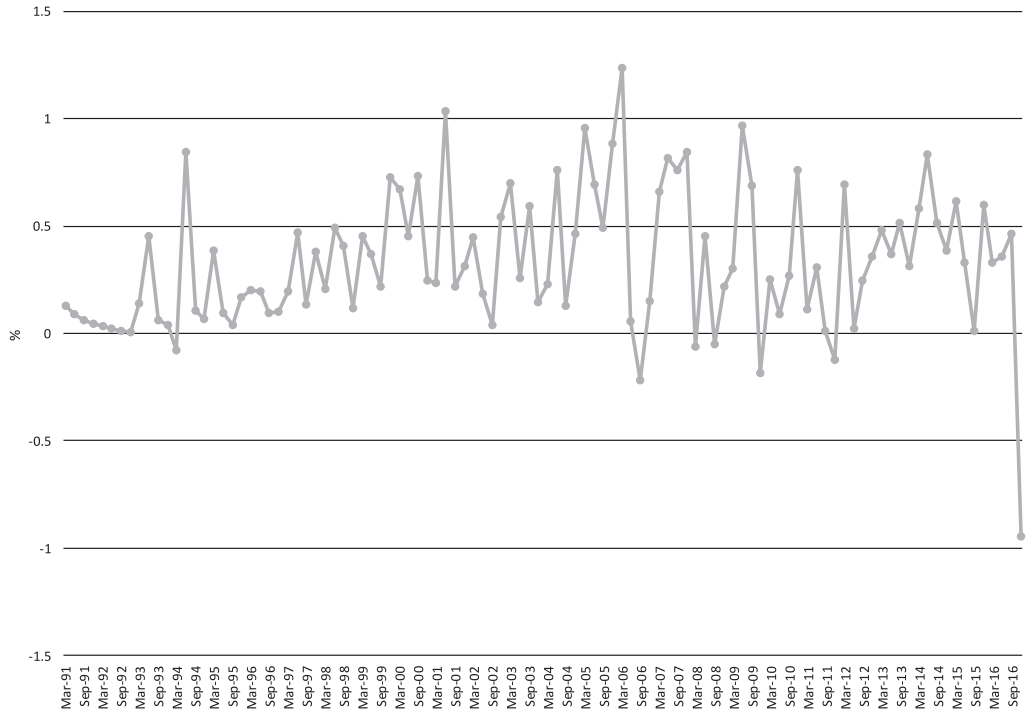


Figure 16. Portfolio investment liabilities (ratio to GDP): emerging economies

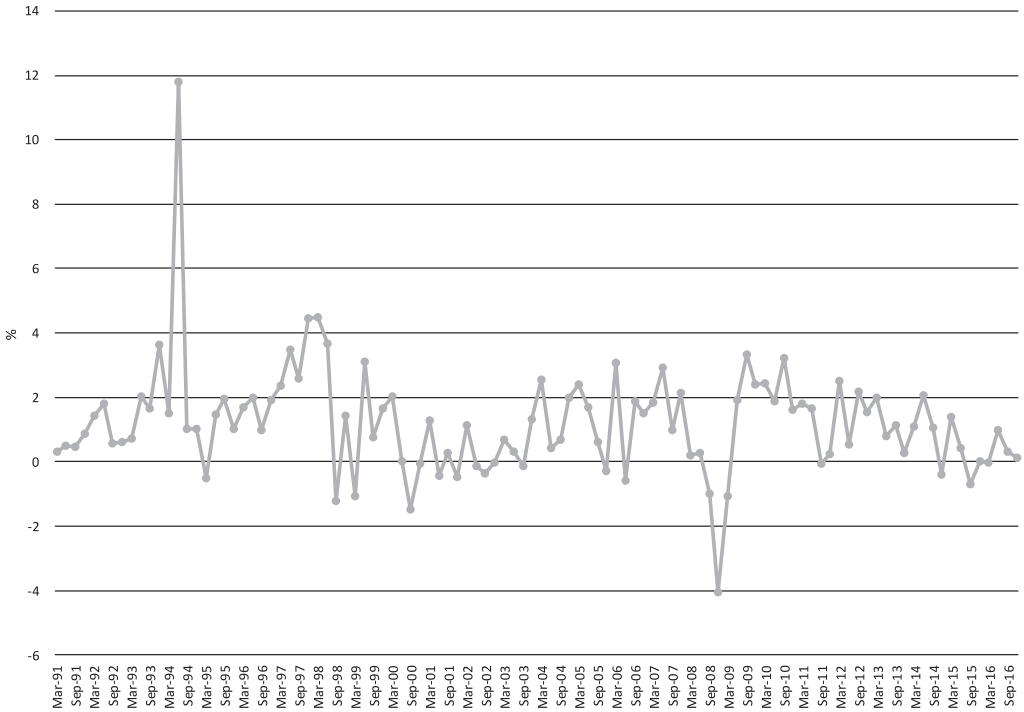


Figure 17. Other investment assets (ratio to GDP): emerging economies

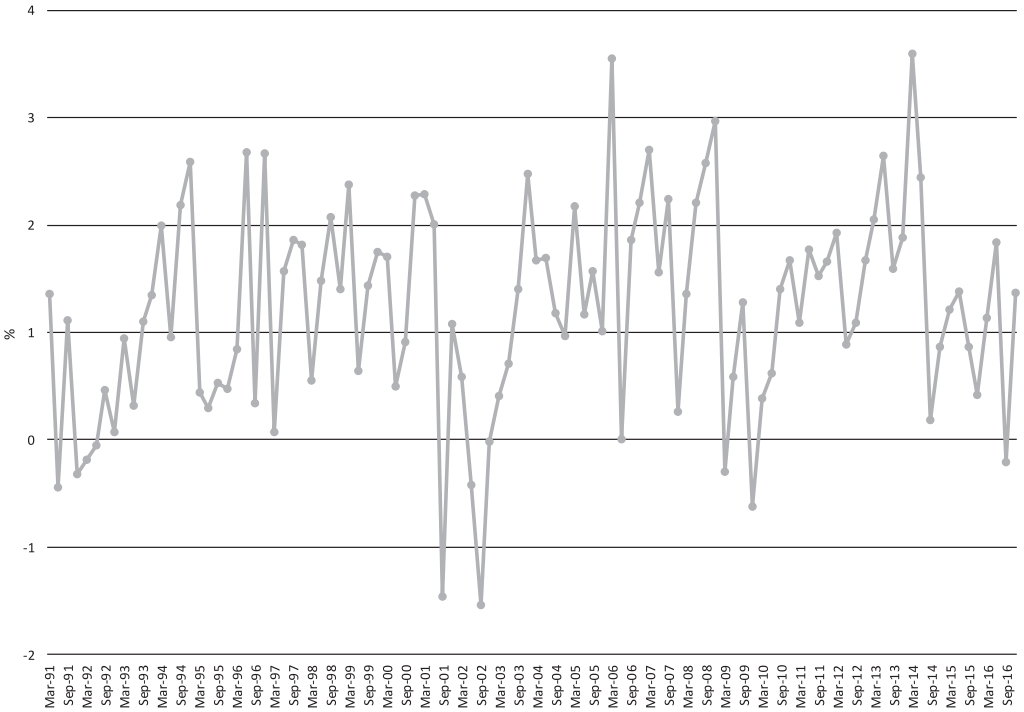


Figure 18. Other investment liabilities (ratio to GDP): emerging economies

mies do not exhibit a specific trend. The size and volatility of capital flows in developed economies tend to become larger during the GFC than before. In particular, outflows and inflows of portfolio investment have remained large since the GFC.

III. Regression analysis

III-1. Methodology

This paper regresses gross capital outflows and inflows on global and domestic factors. The estimation employs foreign assets and liabilities of three types of capital flows (FDI, portfolio investment, and other investment) as dependent variables to explore how factors affecting capital flows differ among capital flow types. In addition, we divide sample countries and periods into subsamples of developed and emerging economies and subsample periods of before and after the GFC, respectively. Following previous articles, we employ global and domestic factors as explanatory variables. The factors affecting capital flows that the analysis uses are domestic economic growth, global money supply, global economic growth, interest rate difference between domestic and major countries' rates, foreign stock price, global risk, and capital flow openness. The variables of domestic economic growth and global economic growth are the change rates of real GDP of each country and the world, respectively. While the global money supply is calculated by the change rate of the sum of

M2 of the euro area, Japan, and the United States and M4 of the United Kingdom from the same period of the preceding year, the value of interest rate difference is the difference between average long-term interest rates among euro area, Japan, the United Kingdom, and the United States and domestic long-term interest rates.[7] We employ the change rate of the US stock market index S&P 500 as the variable foreign stock price and the change rate of the VIX as the global risk variable[8].

Many previous studies used those explanatory variables. For example, Forbes and Warnock (2012), Agosin and Huaita (2012), Fratzscher (2012), Molnar *et al.* (2013), and Nier *et al.* (2014) employed the domestic real GDP growth rate as domestic factors of capital flows. Forbes and Warnock (2012) and Mercado and Park (2011) used explanatory variables of global money supply, international interest rate, and foreign stock price in the regression for capital flows. The variables of global money supply in this paper are configured in a similar way to those of Forbes and Warnock (2012). In addition, we use the world real GDP growth rate utilized by Forbes and Warnock (2012).[9] We employ the change rate of the US stock market index S&P 500 and the change rate of the VIX. Regarding the variable for foreign stock price, Forbes and Warnock (2012) employed S&P 100, while Mercado and Park (2011) utilized the world stock price index. For global financial risk, many studies, such as Fratzscher (2012), Molnar et al. (2013), and Nier et al. (2014), employed the VIX.[10] The regression equation in this study includes the change rate of the S&P 500 or the change rate of the VIX, because they are indices of the US stock market and their correlation is high. In connection with the difference between the domestic and global interest rate, Ahmed and Zlate (2014) and Mercado and Park (2011) note factors related to capital inflows. Ahmed and Zlate (2014) suggested that interest rate differences between developed and emerging economies can be influential variables for net inflows to emerging economies. The global interest rates that we use in order to construct the variable on interest rate difference are calculated in the same way as in Forbes and Warnock (2012).

We also introduce variables for capital controls into the equation of estimation. These are dummy variables constructed using the KAOPEN index from Chinn and Ito (2008). The KAOPEN index is a measure for the extent of financial account openness and it is made by the principal components of variables about exchange rates, restrictions on current and financial account transactions, and the surrender of export proceeds that is reported in IMF. The higher the KAOPEN index is, the more open (lower restriction) the cross-border capital transaction is. Although many previous studies employed this index as a variable of capital openness, its frequency is annual and does not match our analysis using quarterly data. Therefore, we divide the sample countries into five groups on the basis of extent of openness and use four dummy variables following the KA_OPEN index created by Chinn and

[7] When we calculate global money supply, the money supply of each country and area is denominated in the US dollar. The exchange rate between the Euro and the US dollar before the fourth quarter of 1998 is based on Anderson *et al*. (2011).
[8] Rey (2015) claims that the level of capital flows influences the impact of VIX on stock prices.
[9] Mercado and Park (2011) used the one-lagged change rate of the world real GDP.
[10] Forbes and Warnock (2012) utilized the VXO that is the former index of VIX, because their sample period was long.

Ito (2008). KA_OPEN ranges between 1.00 to 0.00 and measures how capital openness of each country is lower than normalized the US financial account openness as 1.00. It means that a country which scores variable 1.00 by KA_OPEN index has the same level of openness as the United States, while a country with variable 0.00 has the lowest level of openness.

In our regression, the benchmark countries have extent of financial account openness that is the same as the extent of the United States and other countries that have higher restriction of openness than the United States are categorized into four groups according to intensity of restriction. We make these four variables as follows: dummy variable 1 that takes the value of one whenever a country's openness index is 0.939597-0.758389115 and otherwise zero, dummy variable 2 that takes the value of one whenever a country's openness index is 0.697986424-0.509572864 and otherwise zero, dummy variable 3 that takes the value of one whenever a country's openness index is 0.49042719-0.346905202 and otherwise zero, and dummy variable 4 that takes the value of one whenever a country's openness index is 0.286502451-0.00 and otherwise zero. Because any one of the four dummy variables tends to take the value of one for emerging countries and every dummy variable takes zero for developed countries, we employ capital control dummy variables only in the analysis for total sample countries.

The regression equation we estimate is as follows:

$$Flow_{i,t} = \alpha + \beta_1\, Domestic\ growth_{i,t} + \beta_2\, Global\ money\ supply_t + \beta_3\, Global\ growth_t + \beta_4\, Interest\ \ differential_{i,t} + \beta_5\ \ X_t + Openness1 + Openness2 + Openness3 + Openness4 + \varepsilon_{i,t}$$

where

$Flow_{i,t}$: three categories (FDI, portfolio investment, and other investment) of capital outflows and inflows for country i and period t, expressed as a ratio of country i's GDP,

$Domestic\ growth_{i,t}$: real GDP growth rate of country i and in period t,

$Global\ money\ supply_t$: change rate of the sum of M2 in the United States, the euro area, and Japan, and M4 in the U.K. in period t from the previous year,

$Global\ grwoth_t$: world real GDP growth rate in period t,

$Interest\ differental_{i,t}$: difference rate in period t between domestic long-term interest rate of country i and global interest rate calculated by the average long-term rate in the euro area, Japan, the United Kingdom, and the United States,

X_t: *Global stock price* variable (change rate of S&P500) or *Global risk* variable (change rate of the VIX)

*Openness*1, *Openness*2, *Openness*3, *Openness*4: dummy variables for capital control that is categorized by the extent of capital openness,

$\varepsilon_{i,t}$: residual error term

In addition, the regression equation for capital inflows and outflows of other investment includes the explanation variable of foreign reserve ratio to domestic GDP (*Reserve*), because the intervention in the foreign exchange market by the authorities produces fluctua-

tions of other investments through moving the level of foreign reserves.

The analysis employs a generalized method of moments (GMM) type estimation method, using panel data given that the problems of endogeneity between capital flows and explanatory variables might influence the results.[11]

When the domestic real GDP growth, change rate of global money supply, world real GDP growth, and change rate of US stock index rise, each country's capital outflows and inflows would increase. Therefore, the sign of coefficients on *Domestic growth, Global money supply, Global growth*, and *Global stock price* is expected to be positive. Because an increment on interest rate differences means that domestic interest rate becomes large compared to global interest rate, capital outflows (inflows) would be declined (increased). It suggests that the coefficient *Interest differential* is anticipated to negative in the regression for foreign assets (capital outflows) and positive for foreign liabilities (capital inflows). As a rise in the VIX indicates the increment of global risk and it lessens the capital outflows and inflows, the coefficient of *Global risk* is expected to be negative. The coefficients for capital control dummies (*openness1*, *openness2*, *openness3*, and *openness4*) would be negative, because the capital outflows and inflows to countries which openness are lower than the United States are anticipated to be smaller than those of benchmark countries.

III-2. Data and terms

The regression uses subsample countries and periods divided from total samples. To explore if the factors of capital flows vary on emerging economies and developed economies, one of the subsamples is emerging economies and the other is developed economies. This clarification has been described at the footnote 6. Because we use the US market indices as variables for the global factors, total sample countries do not include the United States.

Total sample period is from the first quarter of 2003 to the fourth quarter of 2015 and this is divided into the subsample period before the GFC and the subsample period during and after the GFC.[12] The regressions for total sample countries and emerging economies set the subsample period before the GFC from the first quarter of 2003 to the first quarter of 2007 and the subsample period since the GFC from the second quarter of 2007 to the fourth quarter of 2015, because Figures 1 to 18 shows that flows and their volatility have been larger since the second quarter of 2007 than before.[13] The total sample period of the analysis for developed economies starts from the first quarter of 1992 because of richer amounts of data than emerging economies.[14] In the regression for developed economies, in addition to before the GFC period from the first quarter of 1992 to the first quarter of 2007, we estimate the

[11] We use the first or the second-lagged variables as instruments for the explanatory variables.

[12] The reason why the end of total sample period is set on the fourth quarter of 2015 is that we could not obtain KAOPEN after 2015.

[13] In mid-2007, a number of other hedge funds exposed to subprime loans and rating agencies Moody's and Standard & Poor's dramatically reduced their ratings on securitized bonds backed by subprime mortgages.

[14] Singapore is included in sample countries only in the regression period after the GFC due to the data limitation of long-term interest rates.

Table 1. Basic statistics

	Total sample: Q1. 2003 - Q4. 2015					Developed economies: Q1. 1992 - Q4. 2015					Emereging economies: Q1. 2003 - Q4. 2015				
Variables	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
FDI assets	1,969	0.03929	0.11085	-0.99537	1.13508	1,939	0.04731	0.35340	-4.45827	13.68466	773	0.01884	0.07360	-0.54825	0.84744
FDI liabilities	1,969	0.04513	0.10600	-0.60508	1.22877	1,939	0.03601	0.09589	-0.53024	1.22877	773	0.04014	0.08165	-0.60508	0.83505
Portfolio investment assets	1,951	0.03231	0.08014	-0.50563	0.56928	1,939	0.05070	0.24684	-0.50563	7.29398	755	0.01000	0.03160	-0.29478	0.25771
Portfolio investment liabilities	1,969	0.03367	0.20539	-1.20404	7.32899	1,939	0.12300	1.56942	-1.20404	45.65341	773	0.01546	0.05047	-0.24899	0.36082
Other investment assets	1,917	0.03388	0.18956	-1.58845	1.85317	1,939	0.00994	1.16226	-31.91372	19.89019	721	0.01542	0.05450	-0.29695	0.29846
Other investment liabilities	1,917	0.03875	0.27212	-1.79068	7.80928	1,939	0.04041	0.87487	-15.94825	19.42027	721	0.02113	0.07994	-0.30087	0.44997
Domestic growth	1,894	0.02518	0.03374	-0.11151	0.18999	2,056	0.02173	0.02905	-0.10734	0.16327	698	0.03821	0.03486	-0.11151	0.15413
Global money supply	1,976	0.05548	0.06125	-0.06864	0.17202	2,112	0.04707	0.05694	-0.06864	0.17202	780	0.05548	0.06127	-0.06864	0.17202
Global economic growth	1,976	0.03651	0.01749	-0.01873	0.07302	2,112	0.03409	0.01473	-0.01873	0.07302	780	0.03651	0.01750	-0.01873	0.07302
Interest rate differential	1,950	0.01551	0.02444	-0.02525	0.23378	2,091	0.00989	0.02272	-0.04176	0.23378	763	0.02933	0.02420	-0.00924	0.12005
Global stock price	1,976	0.01847	0.06400	-0.27328	0.11709	2,112	0.01944	0.06015	-0.27328	0.12807	780	0.01847	0.06402	-0.27328	0.11709
Global risk	1,976	0.01676	0.27372	-0.38971	1.34164	2,112	0.02031	0.22941	-0.38971	1.34164	780	0.01676	0.27383	-0.38971	1.34164
Reserve	1,957	0.01350	0.06138	-0.70731	0.78228	1,891	0.03127	0.88480	-7.69239	28.80322	773	0.01809	0.05891	-0.33035	0.39049

Notes: Capital outflows and inflows are expressed as ratio of GDP, *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global economic growth* is world real GDP growth rate, *Interest rate differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Reserve* is change in foreign reserve (ratio to domestic GDP).

subsample period from the first quarter of 1992 to the second quarter of 1997 when the volatility of capital flows was smaller than after this period.

We use quarterly data on three categories of capital inflows and outflows (FDI, portfolio investment and other investment) and variables for capital flow factors. All data are from the IMF Balance of Payments Statistics and the CEIC database. Basic statistics of variables that are used in estimation are provided by Table 1.

III-3. Regression results

Tables 2-7, Tables 8-13, and Tables 14-19 report regression results obtained from total sample countries, developed economies, and emerging economies respectively.

III-3-1. Results for total sample countries

Tables 2 and 3 show results for FDI assets (capital outflows) and FDI liabilities (capital inflows). The coefficients on *Domestic growth, Global stock price* in the regression before the GFC, and *Global money supply* in the regression since the GFC are positive and significant in FDI outflows and inflows. However, the coefficients on *Global risk* and *Global money supply* in the regression before the GFC have an unexpected sign. In the regression for FDI assets (Table 2), dummy variables for capital control are significantly negative except for the dummy variable *openness2*. On the contrary, every dummy variable for capital control is significant and negative for FDI liabilities (Table 3). Therefore, FDI inflows are small in almost capital control-introduced countries that have less openness compared to the United States.

Tables 4 and 5 shows the results for portfolio assets and liabilities in the test on total sample countries. Table 4 depicts that portfolio assets (outflows) are influenced by variables of global stock price, global money supply since the GFC, and global risk since the GFC, while the coefficient of global money supply before the GFC has a negative sign which is

Table 2. Determinants of FDI assets: total sample countries

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	0.27487 ***	0.27957 ***	0.44752 ***	0.49199 ***	0.26676 ***	0.19018 ***
std.err.	0.02595	0.04545	0.11973	0.12767	0.03376	0.04207
Global money supply	0.08161 ***	0.08141 ***	-0.14062 ***	-0.12566 ***	0.17107 ***	0.16522 ***
std.err.	0.01295	0.00967	0.01636	0.01805	0.01527	0.01555
Global growth	0.08964 ***	-0.02831	-0.02458	-0.17025 *	0.00924	-0.00947
std.err.	0.03457	0.03510	0.09710	0.08796	0.03298	0.02837
Interest differential	-0.10224	-0.06886	-0.19563	-0.21531	-0.07940	-0.04357
std.err.	0.10480	0.11017	0.15010	0.15224	0.07483	0.06578
Global stock price	-0.07514 ***		0.01243 *		-0.06487 ***	
std.err.	0.00830		0.00713		0.00747	
Global risk		0.01139 ***		0.02332 ***		0.00728 ***
std.err.		0.00200		0.00697		0.00221
Openness1	-0.03236 ***	-0.03059 ***	-0.03908 ***	-0.03653 ***	-0.02985 ***	-0.02318 ***
std.err.	0.00399	0.00385	0.00700	0.00703	0.00389	0.00428
Openness2	-0.00661	-0.01115 *	0.01911 **	0.02192 *	-0.02987 ***	-0.01850 ***
std.err.	0.00623	0.00672	0.00968	0.01134	0.00471	0.00574
Openness3	-0.03908 ***	-0.03948 ***	-0.05562 ***	-0.05273 ***	-0.03833 ***	-0.02831 ***
std.err.	0.00519	0.00590	0.00886	0.00909	0.00426	0.00608
Openness4	-0.04705 ***	-0.04622 ***	-0.06275 ***	-0.05953 ***	-0.04369 ***	-0.03473 ***
std.err.	0.00449	0.00528	0.00999	0.01041	0.00445	0.00563
Constant	0.03765 ***	0.03915 ***	0.06097 ***	0.06330 ***	0.03821 ***	0.03203 ***
std.err.	0.00458	0.00331	0.00565	0.00517	0.00263	0.00339
Hansen's J -statistics (p-value)	0.2564	0.5275	0.3434	0.3993	0.2772	0.5884
Number of observation	1866	1866	619	619	1247	1247

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Openness1, Openness2, Openness3, and Openness4* are capital control dummy variables.

contrary to expectation. All dummy variables for capital control are significant and negative. Table 5 reports the results for portfolio liabilities (inflows) that are different from the results for portfolio assets. The coefficients on *Global money supply* before the GFC, *Domestic growth*, and *Global risk* have the expected sign, although the coefficients on *Interest differential, Global growth* since the GFC, and *Global money supply* since the GFC have unexpected signs. The dummy variable *openness3* and *openness4* indicating the first and the second lower openness groups (higher restriction groups) among countries that have capital controls are significantly negative since the GFC.

Table 6 shows that the coefficient on *Global risk* since the GFC is significantly negative and the coefficients on *Domestic growth* and *Global stock price* are significant and positive in the regression for other investment assets (outflows). In Table 7, other investment liabilities (inflows) are influenced by variables for domestic growth, global money supply since the GFC, global stock price since the GFC, global risk since the GFC, and foreign reserve since the GFC. The capital control dummy variables for the top two lower openness (higher

Table 3. Determinants of FDI liabilities: total sample countries

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	0.57477 ***	0.70001 ***	1.21529 ***	1.10620 ***	0.53650 ***	0.59048 ***
std.err.	0.08869	0.07185	0.11978	0.16004	0.09181	0.06618
Global money supply	0.02086	0.03466 **	-0.17515 ***	-0.14387 ***	0.11150 ***	0.14222 ***
std.err.	0.01826	0.01365	0.01694	0.01490	0.01581	0.01329
Global growth	-0.20272 **	-0.34234 ***	-0.61083 ***	-0.52849 ***	-0.25114 ***	-0.30062 ***
std.err.	0.08510	0.06127	0.16716	0.14863	0.07077	0.05268
Interest differential	0.08936	0.02825	0.12532	0.09648	0.13790	0.22035 **
std.err.	0.06932	0.15432	0.20185	0.13197	0.11043	0.11031
Global stock price	-0.07868 ***		0.05438 ***		-0.05700 ***	
std.err.	0.00651		0.01974		0.00859	
Global risk		0.01940 ***		0.01889 *		0.01377 ***
std.err.		0.00233		0.01033		0.00193
Openness1	-0.03206 ***	-0.03216 ***	-0.03877 ***	-0.02344 ***	-0.02758 ***	-0.03697 ***
std.err.	0.00552	0.00476	0.00793	0.00693	0.00518	0.00428
Openness2	-0.02207 ***	-0.02503 ***	-0.02272 ***	-0.01765 ***	-0.02729 ***	-0.03954 ***
std.err.	0.00641	0.00696	0.00604	0.00585	0.00731	0.00641
Openness3	-0.03232 ***	-0.03654 ***	-0.05055 ***	-0.04648 ***	-0.03298 ***	-0.04366 ***
std.err.	0.00674	0.00681	0.00600	0.00755	0.00640	0.00548
Openness4	-0.04966 ***	-0.04925 ***	-0.07397 ***	-0.06916 ***	-0.04215 ***	-0.04862 ***
std.err.	0.00570	0.00906	0.01334	0.01124	0.00759	0.00825
Constant	0.04440 ***	0.04767 ***	0.05971 ***	0.05676 ***	0.04116 ***	0.04428 ***
std.err.	0.00413	0.00307	0.00690	0.00707	0.00385	0.00345
Hansen's J -statistics (p-value)	0.5056	0.2503	0.4878	0.4889	0.4467	0.2002
Number of observation	1866	1866	619	619	1247	1247

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Openness1, Openness2, Openness3, and Openness4* are capital control dummy variables.

restriction) groups are significantly negative since the GFC in both other investment assets and liabilities.

The regression result suggests that the driving factors of capital flows have varied since the GFC. The external factors, especially an increase (decline) of global risk and a decline (increase) on global money supply tend to reduce (amplify) capital flows since the GFC. The estimation for capital control dummy variables implies that stronger regulation on capital flows was effective during and after the GFC.

III-3-2. Results for developed economies

Tables 8 and 9 show the regression results for FDI assets (outflows) and FDI liabilities (inflows) in developed economies. Both FDI assets and liabilities are affected significantly by global economic growth before the GFC and domestic economic growth and global money supply since the GFC. The analysis for the period of 1990s (from the first quarter of 1992 to the second quarter of 1997) in which the volatility of capital flows is small comparing to other sample period reports that the coefficient on *Global growth* is significant and positive.

Table 4. Determinants of portfolio investment assets: total sample countries

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	0.22048 ***	0.15213 **	0.28139 ***	0.07376	0.00898	0.21177 ***
std.err.	0.07207	0.06558	0.06716	0.09778	0.08808	0.07751
Global money supply	0.07660 ***	0.05819 ***	-0.03989 ***	-0.03337 **	0.05647 ***	0.02666 ***
std.err.	0.01162	0.01471	0.01151	0.01429	0.01707	0.01024
Global growth	-0.00192	0.14048 ***	-0.10813 *	0.10213	-0.02159	-0.07727
std.err.	0.06169	0.05284	0.06579	0.10421	0.08271	0.07084
Interest differential	-0.10352	-0.23298	-0.13427	-0.28725 ***	-0.13710	-0.08075
std.err.	0.18630	0.15937	0.15170	0.11100	0.09695	0.13190
Global stock price	0.16816 ***		0.06072 ***		0.17315 ***	
std.err.	0.01463		0.01334		0.01512	
Global risk		-0.03658 ***		-0.00106		-0.03550 ***
std.err.		0.00315		0.00633		0.00287
Openness1	-0.02272 ***	-0.02118 ***	-0.04950 ***	-0.04523 ***	-0.00909 ***	-0.01277 ***
std.err.	0.00348	0.00356	0.00468	0.00397	0.00336	0.00268
Openness2	-0.01362 **	-0.01481 **	-0.03499 ***	-0.02624 ***	-0.00623	-0.01450 **
std.err.	0.00644	0.00590	0.00522	0.00533	0.00559	0.00653
Openness3	-0.03886 ***	-0.03395 ***	-0.07418 ***	-0.06163 ***	-0.01781 ***	-0.02651 ***
std.err.	0.00531	0.00548	0.00548	0.00561	0.00515	0.00455
Openness4	-0.03970 ***	-0.03300 ***	-0.07798 ***	-0.06443 ***	-0.01752 ***	-0.02706 ***
std.err.	0.00675	0.00660	0.00745	0.00623	0.00535	0.00420
Constant	0.03108 ***	0.03221 ***	0.07535 ***	0.07112 ***	0.02340 ***	0.02967 ***
std.err.	0.00297	0.00283	0.00480	0.00534	0.00238	0.00179
Hansen's J -statistics (p-value)	0.2934	0.3214	0.4175	0.3564	0.4193	0.2969
Number of observation	1848	1848	601	601	1247	1247

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Openness1, Openness2, Openness3, and Openness4* are capital control dummy variables.

Some coefficients on *Global stock price* and *Global risk* have unexpected signs.

The result for portfolio investment assets (outflows) of developed economies in Table 10 reports that the coefficient on *Global growth* is significantly positive before the GFC and the coefficients on *Global money supply, Global stock price*, and *Global risk* are expected sign and significant in the regression since the GFC. The coefficient on *Global growth* is not significant in the 1990s (the period until the second quarter of 1997), which differs from the result for the period before the GFC (until the first quarter of 2007). In addition, the coefficient on *Global money supply* before the GFC has a negative sign which is contrary to expectations. Table 11 depicts the result for portfolio investment liabilities (inflows) in developed economies. We find that global economic growth before the GFC, domestic economic growth and global stock price since the GFC, and global risk significantly influence portfolio investment inflows. The result in portfolio investment inflows for the period until the second quarter of 1997 differs from that of the period until the first quarter of 2007.

Tables 12 and 13 report the results for other investment assets (outflows) and liabilities (inflows) in developed economies. The regression for other investment assets shows that the

Table 5. Determinants of portfolio investment liabilities: total sample countries

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	1.24917 ***	1.14663 ***	0.87483 ***	0.84950 ***	1.06954 ***	1.14521 ***
std.err.	0.14719	0.15183	0.19818	0.20100	0.20588	0.19536
Global money supply	0.00098	-0.01693	0.05944 *	0.06853 **	-0.07784 ***	-0.08778 ***
std.err.	0.01389	0.02277	0.03244	0.03135	0.02409	0.02225
Global growth	-1.02160 ***	-0.88848 ***	-0.02612	0.12308	-1.17813 ***	-1.07814 ***
std.err.	0.18837	0.19605	0.17130	0.17624	0.22848	0.20896
Interest differential	-0.32362	-0.88780 **	-0.27342 *	-0.26542 *	-0.38945 **	-0.25133 *
std.err.	0.29706	0.34868	0.14390	0.15021	0.15911	0.14315
Global stock price	0.23131 ***		0.11896 ***		0.19900 ***	
std.err.	0.01742		0.02297		0.01439	
Global risk		-0.05915 ***		-0.02125 ***		-0.05326 ***
std.err.		0.00443		0.00806		0.00301
Openness1	-0.01404 **	-0.00498	-0.05098 ***	-0.05231 ***	0.00103	0.00317
std.err.	0.00555	0.00779	0.00924	0.00874	0.00710	0.00630
Openness2	0.05356 ***	0.06025 ***	0.19484 ***	0.19950 ***	-0.00263	-0.00724
std.err.	0.01052	0.00944	0.02955	0.02377	0.01122	0.01016
Openness3	-0.04385 ***	-0.02757 **	-0.05823 ***	-0.06034 ***	-0.01899 **	-0.02325 ***
std.err.	0.00842	0.01210	0.00962	0.00837	0.00843	0.00820
Openness4	-0.04946 ***	-0.03781 **	-0.06632 ***	-0.06960 ***	-0.03662 ***	-0.04269 ***
std.err.	0.01180	0.01718	0.01053	0.00975	0.01119	0.00993
Constant	0.04812 ***	0.05280 ***	0.01108 **	0.02557 **	0.04858 ***	0.04930 ***
std.err.	0.00711	0.00743	0.01063	0.01063	0.00811	0.00720
Hansen's J -statistics (p-value)	0.2535	0.3640	0.2045	0.1978	0.4196	0.3671
Number of observation	1866	1866	619	619	1247	1247

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Openness1, Openness2, Openness3, and Openness4* are capital control dummy variables.

coefficients on *Global money supply*, *Global stock price*, and *Global risk* are significant and have the expected sign (Table 12). The coefficient on *Reserve* before the GFC is significantly negative. For other investment liabilities (Table 13), the coefficients on *Global money supply* and *Global stock price* are significantly positive. In addition, the coefficients on *Domestic growth* and *Reserve* are significant and positive in the period since the GFC.[15] The result for 1990s do not imply noteworthy findings because the coefficients are not stable in Table 12 and no coefficient is significant in Table13.

The analysis on capital flows in developed economies claims that a rise in global risk can produce a fall of portfolio investment inflows and other investment outflows. An increase in global money supply can magnify capital outflows and inflows during and after the GFC except for portfolio inflows, and a rise of global stock price can increase all capital flows but FDI since the GFC. The driving factors of capital inflow are different before and

[15] One of the reasons why the coefficient on change in foreign reserves of developed economies is as reported is that the subsample of developed economies includes countries which intervene in their foreign exchange market.

Table 6. Determinants of other investment assets: total sample countries

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	1.56846 ***	1.22925 ***	2.26712 ***	2.34694 ***	1.27497 ***	1.21252 ***
std.err.	0.17637	0.34494	0.44218	0.35781	0.23007	0.17699
Global money supply	0.08700 **	0.09313 **	0.07053	0.15667 ***	0.15365 ***	0.07118
std.err.	0.04319	0.04619	0.05796	0.05911	0.04534	0.04645
Global growth	-0.07467	0.11102	-0.19671	-0.55288	0.05786	0.14015
std.err.	0.17726	0.27283	0.41345	0.38075	0.20381	0.20585
Interest differential	-0.00889	-0.00725	0.09639	0.01602	0.36442	0.50931
std.err.	0.50454	0.60854	0.45434	0.44486	0.35941	0.38704
Global stock price	0.17782 ***		0.18678 ***		0.16397 ***	
std.err.	0.03093		0.06873		0.03009	
Global risk		-0.01477 **		0.03833		-0.01693 ***
std.err.		0.00610		0.02454		0.00519
Reserve	-0.10217	-0.03343	0.19477	0.30485 **	-0.07655	0.06699
std.err.	0.15891	0.12594	0.15844	0.13301	0.05844	0.08704
Openness1	-0.02581 ***	-0.02170 **	-0.08667 ***	-0.08384 ***	-0.00416	-0.00465
std.err.	0.00827	0.00904	0.01305	0.01235	0.00703	0.00569
Openness2	-0.00733	-0.02184	0.01726	-0.01076	-0.01786	-0.02171 **
std.err.	0.02098	0.02554	0.03929	0.03575	0.01419	0.01089
Openness3	-0.06201 ***	-0.05335 **	-0.13423 ***	-0.13161 ***	-0.04006 ***	-0.04270 ***
std.err.	0.01624	0.02226	0.02517	0.02026	0.01340	0.01271
Openness4	-0.07865 ***	-0.06048 **	-0.14825 ***	-0.14755 ***	-0.04798 ***	-0.05738 **
std.err.	0.02141	0.02744	0.02513	0.02397	0.01409	0.01556
Constant	0.00347	0.00492	0.01321	0.02725 **	-0.01477 ***	-0.01357 ***
std.err.	0.00759	0.00588	0.01287	0.01287	0.00513	0.00469
Hansen's J -statistics (p-value)	0.5016	0.6216	0.4830	0.5664	0.4630	0.5555
Number of observation	1802	1802	594	594	1208	1208

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, *Reserve* is change in foreign reserve (ratio to domestic GDP), and *Openness1, Openness2, Openness3, and Openness4* are capital control dummy variables.

since the GFC, and there are more significant factors in the period since the GFC than before the GFC. In addition, the result for the period before the GFC (the first quarter of 1992 to the first quarter of 2007) varies from that of 1990s (the first quarter of 1992 to the second quarter of 1997). It implies that the capital flow factors altered during the period from the middle of the 1990s to the outbreak of the GFC.

III-3-3. Results for emerging economies

The results of estimation for emerging economies reported by Tables 14 to 19 show that there are less significant factors of capital flows to emerging economies than in developed economies. The analysis of FDI assets (Table 14) suggests that a rise of global money supply produces an increase in FDI assets (outflows) since the GFC, while there are no significant variables in the regression before the GFC. For FDI liabilities (inflows), Table 15 shows that the coefficients on *Global stock price* before the GFC and *Global money supply*

Table 7. Determinants of other investment liabilities: total sample countries

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	1.22652 ***	1.41743 ***	0.94726 *	1.88423 ***	1.50687 ***	0.98434 ***
std.err.	0.20997	0.19161	0.53177	0.24587	0.17706	0.23878
Global money supply	0.20369 ***	0.14964 ***	-0.01430	0.04329	0.26786 ***	0.28382 ***
std.err.	0.03490	0.05794	0.04002	0.05272	0.04707	0.04048
Global growth	0.50505 **	0.39956 *	0.49036	0.00221	0.03833	0.53486 ***
std.err.	0.21313	0.22737	0.40560	0.31259	0.27082	0.18714
Interest differential	0.30970	0.79429	-0.54251	-0.13756	0.62215	0.62352 *
std.err.	0.31370	0.55420	0.33631	0.30299	0.49537	0.36285
Global stock price	0.08568 ***		0.17361		0.09073 ***	
std.err.	0.02073		0.12632		0.02142	
Global risk		-0.00655 *		0.06546 ***		-0.00910 **
std.err.		0.00396		0.02097		0.00399
Reserve	0.29247 **	0.39331 ***	-0.52140	-0.47654 **	0.49301 ***	0.51687 ***
std.err.	0.14776	0.09774	0.53177	0.21977	0.11817	0.07818
Openness1	-0.02528 ***	-0.03235 ***	-0.03690 **	-0.06358 ***	-0.01116	-0.00552
std.err.	0.00646	0.00951	0.01761	0.01292	0.00778	0.00714
Openness2	-0.01455	-0.02487	-0.01204	-0.01748	-0.01840	-0.01035
std.err.	0.01220	0.01527	0.03159	0.02484	0.01308	0.01204
Openness3	-0.07573 ***	-0.08730 ***	-0.05533 ***	-0.10912 ***	-0.04768 ***	-0.03822 ***
std.err.	0.01156	0.01769	0.02269	0.01334	0.01386	0.01244
Openness4	-0.06875 ***	-0.08401 ***	-0.06790 **	-0.13017 ***	-0.03210 **	-0.03853 **
std.err.	0.01403	0.02299	0.02674	0.01571	0.01368	0.01856
Constant	-0.01775 **	-0.01920 ***	0.03650 ***	0.03982 ***	-0.02812 **	-0.03937 ***
std.err.	0.00794	0.00687	0.01149	0.00868	0.01201	0.00700
Hansen's J -statistics (p-value)	0.3093	0.3439	0.3313	0.1556	0.3080	0.4153
Number of observation	1802	1802	594	594	1208	1208

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, *Reserve* is change in foreign reserve (ratio to domestic GDP), and *Openness1, Openness2, Openness3, and Openness4* are capital control dummy variables.

since the GFC are significant and positive.

Tables 16 and 17 depict the results for portfolio investment assets and liabilities in emerging economies. In the analysis on portfolio investment assets (Table 16), the coefficient on *Global stock price* since the GFC is significantly positive, though no coefficient is significant before the GFC. Table 17 reports that portfolio investment liabilities are influenced by the global economic growth rate, global stock price index, and global risk.

Tables 18 shows the regression result of other investment assets. The coefficient on *Global risk* since the GFC is significantly negative, while all coefficients are insignificant before the GFC. As Table 19 suggests, we do not find consistent result on the other investment liabilities.

The analysis for emerging economies insists that the factors affecting FDI inflows, portfolio investment outflows, and other investment outflows and inflows are not clarified before the GFC.[16] This result is different from that in developed economies and implies that domes-

Table 8. Determinants of FDI asset: developed economies

	Q1. 1992 - Q4. 2015		Q1. 1992 - Q1. 2007		Q2. 2007 - Q4. 2015		Q1. 1992 - Q2. 1997	
Domestic growth	0.43530 **	0.38592 ***	0.32165	0.91301 **	0.37243 ***	0.33437 ***	0.01532	-0.01676
std.err.	0.18622	0.08244	0.27908	0.35811	0.06751	0.08044	0.03535	0.02531
Global money supply	0.04228 **	0.01110	-0.09307 ***	-0.17485 ***	0.16024 ***	0.19143 ***	-0.01025	0.01183
std.err.	0.02061	0.03012	0.02620	0.04292	0.02124	0.01751	0.00796	0.00737
Global growth	0.29368	0.37401 ***	1.34113 ***	0.80816 *	-0.00111	0.00935	0.17150 *	0.22657 ***
std.err.	0.23768	0.12627	0.19127	0.43048	0.05666	0.05993	0.08982	0.06559
Interest differential	-0.14866	-0.36411	-0.52648	-1.27555	-0.00947	-0.13961	-0.15847 **	-0.10992
std.err.	0.44839	0.30672	0.35603	0.99018	0.09861	0.09261	0.07053	0.07849
Global stock price	-0.06460 **		-0.02875		-0.06777 ***		0.02251 *	
std.err.	0.02607		0.03428		0.01256		0.01285	
Global risk		-0.02261 ***		-0.12921 ***		0.01296 ***		0.02071 ***
std.err.		0.00490		0.02122		0.00318		0.00251
Constant	0.01959 **	0.02058 ***	-0.00441	0.01221	0.02658 ***	0.02666 ***	0.00382 ***	0.00673 ***
std.err.	0.00962	0.00392	0.00613	0.01665	0.00356	0.00378	0.00382	0.00222
Hansen's J -statistics (p-value)	0.3983	0.3693	0.3962	0.3742	0.5277	0.4161	0.2259	0.4098
Number of observation	1913	1913	1146	1146	802	802	342	342

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, and *Global risk* is change rate of the VIX.

tic country specifications, which we do not employ as explanatory variables, can drive capital flows in emerging economies before the GFC. In the period during and after the GFC, the change in global stock price and global risk influences portfolio investment outflows and other investment outflows, respectively. It suggests that capital flow factors have changed since the GFC in emerging economies. In addition, it is worth noting that global economic growth rate, change in global stock price, and change in global risk affect portfolio investments inflows to emerging economies in both the periods before and after the GFC.[17]

IV. Conclusion

This paper investigates the factors that drive gross capital outflows and inflows, because capital flows can have large influences on macroeconomy. The analysis focus on differences of factors among three types of flows (FDI, portfolio investment, and other investment), differences between periods before and since the GFC when the capital flow volatility altered, differences between emerging and developed economies. We find that the factors of capital

[16] In addition, other investment inflows are almost not explained by explanatory variables since the GFC.

[17] We find that interest rate difference between the global rate and each country's rate do not influence capital flows in emerging economies. Though this result seems to be inconsistent with Ahmed and Zlate (2014) which claim that interest rate difference is a valid factor. However, their estimation for gross portfolio investment inflows implies the coefficient on interest rate difference was insignificant in the period after the first quarter of 2002, while it maintains that interest rate difference has significant impact on the those flows since the third quarter of 2009 in which turbulence from the GFC calmed down. Because our regression also covers the turmoil period of the GFC, this could influence the result of analysis.

Table 9. Determinants of FDI liabilities: developed economies

	Q1. 1992 - Q4. 2015		Q1. 1992 - Q1. 2007		Q2. 2007 - Q4. 2015		Q1. 1992 - Q2. 1997	
Domestic growth	-0.11620	0.06321	0.01728	0.10637	0.59639 ***	0.41045 ***	-0.11679 *	-0.03649
std.err.	0.10016	0.10433	0.22378	0.09403	0.15529	0.05817	0.05997	0.04136
Global money supply	0.05077 **	0.04744 **	-0.02594	-0.02022 **	0.11555 ***	0.14679 ***	-0.00420	-0.01110
std.err.	0.02318	0.02370	0.04497	0.01002	0.02123	0.01304	0.01730	0.00999
Global growth	0.39976 ***	0.28190 *	0.69554 ***	0.62924 ***	-0.20726	-0.04530	0.81383 **	0.20791 *
std.err.	0.14025	0.15380	0.19277	0.10629	0.18457	0.05417	0.41395	0.12094
Interest differential	-0.01749	0.04344	-0.44161 *	-0.31787	0.37805	0.10956	-0.10621	-0.03521
std.err.	0.08517	0.11657	0.25299	0.20288	0.39426	0.27303	0.08453	0.04242
Global stock price	-0.03603 *		-0.03354		-0.02654 **		-0.08993 **	
std.err.	0.01982		0.02749		0.01219		0.04224	
Global risk		0.01612 ***		-0.00242		0.01089 ***		0.00153
std.err.		0.00234		0.00497		0.00295		0.00262
Constant	0.01448 ***	0.01524 ***	0.01139 *	0.00751 *	0.03169 ***	0.02623 ***	-0.00480	0.00684 **
std.err.	0.00271	0.00179	0.00610	0.00398	0.00401	0.00301	0.01017	0.00302
Hansen's J -statistics (p-value)	0.5350	0.4174	0.3178	0.3114	0.4377	0.4482	0.7876	0.5480
Number of observation	1913	1913	1146	1146	802	802	342	342

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, and *Global risk* is change rate of the VIX.

Table 10. Determinants of portfolio investment assets: developed economies

	Q1. 1992 - Q4. 2015		Q1. 1992 - Q1. 2007		Q2. 2007 - Q4. 2015		Q1. 1992 - Q2. 1997	
Domestic growth	0.23559	0.03990	-0.35996 **	-0.23477	0.25634	0.27372 *	-0.00638	-0.07181
std.err.	0.29851	0.08854	0.14597	0.17274	0.18896	0.15537	0.14606	0.10144
Global money supply	0.03133	-0.02175	-0.09279 ***	-0.07268 *	0.08414 ***	0.05137 **	-0.08647 ***	-0.08165 ***
std.err.	0.02502	0.02836	0.02993	0.03970	0.02002	0.02216	0.02531	0.01791
Global growth	0.21328	0.43325 ***	1.51464 ***	1.67640 ***	-0.24170 *	-0.05806	-0.25258	0.29026
std.err.	0.36420	0.15055	0.26545	0.23549	0.12999	0.12179	0.32696	0.25614
Interest differential	-0.37268	-0.38990 **	-0.71529 *	-0.17864	0.09622	0.22544	-0.16527	-0.07519
std.err.	0.36893	0.19929	0.37929	0.54479	0.30412	0.34840	0.23756	0.19814
Global stock price	0.08836 ***		-0.08829 **		0.26046 ***		0.17095 ***	
std.err.	0.02545		0.03515		0.02443		0.03814	
Global risk		-0.03087 ***		0.02483 **		-0.05421 ***		0.00529
std.err.		0.00381		0.01047		0.00492		0.00590
Constant	0.03011 ***	0.03133 ***	0.02297 **	0.00772	0.02568 ***	0.02853 ***	0.02482 ***	0.01308 **
std.err.	0.00807	0.00554	0.00919	0.01008	0.00367	0.00243	0.00778	0.00514
Hansen's J -statistics (p-value)	0.3044	0.3659	0.4054	0.2789	0.2662	0.2197	0.3509	0.3700
Number of observation	1913	1913	1146	1146	802	802	342	342

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, and *Global risk* is change rate of the VIX.

Table 11. Determinants of portfolio investment liabilities: developed economies

	Q1. 1992 - Q4. 2015		Q1. 1992 - Q1. 2007		Q2. 2007 - Q4. 2015		Q1. 1992 - Q2. 1997	
Domestic growth	1.66470 ***	1.73738 ***	0.17138	-0.04901	2.04438 ***	2.07077 ***	-0.29943 **	-0.27719 **
std.err.	0.28290	0.23443	0.30030	0.23448	0.23239	0.25965	0.13544	0.12516
Global money supply	-0.29729 ***	-0.37595 ***	-0.45779 ***	-0.70590 ***	-0.07299 ***	-0.10214 ***	-0.09520 ***	-0.06618 **
std.err.	0.06399	0.03994	0.13034	0.13257	0.02414	0.01853	0.02803	0.02603
Global growth	1.16172 ***	1.12476 ***	5.71854 ***	6.03614 ***	-2.29900 ***	-2.15268 ***	-0.46535 *	-0.20327 *
std.err.	0.30994	0.21744	1.12771	0.98133	0.24832	0.28940	0.25676	0.11228
Interest differential	0.25950	-0.59004	2.15197 *	1.27794 *	-0.31072	0.06997	0.24670	0.24593
std.err.	0.31313	1.03402	1.21542	0.71727	0.37077	0.27301	0.27830	0.23420
Global stock price	-0.11989 ***		-0.45441 ***		0.17089 ***		0.20501 ***	
std.err.	0.02355		0.11131		0.02025		0.02518	
Global risk		-0.09841 ***		-0.09488 ***		-0.05654 ***		-0.00356
std.err.		0.00995		0.02882		0.00788		0.00836
Constant	0.02113 ***	0.03613 ***	0.03312 ***	-0.08481 ***	0.07395 ***	0.07005 ***	0.01141 ***	0.04046 ***
std.err.	0.00710	0.01365	0.02308	0.02308	0.00790	0.01013	0.00546	0.00546
Hansen's J -statistics (p-value)	0.2807	0.2807	0.6488	0.5140	0.3124	0.2812	0.4894	0.3082
Number of observation	1913	1913	1146	1146	802	802	342	342

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, and *Global risk* is change rate of the VIX.

Table 12. Determinants of other investment assets: developed economies

	Q1. 1992 - Q4. 2015		Q1. 1992 - Q1. 2007		Q2. 2007 - Q4. 2015		Q1. 1992 - Q2. 1997	
Domestic growth	0.01951	0.28941	-0.12276	-0.13020	1.73790 ***	1.65287 ***	-0.05673	-0.21924
std.err.	0.27679	0.26589	0.25983	0.16034	0.29875	0.38267	0.29359	0.29693
Global money supply	0.27583 ***	0.30531 ***	0.37770 ***	0.27344 ***	0.31944 ***	0.27588 ***	-0.05340	-0.06342
std.err.	0.07426	0.03822	0.05616	0.06674	0.05426	0.04856	0.06161	0.04785
Global growth	0.26546	0.14711	-2.42294 ***	-1.64907 ***	0.43518	0.52153	0.42177	1.06091 **
std.err.	0.38222	0.23941	0.39393	0.33652	0.33653	0.34176	0.47373	0.49333
Interest differential	0.16212	-0.32865	-1.07927 **	-0.72380	-0.11945	0.13476	0.62892 *	1.15085 *
std.err.	0.58189	0.52686	0.45203	0.50077	1.00794	0.80081	0.37728	0.64638
Global stock price	0.25153 ***		0.27877 ***		0.23183 ***		0.07716	
std.err.	0.06309		0.06347		0.04539		0.05508	
Global risk		-0.03246 **		-0.05620 ***		-0.03708 ***		0.00644
std.err.		0.01419		0.01843		0.00937		0.03086
Reserve	-1.00191 ***	-0.96489 ***	-0.97645 ***	-0.96184 ***	-0.03483	-0.08248	-0.42786 **	-0.04091
std.err.	0.06255	0.00862	0.04108	0.01248	0.12470	0.07094	0.19127	0.28814
Constant	-0.01228	-0.00673	0.01771 ***	0.07148 ***	-0.03567 ***	-0.03425 ***	0.01518	-0.02970 *
std.err.	0.01305	0.00661	0.01454	0.01454	0.00722	0.00799	0.01785	0.01785
Hansen's J -statistics (p-value)	0.3659	0.3179	0.2504	0.5050	0.3072	0.3580	0.3826	0.2864
Number of observation	1857	1857	1094	1094	798	798	320	320

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Reserve* is change in foreign reserve (ratio to domestic GDP).

Table 13. Determinants of other investment liabilities: developed economies

	Q1. 1992 - Q4. 2015		Q1. 1992 - Q1. 2007		Q2. 2007 - Q4. 2015		Q1. 1992 - Q2. 1997	
Domestic growth	0.55081 *	0.51270 **	0.06678	-0.02106	2.01574 ***	2.55198 ***	0.36701	0.19342
std.err.	0.32401	0.25864	0.20609	0.37252	0.75257	0.46476	0.24080	0.23310
Global money supply	0.24787 ***	0.24902 ***	0.18192 ***	0.29546 ***	0.40482 ***	0.33212 ***	0.01533	-0.03030
std.err.	0.06915	0.07667	0.04604	0.07086	0.12054	0.06165	0.09638	0.09468
Global growth	0.51331	0.63091 **	-1.51155 ***	-1.28549 ***	0.54417	0.13885	-0.31892	0.39889
std.err.	0.49296	0.27968	0.28585	0.48102	0.84774	0.36174	0.53014	0.43846
Interest differential	0.41560	0.79826	-1.18528 ***	-1.05449 ***	1.84213 ***	1.43717	-0.33325	-0.03641
std.err.	0.57110	0.60223	0.36683	0.40696	0.59051	0.99758	0.57257	0.67091
Global stock price	0.12437 ***		0.14015 ***		0.10511 ***		0.04122	
std.err.	0.03809		0.04613		0.04062		0.10208	
Global risk		0.00319		0.02756		-0.02925		0.00168
std.err.		0.01304		0.02425		0.01797		0.02126
Reserve	0.04387	0.05702	0.04615	0.06546 **	0.77065 ***	0.74746 ***	0.20141	0.43661
std.err.	0.08738	0.10105	0.07513	0.02586	0.26874	0.15341	0.33705	0.38160
Constant	-0.02860	-0.03389 ***	0.07416 ***	0.06534 ***	-0.05718 **	-0.04345 ***	0.02324	0.00637
std.err.	0.01945	0.01084	0.01766	0.01750	0.02520	0.01476	0.01621	0.01590
Hansen's J -statistics (p-value)	0.2203	0.2404	0.3377	0.4310	0.2970	0.2817	0.3485	0.2580
Number of observation	1857	1857	1094	1094	798	798	320	320

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Reserve* is change in foreign reserve (ratio to domestic GDP).

Table 14. Determinants of FDI assets: emerging economies

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	0.07138	-0.24928 *	0.00349	-0.25186	-0.01070	-0.17294
std.err.	0.14779	0.14693	0.11147	0.20874	0.22624	0.13897
Global money supply	0.06750 **	0.10624 ***	-0.05206	-0.01028	0.12427 ***	0.19349 ***
std.err.	0.03193	0.03431	0.03317	0.04402	0.04014	0.03661
Global growth	-0.10613	0.27331	0.05453	0.13183	0.11180	0.15528
std.err.	0.10724	0.20074	0.08839	0.22227	0.19186	0.18435
Interest differential	-0.11594	-0.24698	-0.13648	-0.33590	0.57999 **	-0.31281
std.err.	0.17502	0.19460	0.16092	0.34188	0.26979	0.24844
Global stock price	-0.04504 *		0.03483		-0.02260	
std.err.	0.02646		0.03589		0.02408	
Global risk		0.00580		0.00953		0.00287
std.err.		0.00362		0.02271		0.00312
Constant	0.01872 ***	0.01971 ***	0.01825 **	0.03215 *	-0.00583	0.02169 ***
std.err.	0.00673	0.00628	0.00809	0.01910	0.01011	0.00673
Hansen's J -statistics (p-value)	0.4807	0.4680	0.3920	0.3847	0.5973	0.2570
Number of observation	679	679	234	234	445	445

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, and *Global risk* is change rate of the VIX.

Table 15. Determinants of FDI liabilities: emerging economies

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	-0.03818	-0.06114	-0.16391	0.41121	0.02368	0.12054
std.err.	0.15435	0.18773	0.29180	0.41231	0.11604	0.13597
Global money supply	0.14879 ***	0.13451 *	-0.01998	0.01114	0.20312 ***	0.15644 ***
std.err.	0.03965	0.07520	0.04417	0.04544	0.04737	0.05645
Global growth	0.03746	0.05658	0.26658	-0.36705	-0.05803	-0.05815
std.err.	0.18586	0.13470	0.29268	0.40676	0.13917	0.13431
Interest differential	-0.92972 *	-0.82095	-0.77950 ***	-0.51718 **	-0.79791	-0.08878
std.err.	0.54083	0.75306	0.23898	0.22838	0.56287	0.26117
Global stock price	-0.09405 ***		0.06570 *		-0.10028 ***	
std.err.	0.03258		0.03752		0.01890	
Global risk		0.01412 ***		0.05383 **		0.01298 ***
std.err.		0.00429		0.02526		0.00299
Constant	0.05746 ***	0.05138 **	0.05466 ***	0.04931 ***	0.05230 **	0.02597 ***
std.err.	0.01970	0.02446	0.01710	0.01866	0.02047	0.00978
Hansen's J -statistics (p-value)	0.2657	0.4045	0.5832	0.6702	0.2567	0.3657
Number of observation	679	679	234	234	445	445

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, and *Global risk* is change rate of the VIX.

Table 16. Determinants of portfolio investment assets: emerging economies

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	-0.01097	0.00387	-0.22061 **	-0.29735	0.05386	0.01517
std.err.	0.05570	0.10936	0.11004	0.18657	0.07738	0.08027
Global money supply	-0.01791	0.01530	-0.02575	-0.03984 *	-0.00605	0.00051
std.err.	0.01383	0.01512	0.01856	0.02128	0.02193	0.01747
Global growth	0.06226	0.01812	0.09617	0.17395	-0.09917	0.02986
std.err.	0.09140	0.10357	0.06809	0.17390	0.13461	0.09202
Interest differential	-0.13568	-0.21888	-0.16235 *	-0.17691	-0.39986	-0.17577
std.err.	0.20267	0.36446	0.08315	0.26533	0.35905	0.31429
Global stock price	0.02939 *		-0.00614		0.03322 **	
std.err.	0.01498		0.01415		0.01563	
Global risk		-0.00656 *		0.00244		-0.00391
std.err.		0.00392		0.00620		0.00452
Constant	0.01037	0.01334	0.02584 ***	0.02799 ***	0.01957	0.01022
std.err.	0.00805	0.01088	0.00557	0.00952	0.01278	0.00948
Hansen's J -statistics (p-value)	0.6932	0.1987	0.4319	0.3518	0.3511	0.3187
Number of observation	661	661	216	216	445	445

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, and *Global risk* is change rate of the VIX.

Table 17. Determinants of portfolio investment liabilities: emerging economies

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	-0.21522 **	-0.26142	-0.17125	-0.16472 *	-0.02021	-0.22312
std.err.	0.09487	0.19882	0.20792	0.28236	0.08563	0.14313
Global money supply	0.04769 *	0.02705	0.01472	0.04636	0.03284	0.04200
std.err.	0.02735	0.03676	0.06424	0.05560	0.02638	0.03390
Global growth	0.30038 *	0.41467 **	0.85484 ***	1.46828 ***	0.16059 **	0.39071 **
std.err.	0.17948	0.19029	0.28771	0.36317	0.07047	0.15545
Interest differential	-0.74149	-0.69955	-0.08503	-0.35851	-0.01065	-0.66247
std.err.	0.48421	0.62748	0.18147	0.40729	0.33152	0.41367
Global stock price	0.17730 ***		0.11371 **		0.18964 ***	
std.err.	0.02187		0.04796		0.01775	
Global risk		-0.03788 ***		-0.07362 ***		-0.03714 ***
std.err.		0.00485		0.01827		0.00316
Constant	0.02851 **	0.02780	0.02123	-0.04209 **	0.00552	0.02765 **
std.err.	0.01423	0.02105	0.02427	0.02427	0.01134	0.01321
Hansen's J -statistics (p-value)	0.1972	0.2966	0.1402	0.3805	0.2652	0.2677
Number of observation	679	679	234	234	445	445

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, and *Global risk* is change rate of the VIX.

Table 18. Determinants of other investment assets: emerging economies

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	0.80200 *	0.44805	-0.63498	-0.79556	0.31970	0.36182
std.err.	0.46732	0.57924	0.71485	1.14312	0.26714	0.30673
Global money supply	-0.16663	-0.04323	0.03523	0.00642	-0.02669	-0.01876
std.err.	0.10612	0.04873	0.12676	0.17317	0.12846	0.08867
Global growth	-0.62732 **	-0.43549	0.63378	1.64145	-0.45007	-0.26967
std.err.	0.27178	0.66764	0.42674	1.13054	0.50022	0.22992
Interest differential	0.23333	-0.64963	-0.98209	-2.12931	-1.52428	0.06751
std.err.	0.81288	0.52768	1.52224	1.76824	1.35796	0.71364
Global stock price	0.09001 *		0.07148		0.06210	
std.err.	0.04847		0.13539		0.04223	
Global risk		-0.02942 **		-0.13146		-0.01991 **
std.err.		0.01452		0.08615		0.01003
Reserve	-0.13276	-0.21558	0.09746	0.23134	0.03884	-0.10990
std.err.	0.25875	0.40534	0.11502	0.32563	0.31458	0.08973
Constant	0.00925	0.03694 *	0.09305	0.03763	0.06355	0.00942
std.err.	0.03496	0.02126	0.08559	0.08559	0.05918	0.02222
Hansen's J -statistics (p-value)	0.3002	0.3221	0.3597	0.6728	0.5938	0.3923
Number of observation	627	627	217	217	410	410

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Reserve* is change in foreign reserve (ratio to domestic GDP).

Table 19. Determinants of other investment liabilities: emerging economies

	Q1. 2003 - Q4. 2015		Q1. 2003 - Q1. 2007		Q2. 2007 - Q4. 2015	
Domestic growth	1.34869 *	0.64267	0.81894	-0.14911	0.21723	0.61085 ***
std.err.	0.74292	0.44989	0.76597	0.77820	0.52222	0.21837
Global money supply	-0.04942	-0.00438	0.05383	0.00307	0.12650	0.05424
std.err.	0.09402	0.13333	0.06966	0.05667	0.18284	0.09452
Global growth	-1.39287 *	-0.29242	-0.06732	-0.06211	-0.07508	-0.20795
std.err.	0.80277	0.47252	0.29062	0.58441	0.45409	0.23028
Interest differential	0.22770	1.20039	0.22397	-0.82501	-0.77783	-0.01948
std.err.	0.59467	1.87743	0.87563	1.08860	1.30478	0.56635
Global stock price	-0.02580		-0.19752		0.00034	
std.err.	0.08454		0.12199		0.08712	
Global risk		0.03839		0.05189		-0.00424
std.err.		0.02889		0.06262		0.01116
Reserve	0.31696	0.76846	-0.01955	0.28789 *	0.49697	0.26736
std.err.	0.39170	0.57048	0.33446	0.16560	0.36407	0.22286
Constant	0.01125	-0.04879	-0.02624	0.05881	0.02035	-0.00397
std.err.	0.02825	0.06508	0.06027	0.06630	0.03435	0.01905
Hansen's J -statistics (p-value)	0.4616	0.5719	0.1449	0.1096	0.5381	0.3056
Number of observation	627	627	217	217	410	410

Notes: *, **, and *** indicate that the statistics are significant at the 10%, 5%, and 1% level, respectively. Hansen's J test is the test for null hypothesis that the overidentifying restriction is satisfied. The independent variables are as follows: *Domestic growth* is real GDP growth rate of each country, *Global money supply* is change rate of the sum of M2 in the U.S., the euro area, and Japan, and M4 in the U.K. from the previous year, *Global growth* is world real GDP growth rate, *Interest differential* is difference rate between domestic long-term interest rate and global interest rate calculated by the average long-term rate in the euro area, Japan, the U.K., and the U.S., *Global stock price* is change rate of S&P500, *Global risk* is change rate of the VIX, and *Reserve* is change in foreign reserve (ratio to domestic GDP).

flows vary by controlling those differences.

The regression result for total sample countries suggests that the global risk is a major driving factor for portfolio investment inflows in total sample period, portfolio investment outflows since the GFC, and other investment outflows and inflows since the GFC. The change in global money supply plays a significant role for every capital outflow and inflow since the GFC except for the portfolio investment inflows. Capital flow factors depend on the type of flows and varied in the period during and after the GFC. In addition, global factors have become more important since the GFC when the United States and major economies took policy measures to ease money supply.

Regarding the difference between developed economies and emerging economies, the significant factors are fewer in emerging economies. For developed economies, the factors affecting capital flows before the GFC tend to be different from those during and after the GFC. For instance, change in global money supply influences portfolio investment outflows and both FDI inflows and outflows only during and after the GFC. For the period since the GFC in developed economies, domestic real economic growth plays a major role for the fluctuation in most capital flows, while change in foreign stock price index affects portfolio investment flows. In emerging economies, many variables tend to be insignificant before the GFC and there are few clear factors. Meanwhile, for the period during and after the GFC, we find that there is influence from the foreign stock price index on portfolio investment and

the impact of global money supply on FDI. In addition, the change in global risk is a significant factor for portfolio investment inflows and other investment outflows since the GFC, while portfolio investment inflows are affected by global risk and foreign stock price index through a whole period.

We find that every type of capital flow in all periods tends to be smaller in countries with four capital control dummy groups than those in countries having US level-openness. In particular, it is worth noting that portfolio capital inflows to countries which introduce first and second lowest restriction (higher openness) among dummy group countries was not small only in the period during and after the GFC comparing to countries having a level of the US openness. This implies that more restrictive capital controls only have an effect on portfolio investment inflows since the GFC.

The analysis indicates that factors affecting capital flows during and after the GFC when the level and volatility of flows are large varied from those in the period before the GFC. In particular, the global factors such as changes in global risk, foreign stock price, and global money supply have more explanatory power since the GFC than before the GFC. In contrast, the empirical findings suggest that change in global risk can influence portfolio investment inflows in emerging and developed economies, and before and after the GFC. Our evidence that only strict capital controls have a significant effect on portfolio investment inflows since the GFC suggests that moderate capital controls cannot be effective in a period when capital flows are large and volatile.[18] This is a valuable implication for policy makers of emerging economies, because portfolio investment inflows have meaningful impacts on their macro-economies.

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[18] It is also note that FDI inflows declined in countries which introduced less restrictive controls, while FDI inflows are favorable to the authorities of emerging economies.

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