Global Research Unit
Working Paper #2019-028

Post-Crisis Changes in the Pattern of Capital Flows - The Case of Korea

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- The Case of Korea*

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Abstract

This paper investigates pattern changes in international capital flows after the Global Financial Crisis using the Korean case. It follows capital flows of Korea during the last couple of decades to characterize three significant changes after the crisis. First, after the introduction of macroprudential policies, the bank external borrowing was curbed while the bank external lending started an increasing trend. Second, the resident's outward portfolio investments outpaced foreign portfolio investments on domestic assets after the crisis. The net outflow is closely associated with changes in return differentials between domestic and foreign assets. Third, the continued current account surpluses were saved as private assets held abroad, while it was saved as FX reserves before the crisis. The precautionary role of reserves is now complemented by currency swap arrangements with major countries. Simple VAR results confirm the increased resilience of the bank's foreign borrowing to external shocks, and the increased association of net portfolio inflows with the interest rate differential after the crisis.

Keywords: capital flows, capital flow management policy, macroprudential policy

JEL classifications: F32, F38, G15

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* The views expressed in this paper are those of the author and should not be interpreted as reflecting the views of the Bank of Korea. I thank Jongho Park, Kwanghee Nam and seminar participants at the 2019 annual meeting of Korea Money and Finance Association for valuable comments.

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1 Introduction

The Global Financial Crisis (GFC) was an event that altered behavioral patterns of many economic variables. Among those, the pattern of capital flows went through a drastic change. The crisis became *"global"* only through the help of international capital flows, and hence post-crisis policy reforms were concentrated on them. Indeed, the literature documents the contraction in cross-border bank flows and compositional changes of global liquidity toward corporate bonds after the crisis. Due to the complexity of granular behaviors of different flows through every type of financial instruments, and of different regulatory reforms occurred in many different countries, however, we still need more research for a comprehensive understanding of the changes.

Focusing on an individual economy with an open capital account and a considerable size, this paper provides a detailed illustration of changed capital flow patterns in relation with policy reforms. Previous works that analyze the world data had to narrow their scopes to one or two types of capital flows while discussing regulatory changes only in a broad sense. In contrast, the current paper provides a comprehensive view of capital flows in and out of one particular country, Korea. It closely follows the diminishing volatility of bank flows, the wide swing of portfolio flows, and also the slowdown of public flows. Analyzing the capital flows, it differentiates gross inflows with gross outflows[1], and relate the changes to particular policy reforms.

Korea provides a good testbed for the study of post-crisis capital flows and regulatory reforms. It had one of the most open capital account before the GFC. After experiencing large-scale capital inflows and outflows over the GFC, the country reworked capital management framework. The reforms altered the pattern of capital flows, and I find those

[1] Gross inflow is net purchases of domestic assets by foreign investors, and gross outflow is the resident investor's net purchases of foreign assets.

changes to be representative of what happened globally. Focusing on Korea, I discuss the changes in relation to specific reforms in policy practices or regulations.

The purpose of this paper is twofold. First, it documents capital flows of Korea in the last two decades in relation to relevant policies. It highlights the current capital flow management framework by comparing it with the framework before the GFC. In doing so, it not only describes *de jure* policy changes, but also assesses changes in *de facto* policy practices. Second, I deploy a simple vector autoregression (VAR) analysis to confirm the changed temporal patterns of capital flows with external shocks and return differentials between domestic and foreign assets. Without aiming to evaluate a specific policy reform, the analysis measures whether the capital flows became resilient to external shocks, and whether it became more sensitive to return rates.

Gazing out the long time window and wide scope of flows, this paper documents three important pattern changes in the post-crisis capital flows of Korea. First, domestic banks' overseas lending (banking gross outflow) has been increasing significantly after the GFC, while both volatility and size of the banks' external borrowing (banking gross inflow) decreased. These are the results of the macroprudential policies introduced after the crisis. Second, the net portfolio outflow has been increasing rapidly after the crisis, and this is related with the changes in return differentials between domestic and foreign assets. The sizable gross outflow is keeping the portfolio gross inflow to continue by supporting foreign exchange demand in the market. Lastly, the continued current account surpluses are saved as various forms of private assets abroad as opposed to FX reserves. The pace of reserve accumulation slowed down significantly, and instead, currency swap agreements are arranged with many countries.

Simple VAR exercises assess the changes in the temporal patterns of capital flows

documented as the first and second findings. The results indicate that the sensitivity of bank external borrowing to external shocks is muted after the crisis. It also shows that net portfolio outflows are systematically associated with the interest rate differential after the crisis.

The findings of this paper are in line with previously documented post-crisis changes in the global capital flows. Shin (2014) finds a sharp contraction of cross-border bank flows and a rise of corporate bond flows after the GFC, and name it as *"the second phase of global liquidity"*. Avdjiev et al. (2017) delve into the changes a little further and find that the bank flow sensitivity to risk became weak while its sensitivity to the U.S. monetary policy became significant after the crisis. Ahmed and Zlate (2014) also find that the interest rate differential became a more significant determinant of capital flows after the crisis. I document in this paper that Korea also experienced declines in volatility and size of gross banking inflows after the GFC, and that the portfolio flow became more associated with the return differential. Additional contribution of the current paper is that it emphasizes the recipient country's policy reforms while the previous studies are focused more on the lender behavior.

As for the analysis on the public flows, IMF (2019) notes that reserve accumulation of emerging market economies have become far less significant while current account surpluses have been continuing. This observation might come as puzzling to those who argued the mercantilist motive of reserve accumulation. I provide a decomposition of the balance of payment data for Korea to track how the current account surplus is supported by items other than reserves, and relate the slowdown in reserve accumulation with central bank swap lines.

The remainder of this paper is structured as follows. The next section documents capital flows and related policies from 1999 to 2018 by highlighting the three pattern changes. Section 3 deploys a simple three variable VAR to analyze capital flow responses to external shocks and return differentials. Section 4 concludes.

2 Post-Crisis Policy Reforms and Capital Flows

After the 1997 Asian Financial Crisis, Korea moved to a new position in the impossible trinity, one which was becoming increasingly popular among emerging economies: it opened up its financial markets[2], let its exchange rate float freely, and introduced inflation targeting. The framework was then reworked after the country experienced large capital inflows and outflows over the GFC. Going through the GFC and the subsequent quantitative easing of advanced economies, it became obvious that Korea was in need of reforms of capital flow management policies. This section documents three important changes in the pattern of capital flows, and discuss how they are related with post-crisis policy reforms.

2.1 Cross-border bank flows and macroprudential policies

In the years preceding the crisis, global banks made a significant presence by funneling capital to many places around the world. The dramatic increase in cross-border bank flows was observed globally, and Korea was not an exception. Starting from 2006, capital inflows through banks increased significantly along with foreigners' domestic bond investment, each accumulating to nearly 100 billion dollars immediately before the GFC. The reasons behind the sudden surge of global bank flows are not fully understood yet. (Kaminsky, 2019) The bonanza, Korea experienced, however, is clearly fueled by a pull factor, a boom in local economic activities. The shipbuilding and asset management sectors were in a boom, and major firms in those industries sold forward dollars in large amounts through banks. Taking over forward dollars, the banks either borrow dollars or engage in buy-and-sell swaps to get dollar funds of the same amount as the forwards, and sell it in the spot market in order to

[2] Bond market fully opened in Dec. 1997; ceiling on foreign equity investment abolished in May 1998.

avoid having FX position imbalances.[3] This increased banks' short-term external borrowing and lowered the forward rate, which induced capital inflows through the bond market. The rapid increases in short-term external borrowing, FX forward transactions and the inflows of foreigners' short-term bond investment all contributed to the FX-related instability during the GFC. Within the four months between the Lehman bankruptcy and the end of 2018, banks' external borrowing decreased by 50 billion dollars. (Figure 1) The abrupt forced deleveraging in the banking sector triggered a combined currency and banking crisis.

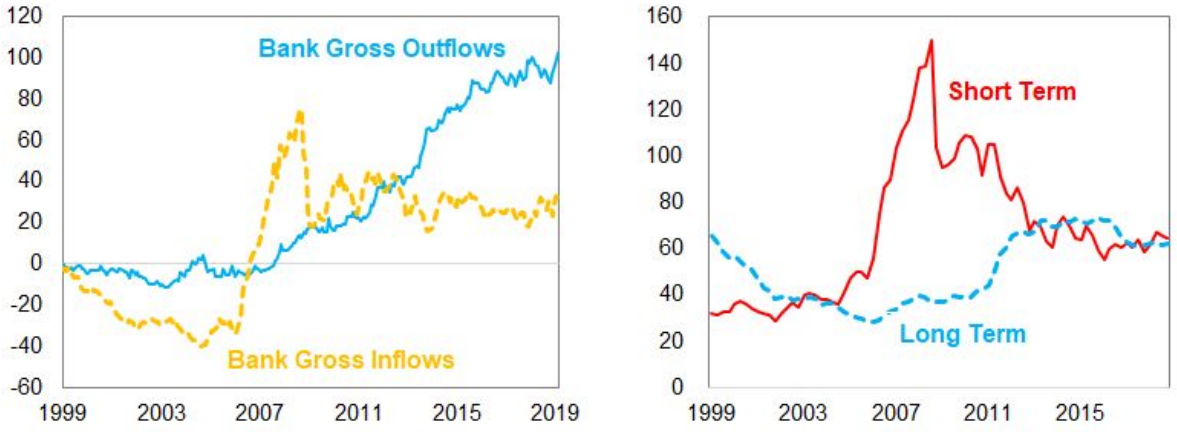

Figure 1. Effect of macroprudential policies. The left panel shows cross-border bank lending and borrowing. Cumulative flows from Jan. 1999. The unit is billion USD. The right panel divide the stock of bank external debt into short-term and long-term. The unit is billion USD.

After the crisis, a series of FX-related macroprudential policies are introduced to prevent recurrences of the increases in bank short-term external borrowing and FX forward transactions seen in the immediate pre-crisis period. Among those, three measures deserve close attention. First, banks' FX loan provision is restricted to those who use the fund overseas. This regulation was first introduced in August 2007, and strengthened later in July 2010. The regulation affects both gross banking inflows and gross banking outflows. It reduces gross banking inflows because the banks now face much smaller pool of FX

[3] Chung, Park and Shin (2014) explain the details of this.

borrowers, and there are less needs for the banks to borrow from abroad. On the other hand, the regulation increases gross banking outflows by inducing banks to lend more to non-residents who are not regulated by the policy.

Second, ceilings are introduced on the FX derivatives positions of banks (October 2010). It limits the positions to be some multiples of capital. This measure has an effect of curbing banks' external borrowing, since the borrowed funds typically go through the swap market. It also encouraged more capitalization of the banks, and more long-term borrowing of the foreign bank branches since the ceilings are proportional to capital and long-term funding (for the foreign branches).

Third, a bank levy was introduced for banks' short-term external borrowing (September 2011). The levy made short-term borrowing more expensive relative to long-term borrowing. The policy was aimed to lengthen the maturity of banks' foreign borrowing and to reduce volatility of bank borrowing. The right panel of Figure 1 hints the effect of bank levy and the leverage cap regulation. After the crisis, banks' short-term borrowing decreased significantly, while long-term borrowing increased.

These policies changed the patterns of both banking gross inflows and outflows. The left panel of Figure 1 shows cumulative flows of cross-border bank lending and borrowing since 1999. First, the bank external lending barely increased until 2007, but it started an increasing trend suddenly after the crisis. It reached 100 billion dollars, roughly a quarter of Korea's FX reserves by the end of 2018. On the contrary, bank external borrowing, which exhibited a large swing before the crisis, did not increase or decrease significantly after the crisis. The volatility is also greatly reduced.

The macroprudential policies reduced volatility in banking flows, thereby making monetary policy more autonomous and allowing it to focus on the domestic business cycle.

The early assessments of the macroprudential policy are that it enhanced external resilience by reducing the maturity mismatch of banks and the currency mismatch of firms.[4] (Bruno and Shin 2014, Kim 2014)

2.2 Portfolio flows and return differentials

Like other emerging market countries, Korea also experienced capital inflows pushed by abundant global liquidity after the GFC. The inflows were mainly through portfolio investment, as the banking flows were well managed by the macroprudential policies. However, a notable change in portfolio flows happened to gross outflows rather than inflows. As can be seen from the left panel of Figure 2, portfolio gross outflows began to increase sharply after around 2012.

I argue that the portfolio outflow is affected by the return differentials between Korea and abroad, which started to decline from 2012. Although the central bank was newly mandated with financial stability after the crisis[5], monetary policy was kept focused on domestic business cycles. Since the business cycle of Korea was desynchronized with that of the U.S. after the crisis, the policy rate differential had a large swing during the 10 years after the crisis. The right panel of Figure 2 plots the interest rate differential as calculated as Korean policy rate minus Federal funds rate target, along with cumulative net portfolio outflows (gross outflows - gross inflows). It is obvious that the decreasing return rate gap is negatively associated with the outflows after the crisis. Low return rates drive residents to invest more

[4] There are more recent research finding unintended consequences of the macroprudential policies though. Yun (2019) finds that the increases in long-term bank borrowing is not driven by a fresh new funds coming from foreign banks, but by tag changes of previously existing short-term debt. Ahn et al. (2019) find that the bank levy made regulatory arbitrage possible since it is easier for foreign bank branches to fund in longer term as they have mother banks overseas.

[5] After the crisis, Korea began discussing financial stability mandate of the central bank, and in 2011 it finally amended the Bank of Korea Act to require the central bank to pay attention to financial stability as it carries out monetary policy.

abroad.[6] The outward portfolio investment was driven by the National Pension Service, insurance companies and mutual funds. In part, it is also a result of the change in accounting standard which gives more incentives to insurance companies to hold more long-term foreign bonds.[7]

The portfolio outflow helped preventing an asset price bubble or other serious financial imbalances during the period of massive foreign capital inflows. It also put more appreciation pressure on the Korean won and helped keeping foreign capital inflows even after the U.S. monetary policy normalization began.

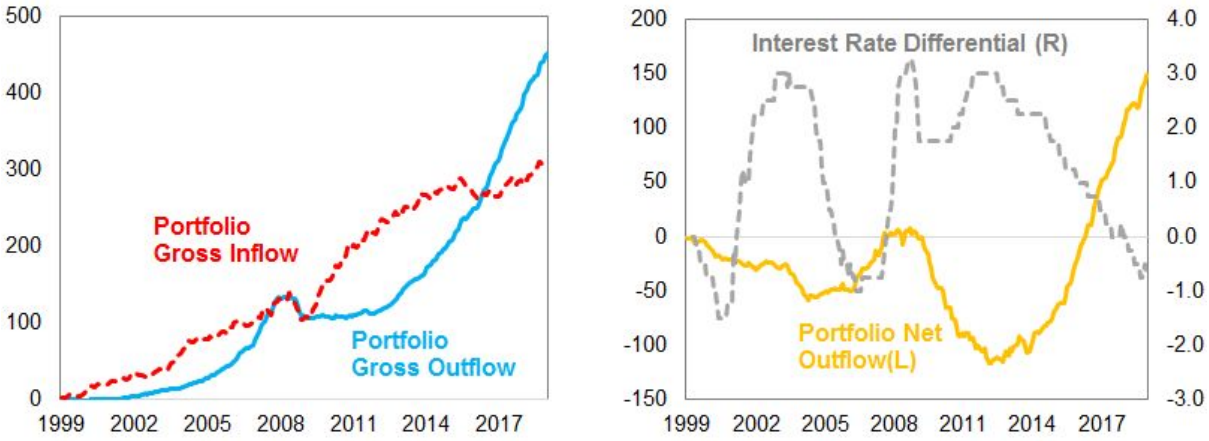

Figure 2. Portfolio flows and the interest rate differential. The flows are in billion USD and cumulative from Jan. 1999. The interest rate differential is the BOK base rate less the Federal funds rate target upper limit.

2.3 Public and private saving abroad

International reserves proved to be useful during the GFC, but they were also found to have limitations. During the second half of 2008, Korea unloaded roughly a quarter of its accumulated reserves, but it was only after the currency swap arrangement with the Fed that

[6]Ammer et al. (2019) find that 100 bp lower home interest rates induce investors from 31 countries to increase U.S. corporate bond investment by 3.6-5.3% of home GDP during the period from 2003 to 2016.
[7] IFRS 17 was issued in May 2017 and will be effective from January 2022.

the market calmed down. The pace of reserve accumulation apparently slowed down after the crisis. The left panels of Figure 3 shows the cumulative reserve accumulation (as it appeared in the balance of payment) since January 1999. After 2010, the slope of reserve flows declined compared to the pre-crisis period. The average monthly accumulation is 1.74 billion USD during 1999-2007, but it is 1.20 billion during 2010-2018. Given that the flow includes interest accrued on the large stock of reserves, one can infer that FX intervention has been minimal in the later period.

The precautionary role of FX reserves is complemented by currency swap arrangements with major countries. While keeping international reserves at a level commensurate with the size of the economy, the central bank has sought to enter into currency swap arrangements. Before the crisis, it had swap lines only with some neighboring countries: China (2002), Malaysia (2002) and Indonesia (2003). After the crisis, the list expanded to include more countries that can offer global safe-haven currencies: UAE (2013), Australia (2014), Canada (2017), and Switzerland (2018).

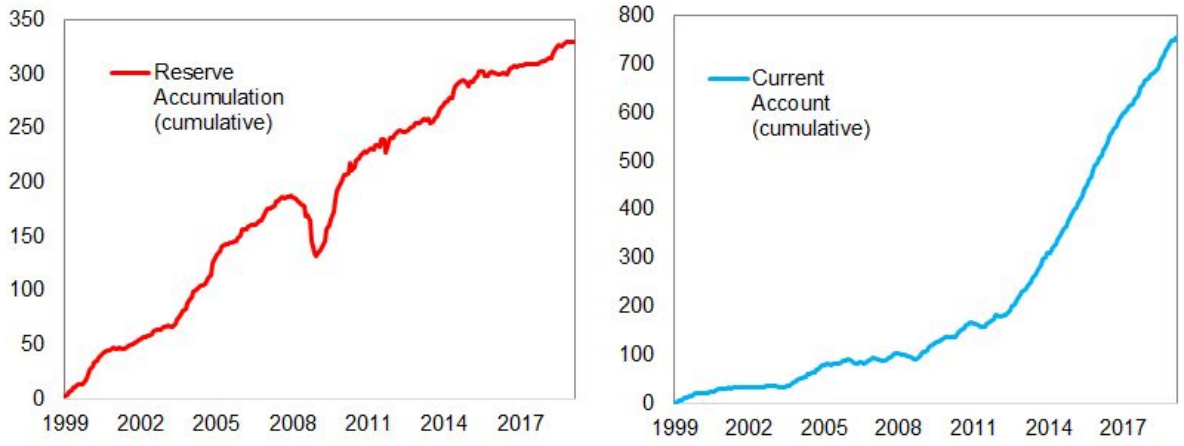

Figure 3. Current account and reserve accumulation. The unit is billion USD. Both panels show cumulative flows since January 1999.

Although the pace of reserve accumulation apparently slowed down, the current account

surplus has been not only continued onward but increased significantly in size (the right panel of Figure 3). When the current account surplus was accompanied by large reserve accumulation before the crisis, many suspected that the surplus was driven by FX intervention. But now, the country is recording even larger surpluses without significant reserve accumulation. Current account equals financial account (net capital outflows), and hence this means the current account surplus has been accumulated as financial assets other than the official FX reserves after the crisis.

Balance of payment identity can be re-organised as follows:

$$
\begin{aligned}
\text{Current account} &= \text{Financial account} \\
&= \text{Public outflow} + \text{Private outflow} \\
&= (\text{Reserve flows} + \text{Government flows}) \\
&\quad + (\text{Net outward direct investment} + \text{Net portfolio outflow} \\
&\quad + \text{Net banking outflow}) + \text{etc.}
\end{aligned}
$$

Table 1 shows the cumulative sum of each item in the last equation above during the period of pre-crisis (1999-2007), crisis (2008-2009) and post-crisis (2019-2018).

	Current Account	Financial Account				
		Public Outflows		Private Outflows		
		Reserve Flows	Gov't (NPS)	Direct Investment	Portfolio Outflows	Banking Outflows
1999-2007	103.6	187.8	17.6	-16.2	-15.9	-44.5
2008-2009	34.8	12.2	-6	16.7	-48.0	29.1
2010-2018	608.4	129.9	131.0	171.9	64.9	82.3

Table 1. Cumulative balance of payment, billion USD.

Current account surplus means saving abroad by the public or/and the private sector. Before the crisis, the rapid growth of reserves absorbed foreign capital coming in through current account surpluses and also private capital inflows (the negative figures in the private outflows). After the crisis, however, the reserve accumulation slowed down and instead, other types of capital outflow increased significantly. First, the outward direct investment increased a lot surpassing incoming direct investment, so that the net direct investment recorded 171.9 billion dollars outflows. Second, net private portfolio outflows (64.9 billion USD) and net banking outflows (82.3 billion USD) also increased significantly. These items recorded net inflows before the crisis. Third, the public outflow in the form of the national pension became significant. (131.0 billion USD) To sum up, current account surpluses were saved abroad as FX reserves before, but those are saved as various forms of private foreign assets after. The fact that rapid portfolio outflows seeking for additional yield were driven by pension, insurance and mutual funds, implies that population ageing is working behind the scenes.

Accumulation of reserves is now substituted with accumulation of private foreign assets and currency swaps. What this change means on financial stability of the country can only be tested by another external shock. Forbes and Warnock (2012), however, observe from international panel data that sudden stops (sudden outflows by foreigners) and retrenchments (inflows by residents) tend to come together. Broner et al. (2013) also find that gross capital inflows and outflows are positively correlated and both are procyclical. The accumulated private assets might be redeemed and help the economy when it is hit by sudden outflows of foreign capital. The swap arrangement and public saving can also be used when the country is in need. The economy relied solely on international reserves before the crisis, but now it is equipped with a multilayered financial safety net: abundant private assets abroad, currency swaps with other central banks, and the international reserve.

3 Evidence from VARs

In this section, I implement a simple recursive VAR analysis on capital inflows. The interest is focused on the two important observations from the previous section. First, I test how resilient banks' external borrowing is to external shocks, and how it is different before and after the GFC. The macroprudential policies were introduced to curtail the volatility of banking flows and to prevent the disorder of the GFC happening again. Hence, I am interested to know whether the gross banking inflows became less sensitive to external shocks after the crisis. I do not attempt to causally evaluate individual policy reforms, but instead, I intend to see how influences of external shocks on capital flows changed after the GFC as a result of many changes including the policy reforms.

Second, I check how the portfolio net inflow is associated with the return differential between domestic and foreign assets. After the crisis, the pace of gross portfolio outflows exceeded that of gross inflows, and hence the net portfolio outflows increased significantly. This happened together with the decrease in return differentials between domestic and foreign assets. Therefore, I want to assess the temporal pattern of return differentials and portfolio flows through the VAR framework. I analyze net flows rather than gross flows, because the portfolio gross inflows and outflows are deeply integrated via FX derivatives markets.[8]

Monthly balance of payment data is used. The focus is on banking gross inflows and net portfolio inflows. The flows were made real by CPI (=100 in 2015). The sample period is from January 1999 to December 2018, but I exclude the GFC period from July 2008 to June 2009. I divide the sample into before-crisis (Jan. 1999 - Jun. 2008) and after-crisis (Jul. 2009 - Dec. 2018), and hence both of them have 114 observations equally.

[8] Not like other types of capital flows, the portfolio investment is often hedged against FX risk. Outward investment becomes more profitable when there are more foreigners' domestic investment coming in, because the hedging cost is cheaper. Analysis on gross flows might be misleading if this relationship is ignored.

I try to stay in the most parsimonious possible model to avoid overfitting and keep clear understanding of the results. For the external shock that would be used to test the resilience of banking gross inflows, I consider the VIX index. It measures the option volatility of S&P 200 index, but it has many other interpretations in the literature. It is a measure of uncertainty, global risk appetite, and also the Global Financial Cycle (Rey, 2015). Hence, it can be used as a representative index of external shocks. For the proxy of the return differentials of domestic and foreign assets, I use the policy rate differential between Korea and the U.S. The policy rate affects the return rates of all the other assets, and therefore it would serve as a good proxy for return differentials in various kinds of assets. With these variables, I construct a simple three variable VAR as follows:

$$A(L)\, y_t = \varepsilon_t$$

$$y_t = [Flows_t,\ ID_t,\ VIX_t]'$$

A is a lower triangular matrix, and ε is a vector of orthogonal shocks. $Flows$ is one of the two capital flows, and ID is the interest rate differential.

The ordering of the variables follows the VAR convention. Slow moving variables come first and fast changing market variables come later. The monthly capital flow is a quantity variable cumulated over 30 days, and hence I place it before the other two price variables. The policy rate gap evolves through periodic decision making by the central banks, thus it is ordered before the VIX index which changes instantaneously by news. The resulting order of variable is similar with Rey (2015) who finds strong influences of U.S. monetary policy and VIX on global credit flows. I do four different VARs using the two different flows (banking gross inflows, and net portfolio inflows) and two different sample periods (before and after the crisis). Lag order is one following the suggestion of the formal test by SBIC.

Figure 4 shows the responses of capital flows to VIX. Graphs in the first column show responses of before-crisis, and the second column is for after-crisis. The first and second row shows banking gross inflows and net portfolio inflows, respectively. One thing very clear from the graphs is that the sensitivity of bank gross inflows to external shocks is muted after GFC. Before the crisis the external borrowing of banks decreased significantly after external shocks like a rise in risk aversion or in uncertainties. After the crisis, however, it does not change at al. This is likely showing the effectiveness of the macroprudential policies focused mainly on banking flows.

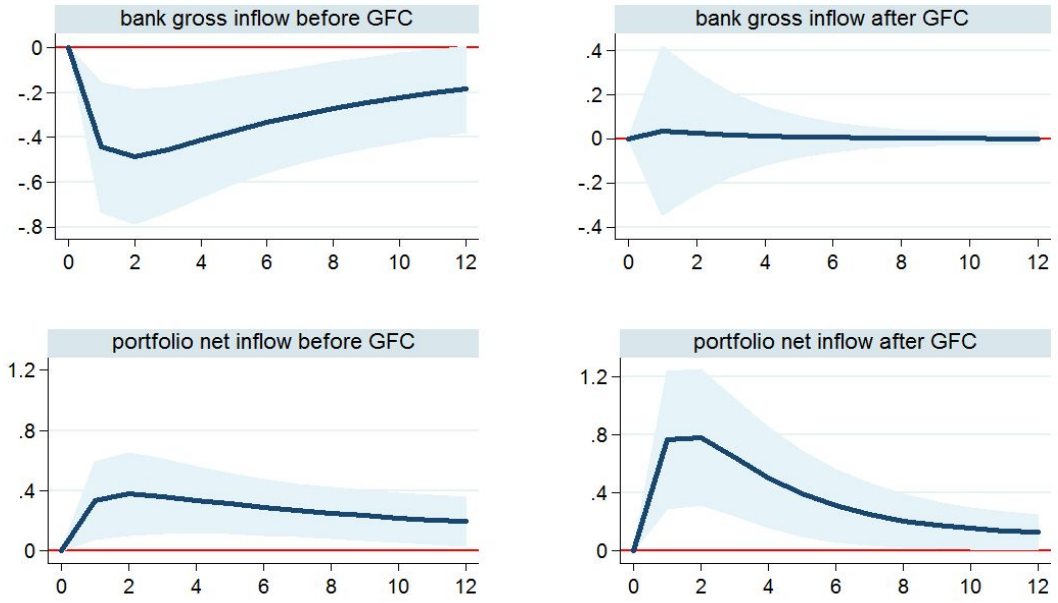

Figure 4. Responses of capital flows to one standard deviation shock in VIX. 90% confidence bands are shown. The standard deviation is 6.3 before GFC (Jan. 1999 - Jun. 2008), and 5.8 after GFC (Jul. 2009 - Dec. 2018). The vertical axis unit is billion USD.

The reason why net portfolio inflows show significant inflows after a VIX shock is that the decrease in gross portfolio outflows is large after the shock. That is, foreign investment to Korean financial market decreases after a VIX shock, but the resident's overseas investment decreases even more (retrenchment). Hence, the net capital inflows become positive after a

shock. This is more significant after the crisis, and it seems reasonable considering much larger overseas investment of domestic institutional investors in the post-crisis period.

Figure 5 shows the responses of capital flows to a shock in the interest rate differential. I find no systemic association of banking gross inflows with the interest rate differential. For the net portfolio inflow, however, we see a clear sign of inflows after a rise in the interest rate gap after the crisis. Moreover, the effect seems to be very persistent extending to longer than a year. A 100 basis point increase in the interest rate gap induces 0.1~0.2 billion dollars more inflows every month.

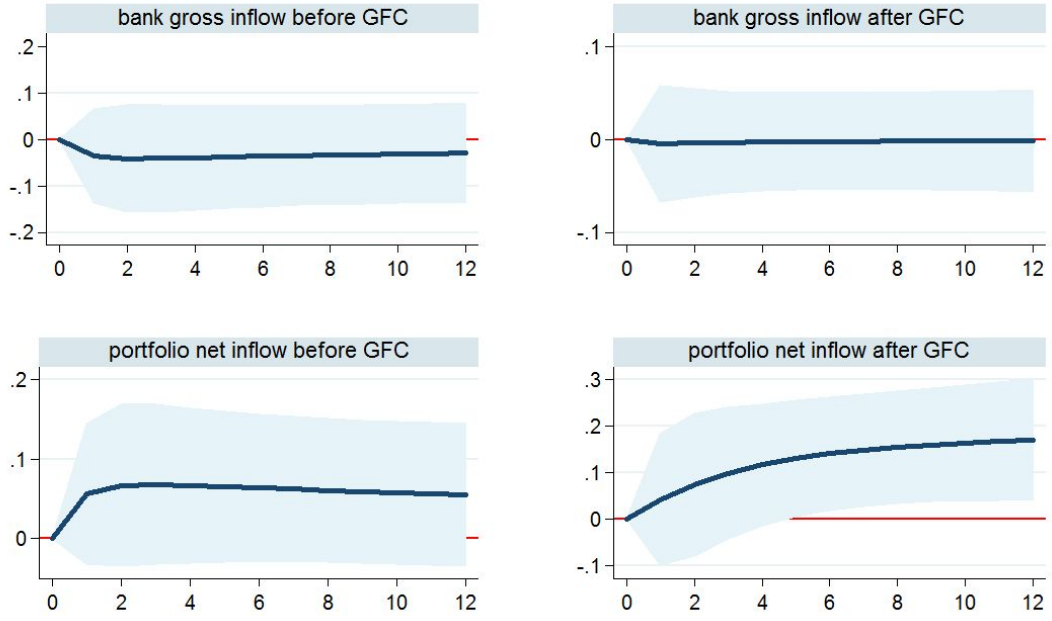

Figure 5. Responses of capital inflows to one standard deviation shock in interest rate differential. 90% confidence bands are shown. The standard deviation is 1.5 before GFC (Jan. 1999 - Jun. 2008), and 1.1 after GFC (Jul. 2009 - Dec. 2018). The vertical axis unit is billion USD.

The VAR results are robust to various changes. I tested increasing the lag order to two, and also tried changing the variable ordering by placing interest rate differential before the flows. The results are qualitatively the same.

4 Conclusion

This paper is an effort to better understand post-crisis capital flows in relation with policy reforms. After the crisis, Korea reworked its policy framework by recalibrating all three major tools for managing capital flows: it introduced new macroprudential measures, financial stability objective was added to monetary policy, which in practice focused on domestic business cycles, FX intervention was kept minimal by complementing the precautionary role of FX reserves with currency swaps. The renovated framework changed the landscape of post-crisis capital flows. The cross-border bank borrowing was curbed and became less sensitive to external shocks, while the bank's external lending started an increasing trend. The diminishing merit in returns of domestic assets fueled the surge in portfolio outflows. The proceeds of trade surplus was saved in various forms of private assets abroad instead of FX reserves.

Managing volatile capital flows to mitigate the negative impact is a major challenge for small open economies. Foreign capital surges and sudden outflows after the GFC posed serious threats to financial stability in many countries, and induced them to rearrange their policy tools. More research is needed on the interaction among macroprudential measures, foreign exchange policy and monetary policy to make them more complementary and efficient.

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