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## ***Foreign Equity Investment in Korea***

by

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### **Abstract**

This paper investigates the behavior of foreign equity investment in the Korean market over the period 1995 through 2001. The main questions to be examined in the paper are that: (1) foreign equity investment is relatively more reversible than domestic investment in the wake of financial crisis; (2) foreign equity investors tend to increase the volatility of the market more than domestic investors. The results indicate that it is difficult to say that foreign equity investment were more reversible than domestic investment for the duration of financial crisis period. On the other hand, I have found evidence that foreign equity investors tend to cause higher volatility in the market than domestic investors.

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### **1. Introduction**

A number of studies have recently been concerned with the idea that

international portfolio investment has destabilized emerging financial markets, hence contributing to recent rash of financial dilemmas. International portfolio investment could increase the volatility of emerging markets when foreign investors make investment decisions on the basis of short-term gains, rushing into countries whose markets are booming and fleeing from countries whose markets are falling.

This is an important issue, particularly in Korea which experienced dramatic financial collapse and destabilization during the period 1997 through 1998, as a result of capital flight. Since Korea has embraced a more open and liberalized equity market for foreigners since recovering from the IMF crisis, a serious question has been raised about the contingency where foreign investors could be a source of financial instability if they rush out of the market in the face of shock.

A recent study by Calvo and Medoza(2000) argued that the combination of informational disadvantage and diversified international portfolios, generated incentives for rational herding and volatile equity flows by foreign investors. In consequence, they may not provide a good indication of the risks of a future crisis, and if a crisis does hit, foreign portfolio investors may exacerbate the crisis by swiftly pulling their investments out of the region as a consequence of herding behavior. On the contrary, Choe et al (1999) argued that there is evidence of positive feedback trading and herding in foreign

equity investment in the Korean stock market, but an everyday event study showed that foreign investment didn't have a substantial impact on stock market volatility for the period of November 1996 through December 1997. On the other hand, Hamao and Mei (2001) argued that in Japan there is no evidence that equity investments by foreigners increase stock market volatility more than investment by domestic investors.

In this paper, by using inbound transactions data (that is foreigner's net purchases of domestic securities) I shall study the behavior of foreign equity flows and their effects on the Korean stock market and its volatility. The questions to be studied are: (1) foreign equity investments are relatively more reversible than domestic investment in the wake of a financial crisis.; (2) foreign equity investors tends to increase the volatility of the market more than domestic investors. The sample period of this study is from January 1995 to December 2001, encompassing both the pre-crisis period and post-crisis period as well.

The paper proceeds as follows. Section 2 describes the behaviors of equity investments by different investor groups and examines the behavior of foreign equity flows in the face of a financial crisis. Section 3 introduces the methodology to investigate the impact of various investment groups on the volatility of the market, and market volatility measure as well. Section 4 also discusses estimation resultss about the

effect of various investments by major investor groups on Korean stock market volatility. Section 5 gives concluding remarks.

## **2. Trend of Foreign Equity Investment.**

The data used herein is trading amount by different types of investors in the Korean Stock Exchange from Jan 1995 to Dec 2001. The original database obtained from the Korean Stock Exchange contain the daily Won amount of purchase and sales by different types of investors. The types of investors are classified into three categories: Korean institutions, Korean individuals, and foreign investors. Korean institutions include banks, insurance companies, other financial institutions, investment and trust companies and non-financial companies. The foreigners include foreign institutions and foreign individual investors. This quantitative data enable us to investigate the patterns of investment by different investors types.

Figure 1 and Figure 2 show the monthly amounts of purchases and sales as a percentage of total purchases(sales) volumes from Jan 1995 to De 2001. According to Figure 1 and 2, we can find that whilst passing through the financial crisis period of 1997-1998, the relative trading volume by Korean individuals as well as foreign investors has increased, whereas the proportional transactions by Korean institutions has decreased.

One of reasons why the relative rate of transactions by foreign investors has recently increased is that the Korean government deregulated foreign investment in the Korean equity market, after passing through the financial crisis. In May 1997, the limit for foreign investment was increased from 5% to 6% of a firm's shares. The limit increased to 7% in November 1997, and remarkably to 50% in December 1997. Also in May 1997, the foreign ownership limit for a firm's share increased from 20% to 23%. It then increased to 50% in December 1997.

( Figure 1 about here)

(Figure 2 about here)

To see the flow of investment in the Korean stock market, we need to compare net purchases by different types of investors. Table 1 shows the cross correlation among net purchases by different investor types for the same period. In Table 1, we find that net investment by Korean institutions and net investment by Korean individual investors have a positive correlation, with net investments by Korean individuals lagging behind that of Korean institutions by one month. Alternatively, the correlation between net purchases by foreign investors and net investment from domestic individuals and institutions shows a substantial contemporaneous negative correlation. As the second part of Table 2 reports, during Korea's financial crisis the results were similar to the

results of the full sample period, but there were higher negative correlations between domestic investors and foreign investment, and a higher positive correlation between domestic individuals and institutions. The results in Table 1 enable us to find evidence that net investment by foreigners shows a substantially different pattern from that of domestic investors. It therefore appears to be meaningful to make a distinction between equity investment by foreigners and investment by domestic residents in the Korean stock market.

( Table 1 about here )

Figure 3 enables us to see that equity flows by foreign investors and equity flows by domestic investors moved in apparently opposite directions. During the financial crisis from late 1997 to the early 1998, primary net sellers were domestic individuals and primary net purchasers were foreign investors in the Korean equity market. This indicates that foreign equity investment was not a major capital flow in pulling out of the Korean equity markets in the wake of the financial crisis. Those who argue that hedge funds and international portfolio investors were the primary villains in the contagious financial crisis should expect the data to show that such types of investment would be the primary capital flow being pulling out of the market. In terms of the composition of international capital flow, if we look to the balance of payment,

we see that major capital flight out of Korea during the crisis was in the form of bank loans, not in the form of portfolio investment ( Jo, 2001).

Another finding from Figure 3 is that international portfolio investors were leaders rather than followers in pulling out of the stock market. From figure 3, we can see that foreign investors were primary net sellers and Korean individual investors were primary net buyers in the stock market during the early stage of financial crisis from August 1997 to November 1997. However, at the heart of the crisis since December 1997, the situation has been reversed. A possible explanation for this phenomenon is that international investors transmitted a sort of financial contagion from the Hong Kong stock market crash and Taiwanese devaluation in October 1997. This phenomenon is contrary to the Calvo-Mendoza (2000) analysis, in which they suggest that international portfolio investors would be followers rather than leaders in pulling out of the market, since foreign investors have an informational disadvantage relative to resident investors.

( Figure 3 about here )

In summation, the question is about whether foreign equity investment is more reversible than residential equity investment in the face of such a financial crisis, I cannot find evidence to support that foreign investment was more reversible than

domestic investment for the financial crisis period, although foreign investors were leaders in pulling out of the market at the early stage of the Korean financial crisis.

### **3. Foreign Equity Investment's Impact on Market Volatility**

#### *Volatility Measures and Methodology*

The next question to be examined in this paper is whether foreign investors tend to increase market volatility in Korea as they make short-term investment decisions. As the trading volume by foreign investors has substantially increased after the financial crisis of 1997 and 1998, Korean government and investors are nowadays more concerned about the impact of foreign investors on market volatility.

To measure volatility of daily stock market returns, I used conditional variance by using Engle's (1982) ARCH (autoregressive conditional heteroscedasticity) model. Conditional variance is the weighted average of lagged squared residuals at time  $t$  from an appropriate model of stock market return

$$(1) \quad \mathbf{g}_t = \sum_{i=1}^p \mathbf{f}_i \mathbf{g}_{t-i} + \sum_{i=1}^p \mathbf{d}_i \mathbf{e}_{t-i} + \mathbf{e}_t$$



where  $g_t$  is the stock market return represented as log first difference of KOSPI, and  $e_t$  is the white-noise process. ARMA (1,1) was chosen as the best fitting model of stock market returns.

Figure 4 presents the trends of volatility of the Korean stock market and KOSPI from January 1st 1995 to December 30th 2001. According to figure 4, we can see a substantial difference of volatility between the periods before and after the crisis occurred. Relatively low market volatility before the financial crisis suddenly increased when the crisis occurred, and then volatility has stayed relatively high for the post-crisis period.

( Figure 4 about here)

In this section, to investigate whether trading by foreign investors caused higher market volatility I carried out the following regression:

$$(2) \quad CV_t = C + \alpha_0 CV_{t-1} + CF_{it} + e_t$$

where  $CV_t$  is the volatility at time  $t$ ,  $CF_{it}$  is the absolute value of net purchase amounts by different investor types, and  $e_t$  is the error term. The sample period I examine in this test is from January 1st 1995 to December 31st 2001, and the sub-period before and after the crisis period January 1st 1995 ~ June 30th 1997 and January 1st 1999 ~ December 31st 2001. Because most of the series appear to have the  $I(0)$

process, I used the data in level form. I included the lagged variable of volatility to capture the persistence of the volatility. To avoid the multicollinearity problem, I regressed to separate three equations for each investor group.

Since I am concerned about the endogeneity of the equity investment variable ( $CF_{it}$ ) in the equation (2), I used the TSLS (two-stage-least-squares) proposed by Davidson and Mackinnon(1989). If  $CF_{it}$  is an endogenous variable, the estimate of the equation (2) will be inconsistent because an endogenous variable is correlated with the regression error term( $e_t$ ). To solve the endogeneity problem in the regression equation (2), I regress the equity investment variable( $CF_{it}$ ) on all exogenous variables and instrument variables. For instrument variables I used the lagged value of the equity investment ( $CF_{it-1}$ ) and KOSPI since they are correlated with equity investment ( $CF_{it}$ ) but uncorrelated with dependent variables ( $CV_t$ ). I then regress the second stage equation (3) below, with all of the variables replaced by the fitted values from the first-stage regressions:

$$(3) \quad CV_t = C + \mathbf{b}_1 CV_{t-1} + \mathbf{b}_2 \hat{CF}_{it} + \mathbf{e}_t$$

Lung-Box Q-statistics used to check residuals from equation (3) are serially uncorrelated and white noise.

### *Empirical Results*

Table 2 reports the regression of the daily volatility on lagged volatility and the contemporaneous absolute value of net purchases by different investor groups, using TSLS (Two Stage Least Squares). The regressions were carried out for three sample periods, namely the full sample period from January 1995 to December 2001, the pre-crisis period from January 1995 to June 1997, and the post-crisis period from January 1999 to December 2001. I found evidence that the market volatility was affected by foreign equity investment, while the market volatility was not significantly affected by domestic investors' transactions. As the 2nd through 4th columns of table 2 reports, for the full sample periods foreigners' investment has significantly increased market volatility, whereas domestic investors didn't have a significant effect on market volatility. For the pre-crisis period and post-crisis period, the results were not different from the result for the full sample period except in one case. The one case is found in the 9th column of Table 2, in which investment by domestic individuals significantly increased market volatility at a 10% significance level during the post-crisis period from January 1999 to December 2001. Table 2 also indicates that market volatility has persisted since the column of Table 2 reports that coefficients on lagged variables of market volatility are significant at a 1% level.

( Table 2 about here )

#### **4. Concluding Remarks**

This paper examines the effect of equity investment by foreign investors on Korean stock market volatility, as well as the relative reversibility of foreign equity investment during the financial crisis. The results indicate that it is meaningful to distinguish between portfolio investment by foreigners and investment by residents. I find evidence that during the financial crisis, foreign equity investors were not the primary net sellers, even though foreign investors were leaders rather than followers at the early stage of the crisis. Consequently, it is hard to say that foreign portfolio investment is more reversible than residents' investment in the wake of the financial crisis. This conclusion is contrary to the Calvo-Mendoza (2000) analysis in which they argue that when a crisis does hit, foreign portfolio investors may exacerbate the crisis by swiftly pulling their investments out of a region as a consequence of herding behavior, suggesting that portfolio investors would be followers rather than leaders in pulling out of Asia.

I also find that the evidence that equity investment by foreigners tends to increase levels of higher market volatility than investment by residents in the Korean market. Using TSLS(two stage least squares), when I investigated the impact of absolute value of net purchases by three investor groups (foreign investors, domestic

institution, and domestic individuals) on daily stock market volatility measured from GARCH model, foreign investment had a significant impact on market volatility. This is whereas domestic institutions and domestic individuals didn't have a significant effect on market volatility from January 1995 to December 2001. This result from Korean market data is different from Japan's example as analyzed in Hamao and Mei (2001) in which they argued that in Japan there is no evidence that equity investments by foreigners increase stock market volatility more than investment by domestic investors. I think one topic for further related research would be a comparative analysis of the different roles and impact of foreign equity investment on market volatility in various countries, especially between emerging markets and established markets.

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Table 1. Cross Correlation among monthly net purchases by investors types

(January 1995 – December 2001)		
	Institutions	Individuals
Foreign Investors	-0.67 (0)	-0.66 (0)
Institutions		0.24 (+1)
(July 1997 – December 1998)		
	Institutions	Individuals
Foreign Investors	-0.79 (0)	-0.78 (0)
Institutions		0.47 (+1)

Table 2. Regression of volatility on net purchase by investors types

Test Statistics	January 1995 ~ December 2001			January 1995 ~ June 1997			January 1999 ~ December 2001		
	$CV_t$			$CV_t$			$CV_t$		
C	-0.989 (-1.82)	-0.202 (-1.59)	-0.394*** (-3.49)	-0.259 (-1.76)	-0.239 (-0.73)	-0.836*** (-3.39)	-0.314 (-1.01)	-0.727** (-2.58)	-1.052*** (-3.02)
$CF_{it}$ institution	0.002 (0.48)	n.a	n.a	0.002 (0.13)	n.a	n.a	0.003 (0.26)	n.a	n.a
$CF_{it}$ individual	n.a	0.006 (1.28)	n.a	n.a	0.001 (0.04)	n.a	n.a	0.018* (1.79)	n.a
$CF_{it}$ foreign Investor	n.a	n.a	0.012*** (3.17)	n.a	n.a	0.028*** (2.61)	n.a	n.a	0.032** (2.37)
$CV_{t-1}$	0.993*** (284.58)	0.991*** (272.58)	0.985*** (263.60)	0.976*** (121.11)	0.975*** (106.43)	0.977*** (112.02)	0.968*** (104.86)	0.963*** (101.88)	0.964*** (100.86)
R <sup>2</sup>	0.989	0.989	0.989	0.951	0.952	0.945	0.940	0.940	0.936
D-W statistics	2.02	2.03	2.05	2.05	2.06	2.15	1.97	2.00	1.99

( Notes: the numbers in parentheses are t statistics and (\*, \*\*, \*\*\*) denotes 10%, 5%, and 1% significance level respectively. )

Figure 1. Purchases by Investors Types (% , Jan 1995- Dec 2001)



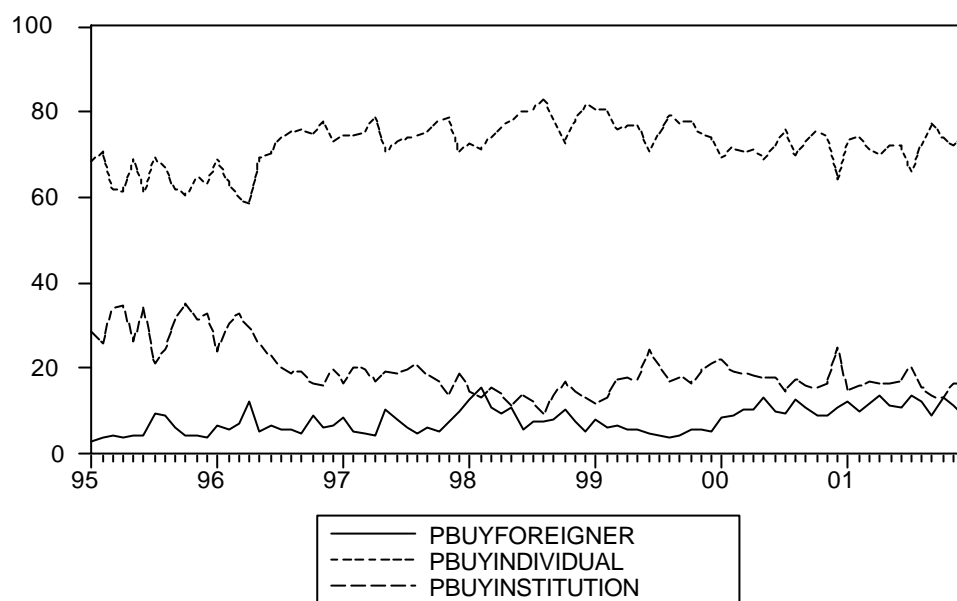


Figure 2. Sales by Investors Types (%. Jan 1995-Dec 2001)

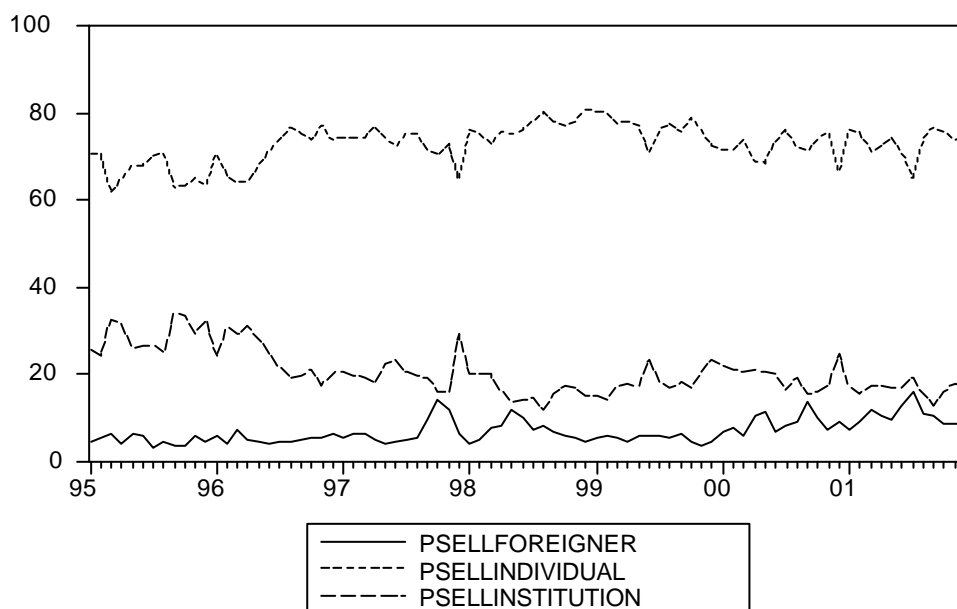
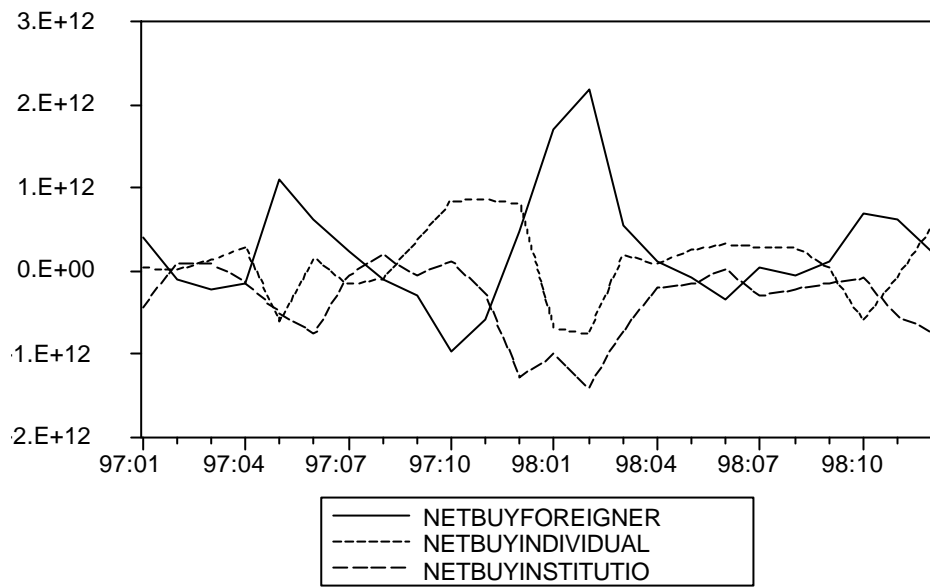


Figure 3. Net Purchases by Investors Types (Won. Jan 1997-Dec 1998)



**Figure 4. KOSPI and Volatility of Stock Market ( Jan 1995-Dec 2001)**

