

Are Capital Controls Effective? The Case of the Republic of Korea

SOYOUNG KIM AND DOO YONG YANG

Capital controls have recently attracted interest as capital surges in emerging market economies threaten to bring about economic instability and heighten difficulties in implementing macroeconomic policies. While an option that can be taken to deal with huge capital inflows involves the use of capital controls, there is no consensus on their effectiveness. Against this background, our paper aims to investigate the effectiveness of capital controls in the Republic of Korea. This paper first reviews the history of capital account policy, which can be divided into five stages: (i) gradual liberalization during the 1980s and early 1990s, (ii) acceleration of liberalization during the early and mid-1990s, (iii) the big-bang approach to liberalization during the Asian financial crisis, (iv) liberalization for facilitation of capital market development beginning the late 1990s, and (v) the conservative approach during the global financial crisis. To quantify the trends, this paper constructs measures of capital account control/liberalization based on the official record of government policies. In the second part, it discusses the effects of capital account control/liberalization in four ways. First, the behavior of key macro variables in the Republic of Korea is reviewed by comparing the periods before and after serious capital account liberalization. Second, the effects of shocks to the capital account control/liberalization indexes on capital flows are examined using a VAR model. Third, the effects of the United States (US) monetary policy shocks on capital flows and the interest rate of the Republic of Korea are examined for the period of capital controls and the period of capital account liberalization. Fourth, a simple event study is conducted of recent capital control measures. The empirical results based on VAR models show that shocks to capital account controls do not have significant effects on capital flows in most cases. However, capital flows, the current account, and the exchange rate were far more volatile in the period of a liberalized capital account. It is also interesting that during the latter period, the Republic of Korea did not gain monetary autonomy despite adopting a freely floating exchange rate. This result may be related to volatile capital flows under a liberalized capital account. Finally, the results of the event study tend to support the effectiveness of capital controls in altering the composition of capital flows.

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I. INTRODUCTION

The influx of capital inflows has been one of the more difficult problems of emerging market economies. Such economies suffer from rapid capital inflows and outflows, generating boom–bust cycles. In the initial period of capital surges, one finds real exchange rate appreciation, domestic credit expansion, consumption and investment booms, and asset price bubbles. Over time, however, the process tends to reverse itself—real exchange rate appreciation worsens the international competitiveness of firms and brings about a current account deficit, influencing foreign investors to lower their view on the domestic market and withdraw capital investment. Therefore, net capital inflows turn into capital outflows, which end the boom phase and start the bust phase. The economy may eventually collapse.

Even if no such dramatic cycles are found, volatile capital flows are likely to increase the volatility of the economy. Volatile capital flows tend to increase the volatility of the exchange rate, liquidity, and asset prices. This makes it hard for policymakers to implement monetary and exchange rate policy to mitigate the negative effects of capital inflows on the economy.

Capital controls are a common tool for mitigating the negative effects of capital inflows in emerging market economies. While these can take a variety of forms, for countries that have substantially liberalized the capital account, more market-based controls (such as a tax on inflows) have been the predominant option in recent years. To these countries, returning to the days of draconian capital controls or recreating a system of extensive administrative controls is not really a viable option.

Evidence on the effectiveness of capital controls is mixed. Experiences of various countries suggest that what the best market-based controls can be expected to do is lengthen the maturity of inflows and change the composition, with little impact on volume. The effectiveness of any control measure tends to weaken over time, as agents in the markets may find ways to circumvent them through various channels. At the same time, capital controls produce adverse effects: they tend to increase domestic financing costs, reduce market discipline, lead to inefficient allocation of financial capital, distort decision making at the firm level, and be difficult and costly to enforce.

Even though most Asian emerging market economies have liberalized the capital account after the Asian crisis, Indonesia, Malaysia, the Philippines, and Thailand still maintain some control over foreign capital flows, especially short-term capital flows. Thailand limits domestic banks' baht borrowing from offshore parties. In December 2006, Thailand's policy authorities announced unremunerated reserve requirements against portfolio inflows, but the subsequent adverse reaction of the equity market led them to apply the policy only to fixed income inflows. Reserve requirements were removed completely in March 2008.

This episode illustrates the difficulty of maintaining capital controls. The story may be different for countries that have not substantially opened their capital account such as the People's Republic of China (PRC) and India. In some ways, they appear to be successful in managing the process of gradual capital account liberalization through the use of investor-based controls and prudential-like measures. In particular, both are concerned with currency mismatches in the banking sector. The PRC extended to foreign banks the long-standing restrictions on domestic banks' ability to borrow dollars abroad to fund dollar assets in the PRC. In India, the government set a limit on external commercial borrowing in August 2007 when commercial borrowing soared. While firms were still able to borrow abroad in foreign currency, their ability to convert the foreign currency into rupees to finance spending in India was limited to \$20 million per year.

This paper analyzes the effectiveness of capital controls in the Republic of Korea, which has an interesting history in that area. Before the Asian crisis, the country successfully controlled capital inflows and outflows while undertaking gradual capital account liberalization. It started to accelerate capital account liberalization from the early 1990s, but the financial crisis occurred in 1997. Although this crisis was at least partially due to capital account liberalization, the Republic of Korea ended up with an almost fully liberalized capital account to recover from the crisis, making it difficult for the country to manage capital flows. The foreign exchange market was in turmoil during the recent global financial crisis, after which the country chose to adopt market-based restrictions on capital flows such as more liberalized measures on capital outflows and strengthened financial supervision and regulation. This experience, by analyzing the effectiveness of capital restriction measures, provides an important lesson to other emerging market economies.

Section II provides a brief history of capital flows and capital controls in the Republic of Korea and constructs capital account control/liberalization indexes. Section III shows the capital flows and major macroeconomic variables of the country in relation to capital account policy. Section IV empirically analyzes the effects of shocks to capital account policy on capital flows using the measures constructed in Section II. Section V investigates the effects of US monetary policy shocks on various Korean variables for the period before and after capital account liberalization in order to discuss monetary independence and capital flow behavior. Section VI provides a simple event study to analyze the effectiveness of capital controls in recent years. Section VII summarizes the results.

II. CAPITAL CONTROLS AND CAPITAL ACCOUNT CONTROL/LIBERALIZATION INDEXES IN THE REPUBLIC OF KOREA

This section gives a brief summary of capital liberalization in the Republic of Korea and constructs capital account control/liberalization indexes based on public information.

A. Brief History of Capital Liberalization in the Republic of Korea

Capital market liberalization in the Republic of Korea can be divided into five distinct stages based on economic environment, incentives, and policy orientation. The early stage of capital market opening, the 1980s to the early 1990s, was a time of gradual approach. During this stage, the government had been cautious in opening the capital market to foreign investors because of concerns over the influx of capital inflows. Prior to the liberalization of the capital market, financial deregulation measures in the Republic of Korea had first been initiated in 1979 with the privatization of banks, free entry of nonbank financial intermediaries, introduction of new financial instruments, etc. After the launching of the deregulation processes, capital market liberalization measures took off in the first half of the 1980s. Domestic banks were allowed to borrow from abroad, foreign investors permitted to participate in the Korean stock market through investment trust funds, and the Korea Fund listed on the New York Stock Exchange (NYSE).

Throughout the 1980s, the policy of the Korean government on capital flows depended on the current account balance. Under a pegged exchange rate regime, capital inflows were used to accommodate the overall balance of payments (BOP). Therefore, the overall BOP fluctuated around a net zero balance, and the current account and capital account moved in opposite directions (Kim, Kim, and Wang 2004). In 1988, the Korean government formally accepted the obligations of Article VIII, Sections 2–4 of the International Monetary Fund's (IMF's) Articles of Agreement and abolished its remaining restrictions on payments and transfers for current account transactions.

Despite a series of capital account liberalization measures, the Korean government maintained a gradual approach and thus a considerable number of capital controls on foreign exchange and cross-border capital transactions remained. For example, the opening of the domestic bond market was given special attention because interest rate differentials were still large.¹ While most

¹Permitting foreign participation in equity markets has tended to precede the opening of domestic fixed-income markets in most developing countries. Ironically, this sequencing seems to be motivated by reluctance to share real returns on fixed-income claims that exceed worldwide real returns with foreigners. In practice, however, real yields gained by equity holders have often been exceeded by large multiple real yields on fixed-income securities (Fry 2000).

capital outflows were liberalized, capital inflows in the form of foreign portfolio investment remained subject to various ceilings and other regulations.² However, large domestic firms (the *chaebols*) were severely critical of the remaining restrictions and thus claimed that rigid control on capital inflows undermined the international competitiveness of domestic firms in the world market due to high financial costs.

The second stage came with increasing pressure for capital market openness in the early 1990s. With the intent to join the Organisation for Economic Co-operation and Development (OECD), the Republic of Korea accelerated its capital account liberalization in the early 1990s. In 1992, foreign investors were given permission to purchase Korean stocks comprising up to 3% of outstanding shares of each company per individual, but no more than 10% of a company in total. In June 1993, the Korean government put out a blueprint for financial sector liberalization that would ease restrictions on foreign exchange transactions, e.g., by widening the daily won-dollar trading margins, expanding limits on foreign investments in the stock market, and permitting long-term commercial loans (see details in Park 1995).

Further capital account liberalization became inevitable when the Republic of Korea joined the OECD in 1996. However, the Korean government was not without reservations. In the OECD membership negotiations, the Republic of Korea was reluctant to liberalize its capital account out of concern that foreign capital inflows would increase dramatically due to the interest rate differential. The government had thus planned to delay the capital account liberalization until interest rates converged significantly.

The 1997–1998 currency crisis marked the third stage of capital market liberalization. The opening of capital markets in the Republic of Korea had been carried out under a big bang approach during this period, orchestrated by international financial institutions such as the IMF and the World Bank. Most capital account and foreign exchange restrictions that prevented or hindered capital inflows and outflows by both domestic residents and nonresidents were then lifted, making the level of openness of the country's capital markets comparable to that of advanced countries. Indeed, there had been a tremendous impact on capital market structure and activity. Due to the series of liberalization measures after the crisis, foreign investments into the capital market significantly increased since 1999.

The outbreak of the financial crisis in the Republic of Korea changed the climate of capital market liberalization. In order to overcome the currency crisis,

²The remaining restrictions were as follows: nonresidents' holdings limited to a maximum of 20% of the outstanding shares of each company and nonresidents' holdings up to 5%, holdings of bonds by nonresidents allowed indirectly through the Korean Trust and Country Fund, direct holdings allowed only for convertible bonds issued by small and medium enterprises, limits placed on domestic companies' use of foreign commercial loans to just the importation of capital goods, and for FDI, a cap on the permitted period for delayed payment of imports (up to 120 days).

the Korean government aimed for far more extensive capital market opening. A variety of policies to induce foreign capital in an attempt to overcome the currency crisis were developed and measures for capital account liberalization undertaken. It was ironic that the Republic of Korea ended up with a fully liberalized capital account despite the fact that the 1997 crisis was at least partly due to volatile capital flows under a liberalized capital account.

The individual shareholding limit for foreigners increased drastically from 7% to 50% on 11 December 1997, and the ceiling was lifted completely on 25 May 1998. On the other hand, ceilings imposed on foreign purchases of listed shares issued by two large public enterprises, Korea Electric Power Corporation (KEPCO) and Pohang Iron and Steel Corporation (POSCO), remained at 30%.

All restrictions on the foreign purchase of debt securities were abolished after the 1997 crisis. The Republic of Korea fully opened the domestic bond market to foreign investors in order to induce capital inflows. All restrictions previously in force regarding the purchase by nonresidents of listed or unlisted and guaranteed or nonguaranteed bonds issued by small or medium size enterprises and other firms were eliminated. The ceilings imposed on foreign purchases of public debt instruments were also abolished.

Nonresidents could freely open deposit accounts in foreign currency with resident institutions in the Republic of Korea. However, restrictions applied to nonresidents' accounts in Korean won as the domestic currency account could not freely be converted into foreign currency and transferred abroad unless designated as a free-won account. For the purpose of portfolio investment, foreign investors need some guarantee of convertibility of the domestic currency. As of December 1997, all domestic enterprises, regardless of size, were allowed to borrow overseas without limit for as long as the maturity did not exceed one year. All short-term money market instruments, such as commercial paper and trade bills, were also completely liberalized on 25 May 1998 thus bringing the level of openness of the country's capital markets at par with advanced economies.

The fourth stage of capital liberalization, the late 1990s to the early 2000s after the crisis seemingly passed, can be characterized as a period of facilitation of capital market development. In the 2000s, the government grew increasingly concerned about the rapid increase in capital inflows. The country encouraged more overseas investment by financial institutions and individuals to mitigate the negative effects of the huge capital inflows into the domestic capital market. In 2006, the limit on FDI overseas investment by domestic residents was relaxed to include the purchase of overseas real estate. In 2007, a temporary tax exemption for 3 years was applied to capital gains generated from overseas stock investment by domestic investment trust and investment companies. The government also eased regulations to boost overseas real estate investment through indirect investment.

The fifth stage can be characterized by its conservative approach. Since the 1970s, the direction of capital market liberalization had always been toward greater openness. However, this attitude dramatically changed beginning the global financial crisis in 2008. In the early 2000s, the Republic of Korea experienced a surge in short-term borrowing by foreign banks due to the expectation of won appreciation and mismatches in the forward market. However, the global financial crisis in 2008 and the resulting dollar liquidity squeeze reversed the direction of capital flows, highlighting the need for financial regulation, supervision and capital controls.

Measures to prevent such capital swings and rapid changes in dollar liquidity were consequently introduced. These included the strengthening of financial supervision of foreign bank branches in 2008, as well as tightening of regulations on the liquidity of domestic financial firms, an increase in the liquidity ratio of foreign exchange, and improvement of risk management on foreign exchange transactions in 2009. Therefore, after the global financial crisis, the country adopted a more cautious stance on cross-border capital market transactions and strengthened financial regulation and supervision related to cross-border capital flows to prevent instability of domestic financial markets.

B. Capital Account Control/Liberalization Indexes

To analyze the effect of capital controls on the macroeconomy in the Republic of Korea, capital account control/liberalization indexes are constructed.³ We collect data on capital account policy based on information from the Bank of Korea's *Daily Economic Bulletin*, which is a record of all government policy measures including finance and the economy, industries, labor, and trade.⁴ Capital control measures are divided into two categories: capital inflows (liabilities) and capital outflows (assets). Capital flows are further categorized into four different types: foreign direct investment (FDI), equities, bonds, and bank transactions. Foreign exchange transaction measures are included since these influence cross-border capital transactions.

The capital control indexes are measured by assigning +1 or -1 to each of the implemented measures. Any measure that liberalizes inflows and outflows is assigned +1, while any measure that restricts inflows as well as outflows is assigned -1. The assigned number is scaled by different weights based on the impact of the measure. The weight is set between 0 and 2, where any measure that affects capital inflows or outflows greater than \$150 million is given a weight of 2. If the flow is less than \$150 million, the weight is 0.5. Some measures that

³For most parts, we follow the method of Jongwanich, Gochoco-Bautista, and Lee (2011) used to construct capital control indexes for Malaysia and Thailand.

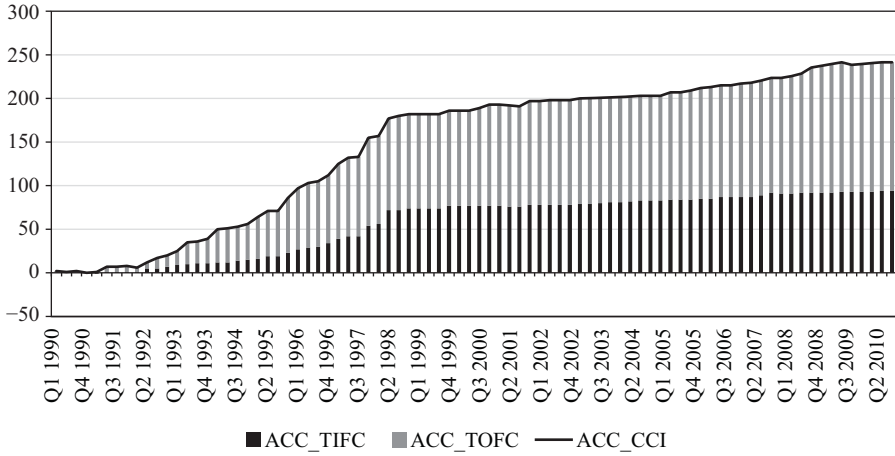
⁴The website for the *Daily Economic Bulletin* can be found at <www.bok.or.kr>. Unfortunately, this is written in Korean only.

significantly influence overall capital flows are also assigned a weight of 2. The measures are constructed on a quarterly basis to match the frequency of major macroeconomic variables such as GDP and capital flows. Once the number and weight have been decided for each measure, the numbers are sequentially accumulated over time to arrive at the indexes for each asset class and foreign exchange transaction. The capital control indexes are constructed on a quarterly basis from 1990 to 2010.

The total capital account control/liberalization index for both inflows and outflows (ACC_CCI) is shown in Figure 1a. The index illustrates well the capital liberalization measures in the Republic of Korea on a general scale beginning 1990. First, the index increases over time, implying that the capital account has increasingly been liberalized. As discussed in the previous section, the country started comprehensive liberalization in 1992, a move driven by the intent to join the OECD as well as the increase in the external sector. Second, most big bang-type liberalization measures were introduced in 1998, as shown by the highest slope in the graph during that year. Third, there had been a small increase in the degree of restrictions on short-term capital inflows in recent years. While the graph does not show it clearly, there had been a small drop in the index.

The index on capital outflows (ACC_TOFC) is also shown in Figure 1a. As discussed in the previous section, the early stage of capital liberalization focused on capital outflows, which is why ACC_TOFC comprises a large portion of the total index in the early 1990s. This was true also of the 2000s (ACC_TOFC accounting for more than 50% of ACC_CCI), indicating that outflows have become more liberalized than inflows even in recent years. Increased capital inflows at the time spurred capital outflow liberalization to mitigate the negative impacts of excessive capital inflows. The index on capital inflows (indicated by ACC_TIFC), meanwhile, reflect the widespread lifting of capital restrictions on capital inflows after the currency crisis in 1998.

Figure 1a. Capital Account Control/Liberalization Index

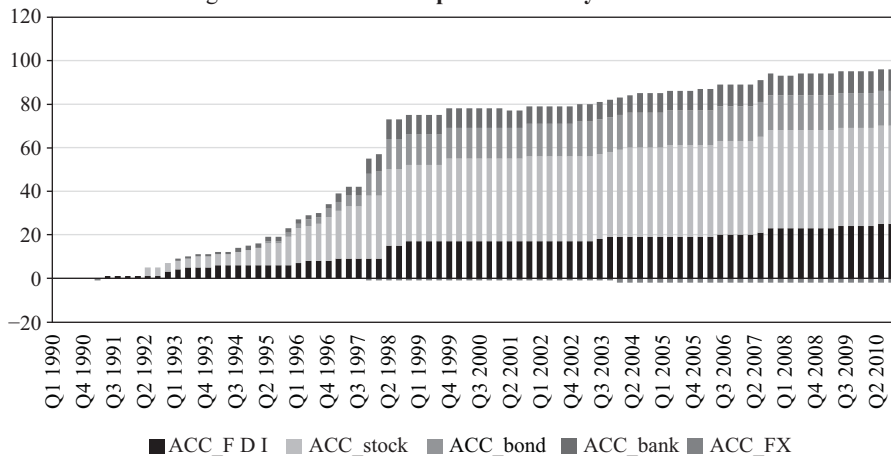


ACC_CCI = capital account control/liberalization index on capital inflows and outflows, ACC_TIFC = capital account control/liberalization index on capital inflows, ACC_TOFC = capital account control/liberalization index on capital outflows.

Source: Author’s computations.

Figure 1b shows the decomposition of the index on capital inflows according to asset type. Before the Asian financial crisis, capital account liberalization on inflows had been mostly concentrated on FDI and stocks, as the government tried to attract foreign capital in the early 1990s, opening up the stock market beginning 1992. During the Asian financial crisis, an effort was made to liberalize all types of inflows. Bank and bond markets had been liberalized significantly along with equity and FDI investment. In the early and mid-2000s, further measures were introduced to ease up on inflows, especially on stocks and FDI. As the Republic of Korea experienced the rapid swing of capital flows between 2007 and 2008 that developed into the dollar liquidity crisis, the government began to reconsider the direction of liberalization on capital inflows, especially bank inflows. The indexes on foreign exchange transactions by nonresidents, on the other hand, show a somewhat different pattern from the indexes on other asset types. This indicates that foreign exchange transactions by nonresidents were still not fully liberalized.

Figure 1b. Indexes on Capital Inflows by Asset Class

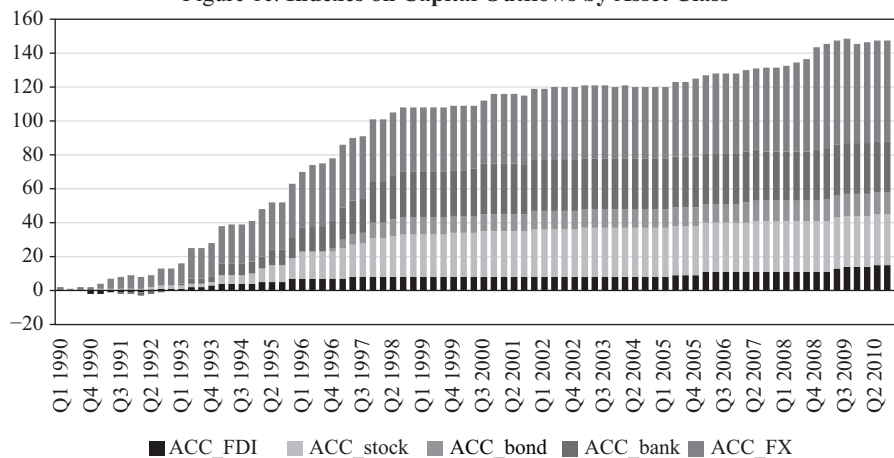


ACC_bank = capital account control/liberalization index on bank loan inflows, ACC_bond = capital account control/liberalization index on bond inflows, ACC_FDI = capital account control/liberalization index on FDI inflows, ACC_stock = capital account control/liberalization index on stock inflows.

Source: Authors' computations.

Figure 1c similarly shows the breakdown of the index on capital outflows. Liberalization measures were applied to all components except for bonds. Unlike for capital inflows, foreign exchange rate transactions had been liberalized early on to induce more outflows. The indexes show rapid liberalization of capital outflows for all types of assets in 1998. More interestingly, in the middle of the 2000s, capital outflows had been encouraged to mitigate the negative effects of increases in short-term capital inflows, particularly through liberalization of foreign exchange rate transactions and FDI outflows. However, in 2008, foreign exchange transactions by domestic residents had been more or less restricted by the strengthening of the liquidity ratio of dollar transactions.

Figure 1c. Indexes on Capital Outflows by Asset Class



ACC_bank = capital account control/liberalization index on bank loan outflows, ACC_bond = capital account control/liberalization index on bond outflows, ACC_FDI = capital account control/liberalization index on FDI outflows, ACC_FX = capital account control/liberalization index on foreign exchange transaction outflows, ACC_stock = capital account control/liberalization index on stock outflows.

Source: Authors' computations.

III. CAPITAL FLOWS AND MAJOR MACROECONOMIC VARIABLES IN THE REPUBLIC OF KOREA

This section describes capital flows and other major macroeconomic variables in relation to capital account policy. In order to explain the relationships between capital flows and capital controls as well as other major macroeconomic variables, this section presents the trends of capital flows and shows the impacts of capital flows on the major macroeconomic variables in the Republic of Korea.

A. Trends of Capital Flows in the Republic of Korea

Cross-border capital flows in general grew steadily from the 1980s in the Republic of Korea as international institutional investors began to show a high tendency to diversify their portfolios in order to lower risks. In addition, the development of information and communication technology enabled global investment and broadened opportunities for investors to manage risks through investment in diversified financial assets across countries. In line with this, the changes in the form of capital flows in emerging market economies have been induced by both push effect and pull effects. With lower returns on domestic capital due to sluggish economic growth in the advanced economies, investors' demand for investment in emerging market portfolio began to soar. At the same time, major emerging market economies had relaxed their regulatory measures on cross-border capital flows.

With the turn to the 1990s, capital inflows on a global scale started to take multiple forms, with investors from advanced economies diversifying their assets internationally. In the 2000s, the Republic of Korea, like other emerging market economies, experienced huge capital inflows because of the rise in global liquidity. However, it also experienced large capital outflows when domestic institutions started to invest abroad for their profit-seeking activities and for diversification of risks.

With the liberalization of the capital market through the last three decades, the total amount of capital inflows into the Republic of Korea increased almost 33 times, from \$2.2 billion in 1980 to \$68.8 billion in 2007, the highest level historically (Figure 2). During this period, the country experienced different types of capital flows. In the early 1980s, for instance, bank loans were the most important type of capital inflows along with transfer payments. Since most other types of capital inflows were prohibited, as mentioned in the previous section, the Korean government encouraged domestic banks to borrow from abroad in order to fill the current account deficit. At the time, foreign investors were only allowed to participate in the equity market through investment trust funds such as the Korea Fund, which had been listed on the NYSE since 1981. By 1990, foreign equity investment in the Korean stock market had been allowed albeit with limitations on the shares purchased by foreign investors. By 1998, these limitations on holdings had been removed. Following the liberalization measures, equity inflows steadily rose prior to the Asian financial crisis, dropped in 1997, but increased again since then.

Before the currency crisis of 1998, the government could control the type and size of capital flows with limited capital control measures because the capital market was not fully liberalized. Therefore, capital inflows in the Republic of Korea were quietly related to the measures that controlled the capital markets. This implied that pull factors were dominant in the Republic of Korea before the currency crisis.

However, with the liberalization of the capital market after the currency crisis, capital flows in the Republic of Korea took on different characteristics. There had been the big bang liberalization in capital markets, as indicated in Figure 1b, as well as push factors such as the global investment environment and the rise in liquidity. For example, as equity was seen as a candidate for resolving the currency crisis, the government removed most barriers to stock market investment in early 1998. Equity financing increased rapidly in 1999 as a result, but momentum was reversed in 2000 due to the global bursting of the information technology bubble. In 2003, foreign investment in the domestic stock market reached a record high of \$14.4 billion but declined significantly since 2005 due to global deleveraging in response to the evolving US subprime mortgage crisis.

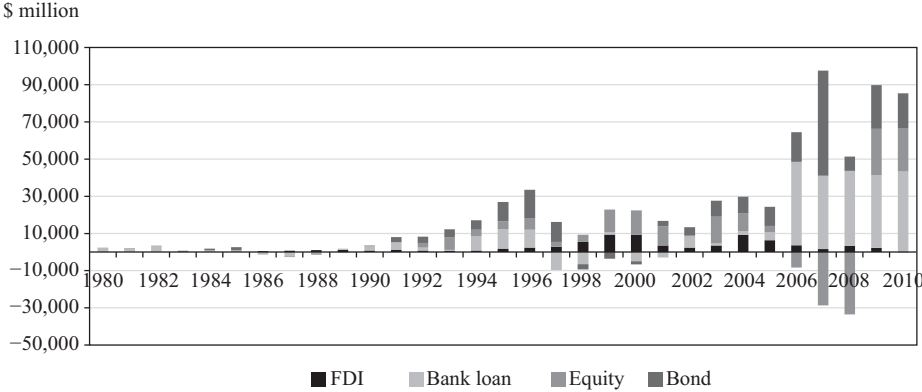
FDI flows meanwhile have shown a relatively steady increase. As foreign banks have been extremely cautious in their cross-border lending since the 1997

crisis, inflows of bank loans have shown a negative value except in 2006, implying that foreign banks have repatriated their loans since the crisis. By 2009 and 2010, capital inflows already returned to normal levels.

Capital outflows (investment by domestic residents) had traditionally been relatively small until the early 2000s (Figure 3). Even though there had been a series of liberalization measures since the early 1990s, they mostly focused on foreign exchange transactions. Levels impressively increased after the government encouraged outflows in response to the influx of short-term capital. Total capital outflows increased from \$35.7 billion in 2006 to \$78.7 billion in 2007. Increasing at a steady pace, FDI investment had traditionally been the major driver of outflows. However, since 2001, portfolio investments have made up more than 60% of capital outflows, reflecting the liberalization of residents' investment abroad, which skyrocketed from \$15.2 billion in 2006 to \$52.4 billion 2007. But in 2008, when the global financial crisis rocked the world financial markets, equity outflows significantly reversed.

Capital inflows to emerging market economies make macroeconomic management difficult since they can result in an increase in money supply, liquidity, and asset prices as well as an appreciation of nominal and real exchange rates. Moreover, the current account often runs a deficit with higher capital mobility. To avoid persistent current account deficits, money supply will have to be increased, precipitating a surge in domestic prices, or foreign exchange intervention activated, resulting in an accumulation of foreign reserves and accordingly domestic money supply. Foreign exchange intervention may be sterilized through sales of government securities in an open market operation. However, if the sterilization is only partial, liquidity and asset prices may increase.

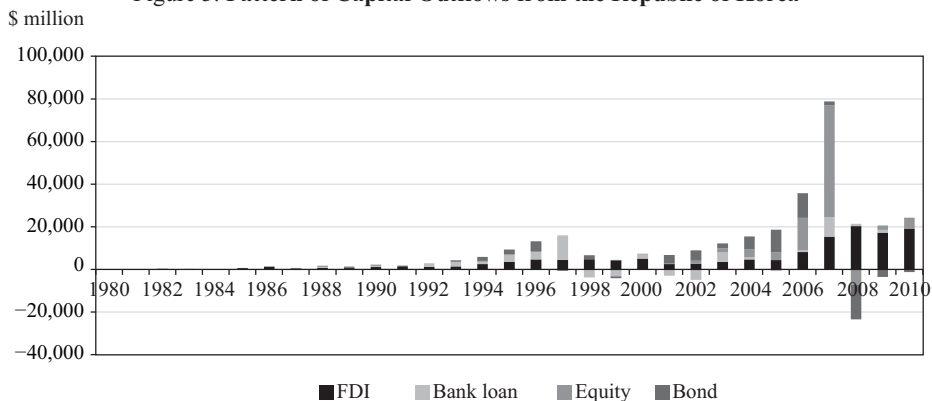
Figure 2. Pattern of Capital Inflows to the Republic of Korea



FDI = foreign direct investment.

Source: International Financial Statistics.

Figure 3. Pattern of Capital Outflows from the Republic of Korea



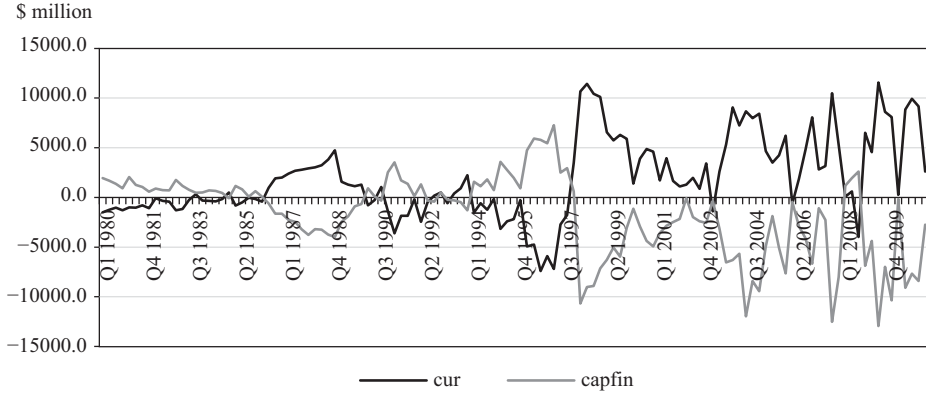
FDI = foreign direct investment.

Source: International Financial Statistics.

To identify the effects of capital flows and capital controls on the Korean economy, we select several macroeconomic variables for scrutiny. Capital inflows dramatically increased since 1998 due to the big bang approach to capital market liberalization, with major macroeconomic variables showing different patterns.

Figure 4 shows the relationship between net capital inflows and current account balances in the Republic of Korea. As theory predicts, the current account is a mirror image of net capital inflows. However, the characteristics of the relationship between capital flows and current account balances are different depending on the degree of openness in capital markets. Before the currency crisis of 1998, current account balances were generally exactly matched with net capital inflows, with both series showing relative stability and persistence. There had been many reasons for that, but limited capital market openness seemed to be a major factor. However, net capital inflows and current account balances became more volatile and increased in volume after the currency crisis probably due to higher capital market openness. As a consequence of this, the Republic of Korea has faced more difficulties in achieving stable external balances.

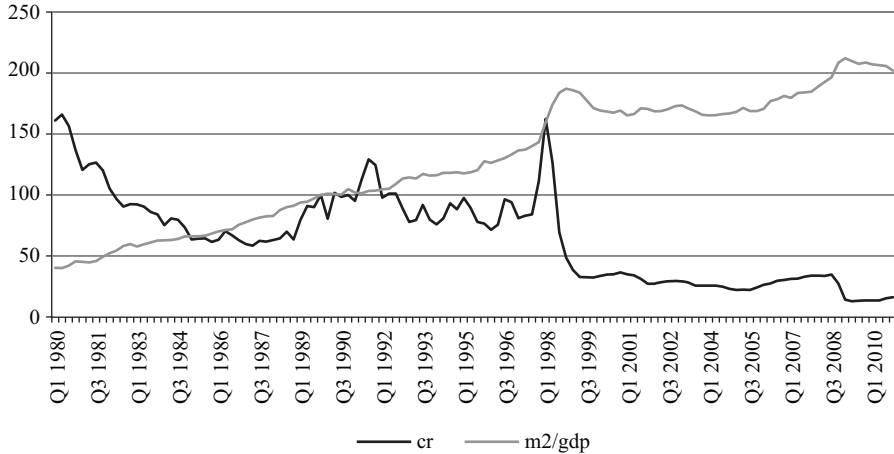
Figure 4. Net Capital Inflows and Current Account Balance of the Republic of Korea



capfin = net capital inflows, cur = current account balance.
 Source: Bank of Korea.

Domestic liquidity and short-term interest rates have also been influenced by capital flows. Figure 5 indicates the trends of M2/GDP and call rates in the Republic of Korea. Before the 1998 currency crisis, there seemed to be less of a relationship between call rates and domestic money supply. This implied that domestic short-term interest rates were so repressed that monetary aggregates could not be as influential. However, since 1998, domestic money supply and call rates have displayed a negative relationship.

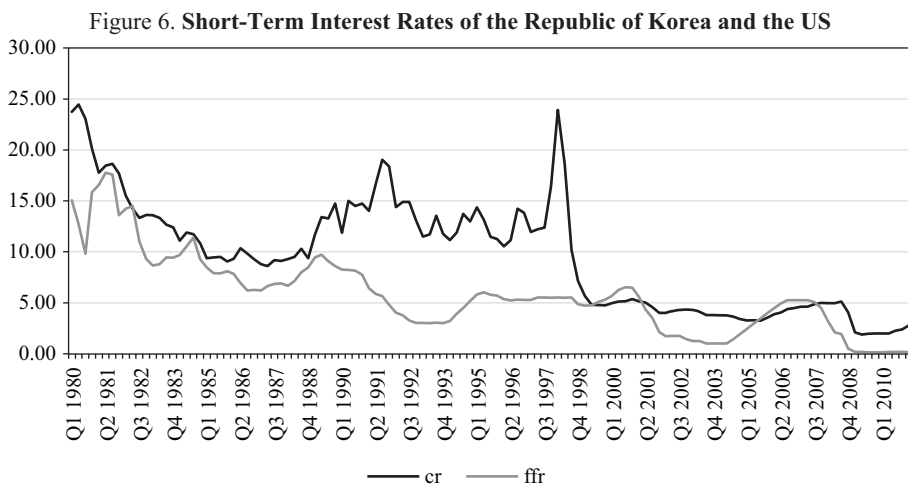
Figure 5. Domestic Liquidity and Short-Term Interest Rates of the Republic of Korea (1980Q1=100)



cr = call rates, GDP = gross domestic product.
 Source: Bank of Korea.

More interestingly, policy interest rates show different characteristics depending on the level of capital flows and foreign exchange rate regimes before and after the currency crisis. Through the 1980s, the Republic of Korea took a fixed exchange rate regime. Therefore, domestic short-term interest rates were closely correlated with the federal funds rate of the US. However, from the early 1990s to 1998, the country adopted a managed floating exchange rate regime generally with increasing flexibility of exchange rates, implying that domestic policy interest rates should be equal or close to policy rates of the US. By the same argument, domestic policy rates should be independent from that of the US after the currency crisis as the country adopted a free floating exchange rate regime. However, Figure 6 shows contradictory trends of short-term interest rates. Before 1998, the country's policy rates did not respond much to US interest rates changes. This was possible only if the Republic of Korea could control capital inflows.

But since 1998, short-term policy rates have followed changes in US interest rates more closely. This indicates that the monetary autonomy supposedly guaranteed under a free float had not been achieved. One of the reasons for this could have been the excessive capital inflows which raised the risk of undue currency appreciation, liquidity expansion, asset price bubbles, and overheating of the domestic economy. To avoid this, domestic policy interest rates had to be closely aligned with US interest rates, weakening domestic monetary independence as capital controls were not an option for this period.

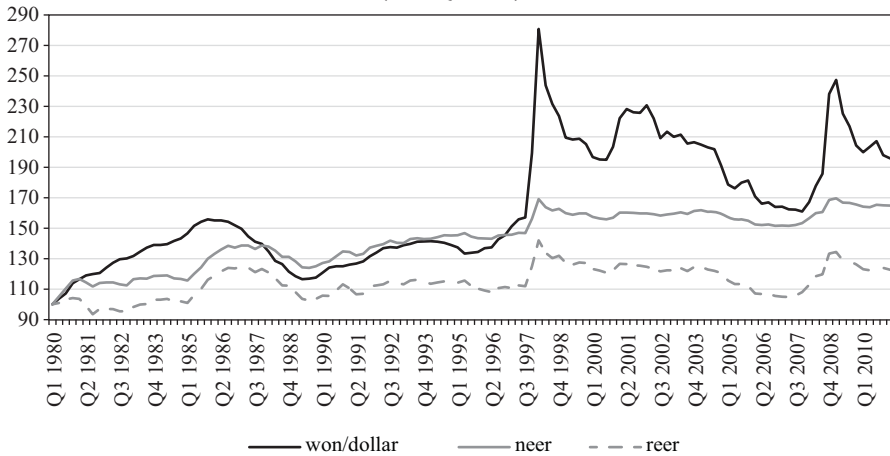


cr = call rates of the Republic of Korea, ffr = federal funds rate of the US, US = United States.

Sources: Bank of Korea and IFS.

Finally, capital inflows tend to appreciate nominal and real exchange rates. When the Republic of Korea adopted a managed floating exchange rate regime with capital controls before the currency crisis, foreign exchange rates had been managed at stable levels (Figure 7). In the 1980s and the first half of the 1990s, the won/dollar exchange rate closely moved with the nominal effective exchange rate and the real effective exchange rate. In a floating exchange rate regime after the currency crisis, capital inflows directly affected the demand for domestic currency assets, leading to an appreciation in the nominal exchange rate as well as the real exchange rate given sticky prices. Two episodes of rapid capital outflows in 1998 and 2008 led to the huge depreciation of the won/dollar exchange rate as well as the nominal and real effective exchange rates.

Figure 7. Foreign Exchange Rates
(1980Q1=100)

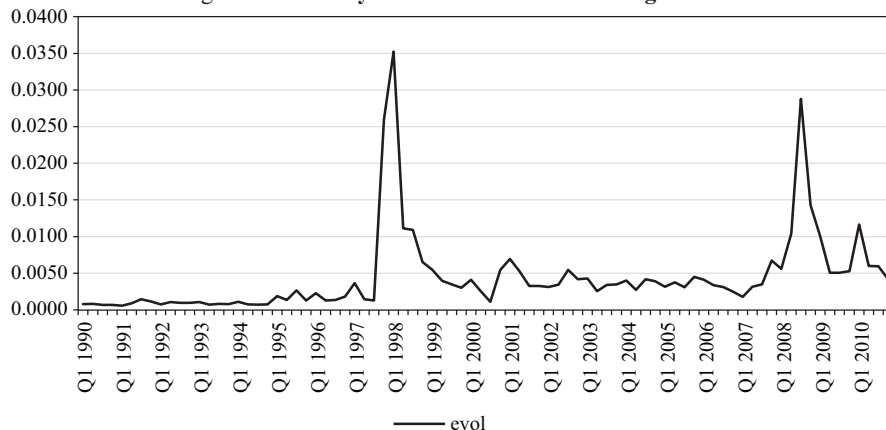


neer = nominal effective exchange rate, reer = real effective exchange rate.

Source: Bank of Korea and IFS.

The movement of foreign exchange rates of course depends on the choice of exchange rate regime. However, the capital inflow can also be an important factor. Figure 8 shows how volatility of the exchange rates had increased five times after the currency crisis in 1998. There were two abnormal periods: the currency crisis of 1998 and the liquidity crisis of 2008. Even if we exclude these two episodes, volatility still increased significantly after 1998. With the free floating exchange regime, the more volatile capital flows under a liberalized capital account probably led to more volatile foreign exchange rate movements during the period.

Figure 8. Volatility of the Won/Dollar Exchange Rate

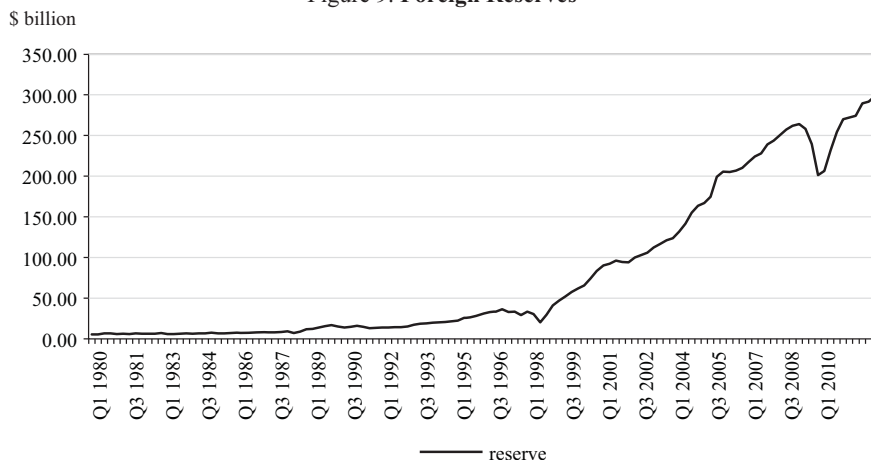


evol = volatility of the won/dollar exchange rate.

Sources: Bank of Korea and authors' calculations.

To mitigate the adverse effects of capital flows on the exchange rate, the Korean government has intervened in the foreign exchange market as evidenced by the rapid accumulation of foreign reserves since 1998 (Figure 9). Reserves rose quickly due to precautionary demand spurred by the crisis. Furthermore, while the country has been running sizeable surpluses on its current accounts, it has also accumulated large capital inflows as seen in the previous section. The bulk of the current account surpluses and capital inflows have been sterilized and added to reserves to stabilize either the nominal or real effective exchange rate with the objective of maintaining export competitiveness.

Figure 9. Foreign Reserves



reserve = foreign reserves of the Republic of Korea.

Source: Bank of Korea.

In sum, the Republic of Korea has faced difficulty in macroeconomic management since the period of greater capital market openness. Capital inflows without controls lead to an increase in liquidity as well as appreciation of the nominal and real exchange rates. To avoid deterioration of the current account balance, Korean authorities are pressed to undertake foreign exchange intervention which could result in excessive accumulation of foreign reserves and accordingly an increase in domestic money supply.

IV. EMPIRICAL ANALYSIS OF THE EFFECTS OF CAPITAL CONTROL MEASURES

This section analyzes the effects of capital account policy on capital flows by using the capital account control/liberalization indexes developed in Section II. By constructing a VAR model, we examine how exogenous changes in capital account policy affect capital flows.

A. Empirical Model

This section empirically examines the effectiveness of capital controls in the Republic of Korea using structural VAR models. We are particularly interested in the effects of capital controls on capital flows. We first analyze the issue using the baseline model. Afterwards, we consider various extensions of the baseline model to check the robustness of the results and examine the extended issues.

We consider a VAR model that includes nine endogenous variables: the index for capital account control/liberalization on capital inflows (TIFC), the index for capital account control/liberalization on capital outflows (TOFC), real GDP (RGDP), the real interest rate differential (DR), the real exchange rate against the US dollar (RER), stock price (SP), the current account as a ratio to trend GDP (CUR, multiplied by 100), capital inflows as a ratio to trend GDP (TIF, multiplied by 100), and capital outflows as a ratio to trend GDP (TOF, multiplied by 100). To construct trend GDP, we use the fitted value of GDP obtained from a regression of nominal GDP to a linear trend.⁵ The real exchange rate is constructed using the nominal exchange rate against the US dollar and the consumer price indexes of the Republic of Korea and the US. The real interest rate differential is constructed by subtracting (ex post) US real interest rate (the federal funds rate minus CPI inflation) from (ex post) Korean real interest rate (call rate minus CPI inflation). RGDP, RER, and SP are in logarithm (multiplied by 100). The model also includes two measures of external variables: US real

⁵We also experimented with the quadratic trend. The results are similar.

GDP (RGDPUS) and US stock price (SPUS). RGDPUS and SPUS are in logarithm (multiplied by 100).

Output, the interest rate differential, stock price, the current account, and the exchange rate are likely to affect capital inflows and outflows. By including these variables in the model, we try to control for all the variables that could influence capital flows to properly capture the effect of capital control measures.

We include the capital account control/liberalization indexes on inflows and outflows separately (and capital inflows and outflows separately), as the two measures are likely to have different effects on inflows and outflows. We include both indexes in the model as they can be interrelated. If capital controls can be imposed on both inflows and outflows, interpretations based on only one measure can be misleading.

The reduced form model is the following:

$$\begin{pmatrix} RGDP_t \\ DR_t \\ RER_t \\ SP_t \\ CUR_t \\ TIF_t \\ TOF_t \\ TIFC_t \\ TOFC_t \end{pmatrix} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \\ a_5 \\ a_6 \\ a_7 \\ a_8 \\ a_9 \end{pmatrix} + A_{ij}(L) \begin{pmatrix} RGDP_{t-1} \\ DR_{t-1} \\ RER_{t-1} \\ SP_{t-1} \\ CUR_{t-1} \\ TIF_{t-1} \\ TOF_{t-1} \\ TIFC_{t-1} \\ TOFC_{t-1} \end{pmatrix} + B_{ij}(L) \begin{pmatrix} RGDPUS_t \\ SPUS_t \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \\ \varepsilon_{9t} \end{pmatrix}, \tag{1}$$

where $A_{ij}(L)$ and $B_{ij}(L)$ are 9×9 and 9×2 matrices of polynomials in lag operator L , respectively.

The estimated reduced form model is converted to the structural form model by imposing zero restrictions on contemporaneous interactions among endogenous variables similar to Sims (1980). For the identifying restrictions, capital account control/liberalization measures are allowed to be contemporaneously affected by all endogenous variables, but not the other way around. Policy on capital control is likely to be endogenous to the state of the economy. Such identifying assumptions are used to identify the exogenous part of policy changes and to examine the effects of the policy changes on the economy.

The structure between TIFC and TOFC is not easy to determine. Since the primary way of controlling capital flows in the Republic of Korea has been to control capital inflows, the assumption that TIFC is contemporaneously exogenous to TOFC may be more reasonable. However, this assumption may not be fully justified, so we also experiment with the alternative assumption that TOFC is contemporaneously exogenous to TIFC.⁶

Quarterly data is used. The estimation period covers January 1990–April 2010. A constant term and two lags are assumed. The Republic of Korea data is obtained from the Bank of Korea's statistical data. US data is obtained from the Federal Reserve Bank of St. Louis web page.⁷

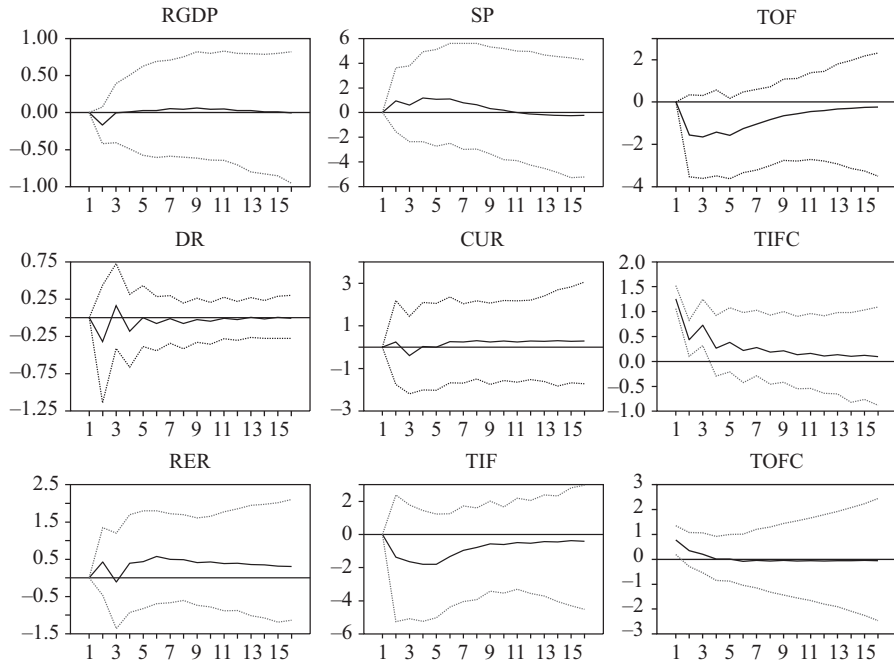
B. Empirical Results

Figures 10 and 11 report the impulse responses of the endogenous variables to TIFC and TOFC shocks, respectively, over 16 quarters with 95% probability bands under the model where TIFC is assumed to be contemporaneously exogenous to TOFC. Figures 12 and 13 similarly report the impulse responses to TIFC and TOFC shocks, respectively, but where TOFC is assumed to be contemporaneously exogenous to TIFC. The responding variables are denoted at the top of each graph.

⁶Practically, we use a recursive VAR model as in Sims (1980). TIFC and TOFC are ordered first. In such a model, the effects of TIFC and TOFC shocks on the other seven variables are theoretically the same regardless of the ordering among the seven variables (for further discussion see Christiano, Eichenbaum, and Evans 1999).

⁷Our statistical inference is not problematic in the presence of unit roots and cointegrating relations since we follow Bayesian inference. See Sims (1988) and Sims and Uhlig (1991) for a general discussion on Bayesian inference in the presence of unit roots and cointegrating relations.

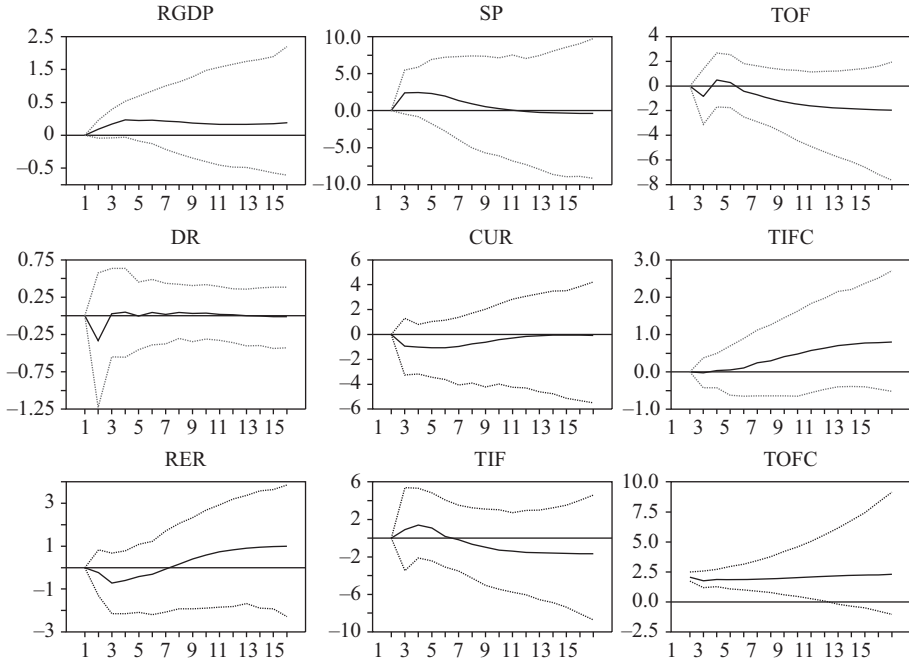
Figure 10. Impulse Responses to TIFC shocks



CUR = current account as a ratio to trend GDP, DR = real interest rate differential, RER = real exchange rate against the US dollar, RGDP = real GDP, SP = stock price, TIF = capital inflows as a ratio to trend GDP, TIFC = capital account control/liberalization index on capital inflows, TOF = capital outflows as a ratio to trend GDP, TOFC = capital account control/liberalization index on capital outflows.

Source: Authors' computations.

Figure 11. Impulse Responses to TOFC Shocks



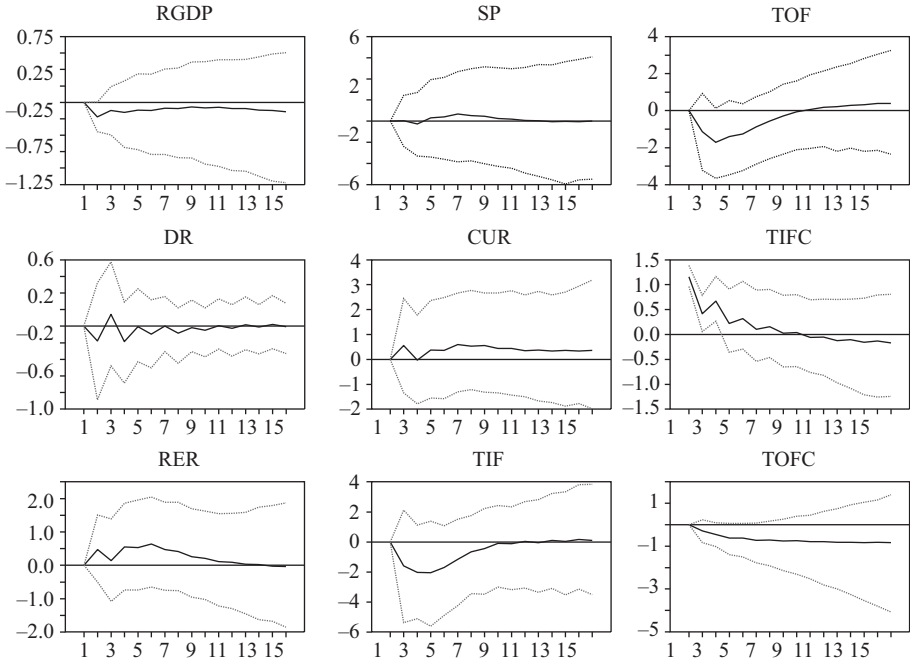
CUR = current account as a ratio to trend GDP, DR = real interest rate differential, RER = real exchange rate against the US dollar, RGDP = real GDP, SP = stock price, TIF = capital inflows as a ratio to trend GDP, TIFC = capital account control/liberalization index on capital inflows, TOF = capital outflows as a ratio to trend GDP, TOFC = capital account control/liberalization index on capital outflows.

Source: Authors' computations.

The results show that shocks to capital account control/liberalization measures do not have much effect on the economy. In particular, the responses of capital inflows and capital outflows are not very significant in most cases, suggesting that capital controls do not affect capital flows significantly. The only possible exception is the following. In Figure 12, in response to TIFC shocks, capital inflows do not change significantly. However, TOFC and TOF decrease significantly, in response to TIFC shocks. This may show a case in which changes in capital controls on inflows have a significant effect on capital outflows.⁸

⁸The negative effect of TIFC shocks is marginally significant. This result is strange since capital account liberalization decreases capital inflows. The identified TIFC shocks might include an endogenous reaction to the state of the economy, e.g., during the Asian financial crisis, the Korean government had liberalized the capital account when capital inflows fell.

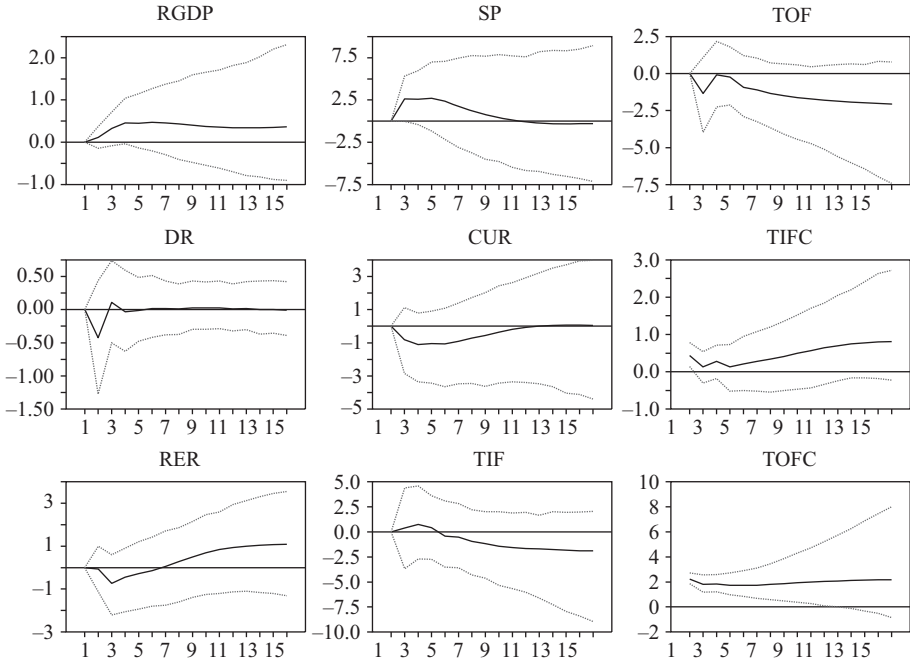
Figure 12. **Impulse Responses to TIFC shocks** (Alternative Ordering)



CUR = current account as a ratio to trend GDP, DR = real interest rate differential, RER = real exchange rate against the US dollar, RGDP = real GDP, SP = stock price, TIF = capital inflows as a ratio to trend GDP, TIFC = capital account control/liberalization index on capital inflows, TOF = capital outflows as a ratio to trend GDP, TOFC = capital account control/liberalization index on capital outflows.

Source: Authors' computations.

Figure 13. **Impulse Responses to TOFC shocks (Alternative Ordering)**



CUR = current account as a ratio to trend GDP, DR = real interest rate differential, RER = real exchange rate against the US dollar, RGDP = real GDP, SP = stock price, TIF = capital inflows as a ratio to trend GDP, TIFC = capital account control/liberalization index on capital inflows, TOF = capital outflows as a ratio to trend GDP, TOFC = capital account control/liberalization index on capital outflows.

Source: Authors' computations.

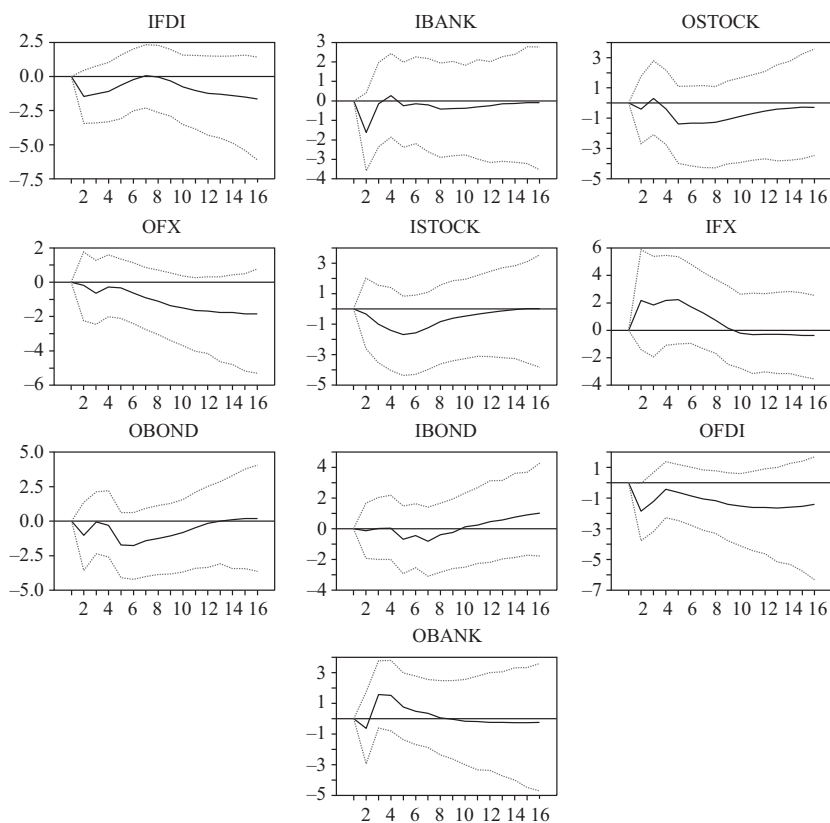
C. Effects of Each Measure

We further investigate the effects of components of the capital account control/liberalization measures. For such an analysis, we construct 10 individual capital account policy indexes, i.e., on inflows and outflows of FDI, stocks, bonds, bank loans, and foreign exchange transactions. To estimate the effect of each index, we extend the baseline model by adding the index and the corresponding capital flow series. For example, to investigate the effects of capital account control/liberalization measures on inflows of FDI, we include the capital account control/liberalization index on FDI inflows as well as FDI inflows (as a ratio to trend GDP). For the measures on foreign exchange transactions, we add the relevant index only because there is no corresponding capital flow measure. For identification, we keep the assumption that the policy measures are allowed to be contemporaneously affected by all other endogenous variables but not the other way around. Regarding the structure among policy measures, we

assume that the additional index is contemporaneously exogenous to the two indexes in the baseline model.⁹

Figure 14 reports the responses of each component of capital flows to shocks to the corresponding capital account control/liberalization index for that type of flow. In the case of inflows and outflows of foreign exchange transactions, the responses of total capital inflows and outflows, respectively, are reported. There is no case in which a relaxation of capital controls increases capital flows significantly.

Figure 14. Impulse Responses of Capital Flows to Shocks to Each Capital Control/Liberalization Measure



IBANK = bank loan inflows, IBOND = bond inflows, IFDI = FDI inflows, IFX = foreign exchange transaction inflows, IFX = foreign exchange transaction outflows, ISTOCK = stock inflows, OBANK = bank loan outflows, OBOND = bond outflows, OFDI = FDI outflows, OSTOCK = stock outflows.

Note: All flows are presented as a ratio to trend GDP.

Source: Authors' computations.

⁹ For alternative assumption on the ordering among policy measures, the results are similar in that the effects are insignificant.

V. SUBPERIOD ESTIMATIONS FOR CAPITAL FLOWS

In Section IV, we investigated the effects of shocks to capital account control/liberalization measures over the full sample period. The results show that shocks to capital account policy do not affect capital flows significantly. The previous empirical experiment shows that typical measures adopted in a quarter do not have a significant effect. However, this does not necessarily imply that capital account control/liberalization will not affect capital flows and the economy. The economy may behave differently after a series of measures are imposed.

In this section, we compare the behavior of the Korean economy in two subperiods: the periods before and after serious capital account liberalization. In particular, we examine how US monetary policy shocks affect Korean macroeconomic variables such as the exchange rate, the interest rate, and capital flows. We draw various implications from the exercise, including on international monetary transmission and monetary independence under a restricted and liberalized current account. A substantial part of this section is drawn from Kim and Shin (2010).

A. Empirical Model

We use the following empirical model to analyze the effects of changes in US monetary policy on Korean economies. The Republic of Korea is a small open economy and, to reflect this structure in the model, we assume a block-exogenous VAR model in which US variables are treated as exogenous to Korean variables. This also weakens the small-degree-of-freedom problem (compared to a fully fledged, two-country model).

US monetary policy and the Korean economy endogenously respond to US or world structural shocks. As a result, simple analysis on the relationship between US monetary policy and the Republic of Korea can be misleading as any established could have originated from the US or world non-monetary structural shocks. Therefore, exogenous US monetary shocks are identified in the following model using the method of Christiano, Eichenbaum, and Evans (1999).

We assume that the economy is described by the following structural equation system

$$G(L)y(t) = e(t) \tag{2}$$

where $G(L)$ is a matrix polynomial in lag operator L , $y(t)$ is an $m \times 1$ data vector, and m is the number of variables in the model. Also, $\text{var}(e(t)) = \Lambda$ where Λ is a diagonal matrix and the diagonal elements are variances of structural shocks.

We assume that the equation system (1) can be expressed as

$$y(t) = \begin{bmatrix} y_1(t) \\ y_2(t) \end{bmatrix}, \quad G(L) = \begin{bmatrix} G_{11}(L) & 0 \\ G_{21}(L) & G_{22}(L) \end{bmatrix}, \quad e(t) = \begin{bmatrix} e_1(t) \\ e_2(t) \end{bmatrix} \quad (3)$$

where $y_1(t)$ and $e_1(t)$ are $m_1 \times 1$ vectors, $y_2(t)$ and $e_2(t)$ are $m_2 \times 1$ vectors, $G_{11}(L)$ is an $m_1 \times m_1$ matrix, $G_{21}(L)$ is an $m_2 \times m_1$ matrix, and $G_{22}(L)$ is an $m_2 \times m_2$ matrix.

We assume that $G_{21}(L)=0$. This assumption is the restriction of block-exogeneity, which implies that $y_1(t)$ is not affected by current as well as lagged $y_2(t)$. In the empirical model, $y_1(t)$ contains the US variables, and $y_2(t)$ the Korean variables. Therefore, the US variables are not affected by the variables of a small open Korean economy.

In the US block, the method of Christiano, Eichenbaum, and Evans (1999) is applied to identify US monetary policy shocks. The vector $y_1(t)$ includes [IP_US, CPI_US, CMP, FFR, NBR, M]' where IP_US is industrial production, CPI_US is the consumer price index, CMP is commodity price, FFR is the federal funds rate, NBR is non-borrowed reserves, and M is a monetary aggregate. Following Christiano, Eichenbaum, and Evans (1999), we identify FFR shocks as monetary policy shocks by imposing restrictions on the contemporaneous structural parameter $G_{11}(0)$ such that IP_US, CPI_US, and CMP do not respond to FFR contemporaneously, while FFR does not respond to NBR and M contemporaneously.¹⁰

For the Korean variables, $y_2(t)$ includes the call rate (or interbank rate) (CR), the exchange rate against the US dollar (ERA), the consumer price index (CPI), and industrial production (IP). CPI and IP are important macro variables that show the aggregate price level and aggregate economic activity. CR and ERA are included as they show the monetary and foreign exchange policy stance of the country. Other variables of interest are included (one by one, additionally). They are foreign exchange reserves (RES), net capital inflows (CAP), and net portfolio inflows (PORT).

Because the variables on the right hand side differ in the reduced form block-exogenous VAR model, OLS provides inefficient estimates. We estimate the reduced form block-exogenous VAR model with seemingly unrelated regression (SUR) and then change to a structural VAR model.

As the estimation period is short, we use monthly data. The estimation periods are: 1982:10–1991:12 and 1999:1–2007:6. The first sample period

¹⁰The US data is obtained from the database of the Federal Reserve Bank of St. Louis. Intermediate material prices are used as the commodity price index, while M1 is used as the monetary aggregate. We experiment with various measures of commodity prices and monetary aggregates. Abnormal responses such as the price puzzle are relatively weaker when we use intermediate material prices and M1. The natural logarithm is taken and multiplied by 100 for all variables, except for the interest rate.

corresponds to the period before serious capital account liberalization, while the second corresponds to the period after almost full capital account liberalization.

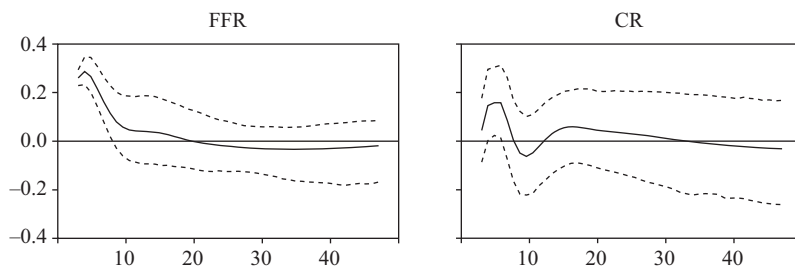
Studies like Strongin (1995) and Clarida, Gali, and Gertler (2000) suggest that by October 1982, the US monetary policy operating procedure had already changed to interest rate targeting. Therefore, the estimation period starts from October 1982 in the first sample. As reviewed in the previous section, capital account liberalization had accelerated beginning 1992. For example, the Korean stock market of the Republic of Korea was opened up to foreign investors starting January 1992. Therefore, we end the first subsample at December 1991. As mentioned earlier, the Korean capital account had been liberalized during the Asian financial crisis. In the second sample period, the Republic of Korea adopted inflation targeting with the interest rate as the monetary instrument. We end the sample on June 2007 in the period before the global financial crisis. We consider this period because the US had then chosen to implement an unusual monetary policy (i.e., quantitative easing). A constant term and two lags are assumed.

B. Empirical Results

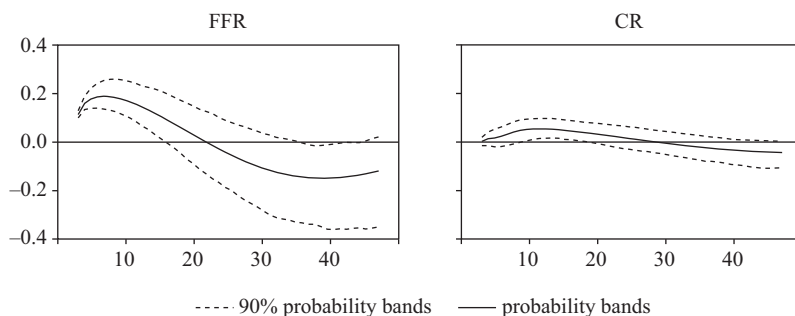
Figure 15 shows the impulse responses of the federal funds rate and the Korean call rate to US monetary policy shocks over a span of 4 years. The dotted lines are 90% probability bands. The first and the second rows of the graphs show the impulse responses for the first and second sample periods, respectively.

Figure 15. **Impulse Responses of the Federal Funds Rate and the Korean Call Rate To US Monetary Policy Shocks**

Before Liberalization



After Liberalization



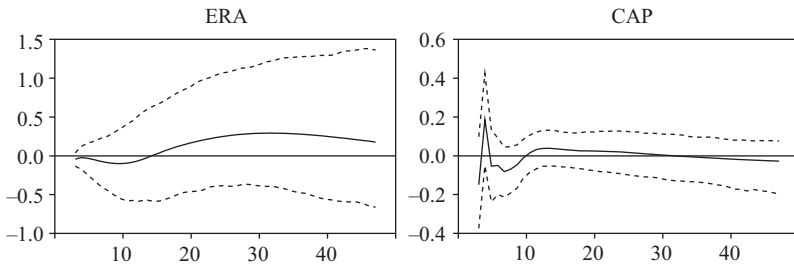
CR = call rate of the Republic of Korea, FFR = federal funds rate of the US, US = United States.
 Source: Authors' computations.

In the sample period before serious capital account liberalization, the federal funds rate increases by 0.25–0.3% for the first three months after the shock and then decreases over time and goes back to the initial level in about 9 months. The Korean call rate also increases, rising up to 0.18% in about 2–3 months, and then falls back to the initial level in about 6 months. Therefore, as the federal funds rate increases, the Korean call rate also increases. For the sample period of a liberalized capital account, the federal Funds rate increases by 0.2% in about 3 months after the shock. The Korean call rate also increases by 0.05% in about 3–4 months.

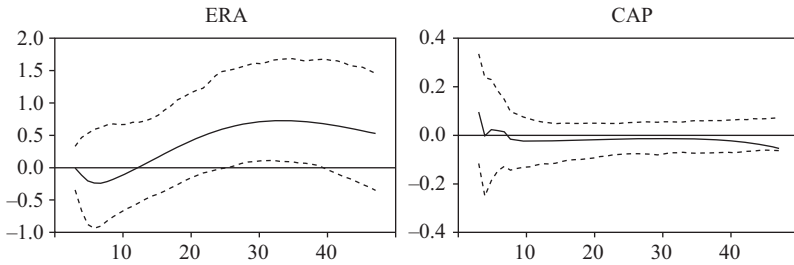
Based on these results, we can conclude that Korean monetary policy was not independent of US monetary policy during both sample periods. As the Republic of Korea tightly managed the exchange rate during the first sample period, it is not surprising that Korean monetary policy depended much on US monetary policy. However, as the country adopted a floating exchange rate regime during the second sample period, it is interesting to note how Korean monetary policy was not independent of US monetary policy.

Figure 16. **Impulse Responses of the Won–Dollar Exchange Rate and the Republic of Korea’s Net Capital Inflows to US Monetary Policy Shocks**

Before Liberalization



After Liberalization

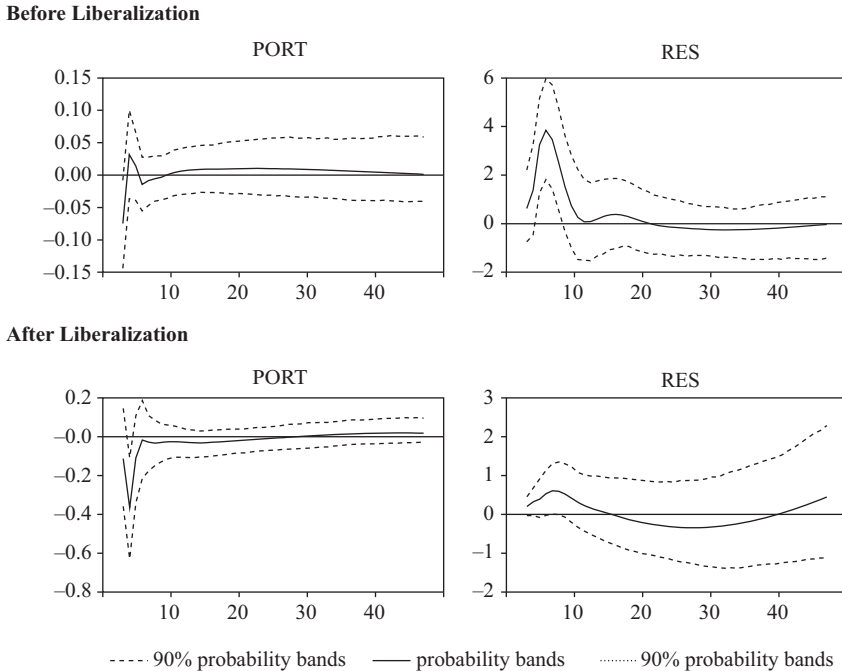


----- 90% probability bands ——— probability bands

CAP = net capital inflows, ERA = won-dollar exchange rate, US = United States.

Source: Authors' computations.

Figure 17. Impulse Responses of Korean Net Portfolio Inflows and Foreign Exchange Reserves to US Monetary Policy Shocks



PORT = net portfolio inflows, RES = foreign exchange reserves, US = United States.

Source: Authors' computations.

To further infer why Korean monetary policy was not fully independent of US monetary policy during the second sample period, Figures 16 and 17 report the impulse responses of the exchange rate, net capital flows, net portfolio flows, and foreign exchange reserves. The exchange rate responses are not significant for the first sample period which can be expected as the Republic of Korea controlled the exchange rate very tightly during the time. Responses of foreign exchange reserves meanwhile reveal strong foreign exchange intervention. The exchange rate responses are not significant in the short run even for the second sample period. As shown in the responses of foreign exchange reserves, the Republic of Korea actually intervened in the foreign exchange market to stabilize the exchange rate, although the size of intervention was smaller than for the first sample period. In addition, the country also increased the interest rate in response to the US rate rise. All these possibly contribute to the weak short-run effects on the exchange rate.

Although net capital flows do not change significantly in both periods, net portfolio flows decrease significantly in both periods. In particular, net portfolio flows decrease sharply in the second sample period by up to 0.35%, which is about four times larger than the decrease of net portfolio flows in the first sample period. From these responses, we can infer the following. First, we find that net portfolio flows change more in the period of liberalized capital account than in the period of capital controls. This implies that the economy, not to mention capital flows itself, is likely to behave differently with and without capital controls. Second, we find that in the period of a more liberalized capital account, portfolio flows change a lot in response to US monetary policy shocks. If the Republic of Korea had not increased the interest rate and intervened in the foreign exchange market, portfolio flows would have changed even more. Volatile capital flows are likely to make the exchange rate, liquidity, and asset prices volatile (Kim and Yang 2009, 2011; Kim, Kim, and Wang 2004). This may be the reason why it was hard for the Republic of Korea to gain monetary independence from the US.

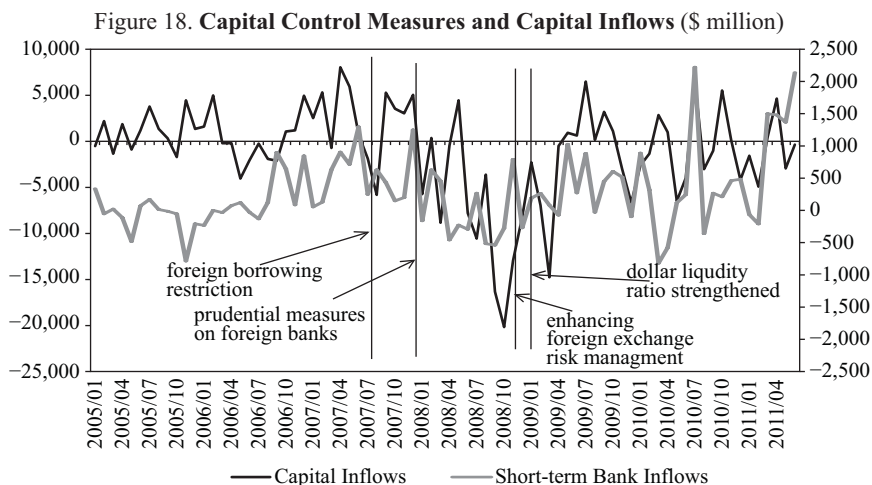
VI. EVENT STUDY

In Section IV, we examined the effects of shocks to the capital account control/liberalization indexes on capital flows. However, as discussed in Section II, most of the measures taken by the Republic of Korea over the last three decades had been toward capital account liberalization. A few capital control measures were implemented only beginning 2007. In this section, we analyze the effects of those recent measures by conducting an event study to examine their effects on capital inflows.

The major motivation for the introduction of capital controls in 2007 and 2008 had been to reduce large short-term capital inflows into the Republic of Korea. Since 2005, the country had experienced a surge in short-term borrowing by foreign banks due to the expectation of won appreciation in relation to global imbalances and mismatches in the forward market. Domestic exporters faced the full currency risk since most transactions in international trade were contracted in terms of the US dollar. They had to purchase forward contracts in order to fix their cash flows in terms of the Korean won, thus reducing forward swap rates. Banks which intermediate these contracts, were in the opposite position, selling forward contracts. Foreign banks' advantage as regards dollar-denominated funding in the global market and the interest rate differential versus the US created the possibility of risk-free arbitrage profits (i.e., by borrowing from abroad and trading forward contracts in the domestic forward market). This further appreciated the Korean won and induced more short-term capital inflows into the country.

To reduce short-term capital inflows, the Korean government considered comprehensive measures including capital controls, liberalization of capital outflows, and enhancement of prudential measures in the banking sector. The policy measures were limited unless draconian capital controls were imposed, but the government did not want to generate political risks by imposing strong capital controls such as the introduction of unremunerated reserve requirements in Thailand. However, as discussed in the previous section, the government’s attitude to capital liberalization changed during this period. In August 2007, the Korean government announced a measure that restricted the use of foreign borrowings by allowing such funds only for real demand and investment in the manufacturing sector. By January 2008, foreign banks’ borrowings from headquarters had become more restricted.

More prudential measures in foreign exchange transactions were implemented as the country experienced a shortage of foreign reserves and dollar liquidity during the global financial crisis of 2008. The Korean government strengthened prudential measures concerning dollar liquidity by imposing high standards on foreign exchange risk management guidelines in November 2008 and increasing the dollar reserve ratio in banking sector in December 2008. As indicated in Figure 18, two capital control measures in 2007 succeeded in reducing total capital inflows as well as inflows of short-term bank loans. Even though the two capital control measures introduced in 2008 could not contribute to the decrease in the total capital inflows, short-term bank loans decreased after their implementation at least temporarily. This implies that the capital control measures in 2007 and 2008 had been more or less successful in throwing sand on inflows in the form of short-term banks loans as the government intended.



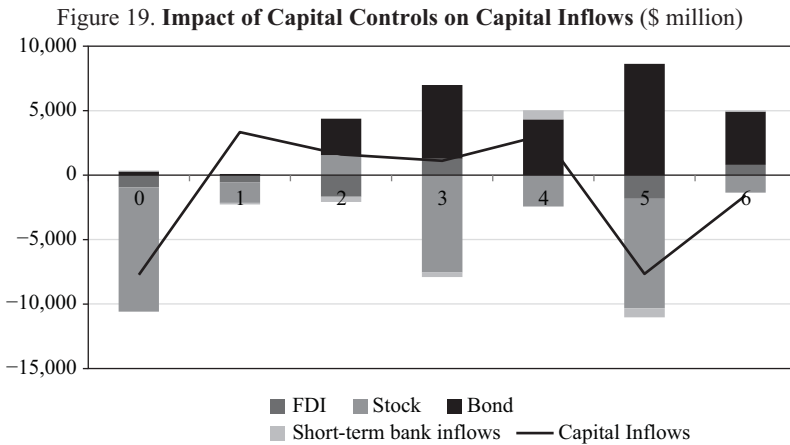
Note: Capital inflows are on the left axis, short-term bank loan inflows on the right.

Source: Bank of Korea.

Nevertheless, the event study in this section mainly focuses on capital controls in 2007. The reason we exclude capital control measures in 2008 is that these measures had been heavily influenced by the global financial crisis. After the second half of 2008, capital inflows dramatically reversed, while capital outflows increased, making it hard to infer the effects of capital account restrictions with a simple method of analysis. In contrast, measures in 2007 were implemented in a relatively neutral environment.

In order to check the effectiveness of the capital control measures, we calculate the difference between the amount of capital inflows after implementation of control measures and the 12-month average of capital inflows before implementation (Figure 19). Time 0 is the period when capital controls were implemented (e.g., August 2007), and consecutive time periods indicate the number of months beyond the time that controls were put into practice.

As indicated in Figure 19, total capital inflows decreased right after capital controls were introduced (compared to the 12-month average before they were implemented), and most types of capital inflows decreased in the period 0 to 1. However, total capital inflows increased after 2 months of capital control execution, implying that dollar liquidity affects overall capital flows in the short run. Stock inflows persistently fell after the measures were implemented. More interestingly, short-term bank loans from abroad persistently declined up to 4 months after the policy restriction even as other types of capital flows such as bonds already returned to positive values. Although the current event study is limited in that other economic events were not fully controlled, the results suggest that capital controls may have changed the composition of capital inflows, which is consistent with the empirical literature.



FDI = foreign direct investment.
 Source: Authors' computations.

VII. CONCLUSION

Most small open emerging economies have experienced major difficulties because of volatile capital flows. While sound macroeconomic policies have been recommended for managing these flows, it is difficult for small open economies to be consistent in simultaneously achieving both internal and external balances. One of the options available would be capital controls on cross-border capital transactions. But can these adequately deal with volatile capital inflows in emerging market economies? The previous empirical literature is inconclusive. Nevertheless, several countries in recent years have been interested in implementing them to mitigate the adverse effects of financial volatility. Therefore, whether or not capital controls work is an important research question for policymakers in emerging market economies.

Against this background, our paper aimed to shed light on the effectiveness of capital controls based on the experience of the Republic of Korea. We first reviewed the history of capital account control/liberalization, dividing it into five stages: (i) the gradual approach from the 1980s and the early 1990s; (ii) accelerated capital account liberalization in the early 1990s; (iii) the big bang approach during the Asian financial crisis; (iv) facilitation of capital market development from the late 1990s to the early 2000s; and (v) after the global financial crisis, the conservative approach to decrease the volatility of capital flows and prevent instability of domestic financial markets.

Previous empirical studies on capital controls have a major caveat in constructing capital control measures. Most of them rely on data from the IMF's annual reports on exchange rate arrangement and restrictions. Even though the IMF data covers most countries, it is not comprehensive at all, and is constructed at a low frequency. To overcome this limitation, we constructed quarterly series of comprehensive capital control indexes based on the record of Korean government policies.

This paper discussed the effects of capital account control/liberalization in various ways. First, we reviewed the behavior of key macro variables from the 1980s. Second, we developed a VAR model to examine the effects of shocks to capital account policy on capital flows. Third, we constructed a VAR model to analyze the effects of US monetary policy shocks on the Republic of Korea's capital flows and interest rate for the sample periods before and after serious capital account liberalization. Fourth, we performed a simple event study to analyze the effectiveness of capital control measures adopted in 2007.

The results from VAR analysis find that shocks to capital account policy do not have significant effects on capital flows in most cases. This evidence implies that it is not so easy to decrease the volatility of international capital flows by adopting a few policy measures on capital controls. However, this does not necessarily mean that economies under several capital controls and those with a

liberalized capital account have the same characteristics. We find differences in the behavior of macro variables in the sample periods before and after serious capital account liberalization. Capital flows, the current account, and the exchange rate are far more volatile in the period of a liberalized capital account than in the period of severe capital controls. In addition, the event study, although simple, tends to support the effectiveness of capital controls in terms of altering the composition of capital flows.

Empirical results also show that under a liberalized capital account, the Republic of Korea did not maintain monetary autonomy despite adopting a free float for the won. This may be related to financial globalization and volatile capital flows during the period. In addition, past studies such as Kim, Kim, and Wang (2004) and Kim and Yang (2009, 2011) found that capital flows significantly influenced key macroeconomic variables such as output, asset prices, and the exchange rate, and had adverse effects on the economy. It is hence imperative to develop a policy framework to decrease potential problems of volatile capital flows.

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