Chapter 4

FX RELATED MACROPRUDENTIAL POLICIES IN KOREA:
A STUDY ON THE EFFECT OF THE
FX DERIVATIVES POSITION RATIO POLICY ON THE
BANKS’ FOREIGN BORROWINGS

By
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1. Introduction

Inflows of global capital help developing countries’ economic growth by supplementing domestic capital. The easing of global monetary policy after the global financial crisis resulted in an increase of global liquidity, which led to capital inflows to the developing countries. By and large, these capital flows brought positive effects in terms of economic growth to the developing countries. However, sudden flows of global capital increase volatility of the domestic financial market and may negatively affect the economic growth of the developing countries. Due to this reason, developing countries have been concerned with sudden capital outflows and decrease in global liquidity.

Before 1990, Korea strictly controlled capital flows to minimize its effect on the domestic financial market. However, as foreign trade grew and market-opening pressure increased after 1990, Korea began to liberalize the capital market. In March 1990, the average market exchange rate system² was implemented so that the exchange rate was to be determined by demand and supply in the foreign exchange market. In January 1992, Korea allowed foreign investors to invest in the domestic stock market. In December 1997, a flexible exchange rate system was implemented and foreign investment in bonds was also allowed. By opening the domestic capital market, Korea was able to easily obtain global capital and grow rapidly.

On the other hand, Korea became vulnerable to external shocks. In 1997, right after opening the market to foreign investors, Korea faced sovereign default and needed IMF assistance for foreign exchange borrowings. During the global financial crisis in 2008, Korea experienced sudden outflows of capital and faced economic problems.

² Under this system, the exchange rate of the Korean won against the US dollar was determined in the market within a specified range around the weighted average interbank rates of the previous day. A specified range was 0.4% of weighted average interbank rates of the previous day at first and had widened in several times to 2.25% in December 1995.
depression again. At the time, financial institutions in Korea increased short-term foreign borrowings with low interest rates from the global market and lent it to the domestic market in long-term at relatively high interest rates. Due to this structure, it was inevitable for Korea to be vulnerable to the global risks.

The recent two severe financial crises in Korea took place when capital inflows turned into sudden outflows. Capital was flowing in rapidly during the boom and flowing out during the depression. Such pro-cyclical capital flows caused the financial and foreign exchange market to be very volatile.

Korea’s high capital flow volatility has been affected by the high degree of dependence on foreign trades and the openness of the capital market. The high dependence on foreign trade has meant that Korea has frequent capital flows for trade settlement. From 1997, since there is no limitation on the capital market, foreign bank branches have actively increased their short-term foreign borrowings and as a result, foreign investors have also actively invested in the Korean capital market.

Based on past experiences, Korea needed to curb capital flow volatility to avert a financial crisis. In 2010, just after the global financial crisis, Korea implemented a series of FX related macroprudential policies such as limitation on banks’ FX derivatives positions, macroprudential stability levy and taxation on foreign investor’s bond investment. In this paper, the effects of these macroprudential policies are discussed and the effects of the FX derivatives position ratio policy is analyzed empirically. The results of this paper will be able to provide directions in the future policy decision makings of the developing economies.

In the next section, related studies will be taken into a consideration. In Section 3, Korea’s FX related macroprudential policies will be introduced. In Section 4, the changes after the implementation of the policies will be discussed. In Section 5, the effects of the FX derivatives position ratio policy will be analyzed using econometric models. Finally, Section 6 concludes and some implications will be drawn.

2. Related Studies

Precedent studies quantified FX related macroprudential policies and focused on analyzing their effects. Ostry et al. (2010) proclaimed that FX related macroprudential policies and capital control reduced the domestic banks’ foreign liability based on the cases of 51 developing countries. Bruno et al. (2016) analyzed the macroprudential policies in 12 Asia-Pacific countries and concluded that countries which have the regulations showed a reduction in capital inflows throughout banks and bond markets.
While there have been many empirical studies on developing economies, there has been a lack of research on Korea. Choi (2014) analyzed the effect of macroprudential policies on banks’ foreign borrowings and concluded that these policies decreased short-term foreign borrowings. Bruno and Shin (2014) focused on Korea’s macroprudential policies on pro-cyclicality of capital flows and cross-border interconnections. They concluded that Korea is less sensitive to global factors after implementing the macroprudential policies compared to other countries. Huh and An (2014) analyzed the effects of Korea’s FX related macroprudential policies on growth of foreign liability and changes in the structure of foreign liability. They concluded that limitation on FX derivatives positions have a significant effect on debt and short-term liability, but both the macroprudential stability levy and taxation on foreign investors’ bond investments were found to be statistically insignificant.

3. Introduction of Korea’s FX Related Prudential Policies

3.1 Limitation on Banks’ FX Derivatives Position Ratio

In October 2010, Korea implemented the limitation on banks’ FX derivatives position policy in order to decrease banks’ foreign borrowings and its volatility. Banks in Korea, in particular, foreign bank branches, enjoy arbitrage profits through FX swap transactions. If there is no limitation on bank’s FX derivatives position ratio, those banks have an incentive to borrow US dollar as much as they can because of the arbitrage profit. The first FX derivatives position ratio was 50% of their equity capital of the preceding month for domestic banks and 250% for the foreign bank branches.

When short-term foreign borrowings rapidly increased at the first half year of 2011, the Korean government decreased the FX derivatives position ratio limitation to 40% for domestic banks and 200% for foreign bank branches in July 2011. They once again decreased the ratio limitation to 30% for domestic bank and 150% for foreign banks in January 2013 to curb capital flows volatility which came from the Quantitative Easing (QE) of the developed economies. 3

The FX derivatives position limitation policy is designed for the banks to be able to control their positions flexibly. The policy regulates the banks’ FX derivatives positions to a certain ratio of their equity capital, and the banks can continue to trade the FX derivatives products by raising their capital. As only the net position is regulated, when the banks encounter the limitation, they can control the net position through reverse transactions of other derivative products.

3. The Korean government loosened the limitation ratio to 40% for domestic banks and 200% to foreign bank branches in July 2016.
3.2  Macroprudential Stability Levy

In order to curb excessive foreign borrowings and to increase the maturity of foreign liabilities, Korea has implemented a macroprudential stability levy policy in which allotments are imposed on the non-core foreign liabilities of financial institutions from April 2011. The rate of between 0.02% and 0.2% were imposed on the non-deposit foreign liabilities by their contract maturities. The macroprudential stability levy is part of the foreign exchange stabilization fund and is to be used to support financial institutions in times of financial crisis.

In July 2015, Korea reformed the macroprudential stability levy to guarantee fairness among the financial institutions and to simplify imposing rate. Non-bank financial institutions were also included and a unitary rate of 0.1% was applied to the non-deposit foreign liabilities with less than one year of maturity. A discounted rate (0.02% for contract maturity exceeding 2 years, 0.03% for exceeding 3 years, and 0.04% for exceeding 4 years) was applied to the long-term foreign liabilities.

3.3  Resumption of the Taxation on Foreigners’ Bond Investment

In May 2009, Korea implemented a policy that exempted tax on capital gains and interest (14% and 20% each) on foreign investors’ bond investments with concerns about the lack of domestic FX liquidity during the global financial crisis. However, due to the increase of global liquidity, recovery of the Korean economy, appreciation of the Korean won and the expansion of the difference in domestic and global interest rates, foreign investors’ bond investments increased to the level it was before the global financial crisis.

As large inflows of foreign investors’ bond investments increased the volatility of the financial market, the taxation on them was revived to curb speculative capital flows in January 2011. As an alternative, a flexible tax rate (0-14%) determined by the President was newly introduced.

4. Different macroprudential stability levy rates were imposed by maturities of non-deposit foreign liability. 0.2% was imposed for the contract maturity less than 1 year (included 1 year), 0.1% for between 1y and 3y, 0.05% for between 3y and 5y, and 0.02% for more than 5y.

5. The maturity here is not a contract maturity but a duration.
Table 1
Dates of FX-related Macroprudential Policies in Korea

<table>
<thead>
<tr>
<th>Date</th>
<th>Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010.7</td>
<td>Regulation on Foreign Currency Loan Use</td>
</tr>
<tr>
<td>2010.10</td>
<td>Regulate FX derivatives position ratio (50% to capital for domestic, 250% for foreign banks branches)</td>
</tr>
<tr>
<td>2011.1</td>
<td>Resumption of the Taxation on Foreigners’ Bond Investment</td>
</tr>
<tr>
<td>2011.4</td>
<td>Macro-prudential Stability Levy</td>
</tr>
<tr>
<td>2011.7</td>
<td>Tightening FX derivatives position ratio (40% for domestic, 200% for foreign banks branches)</td>
</tr>
<tr>
<td>2013.1</td>
<td>Tightening FX derivatives position ratio (30% for domestic, 150% for foreign banks branches)</td>
</tr>
<tr>
<td>2016.7</td>
<td>Loosening FX derivatives position ratio (40% for domestic, 200% for foreign banks branches)</td>
</tr>
</tbody>
</table>

Source: Bank of Korea.

4. The Effects of the FX Related Macro Prudential Policies

4.1 FX Derivatives Position Ratio Limitation

The aggregate FX derivatives position of banks in Korea is depicted in Figure 1. As can be seen, the position was US$ 38.0 billion at the end of October 2010 when the FX derivatives position regulation was introduced. Just after introduction of the policy, it decreased sharply to US$ 25.0 billion. However, as short-term foreign borrowings rapidly increased during the first half year of 2011, it also increased rapidly. After the second tightening was implemented in July 2011, it decreased to US$ 27.2 billion in October 2011. Due to the increase of global liquidity, however, the aggregate FX derivatives position was increased again in 2012. Reacting to this, the third tightening was introduced in January 2013. This led it to decrease to US$ 24.5 billion dollars at the end of 2015. For domestic banks, it was US$ 11.5 billion at the end of October 2010 and decreased to US$ 6.5 billion. For the foreign bank branches, it was US$ 26.5 billion at the end of October 2010 and decreased to US$ 18.0 billion at the end of 2015.
Figure 1
Aggregate FX Derivatives Position of Korean Banks

Source: Bank of Korea.
The average FX derivatives position ratio to equity capital is depicted in Figure 2. The limitation of the ratio was 50% of equity capital for domestic banks and 250% for the foreign banks at the beginning. The actual average FX derivatives position ratio of the domestic banks and the foreign bank branches were 9.5% and 154.3% respectively. After the FX derivatives position ratio was tightened to 30% for the domestic banks and 150% for the foreign bank branches in January 2013, the average FX derivatives position ratio of the domestic banks and the foreign bank branches dropped to 4.3% and 57.6% respectively at the end of 2015. After the implementation of the policy, the FX derivatives position ratio of the foreign bank branches dropped significantly.

**Figure 2**

**Average FX Derivatives Position Ratio to Equity Capital**

**a. Domestic Banks**

![Graph showing the average FX derivatives position ratio to equity capital for domestic banks over time, with actual and regulation ratios, and a limitation set at 50% of equity capital.](image)

**b. Foreign Bank Branches**

![Graph showing the average FX derivatives position ratio to equity capital for foreign bank branches over time, with actual and regulation ratios, and a limitation set at 150% of equity capital.] (image)

*Source: Bank of Korea.*
4.2 The Implementation of the Macroprudential Stability Levy

The aggregate non-deposit foreign liability of the financial institutions is depicted in Figure 3. It increased quickly but dropped significantly during the global financial crisis. It saw a slight increase of US$ 176.6 billion by the end of July 2011 when the macroprudential stability levy was implemented. After the policy was introduced, there was a decrease of US$ 15 billion until the end of 2015. The domestic banks saw an increase of US$ 115.8 billion after the regulation was implemented while the foreign bank branches saw a huge decrease of US$ 42.8 billion at the end of 2015.

Figure 3
Non-deposit Foreign Liability of Financial Institutions in Korea

![Non-deposit Foreign Liability of Financial Institutions in Korea](image)

Source: Bank of Korea.

4.3 Taxation on Foreign Investors’ Bond Investment

Foreign investors’ bond investment flow is depicted in Figure 4. It saw a US$ 35 billion inflow in 2007 and decreased tremendously during the financial crisis. Before the taxation on foreign investors’ bond investment, US$ 15.3 billion flowed into Korea in 2010. However, after the taxation, the inflow of investment by the foreigners has been decreasing and was US$ 1.0 billion in 2015, a decrease of US$ 14.3 billion compared to 2010.
4.4 Capital Flows After the FX-related Macroprudential Policy

The overall capital flows of Korea are depicted in Figure 5. Short-term liability of the banks has decreased since 2010. It was minus US$ 7.3 billion on average from 2010 to 2015. The maturity structure of foreign liability was prolonged due to the decrease in short-term liability after the implementation of FX derivative position regulation and the macroprudential stability levy. Capital inflows also gradually decreased after the implement of the policies. There were US$ 56.3 billion inflows in 2009, but outflows recorded US$ 10.7 billion in 2015.

5.1 Empirical Methodology

When global liquidity is sufficient, the foreign bank branches in Korea usually enjoy arbitrage profits through FX swap transactions. If there is no limitation on banks’ FX derivatives position ratio or there is enough space in the position, these banks have an incentive to increase foreign borrowings as much as possible because of the arbitrage profit. However, if a limitation is placed on the position, their foreign borrowings will be curbed. To examine this effect of the FX derivatives position ratio policy on banks’ foreign borrowings, a panel of individual bank’s data is constructed. The panel includes the banks that had the foreign liability balance of over US$ 100 million at the end of 2015. There are 44 banks including 16 domestic banks (7 commercial banks, 4 local banks, 3 special banks, and 2 development institutions) and 28 foreign bank branches. Table 2 presents the statistical data.

<table>
<thead>
<tr>
<th></th>
<th>Domestic Banks</th>
<th>Foreign Bank Branches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commercial Banks</td>
<td>Local Banks</td>
</tr>
<tr>
<td>No. of Banks</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Foreign Liability 1)</td>
<td>24.4</td>
<td>1.2</td>
</tr>
<tr>
<td>Capital 1)</td>
<td>11.7</td>
<td>2.4</td>
</tr>
<tr>
<td>FX Derivative Position Ratio in Average (%)</td>
<td>1.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Note: 1) US$ 100 million.
Source: Bank of Korea.

The variables used in the regression model are described in Table 3. The dependent variable is the volatility of foreign liability of every individual bank. It is calculated by the rate of monthly change in the foreign liability of the individual banks. This variable captures the volatility of individual bank’s foreign borrowings.
In general, if individual bank’s FX derivatives position ratio is approaching the policy limitation, they would stop foreign borrowings or settle the position through a reverse transaction. When the individual bank choose to stop foreign borrowings or repay, the volatility would decrease.

The explanatory variables are the FX derivative position ratio to the limitation, size of the bank and dummy variable of foreign bank branches. If the FX derivative position ratio to the limitation is near 100%, the bank is not able to increase foreign borrowings for investing in domestic assets and if they wish to do so, they have to reduce the ratio first.

The size of the bank variable captures the size effect. In general, the volatility of foreign borrowings would decrease as the bank size increases. The foreign bank branch dummy captures their specialty in Korea.

### Table 3
**Variables in the Regression Model**

<table>
<thead>
<tr>
<th>Name</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variables</strong></td>
<td></td>
</tr>
<tr>
<td>$Liab_{vol,c,t}$</td>
<td>Volatility of Foreign Liability : $\frac{Foreign\ Currency\ Liability_{c,t}}{Foreign\ Currency\ Liability_{c,t-1}}\ (%)$</td>
</tr>
<tr>
<td></td>
<td>where $c$: individual banks, $t$: month</td>
</tr>
<tr>
<td><strong>Explanatory Variables</strong></td>
<td></td>
</tr>
<tr>
<td>$FX_{position,c,t}$</td>
<td>FX derivatives position ratio to the limitation : $\frac{FX\ derivatives\ position_{c,t}}{FX\ derivatives\ position\ limitation_{c,t}}\ (%)$</td>
</tr>
<tr>
<td></td>
<td>where $c$: individual banks, $t$: month</td>
</tr>
<tr>
<td>$Size_{c,t}$</td>
<td>1) log(capital) of individual bank</td>
</tr>
<tr>
<td></td>
<td>2) log(foreign asset) of individual bank</td>
</tr>
<tr>
<td>$Foreign_c$</td>
<td>Foreign Bank Branches : 1</td>
</tr>
<tr>
<td></td>
<td>Domestic Banks : 0</td>
</tr>
</tbody>
</table>

Source: Bank of Korea.

6. Bank’s foreign currency liability which is the dependent variable’s denominator and numerator is related to the size of the bank positively. The dependent variable also can be related to the size of the bank.
The null hypothesis of the regression model is as below.

**Null hypothesis**
There is no relationship between the FX derivatives position ratio and the volatility of foreign liability of the individual banks.

The estimated model is described in an equation below.

\[
Liab\_vol_{c,t} = \alpha_0 + \alpha_1 FX\_position_{c,t} + \alpha_2 Size_{c,t} + \alpha_3 Foreign_c + \alpha_4 Liab\_vol_{c,t-1} + \varepsilon_{c,t}
\]

\(\alpha_1\) explains the effect of FX derivatives position ratio regulation on the volatility of foreign liability of the banks. If \(\alpha_1\) is negative and statistically significant, it means that the individual bank’s volatility of the foreign liability becomes lower as the FX derivatives position ratio increases.
5.2 Results of Panel Analysis

Table 4 depicts the results of regression analysis. First of all, the volatility decreases as the FX derivatives position ratio increases. This shows that the banks tend to control their foreign borrowings when their derivatives position ratio becomes closer to the limit. Since the purpose of the FX derivatives position regulation is to control the foreign liability of the banks, the FX derivatives position policy seems to meet its goals.

Second, the volatility also decreases as the size of the bank increases. The size of foreign liability is roughly proportional to the size of equity capital and foreign assets. In general, the bigger the size of a bank, the smaller the volatility of foreign borrowings.

Third, the fixed effect coefficients of the foreign bank branches are mostly positive and these results mean that foreign bank branches have higher volatility on foreign liabilities compared to the domestic banks. The random effect model with foreign bank branch dummies also supports the same results.

Table 4
Results of the 1st Analysis

<table>
<thead>
<tr>
<th></th>
<th>Liab_vol_{c,t}</th>
<th>Liab_vol_{c,t}</th>
<th>Liab_vol_{c,t}</th>
<th>Liab_vol_{c,t}</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha_0$</td>
<td>Constant</td>
<td>0.110***</td>
<td>0.109***</td>
<td>0.144***</td>
</tr>
<tr>
<td>$\alpha_1$</td>
<td>$FX_{position_{c,t}}$</td>
<td>-0.23***</td>
<td>-0.012*</td>
<td>-0.033***</td>
</tr>
<tr>
<td>$\alpha_2$</td>
<td>$Log(capital_{c,t})$</td>
<td>-0.015***</td>
<td>-0.017***</td>
<td>-0.036***</td>
</tr>
<tr>
<td>$\alpha_3$</td>
<td>$Log(asset_{c,t})$</td>
<td>0.040***</td>
<td>0.020***</td>
<td></td>
</tr>
<tr>
<td>$\alpha_4$</td>
<td>$Liab_vol_{c,t-1}$</td>
<td>0.288***</td>
<td>0.299***</td>
<td>0.160***</td>
</tr>
</tbody>
</table>

Note: ***, **, * mean 1%, 5%, 10% significant level respectively.
The foreign bank branches have invested in Korean assets actively by borrowing foreign liabilities and using FX swap markets. To consider this, another explanatory variable which is the foreign bank branch dummies multiplied by the FX derivatives position of the individual banks is added. This variable separates the effect of the foreign bank branches from the domestic banks.

Table 5 depicts the results which show a positive value for the domestic banks and negative value for the foreign bank branches. It can be seen that the FX derivatives position ratio policy do not curb the increase of foreign borrowings of the domestic banks, but curb those of foreign bank branches.

Table 5
Results of the 2$^\text{nd}$ Analysis

<table>
<thead>
<tr>
<th></th>
<th>$\alpha_0$</th>
<th>$\alpha_1$</th>
<th>$\alpha_2$</th>
<th>$\alpha_3$</th>
<th>$\alpha_4$</th>
<th>$\alpha_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha_0$</td>
<td>Constant</td>
<td>0.110***</td>
<td>0.026**</td>
<td>-0.073***</td>
<td>0.058***</td>
<td>0.278***</td>
</tr>
<tr>
<td>$\alpha_1$</td>
<td>$FX_{position_{c,t}}$</td>
<td>0.103***</td>
<td>0.029**</td>
<td>-0.060***</td>
<td>0.035***</td>
<td>0.283***</td>
</tr>
<tr>
<td>$\alpha_2$</td>
<td>$FX_{position_{c,t}} \times Foreign_c$</td>
<td>0.144***</td>
<td>0.011</td>
<td>-0.058***</td>
<td>0.158***</td>
<td>0.157***</td>
</tr>
<tr>
<td>$\alpha_3$</td>
<td>Log(capital)$_{c,t}$</td>
<td>0.183***</td>
<td>0.007</td>
<td>-0.044*</td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>$\alpha_4$</td>
<td>Log(asset)$_{c,t}$</td>
<td>-0.017***</td>
<td>-0.014**</td>
<td>-0.033***</td>
<td>0.256</td>
<td></td>
</tr>
<tr>
<td>$\alpha_5$</td>
<td>Foreign$_c$</td>
<td>-0.017***</td>
<td>-0.014**</td>
<td>-0.033***</td>
<td>0.254</td>
<td></td>
</tr>
<tr>
<td>$\alpha_6$</td>
<td>Liab_vol$_{c,t-1}$</td>
<td>0.058***</td>
<td>0.035***</td>
<td>-0.033***</td>
<td>0.254</td>
<td></td>
</tr>
</tbody>
</table>

Note: ***, **, * mean 1%, 5%, 10% significant level respectively.

From the results above, we know that the FX derivatives position ratio policy reduces the volatility of foreign bank branches’ foreign borrowings. When global liquidity was overflowing, the foreign bank branches in Korea were operating very actively by increasing foreign borrowings and because of this, the Korean FX market became very volatile. However, after implementing the FX derivatives position ratio policy, those activities had been curbed and the volatility of the FX market had also
decreased. In short, the FX derivative position ratio policy achieved its goal and it is still effective.

There are, however, some limitations to this analysis. There can be other explanatory variables which are not included in this model. For example, the macroprudential stability levy policy could also have reduced the foreign borrowings of banks, but has not included in this model. These limitations need to be considered in the future researches.

6. Conclusions

The FX related macroprudential policy can be said to have reduced the volatility of the capital flows in Korea. After the implementation of the policies, 1) the FX derivatives position of the foreign bank branches decreased sharply; 2) the non-deposit foreign liabilities of the financial institutions have decreased; and, 3) the inflows of the foreign investors’ domestic bond investment have slowed down.

In addition, the empirical analysis of the effect of FX derivatives position ratio regulation on the foreign borrowings of the individual banks showed that the implementation of the policy decreased the volatility of FX liability. In particular, the foreign bank branches were more affected by the regulation. Since the purpose of the regulation was to reduce the volatility of capital, the FX derivatives position regulation had achieved its goal to a certain extent.

As mentioned in the introduction, the developing countries have economic structures that are very sensitive to the global capital flows. Korea’s FX related macroprudential policies have been working quite effective in countering the volatility of these flows. It is hoped, therefore, that this regulation can also be considered for other SEACEN economies that are concerned about excessive global liquidity. However, since the implemented regulation in Korea is still questionable in terms of whether it breaches the OECD Code for Liberalizing Capital Movements, the other economies must pay due heed to this factor.
References


