Mitigating Systemic Spillovers from Currency Hedging

Kyuil Chung
Hail Park
Hyun Song Shin

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Requests for copies of publications, or for
addition/changes to the mailing list, should be
sent to:

Economic Research Institute
The Bank of Korea
39 Namdagmunno Jung-Gu
Seoul, 110-794, Korea

E-mail: eso@bok.or.kr

Fax: 82-2-759-5410

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Mitigating Systemic Spillovers from Currency Hedging[†]

Kyuil Chung*

Hail Park**

Hyun Song Shin***

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* Head, International Economic Studies Team, Economic Research Institute, Bank of Korea, 39, Namdaemun-Ro, Jung-Gu, Seoul, 100-794, Republic of Korea. Email: kichung@bok.or.kr

** Economist, Research Planning & Coordination Team, Economic Research Institute, Bank of Korea, 39, Namdaemun-Ro, Jung-Gu, Seoul, 100-794, Republic of Korea. Email: bluechip@bok.or.kr

*** Corresponding author, Hughes-Rogers Professor of Economics, Princeton University, Bendheim Center for Finance, 26 Prospect Avenue, Princeton, NJ 08540, U.S.A. Email: hsshin@princeton.edu

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Mitigating Systemic Spillovers from Currency Hedging

Korea has been a forerunner in incorporating macroprudential policies to mitigate the vulnerabilities from currency crises that can turn into a more generalized liquidity crisis. This paper examines longer-term design issues for a more resilient and stable financial system that can complement the existing macroprudential measures. In the period before the Lehman crisis of 2008, rapid growth of short-term foreign currency denominated debt in Korea was the result of banks' receiving forward dollar sales by exporters and asset managers, and then hedging the long dollar position by borrowing short in dollars. Our paper examines the rationale and mechanics of a new public financial institution, provisionally called the *Exchange Stabilization Corporation (ESC)* whose main role is to allow Korean exporters to hedge their currency exposure without generating currency or maturity mismatch in the Korean financial system as a whole. Three features of the ESC enable such a role: (1) it is fully equity-financed, rather than debt financed like a bank (2) its gains and losses are evaluated in US dollars, and (3) it holds a portfolio of both US dollar-denominated and Korean won-denominated assets. The ESC maintains a fully hedged position by switching between assets in different currencies while balance sheet size is fixed. This is in contrast to banks, who hedge their currency exposure by expanding the balance sheet by taking on more short-term dollar denominated debt. This paper is intended as a contribution to discussions about policies toward longer-term financial resilience, rather than about short-term crisis management policies in the light of current financial developments. More detailed research and study on feasibility of the ESC would be needed before it can be put in place.

Keywords: Currency Hedging, Banking Stability, Exchange Rate Overshooting

JEL Classification: F31, F33

I. Introduction

External financial conditions provide the backdrop to domestic financial conditions, especially when the domestic banking system is open to funding from cross-border banks. An IMF report on capital flows (IMF (2011)) identifies three epochs of capital flows, the first being the period 1995Q4 – 1998Q2 associated with the Asian crisis, the period 2006Q4 – 2008Q2 associated with the credit boom that led to the recent global financial crisis, and the most recent period in the aftermath of the crisis (2009Q3 – 2010Q2).

Figure 1: Components of capital flows to emerging economies

Source: IMF (2011, p.14)

The distinguishing feature of the credit boom that preceded the global financial crisis of 2007-9 is the role played by banking sector inflows. In contrast to the other two episodes where banking sector inflows account for less than 20%, banking sector inflows surged during the period leading up to the Lehman bankruptcy and the subsequent global crisis.

Figure 2, from the IMF's Global Financial Stability Report in 2010, shows the capital inflows into 41 countries including many emerging economies, where the flows are disaggregated into the four main categories of capital flows. Aggregate FDI flows

are steady and portfolio equity flows are small in net terms. However, banking sector flows display the signature procyclical pattern of surging during the boom, only to change sign abruptly and surge out with the deleveraging of the banking sector.

Figure 2: Components of capital flows

Source: IMF Global Financial Stability Report, April 2010 p. 123

Korea has been vulnerable to “twin crises” in which a banking crisis and currency crisis reinforce each other. Although twin crises show many different forms across countries and across time, the common thread that links them is the balance sheet mismatch at the aggregate economy level arising from excessive short-term debt denominated in foreign currency.

In this paper, we explore the extent to which the build-up of short-term foreign currency of the banking sector can be attributed to the currency hedging activity firms who seek to reduce the risks arising from currency movements. For the case of Korea, we present estimates for the period up to the 2008 crisis that suggest that the build-up of foreign currency liabilities of the banking sector can be attributed in large part to such currency hedging activity.

In Korea’s case, the vulnerability to reversals of capital flows owes in large part to the currency hedging need of exporting companies, since exporting companies

acquire long-term dollar receivables through their export orders, and then wish to hedge the currency exposure until receiving final payment in dollars. Hedging takes the form of selling dollars forward to banks in Korea. However, the counterparty to the forward transaction (the bank) must then hedge its own long dollar exposure, which they do by borrowing in dollars, and then investing the proceeds in Korean won.

Hedging is a desirable activity from the point of view of each individual firm undertaking the hedging operation, but may entail a collective outcome where the financial system is left vulnerable to a sudden shift in external financial conditions, especially from a sudden reversal of capital inflows as was experienced in 2008.

In this paper, we review the rationale for an institution – dubbed the Exchange Stabilization Corporation (ESC) – which can provide the public good of providing hedging services to individual firms, but which does not have the harmful side-effect of generating short-term foreign currency liabilities that lie at the heart of the vulnerability of an economy to financial shocks.

Three features of the ESC enable such a role. First, it is fully equity-financed, rather than debt-financed like a bank. Second, its valuation gains and losses are evaluated in US dollars, rather than in Korean won. Third, the ESC is allowed to hold a portfolio of both US dollar-denominated and Korean won-denominated assets. As we describe in more detail below, these three features allow the ESC to maintain a fully hedged position in the face of currency movements by switching between assets in different currencies while balance sheet size is fixed. This is in contrast to banks, who hedge their currency exposure by expanding the balance sheet by taking on more short-term dollar denominated debt. The hedging operations of the ESC are very simple one-off transactions, rather than involving dynamic hedging techniques.

Our paper is intended as a contribution to discussions about the principles underlying longer-term financial resilience, rather than about short-term crisis management policies in the light of current financial developments. As such, more detailed research and study on feasibility of the ESC would be needed before it can be put in place.

II. Background

Before sketching the details of the institutional design, we first review evidence on the spillovers of hedging activity and how such spillovers undermine systemic stability.

Figure 3 gives an overview of the total customer lending by the banking sector in Korea and how it was financed. Up to the end of 2005, core liabilities consisting of customer deposits were adequate in funding total lending, so that the loan to deposit ratio was below 1. However, lending outstripped deposits in the period leading up to the Lehman crisis, and banks resorted increasingly to non-core funding, especially the non-core funding in foreign currency as seen in Figure 3.

Figure 3: Lending and funding aggregates for the Korean banking sector¹⁾

Source: Bank of Korea

1) Core KRW (Korean Won) liabilities include customer deposits and certificates of deposit (CDs) held by non-banks. Non-core KRW liabilities include interbank CDs, bank debt securities, repos, promissory notes. (Source: Bank of Korea)

The reliance on foreign currency funding of the banking sector makes the financial system more vulnerable to a “twin crises”, as amply demonstrated by the Asian financial crisis of 1997 and the turmoil in global financial markets in the autumn of 2008. Such crises are particularly dangerous due to the mutually reinforcing nature of the two crises, and the rapid deterioration of economic fundamentals caused by the amplification of the crisis.

From 2005 to 2007, Korean banks and the foreign bank branches in Korea saw rapid increases in short-term foreign currency liabilities (see Figure 4). The severity of the financial crisis in Korea in 2008 can be attributed largely to the rapid deleveraging that took place by the banking sector (both domestic and foreign) with the onset of the 2008 financial crisis.

Figure 4: Foreign currency liabilities of the banking sector in Korea

Source: Bank of Korea

Figure 5 shows the contrast in the pattern of capital inflows and outflows for two sectors – the equity sector and the banking sector. The banking sector saw very substantial capital outflows from Korea. Although Korean banks also held dollar claims, such as the long dollar forward positions on Korean corporations, such assets were not usable to meet maturing dollar liabilities without exacerbating the economy-

wide liquidity crisis. Non-financial firms in Korea had dollar receivables, such as the receivables of the shipbuilders, but they were long-term dollar receivables that could not be realized immediately.

Korea's vulnerability to currency crises arises from the large hedging need of exporting companies. Since the exporting companies acquire long-term dollar receivables through their export orders, they wish to hedge the currency risk by selling dollars forward.

Figure 5: Net capital flows in equity sector and in banking sector foreign currency liabilities

Source: Bank of Korea and Hahm, Mishkin, Shin and Shin (2010)

The banking sector in Korea (including the foreign bank branches) has been the counterparty, buying the forward dollars sold by the exporters. However, the counterparty to the forward transaction (the bank) must then hedge its long dollar exposure. The bank can hedge its long dollar position by borrowing in dollars, and then investing the proceeds in Korean won, thereby hedging the long dollar forward position with a carry trade position in the Korean won.

By hedging the exchange rate risk in these long-term dollar receivables, the ex-

porting companies could transfer to the banking sector the long-term dollar claims, but the banks then would engage in maturity transformation by borrowing short in dollars.

In this way, the overall currency mismatch on the consolidated balance sheet consisting of the corporate and banking sectors could be eliminated through the hedging activity, a maturity mismatch between long-term dollar claims and short-term dollar liabilities took its place. In effect, the *currency mismatch* was replaced by a *maturity mismatch* which left the Korean financial system vulnerable to the global financial crisis in 2008 that followed in the wake of the bankruptcy of Lehman Brothers.

Figure 6: Stylized aggregate balance sheet of banking sector

Figure 6 depicts the stylized aggregate balance sheet of the banking sector as a result of the hedging transaction by Korean exporting firms. The Figure illustrates a shipbuilder in Korea who has received an order and wishes to hedge the foreign currency risk by selling a long-term dollar forward contract to a bank. The forward contract shows up as an off-balance sheet claim on the bank's balance sheet, and entails a long dollar position for the bank.

The bank can hedge the currency risk by borrowing in dollars and holding the proceeds in Korean won by purchasing local assets, or by entering into a hedging transaction of its own with another bank in Korea. However, in aggregate, the banking sector in Korea will have the form depicted in Figure 6, where the long dollar forward position is offset by a “carry trade” position that funds the purchase of local Korean assets with short-term dollar liabilities. Figure 4 refers to the “banking sector

inside Korea” in order to highlight the role of foreign bank branches that operate in Korea. As shown in Figure 4, the foreign bank branches had larger outstanding amounts of short term foreign currency denominated liabilities in the run-up to the 2008 crisis.

III. Banking Sector Foreign Currency Liabilities due to Hedging Activity

The main findings from a survey conducted jointly by the Bank of Korea and the Financial Supervisory Service (FSS) in November 2007 were announced in January 2008 as a press release (Bank of Korea (2008)). This survey found that in the nine months from January to September 2007, 67% of the receivables of exporting companies in Korea were hedged for currency risk, while only 15% of the future orders of importing companies were hedged. The asymmetry between the large hedging activity of the exporters and the relatively much smaller hedging activity of the importers created the preconditions for a mismatch in the demand and supply of long-dated dollars, with supply outstripping demand. Of the importing firms in Korea, the hedging by the petroleum refining sector and the steel sector were found to be particularly low, at only 2 ~ 6% of total orders.

The imbalance in the hedging activity of the exporting and importing sectors reflect both the nature of the goods involved and also the market structure in Korea. The receivables of exporting companies tend to be medium to longer term, involving large indivisible items typified by shipping orders. In contrast, importing companies liabilities are short-term and relatively easier to predict. Moreover, the market power of companies in the importing sectors in the domestic Korean market enables them to pass on any cost increases resulting exchange rate changes on to the final consumer. The same is not true of exporting companies who face relatively stiffer competition in global markets.

In addition to the hedging activity of Korean exporting companies, another important source of hedging activity in the run-up to the 2008 crisis came from the asset management sector in Korea. The asset management sector includes both stock mutual funds serving retail investors, as well as institutional investors in the insurance and pension sector.

Figure 7: Capital flows in the equity sector of foreign and domestic investors

Source: Bank of Korea and Shin and Shin (2010)

Figure 7 plots the monthly capital flows in the equity sector distinguishing the flows generated by foreign and domestic investors. The sum of the two series in Figure 7 gives the net equity sector flows depicted in Figure 5. The downward pointing bars indicate capital outflows while upward pointing bars indicate capital inflows.

We see from Figure 7 that domestic investors in Korea sharply increased their holding of foreign stocks in the period before the 2008 crisis, especially in late 2006 and in 2007. However, the boom in the sale of managed equity funds to retail investors during 2007 took place during a period of sustained appreciation of the Korean won, and asset managers offered retail products that hedged the currency risk in the equity fund. A survey by the Financial Supervisory Commission (FSC (2007)) found that 84% of the retail funds investing in foreign securities were hedged for currency fluctuations. For such currency-hedged products, Korean investors were promised a return in Korean won terms equal to the change in the foreign stock index itself rather than the stock index change combined with exchange rate changes.

In practice, the currency hedging by asset managers took the form of selling for-

ward contracts in dollars to banks, in a similar way to the hedging transaction of the exporting firms shown in Figure 6. In one respect, however, the hedging demand from the asset management sector was more sensitive to market conditions than for the exporting sector in Korea. The reason is that hedging of currency risk for foreign equity holdings entails marking to market the outstanding stock at any moment in time, so that changes in market prices and the exchange rate entails shifts in the hedging need. A buoyant stock market when prices are rising entails hedging demand that applies to the whole outstanding amount, rather than just the new flows that are generated in each time period.

Figure 8: New orders by shipbuilders and increase in foreign stock holding of domestic investors

Source: Bank of Korea

Figure 8 plots the net increase in foreign stock holdings of domestic investors from 2003 to 2007. The sharp increase in 2007 reflects both the large new outflows but also the marked-to-market increases in the value of existing foreign equity holdings of domestic Korean investors. Figure 8 also plots the new orders received by Korean shipbuilders in the same period. The two series combined represent the underlying demand for currency hedging that had to be met by the banking sector

in Korea. By utilizing information on the percentage of exposures that were hedged by the shipbuilders and asset managers, we can calculate the approximate amount of the foreign currency liabilities of the banking sector that can be attributed to the hedging activity of the exporters and asset managers, and is shown in Table 1.

Table 1: Underlying calculation for the increased in foreign currency debt of the banking sector attributable to hedging activity

U\$ Billions

	2003	2004	2005	2006	2007	2008	2009	2010
Shipbuilders' new orders	23.90	31.80	31.27	61.70	97.50	71.79	18.33	46.30
Estimated increase in foreign debt due to shipbuilders' hedging activities	1.15	4.64	5.70	14.00	19.97	5.24	-12.99	-7.11
Sale of dollar forwards by shipbuilders	4.47	12.50	16.82	35.25	53.26	41.49	16.04	22.60
Settlement of maturing forwards by shipbuilders	-2.89	-6.14	-9.01	-16.07	-25.90	-34.31	-33.84	-32.34
Net sale of dollar forwards by shipbuilders	1.58	6.36	7.81	19.18	27.36	7.18	-17.80	-9.74
Net increase in foreign stock holding of domestic investors	1.63	5.59	4.90	22.91	68.04	-56.98	24.44	9.60
Estimated increase in foreign debt due to hedging activity of asset managers	1.00	3.43	3.00	14.05	41.72	-34.94	14.99	5.89
Estimated increase in foreign debt due to hedging activity of shipbuilders and asset managers	2.15	8.07	8.70	28.05	61.69	-29.70	2.00	-1.22
Increase in total foreign debt	8.89	8.98	10.79	63.79	108.23	-16.06	28.31	13.76
Increase in banking sector foreign debt	9.26	6.76	8.94	53.11	56.34	-23.46	10.84	-7.18

Source: Bank of Korea and Financial Supervisory Commission

The two series shown above in Figure 8 are presented in Table 1. The first row of Table 1 is the new orders of shipbuilding firms in Korea, while the seventh row of Table 1 shows the net increase in the value of foreign stock holdings of domestic investors.

Starting with these series, we can then estimate the increase in banking sector foreign currency debt that is attributable to the respective hedging activities. Consider first the hedging activity by shipbuilders. For shipbuilders, we have both the

series for new orders and the purchase of dollar forwards by the sector (first and third rows of Table 1). We then net out the settlement of maturing forward dollar contracts (fourth row) to calculate the net new sales of dollar forward contracts by the shipbuilding sector. Figure 9 plots the series associated with hedging activity of the shipbuilders.

Figure 9: Net sale of dollar forward contracts by shipbuilder

Source: Bank of Korea

The banking sector is on the other side of these sales, and hence accumulates long positions in dollar forwards. The banks then hedge their own exposure by taking on dollar liabilities which in turn are used to purchase local assets. However, the hedging activity by the banks does not translate into a one-for-one increase in foreign exchange liabilities, as the banking sector will have pre-existing foreign currency liabilities which are unrelated to hedging activities by non-banks. In any case, the banks' ability or willingness to bear some currency risk will mean that the increase in foreign currency debt due to its purchase of dollar forwards will not be one-for-one. The Bank of Korea/FSS joint survey (Bank of Korea (2008)) estimated that the approximately 73% of the shipbuilders' new orders were hedged for currency risk by the banking sector.

Figure 10 applies the 73% estimate of banks' hedging activity to estimate the increase in banking sector foreign currency liabilities that can be directly attributed to the hedging activity of the shipbuilders. It is calculated as 0.73 times the net new purchase of dollar forwards by the shipbuilding sector.

Figure 10: Estimated increase in banking sector foreign currency liabilities due to shipbuilders' hedging activities

Source: Bank of Korea

We can use an analogous procedure to estimate the increase in foreign currency liabilities of the banking sector that is directly attributable to the hedging activities of asset managers. First, we use the estimate from the survey by the Financial Supervisory Commission (FSC (2007)) that approximately 84% of the holdings in foreign equity retail funds are hedged by asset managers. We then combine this with the Bank of Korea/FSS survey that 73% of forward dollar contract purchases by banks are hedged by their taking on foreign currency liabilities.

Thus, the estimated increase in the banking sector foreign currency liabilities that is directly attributable to asset managers' hedging activities is given by $0.73 \times 0.84 \times$ outstanding foreign equity holding.

Figure 11 plots the increase in banking sector foreign currency liabilities attributable to asset managers' hedging activity and adds the analogous series for the foreign currency liabilities arising from shipbuilders' hedging activities. In Figure 12, we plot our constructed series given by the sum of the two series in Figure 11, and then compare it with the actual increase in banking sector foreign currency liabilities.

Figure 11: Estimated increase in foreign currency liabilities due to hedging activity by shipbuilders and asset managers

Source: Bank of Korea and Financial Supervisory Commission

With the exception of 2006, we see that the two series are very close to each other, adding weight to the hypothesis that the increase in foreign currency liabilities of the Korean banking sector can be largely attributed to the hedging activity of domestic non-bank market participants.

Figure 12: Estimated and actual increase in banking sector foreign currency liabilities

Source: Bank of Korea and Financial Supervisory Commission

The interaction between hedging activity by non-banks and the banks' own profit incentives is an important potential explanatory factor in the exchange rate dynamics leading up to the 2008 crisis. There is the potential for a feedback loop that links exchange rate movements, hedging demand and exchange rate changes.

Figure 13: Feedback loop generated by hedging activity

The feedback loop generated by hedging activity can be depicted as in Figure 13. Hedging activity by exporters and asset managers implies sale of forward dollars to banks. In order to hedge the forward dollars, the banks take on short-term dollar liabilities and either sell the dollars in the spot market for Korean won, or enter into a currency swap agreement for delivery of dollars in the future in exchange or delivery of Korean won at the contracting date. Either way, the banks' own hedging activity generates sales of dollars and purchase of Korean won in the spot market, leading to the appreciation of the Korean won value in the spot market. The spot market appreciation of the won sets off marked-to-market valuation changes on banks' balance sheets and possibly also expectations of further appreciation of the Korean won, which in turn further exacerbates the hedging demand of the non-banks. Dynamic hedging by the bank that adjusts the amount of foreign currency liabilities in line with changes in the valuation changes on its balance sheet entails borrowing more dollars and selling them on the spot market as the Korean won comes under further appreciation pressure.

The feedback loop is potentially potent for those exporting firms (such as ship-builders) where the gains or losses from foreign exchange movements constitute a large component of total profit.

As well as the demand for hedging, the incentives of the banks in generating business should also be taken into consideration. The Bank of Korea/FSS survey (Bank of Korea (2008)) reports that the banks entered into a period of intense competition to increase market share in the foreign currency hedging services. Banks engaged in intensive marketing to customer firms, through site visits, customer seminars, training and educational programs for customers, and so on. The BOK/FSS survey visited six banks in Korea over the survey period²⁾.

During the nine month survey period from January to September 2007, the six banks visited 2,453 customer firms, 80% of whom were export firms. The banks made a total of 10,802 visits – an average of 4.4 visits for each customer firm. During this period, the banks issued research reports that consistently and unanimously forecast continued strong appreciation of the Korean won. The research was then used in the marketing effort by the banks to induce customer firms to engage in further hedging activity. Part of the marketing drive by the banks was to point to the potential advantages of pre-emptive hedging in which firms hedge in anticipation of further hedging need, rather than hedging based on realized need.

Pre-emptive hedging may have led to a systematic over-hedging by the exporting firms, which left them exposed to the sharp fall in the Korean won with the onset of the crisis in 2008. It is difficult to gauge the precise amount of over-hedging by exporting companies, even ex post. When the customer of a shipbuilder cancels an order, then the shipbuilder will be left with a hedge against the canceled contract, leaving it exposed to the depreciation of the Korean won. However, the shipbuilder may have entered into the hedging of the order in good faith. Nevertheless, the 2008 crisis and the sharp depreciation of the Korean won left many Korean exporters exposed to exchange rate movements that exacerbated the financial distress of 2008.

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2) Shinhan, Korea Development Bank (KDB), Citibank Korea, Standard Chartered, Credit Agricole (Calyon) and Deutsche Bank

Figure 14: Capital flows and the Korean won exchange rate against the US dollar

Source: Bank of Korea

Figure 14 plots the capital flows reflected in the banking sector foreign currency liabilities (left hand scale), plotted against the USD/KRW exchange rate (right hand scale). We see that throughout 2006 and 2007 the Korean won appreciated steadily, touching 900 won to the dollar in late 2007. During this period of won appreciation, the research emanating from the banks predicted in unison further appreciation of the Korean won. The market consensus at the time was that the exchange rate would eventually break through the 900 level. The intense marketing by the banks based on such research could have further fueled the feedback loop in Korean won appreciation by encouraging firms to engage in more aggressive hedging against the Korean won appreciation.

The feedback loop diagram in Figure 13 also explains why the Korean won exchange rate moves in line with the increase in bank foreign currency liabilities in Figure 14, rather than with the equity sector capital flows. The period when bank foreign currency liabilities are increasing coincides with the period of increased hedging activity which is then amplified through appreciation of the Korean won.

The feedback loop then goes into reverse once the bank liability flows reverse, as happened with the onset of the crisis in 2008. We see in Figure 14 that the Korean won falls very sharply in the summer of 2008 coinciding the deleveraging of the banking sector in Korea. Notice that during the crisis period, there was actually a *net inflow* in the equity sector, as foreign investors' sales of Korean equity was outweighed by the repatriation flows by Korean investors.

The close link between the hedging activities of non-banks with the increase in foreign currency liabilities of the banking sector in Korea holds important lessons for the financial stability implications of real activity. Given the very high economic costs associated with financial crises, we need to take account of the negative spillover effects of the banks' hedging activity using foreign currency liabilities. An institution that can alleviate the negative spillovers of currency hedging activity may enhance system stability. We outline the possible workings of such an institution here. We give it the hypothetical name of the Exchange Stabilization Corporation (ESC). The purpose of the ESC is to cut the link between the need for non-banks to hedge their exposures to currency risk and the creation of vulnerabilities to financial stability.

IV. Exchange Stabilization Corporation (ESC)

The discussion so far has highlighted the double-edged nature of hedging activity. Hedging is an activity that is privately optimal, but it generates significant negative spillover effects on the broader economy through increased fragility of the financial system and the greater amplification of exchange rate movements. The main channel of the negative spillover is the banking sector's role in being the counterparty to hedgers and the fact that the bank needs to neutralize its own currency mismatch by increasing its foreign currency liabilities. In practice, banks foreign currency liabilities tend to be short term, which exacerbates the fragility of the financial system.

The Exchange Stabilization Corporation (ESC) is intended as an alternative to the banking sector whose core role is to be the counterparty to exporters or asset managers who wish to hedge the currency risk. The ESC would have the following three balance sheet attributes.

- The ESC is a public entity which is 100 percent equity financed.
- The ESC is valued in US dollars for computing gains and losses.
- However, the ESC is permitted to hold Korean won-denominated assets as well as foreign currency denominated assets.

The exact corporate form of the ESC would depend on governance and accountability imperatives, but its charter and mission would be to promote the public good through enhancing financial stability.

The primary purpose of the ESC is to play the role of the counterparty to exporting firms or other private sector economic entities who wish to hedge currency risk. The ESC could also serve a subsidiary role of providing trade finance as part of the currency hedging service to those small and medium sized enterprises (SMEs) that do not have access to export trade financing, or face high costs of obtaining such funding.

The ESC would buy dollars forward when an exporter wishes to sell dollars forward. The difference between the ESC and the banking sector is that the ESC is fully equity financed. Hence its ability to provide hedging services does not result in the creation of volatile short-term banking sector foreign currency liabilities. In this sense, for every dollar that the ESC buys from a Korean exporting company, there will be one fewer dollar's worth of short-term bank liability created.

Crucially, the ESC can hedge its own currency exposure by holding Korean won assets (such as Korean government bonds or Bank of Korea bonds) but be valued in US dollars. The fact that the ESC holds Korean won assets but is valued in US dollars creates a natural short-dollar position, which creates the capacity to take on long dollar exposures – for instance, by buying forward dollar positions from Korean exporting companies.

The basic idea can be illustrated in terms of the schematic in Figure 15, which illustrates the balance sheet of the ESC at its inception and then after a series of transactions. At its inception, the ESC holds US dollar assets, such as short-term US Treasury bills. The ESC is fully equity financed, and valued in dollars.

Figure 15: Operation of the Exchange Stabilization Corporation (ESC)

However, the ESC would then begin a series of transactions and modify its portfolio of assets. An exporting firm wishing to hedge its long-term currency exposure can sell forward contracts for US dollars to the ESC. For its part, the ESC can hedge its own currency risk by adjusting its portfolio of assets. The ESC sells an amount of US dollar assets equivalent to the discounted face value of the forward contract, and purchases safe Korean won assets, such as short-term Korean government bonds. However, because the ESC is valued in US dollars, the holding of Korean government bonds purchased in this transaction creates an exact hedge for the forward dollar position purchased from the exporter.

In effect, the ESC's transactions allow it to hold the exact amount of Korean won that is necessary to settle the forward contract with the exporter at the maturity of the contract. The ESC's obligation to the exporter is to deliver Korean won at the maturity of the forward contract. The ESC can guarantee that it meets this obligation by securing exactly the right amount of Korean won at the outset and holding the Korean won until maturity. Therefore, the ESC faces no currency risk during the lifetime of the contract.

Through such adjustments of its asset portfolio, the ESC creates a short position in the US dollar which exactly offsets the long dollar exposure created by the

forward position. However, unlike a bank, the ESC is fully equity financed, and the vulnerabilities created by short-term foreign currency debt of the banking sector can be avoided. When the forward contract matures, the ESC reverses the initial set of transactions. When the exporting firm delivers dollars at the maturity date, the ESC sells Korean won assets and purchases US dollar assets to rebalance its portfolio so that the ESC remains perfectly hedged against currency fluctuations. In general, the day-to-day operation of the ESC will entail fine-tuning of the mix of Korean won and US dollar assets held in its portfolio, in order exactly to offset the long forward dollar position bought from the Korean exporting companies.

It is worth emphasizing the difference between the ESC and a bank in the way that they manage their balance sheets. For the ESC, the size of the balance sheet is held fixed, and the hedging is achieved by switching between assets of different currency denomination. In contrast, the bank hedges its currency exposure by expanding its balance sheet by taking on short-term dollar-denominated debt.

Although the currency risk is perfectly hedged through adjustment of the asset portfolio, the ESC bears some counterparty risk from the possibility that the exporting company is unable to deliver dollars at the maturity date of the forward contract. In order to deal with such counterparty risk, additional safeguards can be put in place. For instance, the counterparty risk could be mitigated by imposing a haircut on the notional value of the forward contract relative to the notarized value of the invoice for the export order, or the collateralization of the forward contract through letters of credit or other securities.

For small and medium sized enterprises (SMEs) that are not able to provide such collateral, the credit guarantees that are currently provided by the Korea Credit Guarantee Fund (KODIT) could be used to secure the forward transaction. By combining credit guarantees with its own operations, the ESC will be able to provide trade financing as well as hedging services, as we will detail below.

To the extent that the ESC will be operating in the currency forward and swap markets, the broader overall impact of the ESC's operations on the liquidity and functioning of these markets should be a concern when contemplating the introduction of the ESC. To the extent that the forward and swap markets are used by diverse financial market participants with differing motives – from purely financial players with speculative motives to non-financial players with hedging motives – the ESC would be only one of many potential market participants. The ESC's primary

purpose is to stand as a counterparty to exporters and other real sector entities, and so the impact on overall market functioning should be limited, although close monitoring would be necessary to assess the overall impact of the ESC.

Having outlined the key features of the ESC, we now provide a more detailed description of its operations through a series of examples. For simplicity of illustration, we assume that the risk-free interest rate for both Korean won and the US dollar is zero.

Example 1: ESC as counterparty to US dollar forward contract sold by exporter

- **Date 0 (initial date):** The ESC has equity of \$100 million, and holds \$100 million of US treasury bills.
- **Date 1 (transactions date):** The exchange rate at the transactions date is 1,000 Korean won for one US dollar. The ESC conducts two transactions.
  - First, the ESC buys a forward contract from an exporter for the delivery of \$1 million at date 2 (the maturity date) in exchange for KRW 1 billion.
  - Second, the ESC sells \$1 million worth of dollar-denominated assets and buys KRW 1 billion worth of short-term Korean government bonds.

Through this paired transaction, the ESC ensures that its value remains at \$100 million irrespective of subsequent exchange rate fluctuations. Any gains or losses (in US dollar terms) on its *on-balance sheet* portfolio of assets are exactly offset by the reverse marked-to-market gains and losses on its *off-balance sheet* forward position. Notice the crucial importance of valuing gains and losses for the ESC in US dollars for this immunization property to hold.

- **Date 2 (settlement date):** The forward contract matures and settlement takes place. The exchange rate will have changed from the contract date, but the ESC can ensure its value remains unchanged after settlement.
  - The ESC sells the KRW 1 billion worth of Korean government bonds on its portfolio, and delivers the won to the exporter, as specified in the forward contract.

- o In return, the exporter delivers \$1 million dollars to the ESC, as stipulated in the forward contract. The ESC then purchases \$1 million worth of US dollar safe assets, to bring its *on-balance sheet* portfolio to \$100 million worth of US dollar-denominated safe assets.

After the settlement date, the ESC's balance sheet is back to its initial portfolio. Provided that counterparty risk can be eliminated, the ESC's trades enable it to remain perfectly hedged against currency fluctuations between the contract date and the settlement date.

Example 2: ESC as counterparty to US dollar currency swap

Suppose that a Korean bank wishes to sell a US dollar currency swap contract with face value of \$1 million. Suppose that the exchange rate at the transactions date is 1,000 Korean won for one US dollar. Under the swap contract, the Korean bank delivers KRW 1 billion in exchange for \$1 million at the contracting date, and receives KRW 1 billion for \$1 million at the settlement date (recall that interest rates are zero for illustration). The ESC can play the counterparty to such a swap as follows.

- **Date 1 (transactions date):**

- o The ESC delivers \$1 million to the bank in exchange for KRW 1 billion as specified in the swap.
- o The ESC conducts no further transactions. The KRW 1 billion proceeds stay on the ESC's balance sheet until maturity.

In the swap transaction, the ESC does not adjust its on-balance sheet portfolio of assets. By keeping the KRW 1 billion proceeds on its balance sheet, the ESC can fully hedge its obligation to deliver Korean won at the settlement date. Notice that any gains or losses on its *on-balance sheet* portfolio of assets are exactly offset by the reverse marked-to-market gains and losses on its *off-balance sheet* position.

- **Date 2 (settlement date):** The swap contract matures and settlement takes place. The exchange rate will have changed from the contract date, but the ESC can ensure its value remains unchanged after settlement.
  - o The ESC delivers KRW 1 billion to the Korean bank.
  - o In return, the Korean bank delivers \$1 million dollars to the ESC.

After the settlement date, the ESC's balance sheet is back to its initial portfolio, provided that counterparty risk can be eliminated in some other way.

Example 3: ESC as provider of combined hedging and trade credit services

Suppose that a Korean manufacturing firm from the SME sector wishes to accept an export order for a long-dated project. The project entails significant currency risk but also entails financing needs. The small firm does not have the financing in hand, and lacks collateral for obtaining trade finance from the banking sector.

Under these circumstances, the ESC can provide a combination of trade financing and currency hedging by working in unison with existing agencies such as the Korea Credit Guarantee Fund (KODIT) who provide credit guarantees for small and medium sized companies that lack collateral demanded by banks. The ESC can provide the combination of a loan and a forward contract as depicted in Figure 16.

Figure 16: Transaction with credit guarantee from Korea Credit Guarantee Fund (KODIT)

In this example, the small exporting firm has obtained an export order for \$1 million, but also needs to borrow in Korean won for working capital to fulfill the order. Say that the firm needs working capital of 1 billion Korean won, which is exactly equal to the \$1 million export order at today's exchange rate of \$1 = KRW 1,000.

In this example, the ESC acts as a discounter of the export invoice. The discounting of receivables is known as “factoring”, and the ESC provides factoring as well hedging services. The specific transactions are as follows.

- **Date 1 (transactions date):**

- o The ESC sells \$1 million and obtains KRW 1 billion. The ESC lends this sum to the export firm, with promised repayment of 1 billion won at the settlement date. This loan is secured on the export invoice and the credit guarantee from KODIT.
- o Simultaneously, the exporting firm enters into a forward contract with the ESC and sells \$1 million forward to the ESC at today's exchange rate of \$1 = KRW 1,000. The forward contract is also guaranteed by KODIT.

Provided that there is no credit risk - either on the loan to the exporting firm, or on the export invoice, the ESC's claim of 1 billion won exactly offsets the obligation to deliver 1 billion won at the settlement date. Meanwhile, any currency risk is eliminated by the fact that the ESC expects to receive \$1 million at the settlement date. In this way, any gains or losses on its *on-balance sheet* portfolio of assets are exactly offset by the reverse marked-to-market gains and losses on its *off-balance sheet* position.

- **Date 2 (settlement date):** The forward contract matures and settlement takes place. Meanwhile, the export firm receives \$1 million from its customer. The final settlement then takes place.

- o The export firm receives \$1 million from its customer and delivers it to the ESC. In return, the ESC delivers KRW 1 billion to the exporter, as stipulated in the forward contract.
- o The export firm uses the 1 billion won to repay the loan of the same amount to the ESC.

After the settlement date, the ESC's balance sheet is back to its initial portfolio, provided that counterparty risk can be eliminated through KODIT.

In all the examples sketched above, the main benefit of the ESC is that every dollar's worth of exposure that is hedged by the ESC entails one less dollar of short-term foreign currency dollar liabilities of the banking sector. The direct benefit of the ESC is to reduce the vulnerability of the financial system to crises by reducing short-term foreign currency liabilities of the banking sector. We may also expect additional stabilization effects of the ESC by mitigating the feedback loop generated by the hedging via the banking sector.

Example 4: ESC as intermediary

Although the ability of the ESC to provide hedging services is limited by its capital, one way to increase its overall capacity would be to play the role of a central counterparty in forward transactions between sellers and buyers. Figure 17 illustrates such an example.

Figure 17: ESC as central counterparty in forward transaction

In Figure 17, the ESC acts as a central counterparty between an export firm who wishes to sell dollars forward and an importing firm (such as an oil refiner or steel producer) who wishes to buy dollars forward. Any matching transactions can free up the equity of the ESC to provide hedging to other parties.

Due to the potential maturity mismatch between the selling and buying leg of the two forward transactions (exporters have longer-dated needs), the role that the ESC plays in Figure 17 could not be taken over by a currency futures exchange. Moreover, by playing the role of the central counterparty, the ESC can reassure both sides of the transaction that the counterparty risk can be minimized.

The central counterparty role of the ESC could be expected also to contribute to the development of a more active market between sellers and buyers of forwards and thus lowering the costs of hedging both for exporters and importers.

The fact that the ESC has a narrow mandate of providing hedging services provides a much stronger political economy rationale in the international context, and is much less susceptible to accusations of exchange rate manipulation through intervention. This advantage distinguishes the ESC from the current Exchange Equalization Fund (EEF) of the Korean government, which is designed specifically for intervention purposes to smooth out exchange rate movements.

The ESC has another advantage over the current Exchange Equalization Fund (EEF) from a political economy perspective, this time viewed from the domestic political context. The current EEF has both dollar-denominated and won-denominated accounts, and are used for intervention purposes. Since the objective is to smooth out exchange rate movements, the EEF can accumulate substantial gains or losses. From a domestic political economy perspective, the won-denominated gains and losses can be a sensitive political issue. During a time of sustained Korean won appreciation, the market intervention to slow the appreciation of the won will result in substantial marked-to-market losses in Korean won terms. Such losses can sometimes be portrayed in the media as reckless gambling by the government and the central bank at the expense of the national budget. Such criticisms are not confined to Korea, as we have seen recently in the case of Switzerland and the Swiss policy of pegging the Swiss Franc to the euro.

The advantage of the ESC is that it is designed to be perfectly hedged, so that there are no value gains or losses. The fact that it is valued in US dollars is crucial for this political economy advantage.

Not only is the ESC relatively free from political economy pressures, it would be possible to construct a highly effective political economy case to highlight the many benefits that the ESC can provide to the small and medium sized enterprise (SME) sector in Korea. The combination of lending for working capital financing as well

as hedging services that are accessible to the small and medium sized (SME) firm sector would be highly beneficial to small exporters, and thereby level the playing field vis-à-vis the large firms in Korea. In this respect, the ESC would chime in well with current consensus in policy circles on the desirability of leveling of the playing field between small and large firms by reducing the competitive disadvantage of small firms.

V. Concluding Remarks

In this paper, we have examined the rationale for an institution (the ESC) that can provide the public good of permitting economic entities to hedge their currency exposure while minimizing harmful spillover effects of their hedging activities for systemic stability as a whole. We saw that three features of the ESC enable such a role. First, it is fully equity-financed, rather than debt-financed like a bank. Second, its valuation gains and losses are evaluated in US dollars, rather than in Korean won. Third, the ESC is allowed to hold a portfolio of both US dollar-denominated and Korean won-denominated assets.

These three features allow the ESC to maintain a fully hedged position in the face of currency movements by switching between assets in different currencies while balance sheet size is fixed. This is in contrast to banks, who hedge their currency exposure by expanding the balance sheet by taking on more short-term dollar denominated debt. The hedging operations of the ESC are very simple one-off transactions, rather than involving dynamic hedging techniques.

As well as systemic stability, we have discussed the potential political economy advantages of such an institution, both domestically and internationally.

As stated at the outset, our study is intended as a contribution to discussions about policies toward longer-term financial resilience, rather than about short-term crisis management policies in the light of current financial developments. More detailed research and study on feasibility of the ESC would be needed before it can be put in place.

In particular, there are legitimate concerns on the potential impact of the ESC on the liquidity and smooth functioning of forward and swap markets and the impact on the business models of existing financial institutions that currently operate

in these markets. In addition, there are also legitimate concerns on how equity capital of the ESC may be financed. More in depth study would be necessary along all these fronts.

References

- Bank of Korea (2008) “Preliminary Findings of Study on Demand and Supply Imbalance in the Currency Forward Market” (in Korean) Bank of Korea Press Release 2008-1-41, January 19, 2008
- Financial Supervisory Commission (2007) “Trends in Mutual Funds in Domestic and Foreign Assets” (in Korean) Financial Supervisory Commission Press Release, November 16, 2007.
- Hahm, Joon-Ho, Frederic S. Mishkin, Hyun Song Shin and Kwanho Shin (2010) “Macroprudential Policies in Open Emerging Economies” NBER working paper 17780, <http://www.nber.org/papers/w17780.pdf>
- Hahm, Joon-Ho, Hyun Song Shin and Kwanho Shin (2011) “Non-Core Bank Liabilities and Financial Vulnerability” working paper
<http://www.princeton.edu/~hsshin/www/noncore.pdf>
- International Monetary Fund (2010) Global Financial Stability Report, April 2010.
- International Monetary Fund (2011) “Recent Experiences in Managing Capital Inflows – Cross-Cutting Themes and Possible Policy Frameworks” Strategy, Policy and Review Department, February 2011
- Shin, Hyun Song and Kwanho Shin (2010) “Procyclicality and Monetary Aggregates”, NBER discussion paper w16836, <http://www.nber.org/papers/w16836>

<Abstract in Korean>

정규일*, 박하일**, 신현송***

우리나라는 글로벌 금융위기 이후 선물환 포지션 한도, 외환건전성 부담금 등 거시건전성 수단을 통해 국제자본 유입을 조절하고 있으나 이와는 별도로 한국 금융시스템의 구조적 취약성을 해소하고 위기 대응력을 높일 수 있는 장기적 방안을 모색할 필요가 있다. 이러한 취약성이 발생하게 된 근본원인은 조선업체, 자산운용사 등 기업들의 대규모 선물환 매도거래 상대방이 된 은행들이 외화자산 매입초과에 따른 환위험을 헤지하는 과정에서 해외차입을 증대시켰던 데에 있다. 본 논문은 이러한 구조적 취약성을 제거할 수 있는 제도적 장치로 외환안정기구 설립을 제안한다. 외환안정기구는 공공기구 형태로 영업자금 전액을 부채가 아닌 자본금으로 조달하고 손익평가는 미 달러화로 이루어진다. 외환안정기구는 선물환 매입에 따른 외화자산 증가를 외화부채 증가가 아닌 다른 외화자산 감소로 상쇄시킴에 따라 해외차입이 자동으로 억제되는 효과를 가져 온다. 기존의 거시건전성 정책수단은 향후 세계경기가 호전되어 조선업체의 선박수주나 내국인의 해외투자가 다시 급격히 늘어날 경우 그에 따른 기업의 헤지수요와 은행의 해외차입을 억제하는 데에는 한계가 있으나 외환안정기구는 이러한 점을 보완할 것으로 기대된다. 이러한 외환안정기구가 실제로 현실화되기 위해서는 재원조달 문제, 지배구조, 기존 은행과의 관계 등 동기구 설립에 따른 다양한 긍정적 및 부정적 영향에 대한 세부적 추가 검토가 필요할 것이다.

* 한국은행 경제연구원 국제경제연구실 실장

** 한국은행 경제연구원 연구조정팀 전문연구원

*** 교신저자, 프린스턴대학교 경제학과 교수

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