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Abstract

In the immediate aftermath of the global financial crisis, the world economy was characterized as experiencing a 'two-speed' recovery. Industrialized nations, where the crisis occurred, saw slow growth whereas many emerging market and developing countries grew significantly. These growth differentials, coupled with significant interest rate differentials across the globe, triggered significant flows of financial capital to the emerging market and developing countries. As a result, many countries experienced sharp appreciations of their currencies and associated concerns about the development of asset bubbles. This paper examines measures taken to mitigate the harmful effects of excessive capital flows in South Korea and South Africa. Each of these nations experienced similar surges in inflows with associated exchange rate and asset bubble woes, but each took quite different approaches in an attempt to mitigate those effects. South Korea devised a series of capital account regulations on the inflow of capital whereas South Africa liberalized their existing regulations on capital outflows. We econometrically analyze the effectiveness of these measures and find only limited evidence that both countries' measures were successful in lessening the appreciation and volatility of their exchanges rates. These nations were even less successful in stemming asset bubbles.

JEL Codes: E65, F32, F36, F41

1 Introduction

Between 2009 and 2012 the expansion of industrialized country balance sheets created significant liquidity for global capital markets. However, subsequent low interest rates in those countries when coupled with relatively higher interest rates in emerging market and

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developing countries made investment abroad more attractive. Many investors took advantage of the 'carry trade.' The carry trade is an investment strategy where an investor will borrow funds in a low-interest rate nation and invest those funds in a higher interest rate country. The differential between the two interest rates is referred to as the 'carry.' Investors not only profit from the carry, but may also benefit for executing a complimentary derivative whereby an investor goes short on the low interest rate currency and long on the high interest rate currency. Leverage factors multiply those benefits.

The carry trade and the 'two speed' growth in the world economy between 2009 and 2012 triggered massive capital flows to emerging market and developing economies and by 2011 such flows reached the same levels as they had in the run up to the crisis. A number of countries attempted to regulate cross-border financial flows. Different nations took very different measures: Turkey chose to lower interest rates to cut the carry differentials, Indonesia put in place a withholding tax on bonds, Brazil regulated foreign exchange derivatives as well as taxed bonds, Chile intervened in the foreign exchange market, Peru put in place regulations on resident and non-resident holdings of currency. This paper looks at two countries-South Korea and South Africa-that took two very different routes to address the same set of exchange rate and balance sheet problems. South Korea put in place a series of regulations on foreign exchange derivatives and other investments, while South Africa took away regulations on the outflow of capital. This paper examines the extent to which those measures were effective.

We investigate several macroeconomic outcomes in order to quantify the overall efficacy of these measures. We test the impact on three main variables: each country's equity market indices, the level and volatility of exchange rates, and the volume and composition of net capital inflows. Note that data was unavailable for South African capital flows. Our findings are summarized below in Table A.

Table A. Summary of Measures to Manage Capital Flows in South Korea and South Africa

Country	Total Inflows	Composition	Asset Prices	Exchange Rate	Monetary Autonomy
South Korea	Increased total inflows in the short run. No effect in the long run.	Increased non-FDI and short-term flows in the short run. Increased derivatives flows in the long run.	Increased national index in the short run. No effect in the long run.	Raised level of the won in the short run. **Lowered won volatility in the long run.**	No effect.
South Africa	Quarterly or monthly data not available.	Quarterly or monthly data not available.	Mixed effects in the short run. No effect in the long run.	Lowered level of the rand in the short run. **Lowered rand volatility in the long run.**	No effect.

The paper is divided into six parts. Section 2 very briefly reviews some of the literature on the theory and evidence pertaining to capital market liberalization and the use of capital account regulations in emerging market economies. Section 3 presents the policies of South Korea and South Africa with respect to capital flows during the post-crisis time period and discusses the use of our data. Section 4 outlines our empirical approach and methodology, while Section 5 presents the results of our analysis. A final section summarizes our conclusions and suggests further work for research and policy.

2 Related Literature

New breakthroughs have emerged in economic theory that deepens the rationale for regulating cross border financial flows. This work has shown how pecuniary externalities can be negative under imperfect financial markets. Such externalities are generated by capital flows because individual investors and borrowers do not know what the effects of their financial decisions will be on financial stability on a macroeconomic level in a particular nation. Therefore, regulating capital flows can act as a Pigouvian tax to correct for such market failures (Korinek, 2011). Empirical studies on the effectiveness of capital flow management

are country-specific, and the results vary across countries and across types of regulation. Capital account regulations (often referred to as 'capital controls' and now referred to as 'capital flow management measures' by the IMF) range from restricting either inflows or outflows to targeting different asset classes.

Magud, Reinhart, and Rogoff (2011) provide a comprehensive assessment of the existing empirical literature. Their review first acknowledges the lack of a unified theoretical framework, no common empirical methodology, and the heterogeneity of empirical findings across studies. They then address these drawbacks by summarizing studies of controls on inflows and outflows and of multi-country studies, and critiquing their methods and results.

The authors argue that capital account regulations are imposed by EMEs to combat four fears: fear of appreciation, fear of hot-money (short-term) flows, fear of large inflows, and fear of the loss of monetary autonomy. Two additional fears are the fear of asset price bubbles and the fear of capital flight (Ocampo and Palma 2008; Grabel 2003; Epstein 2003). Magud, Reinhart, and Rogoff (2011) find that controls on inflows increased monetary policy independence, altered the composition of capital flows, and reduced exchange rate volatility; controls did not reduce the volume of net flows in most studies. Nevertheless, the effects, though statistically significant, are temporary and small in magnitude. In this study we address five of the fears listed above: fear of appreciation, of short-term flows, of large inflows, of the loss of monetary autonomy, and of asset price bubbles. Additionally, their review presents a theory to justify the impact on flow composition. Using a portfolio balance approach, their model shows how capital flow restrictions can raise the share of short-term investments. This outcome will also be tested in our study.

Several country-specific studies embody the empirical literature of capital controls that relate most to our study. Studies on Brazil and South Korea are similar in that they analyze capital controls during the same post-crisis period, since 2009 to present. A recent study analyzes the impact on Brazilian controls on inflows since 2009 on the prices of financial assets and on exchange rate appreciation (Chamon and Garcia, 2013). They find that controls were

effective in distorting prices by making domestic assets relatively more expensive, thereby making such assets less attractive to foreign investors. Yet, controls did not have statistically significant effects on Real appreciation, but may have helped to strengthen the effect of the interest rate cut later in the period. Levy-Yeyati and Kiguel (2009) quantify the effectiveness of a specific Brazilian control, the IOF, on the Brazilian exchange rate by running similar regression analyses to Chamon and Garcia (2013) and also find that the measures had their desired effect. The study, however, tests only the impact of the announcement of the tax, and not subsequent changes. Forbes et al. (2011) examines the IOF tax in Brazil, but tests only the impact on portfolio flows, using the Emerging Portfolio Fund Research database. Their novel dataset gives fund-level investments by country, but only accounts for 5% to 20% of total country market capitalization. They find evidence that controls reduce investor portfolio allocations to Brazil. In our own study (Baumann and Gallagher, 2012), we find that capital account regulations had small but significant impacts on the shifting the composition of capital inflows toward longer-term investment, on the level and volatility of the exchange rate, on asset prices, and on the ability of Brazil to have independence in monetary policy. Another study on Brazilian controls focuses entirely on gross capital inflows, using micro-level data from U.S. and European mutual funds (Jinjarak et al., 2012). This study tests the effectiveness on controls in terms of counterfactuals and finds that controls had some short-term impact in reducing inflows, yet the effect disappeared a few months after imposition.

To the best of our knowledge, very few studies have investigated South Korean capital controls imposed since 2009. The multi-country study examines the impact of inflow controls on a wider range of variables, mainly financial flows, GDP and exchange rates, including those of Brazil and South Korea (Klein, 2012). The paper distinguishes long-standing controls from episodic controls-the latter which are more temporary, target specific assets, and thus pertain more to Brazilian and Korean controls. The study finds that such controls did not have significant effects on any variable. One study specific to South Korea, Bruno and

Shin (2012), examines the impact of recent controls on banking sector flows and the Korean exchange rate through a series of panel regressions, and thereby assesses the prudential effectiveness of controls through its focus on the banking sector. They conclude that controls may have had macroprudential effectiveness in reducing the sensitivity of capital flows to global changes.

For analysis of South African controls, IMF studies are the main source. Such studies include not only analysis of controls on inflows, but controls on outflows. In particular, they address the impact of capital outflow liberalization (Habermeier et al. 2011, IMF 2012a). Besides South Africa's experience, another episode of outflow liberalization took place in South Korea in 2005-2008 and in other countries including Russia, Philippines, Thailand, and Vietnam. Habermeier et al. (2011) specifically assess the impact of liberalization on gross inflows, yet do not find significant effects on reducing inflows or exchange rate appreciation, except in Russia. Liberalization, however, did help improve monetary autonomy and increase outflows. Thus, net inflows may actually decrease as a result of outflow liberalization, yet such a result was not found. According to IMF (2012a), outflow liberalization can help countries deal with inflow pressures; thus, if they are effective, then they may reduce net inflows (in lowering inflows and increasing outflows). Nonetheless, liberalization allowed some countries to maintain higher interest rates and even help to lengthen the maturity of outflows.

3 Background and Data

While South Korea has progressively implemented capital account regulations on inflows since 2009, South Africa has relaxed its exchange controls on outflows. Figure 1 depicts the fluctuation in the South Korean exchange rate, which depreciated drastically following the 2008 crisis, but followed a path of appreciation in the years after the crisis. Financial operations in Korea were deliverable, meaning that all gains and losses were liquidated in US

dollars. Foreign banks' domestic Korean branches were the key players in the carry trade. They engaged in carry trade activities by borrowing USD short-term and selling these dollars for won in the spot market; then buying certificates of deposits on other domestic bonds and selling the won forward for dollars (Prates and Fritz, 2012). These banks also engaged in derivative contracts with exporter companies (mainly shipbuilders) in the OTC market. The foreign exchange options allowed firms to sell dollars (hedge) at a fixed exchange rate, as they expected the continued appreciation of the won. Figure 2 exhibits South Korea's potential stock market bubble that followed a similar trajectory during the same period, yet with more noticeable appreciation. Figure 3 shows the corresponding resurgence and volatility in capital flows since 2009.

Figure 1. South Korean Nominal Exchange Rate (USD/Won)

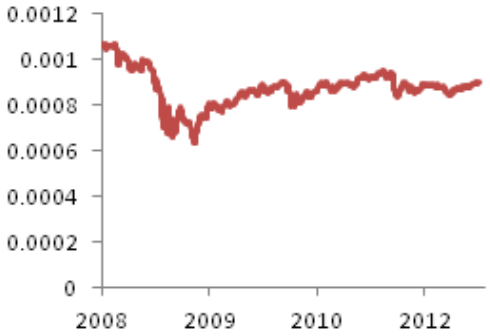


Figure 2. MSCI South Korea

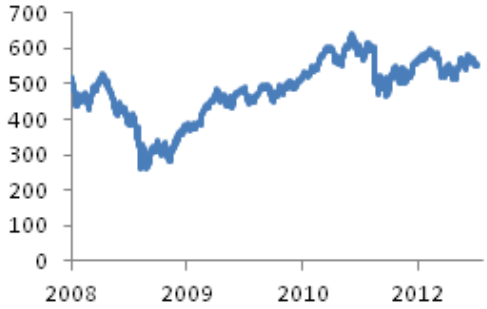


Figure 3. South Korean Net Inflows

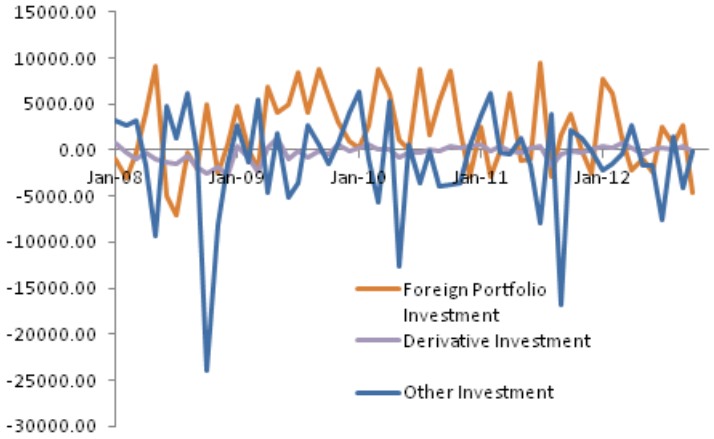


Table B below lists the South Korea capital account regulations that have targeted the banking sector. The main objective of the policies has been to curb short-term foreign debt and tighten foreign exchange liquidity, both which contribute to capital flow and exchange rate volatility. Beginning in late 2009 the country levied controls on banks' foreign exchange holdings of derivatives, forwards, and liabilities. The first policy implemented in November 2009 required banks to hold a designated amount of high-rated foreign treasury bonds and to reduce trading in forex futures. In 2010 the government lowered limits on foreign exchange derivative holdings in banks, with stricter limits for foreign-owned banks than domestic banks. In the same year subsequent policies included barring banks' foreign currency loans to local companies for domestic use. The policies implemented in 2011 were a levy on banks' non-deposit foreign exchange borrowings, with higher levies for short-term debt, and an additional reduction in the limit on banks' foreign exchange derivatives holdings. The most recent policies took place in 2012, with a tax on forex futures and option premiums, an additional probe on forex forward positions, and heightened limits on forex derivatives.

Table B. Capital Account Regulations in South Korea, 2009-2012

Announcement Date	Effective Date	Event
11/19/2009	11/19/2009	Limits on forwards trading, requirements on foreign treasury bond holdings
6/13/2010	6/14/2010	Limits on FX derivatives holdings
6/22/2010	7/1/2010	Barring of FX loans for domestic use
10/5/2010	10/19/2010	Probe on FX derivatives trading
11/18/2010	1/1/2011	14% tax on government bonds, 20% capital gains levy
12/19/2010	8/1/2011	Levy on FX liabilities
4/21/2011	4/26/2011	Probe on FX derivatives trading
5/19/2011	6/1/2011	Limits on FX derivatives
8/8/2012	1/2016	Tax of 0.001% on futures and 0.01% on option premiums
10/30/2012	11/2012	Probe on FX forward positions
11/27/2012	1/1/2013	Limits on FX derivatives tightened

Source: Bloomberg, Reuters, Financial Times

Figure 4 depicts the fluctuation in the South African exchange rate, which follows a similar path as the South Korean exchange rate. Figure 5 shows the steady appreciation of South Africa's national stock market that lasted through 2012. Unfortunately, capital account data of monthly or quarterly frequency is not available for South Africa; only annual is available and, thus, no analysis can be undertaken.

Figure 4. South African Nominal Exchange Rate (USD/Rand)

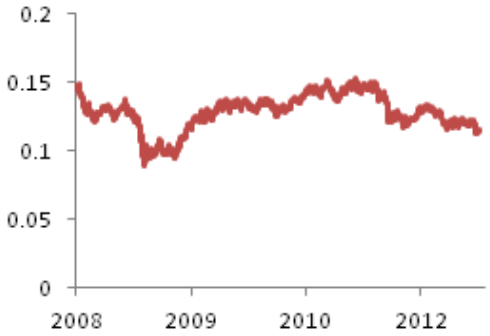
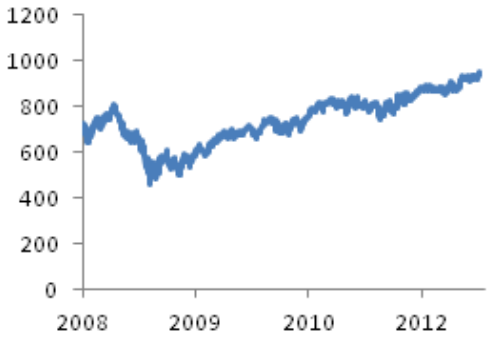


Figure 5. MSCI South Africa



Legislation was first introduced in 1933 through the Currency and Exchanges Act, which laid out the rules and regulations pertaining to international flow of capital and currency. Exchange control regulations were initially introduced during WWII, and formally reintroduced in 1961. The South Africa Reserve Bank administers such exchange controls, which have prohibited South African residents from owning any foreign exchange or foreign assets. Exchange controls in South Africa are effectively controls on outflows since they prohibit a resident from exporting capital without approval from the South Africa Reserve Bank. However, they have been relaxed, or eased, since the all-race elections in 1994.[1]

Below in Table C are the capital account regulations in South Africa that were successively relaxed over the 2009-2012 period. On October 27, 2009, the South African Finance Minister announced the further relaxation of exchange controls to reduce the cost of doing business and attract foreign investment. Foreign capital allowance would be increased from 2 million to 4 million Rand, and restrictions on domestic credit for local FDI were also liberalized. In July 2010, Regulation 24 is introduced to implement the Exchange Control Voluntary Disclosure Program (VDP) as well as to amend the 1961 Exchange Control Regulations in order to set out the procedures, processes and requirements applicable to the regularization of exchange control contraventions. The following month, the Finance Minister announced that legislation is being processed that would remove tax hurdles for a multinational company if it based its regional headquarters in South Africa. On October

[1]More information can be found on the South Africa Reserve Bank website, www.resbank.co.za/.

27, 2010, the next round of relaxed controls increases the limit from 25 to 30 Rand transfers to encourage foreign exchange purchases and weaken the exchange rate. Exchange controls including travel allowances and offshore investment limits for individuals are also relaxed, and controls on domestic companies are reformed to remove barriers to international expansion. Certain international companies are allowed to raise and deploy capital offshore without approval. In December of that year, the South Africa National Treasury announced the further easing to allow local institutions to invest more abroad and raised the limit on the amount institutional investors can take offshore by five percentage points. In October 2011, the government announces it will simplify foreign exchange control rules for individuals and companies, allowing individuals to take as much as 5 million rand offshore a year. Finally, the one exception during this period of control easing is the June 2012 ruling, which extended exchange controls to other forms of capital including intellectual property rights.

Table C. Capital Account Regulations in South Africa, 2009-2011

Announcement Date	Effective Date	Event
10/27/2009	10/27/2009	Limit on foreign capital allowance raised, restrictions on local FDI removed.
7/1/2010	7/1/2010	1961 Exchange Control Regulations amended, new program (VDP) proposed.
8/24/2010	8/24/2010	Future easing of controls announced, including removing tax hurdles for multinationals.
10/27/2010	1/1/2011	Blocked rand transfers relaxed, various other exchange controls relaxed.
12/14/2010	12/14/2010	Prudential foreign investment limits raised, various other controls relaxed further.
10/25/2011	10/27/2011	Future easing of rules announced in budget statement.
10/27/2011	10/27/2011	Cross-border money transfer rules simplified and relaxed.
6/8/2012	6/8/2012	New regulation that extends controls to any intellectual property right.

Sources: Bloomberg, South Africa Reserve Bank, Wall Street Journal

4 Methodology

In this study we examine the extent to which the interventions by South Korea and South Africa had a statistically significant impact on exchange rate levels and volatility, asset appreciation, as well as the scale and maturity composition of net capital inflows. The model specification for each is discussed in this section.

Exchange Rates

We analyze the impact of capital account regulations in South Korea and South Africa on the won and rand exchange rates, respectively. We thereby run a GARCH (1,1) regression for the nominal exchange rate in each country to study the impact on both the level and volatility of the exchange rate. The regressions also allow us to assess the impact on monetary autonomy. We use an interaction variable of the domestic interest rate and a dummy for the period during which controls were tightened in South Korea (and relaxed in South Africa). A negative sign on this variable would signify that monetary autonomy improved during the period. Our time period is January 1, 2009 to October 31, 2012.

The model testing the impact on the level and volatility of exchange rates is given below. The first equation gives the regression of the level variable, while the second gives the variance regression.

$$\triangle ExchangeRate_t = \beta_0 + \sum \beta_n Announce_{nt} + \beta_8 \Delta Controls_t + \\ + \beta_9 \Delta Controls_t * \triangle Interest\ Rate_t + \beta_{10} \triangle Interest\ Rate_t + Other\ Covariates + \varepsilon_t \quad (1)$$

$$\sigma_t^2 = \eta_0 + \eta_1 \varepsilon_{t-1} + \eta_2 \sigma_{t-1}^2 + \eta_3 \Delta Controls_t + \\ + \eta_4 \Delta Controls_t * \triangle Interest\ Rate_t + \eta_5 \triangle Interest\ Rate_t + Other\ Covariates + \varepsilon_t \quad (2)$$

with $\varepsilon_t \sim N(0, \sigma_t^2)$

For South Korea, our variables of interest here are the dummy for the day of each policy announcement, the dummy for the entire period for which the controls were in place, and the interaction variable-the dummy for the entire period times the change in the domestic interest rate. Announcement dummies are specified for the day after the announcement if announced after trading hours. The coefficients on the dummies are the abnormal returns

after controlling for the other covariates. Description and calculation of abnormal returns and cumulative abnormal returns are given in the next section. The interaction term measures the extent to which controls improved monetary autonomy: controls are successful in improving autonomy if changes in the domestic interest rate have smaller or negative effects on the exchange rate. The covariates of the regression are the change in the foreign interest rate (U.S. Fed Funds effective rate) as well as log changes in the dollar exchange index (DXY), commodity price index (GSCI) and the JP Morgan Global Spread (EMBI).

While during this period Korea was tightening capital controls in the banking sector, South Africa continued to relax its exchange controls. Our regression model for South Africa captures the impact of seven different announcements of the easing of exchange controls, along with one announcement of a tightening of controls. Hence, during this period of exchange control easing, the one exception is in June 2012, when exchange controls were extended to other forms of capital such as intellectual property. We also use three interaction variables of the domestic interbank interest rate for 3 different periods: the period since the first October 2009 easing announcement until the October 2010 announcement, the period since the 2010 easing announcement until the June 2012 tightening announcement, and the period since the tightening announcement. Finally, we test the impact on the exchange rate since the first easing announcement and since the tightening announcement using dummies for each time period.

Since capital inflows contribute to exchange rate appreciation, we would expect that a control that restricted inflows would lessen appreciation in an economy's currency, all else equal. Such an outcome is one of the intended goals of the capital account regulation used in South Korea (listed in Table B). Hence, one would expect a negative sign on the coefficients of the announcement dummy variables and the control period dummy if the controls were effective in dampening exchange rate appreciation in the short and long run, respectively.

In South Africa, we should expect similar effects of the liberalization of outflow controls. The intuition is the following: a control that liberalizes outflows raises gross outflows and,

thus, lowers net inflows. Thus, we should expect similar signs on the dummy variables in the South African regressions.

As noted earlier, another intended goal is improving monetary policy independence. The policy mechanism beyond this outcome relies on the trilemma, i.e. an economy cannot have an open capital account, a fixed exchange rate, and independent monetary policy, but only at most two of the three. A country's monetary policy is more independent if the impact of a change in the policy rate is not offset by changes in the exchange rate. For example, in a monetary expansion a reduction in interest rates may lead to depreciation in the exchange rate, causing an increase in import prices and contributing to higher inflation. Central banks of open economies with high inflation are then wary to use monetary easing due to the adverse effect of inflation. Thus, if a control that lower net inflows (i.e. lowers gross inflows or raises gross outflows) improves monetary autonomy, changes in the domestic interest rate should have a smaller effect on the exchange rate. We would then accept a negative sign on our interaction variable of the control period dummy and the domestic interest rate.

Asset Prices

Since high inflows of capital are pro-cyclical and often precipitate credit booms, capital inflows can contribute to asset price bubbles (Calderon and Kubota, 2009). Thus, controls on inflows have a policy goal of dampening asset bubbles. A control liberalizing outflows would have a similar effect if net inflows were reduced.

In order to assess the effectiveness of the controls in curbing asset price appreciation, we conduct an event study on the South Korean national stock market index (MSCI South Korea) and the South African national stock market index (MSCI South Africa). Controlling for changes in the regional stock market, proxied by the MSCI EM Asia or EMEA indices, we compute the marginal and cumulative abnormal returns of capital control announcements. Abnormal returns capture whether the controls caused a significant reaction in the stock

market, controlling for changes in the overall market. Hence abnormal returns effectively measure the difference between the actual and expected return of the local stock market. We obtain cumulative abnormal returns by aggregating the marginal abnormal returns of each announcement, which are given by the coefficients of the event dummy variables. Cumulative returns provide a better measure for the overall effect of the tax. If the respective policies in South Korea and South Africa were effective, we would expect a negative coefficient on our announcement dummy variables and, if effective in the long run, on the control period dummy.

Similar to an event study, we run regression of the log change in the national stock index on dummies for the announcements of changes in capital account regulations. The model regression, along with the definition of abnormal returns, is shown below.

$$\begin{aligned} \triangle StockReturn_t = \beta_0 + \beta_1 \triangle Market_t + \\ + \sum \beta_m Announce_m \\ + \beta_9 Controls_t + \beta_{10} Controls_t * \triangle Market_t + \varepsilon_t \end{aligned} \tag{3}$$

$$\triangle AbnormalReturn_t = \triangle StockReturn_t - \triangle ExpectedReturn_t$$

Cumulative returns provide a better measure for the overall, long-run effect of the tax. To obtain the cumulative abnormal returns, we run an additional regression. According the regression equation below, the coefficient on the $Announce_n$ gives the cumulative abnormal return of all the daily announcements.[2]

[2]One can also obtain cumulative abnormal returns by aggregating the marginal abnormal returns of each announcement, which are given by the coefficients of the event dummy variables. In other words, cumulative abnormal returns, where n is the final period, are computed by the following approximation: $(p_{t+n} - p_t)/p_t = [(1 + ((p_{t+n} - p_{t+n-1})/p_{t+n-1})) * ... * (1 + ((p_{t+1} - p_t)/p_t))] - 1$.

$$\begin{aligned}\triangle StockReturn_t = \beta_0 + \beta_1 \triangle MarketReturn_t + \\ +\beta_1(Announce_1 - Announce_2) \\ +... + (\beta_1 + ... + \beta_n)Announce_n \\ +\beta_9 Controls_t + \beta_{10} Controls_t * \triangle MarketReturn_t + \varepsilon_t\end{aligned} \tag{4}$$

As in the previous section, announcement dummies are specified for the day after the announcement if announced after trading hours. Along with the dummy variables, we include an interaction variable-the regional market index times the dummy of the entire period of policy changes-to capture the effect on local equity market independence. For South Africa, we use a dummy for the period since the tightening announcement in 2012, while for South Korea we use a dummy for the period since the first announcement of controls in 2009. The interaction variable in each regression is then the regional index times the dummy.

Scale, Composition, and Spillover Effects of Capital Flows

In this section we focus only on South Korea, as capital account data of South Africa is not available at frequencies higher than annual frequency. Analysis of the impact on the South Korean capital account is two-fold. First, we conduct a cross-sectional regression of the South Korean net private capital inflows on capital control event dummies, interest rate differentials, and other covariates. Second, we study the impact on the composition of capital flows by studying the following capital flow outcomes: FDI compared to non-FDI flows, and short-term compared to long-term flows. Since the frequency of the data is monthly, we use one-month dummies for the announcements of specific capital account regulation changes as well as use a dummy specified for the entire period the tax is in place (to measure the overall effect of the implementation period). Additional country-specific covariates include

the current account, interbank domestic interest rate, and the Fed Funds effective rate. The time period is January 2002 to October 2012. The capital and current account data is obtained from the South Korea Ministry of Strategy and Finance website, while the rest of the financial data is obtained from DataStream.

A drawback of cross-sectional regressions is the low number of observations as well as the presence of endogeneity of the regressors. We address endogeneity by running IV regressions, using the lagged dependent variable as the instrument. Covariates are a lagged dependent variable, the current account, VIX Volatility index, EMBI Global Spread and Fed Funds - domestic interbank interest rate differential. The model equation of the cross-sectional regression is given below.

$$\begin{aligned}\text{NetInflow}_{it} &= \beta_0 + \beta_1 CurAcc_{it} + \beta_2 C_i + \beta_3 Q_t + \\ &+ \beta_4 Announce_{it} + \beta_5 AllAnnounceDummy_{it} + \beta_5 Controls_{it} + \varepsilon_t \quad (5)\end{aligned}$$

We conduct analyses for total flows and disaggregated flows by decomposing net capital inflows into short-term and long-term measures. The short-term, long-term decomposition is similar to the FDI, non-FDI decomposition; non-FDI is composed largely of short-term investment while FDI can be regarded as long-term investments. We improve the FDI-non-FDI measure by stripping out long-term investments from portfolio investment and other investments. Long-term investment is thus measured by the sum of these long-term investments and FDI. Short-term investment is defined as short-term portfolio investment plus other investment (trade credits, currency and deposits, loans) plus derivatives. Finally, we look at the impact on solely derivative flows, since several controls directly targeted derivative transactions.

An important goal of capital controls that restrict inflows is to reduce that only gross flows, but short-term inflows-inflows which are more speculative and volatile. Hence, controls

in South Korea would be effective if they reduced short-term flows. Similarly, controls that reduced non-FDI or derivative inflows would accomplish the intended policy goal as well. In these cases, we should look for significant, negative coefficients on the dummy variables.

5 Results and Analysis

Exchange Rates

Table 1 gives the impact of South Korean capital controls on the won-the South Korean exchange rate. The table examines the impact of daily announcement of Korean regulations as well as the overall impact. We measure the overall impact using a dummy for the entire period after which the government began tightening regulations, in November 2009. To measure the impact of announcements, we include a dummy for the day of the regulation announcement if the regulation was announced during trading hours. If announced after trading hours, we use the subsequent day. The other explanatory variables include changes in the Korean overnight interest rate and in the Federal Funds Effective rate and log changes in the dollar index, GSCI, and the EMBI global spread.

From the control period dummy, we find that Korean controls had negative, statistically significant impact on exchange rate volatility. The overall impact on the exchange rate level, however, was not statistically significant. Of the announcements that had statistically significant impact, only the tax on bond inflows lowered the level of the exchange rate and by only less than 1 percent. The regulation announcements of limits on forex loans and on forex derivatives, as well as the bank probes, caused a statistically significant appreciation in the won; limits on forex lending even increased the level by over 2 percent. The cumulative effect of all the announcements was positive and amounted to 5 percent. The interaction variable of the period control dummy and the domestic interest rate tells us that there was no significant impact on monetary autonomy. The GSCI, a global commodity price index, increased the volatility of the won, while the EMBI spread, a measure of global

risk, decreased the volatility, but raised the level. As expected, the U.S. interest rate (Fed Funds rate) lowered the level of the won. Korea's interest rate did not have a significant impact on the level of the won, but had a statistically significant negative impact on the volatility. However, during the period of implementation, the domestic interest rate did not have a significant impact on volatility. One explanation is that the Korean controls lessened the attractiveness of the carry trade, such that increases in domestic interest rates did not encourage currency trading as significantly, to an extent.

Table 2 gives a similar regression of the rand-the South African exchange rate. As explained earlier, we examine the impact of daily announcements of the easing of controls as well as control period dummies to capture the overall impact of the easing. We also include the domestic overnight interest rate, the Fed Funds rate, the dollar index, GSCI and EMBI global spread. According to Table 2, the October 2009 and 2010 announcement of exchange control easing had significant and negative impact on the rand level, as did the regulation amendment announcement in July 2010. Yet, the October 2011 announcement had a significant and positive impact whose magnitude of over 1 percent partially offset the negative impact of the previous announcements. All announcements of relaxing exchange controls had a cumulative impact on the rand level of -1.8 percent. The tightening announcement also caused a significant drop in the rand of -1.4 percent. According to the control period dummy, the volatility of the rand was also relatively lower during the period since the controls were relaxed in October 2009. From the interaction variables, we find the relaxation of exchange controls had no significant contribution in improving monetary autonomy. The other covariates had expected impacts.

Asset Prices

Tables 3 and 4 display the regression results of the equity market prices in South Korea and South Africa, respectively. For South Korea, we can conclude that controls were ineffec-

tive in curbing an asset price bubble or in raising equity market independence. According to the dummy variables in Table 3, only the announcements of forex derivatives caused statistically significant negative effects on asset prices. After computing the cumulative abnormal return of all announcements, we find that controls had a positive impact of 1.4 percent. During the period of implementation, there was no significant impact on asset prices, yet the national equity index did become more responsive to the regional market prices, according to the positive coefficient on the interaction variable.

In Table 4, all announcements of relaxing exchange controls had fairly small effects on equity prices in South Africa. Additionally, the cumulative abnormal return of all easing announcements was a mere 0.1 percent. The announcement of tightening had a minute impact as well. Yet in contrast to South Korea, equity prices in South Africa were less responsive to regional markets since the tightening in June 2012.

Scale, Composition, and Spillover Effects of Capital Flows

Table 5 gives the results of the regression of total financial net inflows as well as non-FDI and FDI net inflows, while Table 6 gives results for short-term and long-term net inflows as well as derivative net inflows. According to Table 5, the announcements of controls either had no significant impact or had positive significant impact on total net inflows. The announcements also had a larger, in magnitude, impact on non-FDI than on total or FDI flows. From the regressions, we conclude that the controls were not effective in reducing total net inflows or non-FDI net inflows either in the short-term or long-term. The control period dummy in all regressions was not significant. However, they had the strongest impact on non-FDI flows.

In Table 6, we find that the announcements had an overall more positive impact on short-term net inflows than on long-term inflows. Two of the announcements had a significant and negative impact on long-term flows, while none had such an effect on short-term flows.

Yet, the forex derivatives regulation did cause a statistically significant negative impact on derivative net inflows. But during the whole period of implementation, controls had a significant positive impact on derivative net inflows. Thus, Korean controls had short-term effectiveness in curbing derivative inflows, but not in the long-term. Since the coefficients in the short-term and long-term flow IV regressions lose their significance, we can conclude that controls did not have noticeable impact in curbing either type of inflow.

6 Conclusion

This study analyzed the impacts of seemingly divergent measures taken by two emerging market countries to stem the destabilizing effects of cross-border finance. South Korea deployed a mix of traditional capital controls and new generation macroprudential measures aimed at foreign exchange markets. South Africa liberalized capital outflows and intervened in the foreign exchange market. For the most part each attempt was of limited success at best. We found that both countries' battery of measures had a lasting effect on reducing the volatility of the exchange rate, albeit a relatively small one. Measures taken by these nations did not have an impact on the level of the exchange rate, in changing the composition of capital flows toward longer-term investment, on the overall level of inflows, on stemming potential asset bubbles, or in giving these nations more monetary autonomy.

Why would the seemingly opposite policies of regulating cross-border inflows and de-regulating cross-border outflows have a similar effect? There are at least two reasons. First, if a nation has relatively strong regulations on capital outflows, the liberalization of such a regime could reduce net inflows because some investment that had been sequestered in a nation due to outflows controls would thus be able to leave the country. Second, and as Haggard and Maxfield (1996) have noted, sometimes nations will liberalize capital flows during times of volatility if they believe further liberalization will send a positive signal to

markets. This also may be why such measures were not very successful in the long run, as investors who were looking to exit did exit and as market sentiment moved on.

This paper is roughly in line with the peer reviewed literature on capital account regulations. In some cases such regulations appear to have significant but relatively small effects. This has led to a debate regarding whether the strength of such measures implemented are less than optimal, or whether nations need to put more effort into the enforcement of such measures. Other research suggests that emerging market and developing countries should not be left to carry the burden. Echoing Keynes, Ostry et al. (2012) make the case that capital account regulations should also be regulated by nations where the source of finance comes from.

References

Aizenman, Joshua, Jinjarak, Yothin, and Park, Donghyun (2011) "Capital Flows and Economic Growth in the Era of Financial Integration and Crisis, 1990-2010," NBER Working Paper 17502.

Aizenman, Joshua (2010) "Hoarding International Reserves versus a Pigovian Tax-Cum-Subsidy Scheme: Reflections on the Deleveraging Crisis of 2008-9, and a Cost Benefit Analysis," mimeo.

Aizenman, Joshua and Brian Pinto (2011) "Managing Financial Integration and Capital Mobility: Policy Lessons from the Past Two Decades," World Bank Policy Research Working Paper 5786.

Baumann, Brittany, and Kevin P. Gallagher (2012), "Navigating Capital Flows in Brazil and Chile," Initiative for Policy Dialogue Working Paper, New York, Columbia University.

Bhawati, Jagdish. 1998. "The Capital Myth: The Difference between Trade in Widgets and Dollars," Foreign Affairs 77(3): 7-12.

Bruno, Valentina and Hyun Song Shin. 2012. "Assessing Macroprudential Policies: Case of Korea," mimeo.

Calderon, Cesar and Megumi Kubota. 2012. "Gross Inflows Gone Wild: Gross Capital Inflows, Credit Booms and Crises," World Bank Policy Research Working Paper 6270.

Chamon, Marcos and Marcio Garcia. 2013. "Capital Controls in Brazil: Effective?" mimeo.

Chinn, Menzie D. and Ito, Hiro. 2005. "What Matters for Financial Development? Capital Controls, Institutions, and Interactions," Journal of Development Economics 81: 163-192.

Costinot, Arnaud, Guido Lorenzoni, and Ivan Werning. 2011a. "A Theory of Optimal Capital Controls," mimeo.

Costinot, Arnaud, Guido Lorenzoni, and Ivan Werning. 2011b. "A Theory of Capital Controls as Dynamic Terms of Trade Manipulation," mimeo.

De Grauwe, Paul. 2000. "Controls on Capital Flows and the Tobin Tax," Center for Economic Studies: Discussion Paper Series.

Edwards, Sebastian. 2007. "Capital Controls, Sudden Stops, and Current Account Reversals," In Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences edited by S. Edwards. Chicago: University of Chicago Press.

Fleming, J. Marcus, 1962, "Domestic Financial Policies under Fixed and under Floating Exchange Rates," Staff Papers, International Monetary Fund, Vol. 9 (November), pp. 369-79.

Forbes, Kristin, Fratzscher, Marcel, Kostka, Thomas and Roland Straub. 2011. "Bubble Thy Neighbor: Direct and Spillover Effects of Capital Controls," mimeo.

Gallagher, Kevin P., Griffith-Jones, Stephany, and Jose A. Ocampo, eds. 2012. Regulating Global Capital Flows for Long-Run Development, Boston: Boston University Press.

Habermeier, Karl, Kokenyne, Annamaria, and Chikako Baba. 2011. "The Effectiveness of Capital Controls and Prudential Policies in Managing Large Inflows", IMF Staff Discussion Note.

Haggard, Stephan, and Sylvia Maxfield, (1996) "The Political Economy of Financial Internationalization in the Developing World." International Organization 50: 35-68.

Henry, Peter Blair. 2007. "Capital Account Liberalization: Theory, Evidence, and Speculation," Journal of Economic Literature 45: 887-935.

International Monetary Fund. 2011a. "World Economic Outlook", April, Washington, IMF.

–. 2011b. "The Multilateral Aspects of Policies Affecting Capital Flows", Washington, IMF.

–. 2012a. "Liberalizing Capital Flows and Managing Outflows." March, Washington, IMF.

–. 2012b. "Global Financial Stability Report: The Quest for Lasting Stability," April, Washington, IMF.

Klein, Michael W. 2012. "Capital Controls: Gates and Walls," Washington, Brookings.

Korinek, Anton (2011), The New Economics of Prudential Capital Controls, IMF Economic Review 59(3), pp. 523-561, August 2011. Kose, M. A., Prasad, E. and Taylor, A. D. 2009. "Thresholds on the Process of International Financial Integration," NBER Working Paper 14916. Cambridge, MA, National Bureau of Economic Research.

Jinjarak, Yothin, Noy, Ilan, and Huanhuan Zheng. 2012. "Capital Controls in Brazil: Stemming a Tide with a Signal?" mimeo.

Mundell, Robert A. 1960. "The Monetary Dynamics of International Adjustment under Fixed and Flexible Exchange Rates," Quarterly Journal of Economics 74: 227-57.

Obstfeld, Maurice and Taylor, Alan M. 2004. Global Capital Markets: Integration, Crisis, and Growth Cambridge: Cambridge University Press.

Ostry, Jonathan D., Atish R. Ghosh, Karl Habermeier, Marcos Chamon, Mahvash S. Qureshi, and Dennis B.S. Reinhardt. 2010. Capital Inflows: The Role of Controls. In IMF Staff Position Note. Washington: International Monetary Fund.

Ostry, J, A.R., Ghosh A.R., A. Korinek. (2012). Multilateral Aspects of Managing the Capital Account. IMF Staff Discussion Note SDN/12/10. Washington, DC: International Monetary Fund.

Prasad E, Rogoff K, Wei S-J and Kose MA, 2003. "Effects of Financial Globalization on Developing Countries: Some Empirical Evidence." IMF Occasional Paper No. 220. Washington, DC, International Monetary Fund.

Prates, Daniela; Fritz, Barbara. "How to Increase Policy Space for Emerging Markets? A Broad Approach on Capital Management Techniques and Lessons from Brazil and Korea." Latin American Studies Associateion 2012.

Magud, Nicolas E. and Carmen M. Reinhart. 2006. "Capital Controls: An Evaluation," NBER Working Paper 11973.

Magud, Nicolas E., Carmen M. Reinhart, and Kenneth S. Rogoff. 2011. "Capital Controls: Myth and Reality-A Portfolio Balance Approach," NBER Working Paper 16805.

Schulze, Gunther G. The Political Economy of Capital Controls Cambridge: Cambridge University Press, 2000.

Stiglitz, Joseph E. 2000. "Capital Market Liberalization, Economic Growth, and Instability," World Development 28(6): 1075-1086.

Stiglitz, Joseph E., Jose A. Ocampo, Shari Spiegel, Ricardo French-Davis, and Deepak Nayyar. Stability with Growth: Macroeconomics, Liberalization, and Development. London: Oxford University Press, 2006.

Tobin, James. 1978. "A Proposal for International Monetary Reform," Eastern Economic Journal 4.

Table 1: Korean Exchange Rate

	Won	
	Level	Volatility
Forwards/Bonds	0.0000441	
	(0.000435)	
FX Derivatives	0.0111	
	(0.0102)	
FX Loans	0.0247***	
	(0.000239)	
First Probe	0.00876***	
	(0.000372)	
Tax on Bonds	-0.00795***	
	(0.000352)	
FX Liabilities	0.000278	
	(0.0121)	
Second Probe	0.00856***	
	(0.000289)	
FX Derivatives	0.00402***	
	(0.000442)	
Futures/Options Tax	-0.000276	
	(0.000284)	
Control Period Dummy	-0.000366	-1.988***
	(0.000568)	(0.522)
Korean Overnight Rate	-0.00322	-9.375**
	(0.00989)	(4.234)
Control Period * Korean Rate	0.00550	16.69
	(0.0108)	(10.94)
Fed Funds Rate	-0.0320***	-2.010
	(0.0124)	(20.35)
DXY	0.0463	273.0***
	(0.0470)	(60.95)
GSCI	-0.0164	27.44*
	(0.0172)	(15.40)
EMBI	0.339***	-287.4***
	(0.108)	(93.25)
Constant	0.000345	-12.68***
	(0.000551)	(0.768)
Observations	994	994
Wald Statistic	3.00e+11	3.00e+11

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: South African Exchange Rate

	Rand	
	Rand	Volatility
October 2009 Announcement	-0.00524***	
	(0.00116)	
Regulation Amendment Announcement	-0.0156***	
	(0.00156)	
October 2010 Announcement	-0.0134***	
	(0.000491)	
October 2011 Announcement	0.0148***	
	(0.00126)	
Control Tightening 2012 Announcement	-0.0140***	
	(0.000305)	
Controls Since 2009 Dummy	-0.000337	-1.194***
	(0.000797)	(0.444)
2009 Dummy * Domestic Interest Rate	0.000781	1.856
	(0.00324)	(4.968)
Domestic Interest Rate	-0.000904	-1.606
	(0.00322)	(5.001)
DXY	-0.477***	-71.03
	(0.0646)	(171.7)
GSCI	0.155***	10.32
	(0.0240)	(19.72)
EMBI	1.148***	-267.0**
	(0.164)	(128.3)
Constant	-0.000393	-10.49***
	(0.000742)	(1.015)
Observations	994	994
Wald	1.75e+10	1.75e+10

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: MSCI South Korea

	MSCI Korea
MSCI EM Asia	0.747***
	(0.0457)
Forwards/Bonds	0.0180***
	(0.000359)
FX Derivatives	-0.00686***
	(0.000553)
FX Loans	0.00257***
	(0.000456)
First Probe	0.00292***
	(0.000290)
Tax on Bonds	0.00168***
	(0.000453)
FX Liabilities	0.00327***
	(0.000303)
Second Probe	0.00207***
	(0.000387)
FX Derivatives	-0.0169***
	(0.000299)
Futures/Options Tax	0.00728***
	(0.000247)
Control Period Dummy	0.000108
	(0.000727)
Control Period * MSCI EM Asia	0.149***
	(0.0547)
Constant	0.0000445
	(0.000682)
Observations	994
R^2	0.695

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: MSCI South Africa

	MSCI South Africa
MSCI EMEA	0.506***
	(0.0169)
October 2009 Announcement	-0.00376***
	(0.000503)
Regulation Amendment Announcement	-0.000792*
	(0.000436)
Future Relaxed Controls Announced	-0.00193***
	(0.000362)
October 2010 Announcement	0.00403***
	(0.000473)
Controls Relaxed Further	0.00170***
	(0.000248)
Future Easing Announced	0.00983***
	(0.000237)
October 2011 Announcement	-0.00837***
	(0.000894)
Controls Tightening 2012 Announcement	-0.00151*
	(0.000836)
Controls since 2012 Tightening Dummy	-0.0000221
	(0.000567)
Tightening Dummy * MSCI EMEA	-0.0931**
	(0.0474)
Constant	0.000235
	(0.000234)
Observations	994
R^2	0.628

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Korea Financial, Non-FDI, and FDI Net Inflows

	Financial	Financial(IV)	Non-FDI	Non-FDI(IV)	FDI	FDI(IV)
Current Account	-0.956***	-0.786***	-0.581**	-0.620**	-0.0420	-0.0411
	(0.0828)	(0.118)	(0.246)	(0.292)	(0.0620)	(0.0744)
Financial, lagged	0.0518	0.341*				
	(0.0686)	(0.198)				
Korea - US Interest Rate	-52.51	-36.98	-112.4	-268.3	120.8	56.95
	(91.96)	(108.6)	(276.6)	(317.2)	(74.14)	(205.6)
VIX	-10.21	-2.742	-156.0**	-205.9	-22.48***	-4.806
	(16.11)	(14.55)	(72.80)	(145.5)	(7.257)	(41.85)
GSCI	-0.203	-0.343	-4.248*	-5.116	-2.843***	0.671
	(0.745)	(0.812)	(2.534)	(3.218)	(0.776)	(7.653)
Forwards/Bonds	19.85	647.2	4539.3***	5538.7***	-1461.6***	-2032.2*
	(319.0)	(491.2)	(1382.5)	(2065.1)	(236.3)	(1055.5)
FX Derivatives/Loans	1117.6***	1862.0***	3839.8	-551.2	412.7	-298.5
	(366.3)	(600.2)	(2534.0)	(7840.1)	(268.1)	(1338.9)
3 Month Dummy	-532.8	291.0	9.242	97.46	-1632.8	973.0
	(793.8)	(860.1)	(2830.2)	(2966.9)	(1541.8)	(5070.2)
Second Probe	2926.6***	2939.2***	4486.7***	4011.2**	956.7***	1074.8**
	(286.8)	(325.9)	(1196.4)	(1933.7)	(254.2)	(440.6)
FX Derivatives	-418.4	-1326.5*	-1529.9	14.27	259.5	-756.0
	(307.6)	(762.2)	(1011.0)	(2416.4)	(232.3)	(1999.0)
Futures/Options Tax	2148.4***	4009.3***	1826.0	-430.6	-106.1	-267.6
	(551.8)	(1221.6)	(1567.5)	(4746.8)	(215.4)	(362.5)
Control Period Dummy	97.02	-63.26	1483.4	2099.7	-439.2	-50.42
	(412.4)	(478.9)	(1672.4)	(2404.3)	(321.0)	(794.1)
Non-FDI, lagged			0.113	-0.239		
			(0.148)	(0.624)		
FDI, lagged					0.0710	1.127
					(0.125)	(2.157)
Constant	390.4	471.8	6383.8***	8228.9*	1032.0***	-92.37
	(469.8)	(469.5)	(2030.2)	(4233.4)	(330.2)	(2486.8)
Observations	119	108	119	108	119	108
R^2	0.765	0.724	0.267	0.177	0.432	.

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Korea Short-term, Long-Term, and Derivative Net Inflows

	Short-term	Short-term(IV)	Long-Term	Long-Term(IV)	Derivatives	Derivatives(IV)
Current Account	-0.976***	-1.027***	0.336**	0.414	0.0193	0.0354
	(0.243)	(0.266)	(0.137)	(0.283)	(0.0287)	(0.0331)
Short-term, lagged	0.0232	0.00998				
	(0.133)	(0.774)				
Korea - US Interest Rate	33.19	27.20	-49.95	-27.30	-26.28	-12.94
	(283.3)	(301.9)	(216.4)	(418.8)	(43.95)	(49.36)
VIX	-193.4**	-212.0	2.159	-0.00929	-32.87***	-31.42
	(86.65)	(200.7)	(26.82)	(97.38)	(8.462)	(21.41)
GSCI	-9.344***	-9.141	1.554	-1.199	-1.160***	-1.031
	(2.713)	(6.752)	(2.199)	(11.52)	(0.390)	(0.811)
Forwards/Bonds	6006.6***	6130.0***	-3136.9***	-7139.0	661.5***	709.1*
	(1227.8)	(1328.5)	(721.0)	(18972.0)	(151.6)	(380.2)
FX Derivatives/Loans	3427.8	3521.1	-554.0	-2742.3	82.86	123.5
	(2179.4)	(10342.1)	(788.7)	(9540.9)	(196.9)	(454.6)
3 Month Dummy	1138.0	1090.8	-2770.9	-961.2	211.2*	239.5*
	(2148.3)	(2451.9)	(1908.4)	(8625.2)	(114.6)	(128.2)
Second Probe	3131.9***	2901.3	2213.0***	3675.0	-178.2	-160.4
	(1162.9)	(1757.5)	(758.5)	(5704.8)	(151.7)	(291.0)
FX Derivatives	-1055.3	-1149.7	-19.21	-1343.1	-304.8***	-273.4*
	(922.7)	(2314.6)	(644.4)	(7623.1)	(109.4)	(155.6)
Futures/Options Tax	5517.5***	5254.3	-4820.2***	-8320.0	-132.9	-117.9
	(1943.3)	(8475.0)	(659.3)	(18031.4)	(109.8)	(141.6)
Control Period Dummy	2468.6	2469.0	-1111.5	-542.3	362.8**	287.9
	(1615.9)	(2683.6)	(946.5)	(3091.4)	(179.8)	(300.9)
Long-term, lagged			0.136	1.251		
			(0.105)	(5.405)		
Derivatives, lagged					0.274*	0.324
					(0.152)	(0.570)
Constant	8757.6***	9192.6	-750.5	-123.2	1075.9***	935.6
	(2414.3)	(6336.1)	(983.1)	(4128.6)	(253.9)	(708.5)
Observations	119	108	119	108	119	108
R^2	0.395	0.405	0.180	.	0.517	0.509

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$