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Analysis of Determinants of Foreign Capital Flow: Focused on Interest Rate and Exchange

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I. Introduction

As the linkage between domestic and foreign financial markets grows stronger, concerns have been raised about the inflow and outflow of foreign investment capital as a source of financial instability whenever the financial market becomes unstable. This is because, as the volume of capital inflows and outflows increases and volatility rises in the market, the financial system becomes more vulnerable and financial market price variables and macroeconomic uncertainty are increasing.

Considering that opening the capital market is not an option, it becomes essential to examine the determinants of foreign investment to maximize the benefits of foreign capital inflows and outflows for sound growth in the real sector as well as the financial sector. Accordingly, this study attempts to produce evidence-based policy implications by empirically analyzing the determinants of the inflow and outflow of foreign investment funds.

II. Foreign Investment Trends and Characteristics

Regulations in the system for foreign securities investment began to ease after the late 1990s, increasing the volume of foreign funds flowing into the stock and bond markets (Table 1). In particular, it has been observed that index funds have increased due to a decrease in active investment and increase in passive investment in the stock market (Figure 1). Also, the turnover rate of foreign stock investment is rising. In the bond market, foreign investment is continuously increasing (especially investment in public funds, Figure 2), and due to the increase in duration and diversification of investors, changes are being detected both in quantitative and qualitative terms.

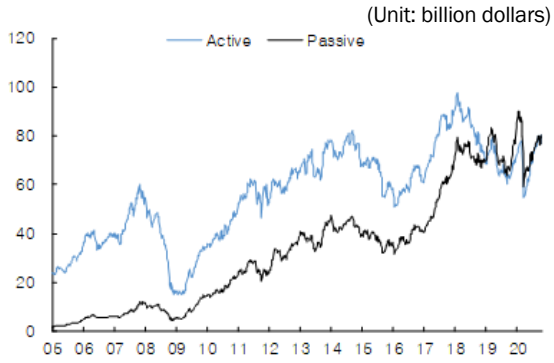
Table 1. Foreign Investors' Stock and Bond Investment

(Unit: trillion won, %)

Years	Stocks			Bonds		
	Cumulative holdings	(proportion of foreigners)	Net purchases	Cumulative holdings	(proportion of foreigners)	Net investment
1995	16.7	(11.9)	1.4	0.1	(0.05)	0.02
2000	58.6	(27.2)	13.1	0.7	(0.2)	△0.4
2005	269.8	(37.2)	△2.3	3.3	(0.5)	1.4
2006	273.1	(35.2)	△11.8	4.6	(0.6)	1.8
2007	325.4	(30.9)	△30.6	37.0	(4.5)	33.5
2008	170.7	(27.4)	△45.5	37.5	(4.3)	23.0
2009	296.0	(30.4)	23.5	56.5	(5.6)	53.6
2010	386.4	(31.2)	22.9	74.2	(6.6)	63.1
2011	351.5	(30.4)	△9.6	83.0	(6.9)	41.2
2012	411.6	(32.2)	17.6	91.0	(7.0)	38.0
2013	432.2	(32.6)	4.7	94.7	(6.8)	3.5
2014	423.0	(31.2)	6.3	100.4	(6.9)	5.2
2015	421.0	(28.6)	△3.5	101.4	(6.5)	0.5
2016	481.6	(31.2)	12.1	89.3	(5.6)	△12.3
2017	635.9	(32.9)	10.2	98.5	(5.9)	9.4
2018	509.7	(31.3)	△6.7	113.8	(6.6)	15.6
2019	593.2	(33.3)	1.6	123.7	(6.8)	9.2

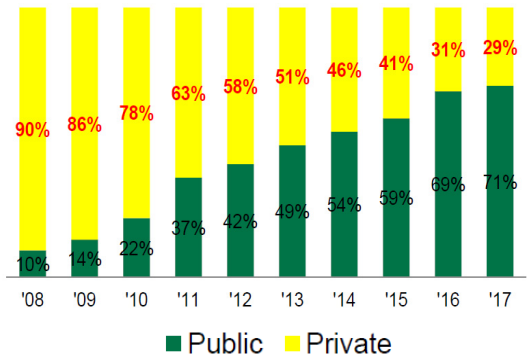
Source: Financial Supervisory Service.

Figure 1. Public Offering Fund AUM



Source: Ju, Y. G. 2020. "Determinants of foreign investment in Korean stocks and latest trends" (in Korean). P. 2

Figure 2. Types of Foreign Bond Funds



Source: Lee, S. H. 2020. "Recent trends and forecast of foreign investment in national bonds market" (in Korean). P. 5

From this, three policy implications can be drawn. First, the increase in passive funds in equity investment reflects the rising importance of risk management for financial market stability. Second, since the movement of bond funds is often determined by the volatility of the exchange rate, management of volatility in the foreign exchange market may be an important condition to maintain stability in foreign bond investment. Third, it is

necessary to improve the investment environment to increase the inflow of foreign investment funds into the Korean financial market and maintain a long-term growth trend. To this end, it is necessary to consider enhancing stability in the foreign exchange market by strengthening the global financial safety net and transparency of foreign investment-related systems.

III. Analysis Model

The Markov regime-switching model is actively used in studies on economic fluctuations and exchange rates, and in this study was applied to the flow of foreign securities funds to analyze the determinants of foreign investors' fund flows. Existing studies on foreign securities investment have been analyzed using various time series models such as the vector autoregressive (VAR) model, error correction model (ECM), and principal component analysis (PCA). However, these studies have limitations in that they cannot take into account the asymmetry that may exist in foreign investors' decision-making. This study assumes that foreign securities investors can make nonlinear investment decisions depending on transaction level and volatility, and a Markov switching model that can reflect this is used as an analysis model. The Markov regime-switching model is known as the Markov transition model because the transitions between unobserved states follow the Markov chain, and because it models a time series of transitions in a finite and unobservable set of states. The model is as follows:

$$y_t = \beta_{S_t}{}' x_t + \delta' z_t + u_t$$

$$u_t | S_t \sim N(0, \sigma^2_{S_t})$$

where y_t is the net buying, buying, and selling of foreign securities, x_t is an explanatory variable, and includes explanatory variables corresponding to [Table 1]. z_t is a variable that does not change according to the phase and includes a linear trend line.

The high level of foreign capital movement was defined as regime 1, and the low level of capital movement was defined as regime 2. Both regime 1 and regime 2 have different constant terms, coefficient estimates, and variances (if $S_t = 1$ then $\beta_{S_t} = \beta_1$, $\sigma^2_{s_t} = \sigma^2_1$, $S_t = 2$ then $\beta_{S_t} = \beta_2$, $\sigma^2_{s_t} = \sigma^2_2$). This setting allows the variance of foreign capital flows to vary depending on each regime, as well as the size of the capital movement. In the model, both the constant term and the heterogeneity of variance were allowed according to the regime, but when interpreting the results, the regime was classified based on the constant term. The analysis period is from January 2007 to July 2020. In order to improve the effectiveness of the policy and detailed policy design, foreign capital flows were analyzed by subdividing them into net buying, buying, and selling funds. The determinants of foreign investment were classified into five categories.

Table 2. Determinants of Foreign Securities Investment by Category

Model 1		Model 2	Model 3	Model 4	Model 5
Stock	Bond	Rate of returns	Risk indicators	Global liquidity	Macro and exhange rates
Bonds and interest rates	Stocks and interest rates				
Bond selling	Stock selling	Korea-U.S. interest rate difference (3 years)	Korea 5 Years CDS premium	MSCI Korea investment share	Won/Euro exchange rate
Bond buying	Stock buying	arbitrage incentives (3 years)	TED spread	Weighted interest rates on government bonds in developed countries	Won/Dollar exchange rate
Korean and US Treasury bond interest rates (3 years)		Kospi Index return rate	Citi Macro Risk Index	G5 M2 growth rate	Real effective exchange rate
-		US Dow Jones Index Return rate	EMBI+	Growth rate of foreign exchange reserves in emerging countries	Current account
-		-	VIX index	-	Industrial production growth rate

Source: Compiled by authors.

In Model 1, it is assumed that stocks and bonds have a complementary or substitute relationship. Therefore, bonds were included in the stock model and stocks were included in the bond model, and the interest rate was considered. Model 2 is composed of variables that affect the rate of return on securities, and considers the difference in interest rates between Korea and the United States, incentives for arbitrage transactions, and stock index returns in Korea and the US. Model 3 included risk indicators such as Korean CDS and TED spread as risk indicators. Model 4 reflects global liquidity, including the share of MSCI (Morgan Stanley Capital International) investment in Korea, government bond interest rates and M2 growth rates in major countries, and foreign exchange reserves in emerging countries. Model 5 considers the KRW/Euro, KRW/Dollar exchange rate, real effective exchange rate, current account, and the growth rate of industrial production as macro and exchange rates.

Since the variables used in this study are mixed with various types of variables such as amounts, differences, and ratios, it is difficult to take the logarithmic transformation commonly used in regression equations. Therefore, for ease of interpretation, all variables went through a standardization process in which the mean value was subtracted and divided by the standard deviation. The aim was to make it possible to compare the relative influence of each variable on foreign securities investment through the sign and size of each estimation coefficient, and to alleviate the difficulty in interpretation arising from the difference in units.

IV. Stock Market Empirical Analysis Results

The main results and implications derived from the analysis results of foreign stock investment determinants are as follows. First, when foreigners invest in domestic stocks,

they consider the foreign interest rate (push factor) as a more important decision-making factor than the domestic interest rate (pull factor). This suggests that Korea's monetary policy may have a limited impact on the inflow and outflow of foreign investment funds. Second, foreigners' selling and buying of stocks were affected by different rates of return. When purchases and sales of stocks were at low levels, the Dow Jones yields was an important factor in buying stocks, but the KOSPI return was an important factor in selling stocks. Third, depending on the policy target and the market phase, different policy measures should be selected. For example, there was a difference between a model well-suited to explain the net buying of stocks and another to explain the buying and selling of stocks. Net buying of stocks was best explained by global liquidity, while buying and selling of stocks were better explained by risk indicators. In addition, since the effective determinants differ between the two phases and the sign (direction) of the effect on the variables is different, this implies that the policy authorities can achieve the intended policy objectives by considering different policy measures according to the phases. Fourth, when the outflow of foreign stock investment is high, volatility is high as well. In general, the ripple effect caused by the outflow of foreign funds occurs in the short term, and given that policy responses are difficult, it poses a huge policy challenge for policy authorities. Foreign capital outflows are highly volatile, and the effects of foreign capital outflows can occur in the very short term and disrupt the financial market, as experienced in the Asian foreign exchange crisis and global financial crisis.

V. Bond Market Empirical Analysis Results

Four main conclusions can be drawn from the analysis results on the determinants of foreign investors' bond investment. First, foreign bond investment is sensitive to interest rates and exchange rates. Interest rate was a significant determinant not only for the total amount of net purchase, but also for each maturity and phase. The effects of interest rates on long-term bonds were particularly significant in the case of bond purchases. As the proportion of long-term bond investment is likely to increase gradually in the future, it is necessary to understand the impact of interest rate variables on bond purchases. Won-euro and won-dollar exchange rates had a significant effect on both short- and long-term bonds when the level of foreign investment was high. Therefore, when the size of foreign investment is large, attention should be paid to the effect of exchange rates on foreign investment. Second, foreign stock investment and bond investment are related to each other. Therefore, when implementing a policy related to foreign investment, it is necessary to clarify the object of the policy implementation. In addition, bond investment within three years of maturity and net purchase of stocks mainly had a complementary relationship. This points to the need to also closely observe foreigners' investment trends in the

stock market when analyzing foreign investment trends in the bond market. Third, for foreign bond investment, variables related to developed markets are more significant than those related to emerging markets. Therefore, in order to predict foreign bond investment trends, it is necessary to closely examine the situation in the securities markets of developed countries. Fourth, macroeconomic variables have a significant impact on foreigners' bond investment, and are particularly important determinants when foreigners invest in long-term bonds. Therefore, it is important to increase the stability of macroeconomic variables in order to maintain stable levels in foreign bond investment in the future.

VI. Conclusion and Policy Implications

This study proposes three policy implications based on the current status of foreign securities investment and empirical results. First, it was proposed to consider the qualitative aspects of expanded foreign securities investment funds to develop the financial market and mitigate volatility in securities prices and foreign exchange markets. Next, it is necessary to reinforce monitoring of securities investment in order to accurately grasp the policy environment and design policies accordingly. Lastly, there is a need to improve the governance structure for external soundness to enable integrated management and supervision of the foreign stock and bond markets and foreign exchange markets that are linked to each other although they are different markets.

1) Qualitative Improvement of Foreign Securities Investment

Korea has continued to open its stock and bond markets, and as a result, the volume of foreign securities investment has increased, leading to concerns by policymakers and markets about the increase in volatility in the stock and bond markets and the foreign exchange market. If investment funds are concentrated in short-term products or hot money transactions, price volatility increases in the domestic stock market and the risk of a reversal of funds may increase. Therefore, it is necessary to replace short-term, highly volatile investment funds with relatively stable mid- to long-term investment funds. Long-term investment funds are expected to induce the development of the stock market, while reducing the volatility of securities prices and the short-term foreign exchange market. Improving the quality of foreign securities investment requires comprehensive consideration of the nature of capital flows – such as investment time horizon, risk preference, and trading objectives – which can be expected to diversify system risk and mitigate market volatility.

2) Stronger Monitoring of Foreign Securities Investment

In order to improve the quality of foreign securities investment, it is necessary to accurately judge which type of investment funds came from which investors, and this requires more detailed foreign securities investment monitoring. Monitoring of foreign securities investment is important in proactively responding to the economic impacts of foreign

capital flows and preparing strategies and policy responses for appropriate resource allocation. In addition, closely monitoring the current situation is also an important start when designing evidence-based policy. As confirmed in the analysis results, since the decision-making of foreign securities investors is context-dependent, the expected effect of the policy can be achieved by grasping the exact policy environment through monitoring. As can be seen from the estimation results, foreign securities investment showed high sensitivity to interest rates and exchange rates. Therefore, monitoring should take into account not only the size and nature of funds, but also related markets such as domestic and foreign securities markets and foreign exchange markets, thus pointing to the need for stronger consultation functions with related organizations.

3) Reinforcement of Consultation Functions with Related Agencies

Stocks and bonds are closely correlated to each other, and interest rates and exchange rates are important decision-making variables in each market. However, the policies for each market and variable remain segmented from each other, making it difficult to consider any interconnections. For example, the Financial Services Commission and the Financial Supervisory Service oversee the stock market, while the Ministry of Economy and Finance issues government bonds, and the Ministry of Economy and Finance and the Bank of Korea are in charge of exchange rates and foreign exchange, respectively. In order to increase the effectiveness of policies by efficiently discussing the results identified through foreign securities investment monitoring, it is necessary to have a forum where institutions in charge of stocks, bonds, and foreign exchange market policies can exchange opinions and design policies. To this end, it is necessary to consider establishing a consultative body that can regularly monitor market situations, share the opinions of each institution, and discuss policies. KIEP