

Determinants of Capital Flows in the Korean Bond Market

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This study shows that interest rate differentials have minor impacts on overall capital flows into the Korean bond market. They are significant factors for private bank capital, however only for short-term interest rates, which takes up ignorable amounts in total capital balances. The most impressive factor is the foreign currency reserves owned by major central banks; these are particularly influential to capital flows throughout the sectors. Global and local risk indicators can also explain the variation of capital flows by sector. The underlying reasons behind these findings are as follows: changes in the proportions of sectoral capital balances after the global financial crisis, introduction of regulations on leverage ratios for international banks, risk management by investors, and increasing flows from foreign currency reserves of major central banks.

Keywords: Capital flows, Bond market, Interest rate differentials, Foreign currency reserves

JEL Classification Numbers: C22, E44, G50

I. Introduction

As of June 2018, the US Federal Reserve (hereafter, the Fed) has raised the federal funds rate target range by 1.75%p, from 0-25% to 1.75-2.00% since December 2015. The seventh consecutive rate hike took place in June 2018 and the market expects two more hikes this year. Despite the preemptive normalization of the Fed, most countries have shown deliberate stances in shifting from expansionary monetary policy regimes to speedy tightening amid anticipation of apparent signs of recovery. Consequently, interest rate differentials (IRDs) between countries such as Korea and the US have narrowed or even reversed. Meanwhile, it is unlikely that this divergence of monetary policy stances between the US and other countries will be resolved soon.

At the end of 2016, one year after the US began its monetary policy normalization, Korea started monetary tightening¹⁾ from its expansionary stance with a historically low benchmark interest rate. However, due to subdued inflation and sluggish recovery, the speed of tightening has been slower than that of the US. Korea thus faces an interest rate reversal of 0.5%p (as of this writing) with respect to the policy target rate. For short-term interest rates, the 1- and 3-month IRDs²⁾ started to reverse in December 2017 and are now about -0.5%p and -0.7%p, respectively. The 1-year IRD³⁾ reversed later, in February 2018, and is -0.55%p as of July 2018. For long-term interest rates, the 5- and 10-year IRDs started to reverse in December and November 2016 and are -0.44%p and -0.34%p, respectively. This may lead to market concerns that the reversals may trigger a sudden stop and outflows from Korea.⁴⁾

1) As of August 2018, the policy rate is set 1.50% and has not been raised since the first rate hike in 2016.

2) The 1- and 3-month, IRDs are calculated as KORIBOR - LIBOR.

3) The 1- to 10-year IRDs, IRDs are the differences in constant maturity rates of Korean and US government bonds

4) Interest rate reversals are potentially attributable to monetary policy co-movements, among many other factors. Monetary policy co-movements, between the US and emerging economies, are often watched. The monetary policies in emerging countries are lagged due to various characteristics: current account balances, capital market openness, foreign exchange regime, etc. (Georgiadis, 2016; Davis, 2016; Caceres et al., 2016) Sometimes such delayed monetary policy co-movements cause interest rate differentials between the

The previous studies often divide the variables driving capital flows into emerging economies into global “push” and country-specific “pull” factors. Global risk aversion and credit spreads, interest rates and GDP growth in advanced economies are push factors, whereas interest rates, GDP growth, and country-specific risk spreads in emerging economies are pull factors. (Fratzscher, 2011). Chari et al. (2017) point out that both types of factors are significant in bond market capital flows, but pull factors are more significant in stock market flows. Meanwhile, pull factors are known to work better under normal financial conditions whereas push factors effectively drive capital flows under distressed market conditions (Nier et al., 2014; Koepke, 2015), and those phenomena are often witnessed, particularly in emerging economies (Fratzscher, 2011). Since there have been massive capital inflows into emerging markets with subsequent quantitative easing by advanced economies such as the US after the Global Financial Crisis (GFC), there are worries about possible changes in capital flows due to the Fed’s normalization. However, Jerome H. Powell (2018), Chairman of the Federal Reserve, announced that capital flows into emerging economies after the GFC were not because of push factors (US monetary policy and quantitative easing) but were due to pull factors (high economic growth rates) in emerging economies, and global capital movements are independent of US monetary policy.

Despite the theory telling us that free cross-border capital flows facilitate an efficient allocation of resources that leads to more productivity and growth, we often observe that large and volatile capital flows create economic distortions and sometimes cause crises. Foreign capital inflows, along with lower policy rates, have raised real asset prices and boosted economic growth, which has helped emerging economies recover from the

US and emerging economies to reverse, at least for short-term periods. Figure 1 shows that the US leads the monetary policy cycle with its well-known “preemptive” policy stance. As seen in Figure 1, Korea starts tightening in the middle of US tightening cycles. Interest rate reversals seem to happen because of not only lagged movement in Korean policy measures but also the fact that speed of tightening is not fast enough to catch up to that of the US. Interestingly, interest rate reversals are witnessed only in rate hike cycles, when the global economy is recovering. In this regard, interest rate reversals do not justify so much concern since the expected recovery may make markets more patient toward reversals for some time.

turmoil caused by the GFC (Anaya et al., 2017). However, the rise in foreign capital balances also came with side effects. A rise in leverage ratios and the co-movement of asset prices exposed the economies to potential risks (Rey, 2014). Increased vulnerability in foreign exchange markets and economic instability place a limitation on policy measures (Bruno and Shin, 2012, 2013).

In the last two decades, Korea has been through two major financial crashes brought about by abrupt changes in foreign capital flows, which created exchange market turbulence and affected the economy overall. The first crash, the so-called foreign exchange crisis in 1997, was a part of Asian financial crisis and occurred when private borrowers were unable to repay loans under implicit government guarantees provided to maintain the fixed-exchange regime. There was a sudden stop in foreign capital flows, mostly private loans, due to insolvency problems at domestic banks and firms.

The crisis led to historically low growth and the high unemployment rates, at levels unseen since the Korean War. The second crash came amid the GFC turmoil, which was triggered by the sub-prime mortgage problem and subsequent failures of major investment banks in the US. Capital outflows again accelerated the Korean won depreciation against major currencies in the foreign exchange market, stimulating more capital exodus from Korean, which in turn caused the economy to once again suffer severe downturns in growth and employment. However, the aftermath of the second crash is still ongoing, as since the GFC, the slope of the Korea GDP trend has lowered and thus the potential growth rate has been changed. Fearing that another sudden stop or capital outflow may bring about the next crisis, possibly due to IRD reversal, the market is focusing on monetary policy in Korea as well as those of major economies such as the US.

Amid concerns about the changes in capital flows, previous studies show lack of consensus on whether IRDs are influential to capital movements. Grubel (1968) shows that capital may flow between countries when IRDs

are zero or negative and may not flow when a positive IRD exists since international capital movements are a function not only of IRDs but also of many other factors. In line with Grubel (1968), MakhethaKosi et al. (2016) test the response of capital flows to IRDs in Africa and find that positive IRDs are not linked to proportional increases in capital inflows. Concerning the Korean bond market, Yu (2018) points out private fund flows are not sensitive to the 1-year IRD between Korea and the US. However, some literature takes contrary views. Ahmed and Zlate (2014) mention that IRDs are one of the key factors influencing capital flows to emerging economies. Vargas and Varela (2009) show capital flows to Colombia are related to IRDs changes, either tightly or loosely by sector. Yun (2018) finds that bank flows to Korea significantly respond to policy rate differentials between Korea and the US.

Taking the novel approach of employing three distinctive models depending on IRD maturities and sectoral flow data, this study tests the main factor behind changes in sectoral capital flows to the Korean bond market. The remainder of this paper is organized as follows. Section 2 describes the characteristics of capital flows in the Korean bond market, section 3 presents data and methodology to analyze the relationships among capital flows and explanatory variables, section 4 shows the empirical results of estimation, section 5 discusses why IRDs are not a significant factor in capital flows to the Korean bond market, and section 6 concludes.

II. Foreign Capital Balances in the Korean Bond Market

The totality of foreign capital flows can be broken down into public and private sectoral capital. Capital flows from government and public institutions are categorized as public capital, while those from private banks and funds are categorized as private capital. Public capital flows in Korea are mostly from central banks and sovereign wealth funds (SWF) abroad.⁵⁾ Since the GFC there have been major changes in the foreign capital

composition of the Korean bond market. As shown in Figures 2 and 3, public capital flows have continued to increase, showing a strong upward trend; their balance was 1.3 billion USD at the beginning of 2008⁶⁾ and reached 65.6 billion at the end of 2017. In contrast, however, private capital flows have fluctuated since the GFC and their balance, especially the flows from private banks, started to decrease after the global regulatory measures on banks leverage ratios were introduced. The balance of private capital sector had been 41.1 billion USD (93% of the total foreign capital balance) and dropped to 26.3 billion USD (18% of the total foreign capital balance) as of December 2017.

III. Data and Methodology

1. Data

The object of this study is to analyze monthly capital flows (expressed in US dollars) in the Korean bond market during 2008 - 2017.⁷⁾ In addition to the total foreign capital balance itself, there are four main sectors within the total foreign capital to examine different sectoral behaviors in the Korean bond market: SWFs, central banks, private funds, and private banks.⁸⁾

Among the explanatory variables, as also discussed in Ahmed and Zlate (2014), there are indicators for expected returns and others for risks. Variables for expected returns are the IRD in each maturity and the industrial product differential between Korea and the US.⁹⁾ Variables for

5) According to the Korean authority, there are 10 to 20 foreign central banks investing in Korea and the resources, mostly with their foreign currency reserves.

6) More precisely, it has measured at the end of January 2008. Others are the same if it says “at the beginning of 2008.”

7) This period includes the GFC, and the explanatory variables employed in this study show typical features of the crisis. Hence it is better not to employ additional variables, such as dummy variables to capture the characteristics during the crisis.

8) There are other sectors taking up relatively small amount of the total foreign balance (about 10% in total). Those sectors are not analyzed since they are not identified in the data.

9) Using alternative variables such as the industrial production of advanced economies other than the US do

investors' risk perception and aversion are the Volatility Index (VIX) computed by the Chicago Board Options Exchange, and the CDS premium (CDS, hereafter) indicating country-specific risk. In addition, the trade-weighted USD exchange rate (DXY), which is the weighted average of USD exchange rates with respect to major trade partner currencies,¹⁰⁾ is also considered as one of the risk factors.

1.1 IRDs

There are studies testing the relationships between capital flows and policy rate differentials, including Ahmed and Zlate (2014). Recently, Yu (2018) shows private fund flows do not seriously respond to the 1-year IRD. Considering the object of this study to examine capital flow behavior by sector, three models are employed using different IRDs in distinctive maturities: 1-month,¹¹⁾ 1-year and 10-year. To the best of the author's knowledge, this is a novel approach that has never been employed to analyze capital flows in terms of behaviors by sector and the responses of flows to IRDs in different maturities. This framework is valid since management and strategy can be characterized by capital sector and thus may have different preferences for asset maturities. It is plausible that capital in the public sector is fond of long-term securities while that in the private sector prefers short-term bonds. Therefore, capital flows can show very different responses depending on IRD maturity. This approach also has an additional advantage that, by way of estimating three distinctive models for each sector, the estimation results can be applied to check robustness for each model within a sector.

not significantly change the results.

10) This currency index includes the euro area, Canada, Japan, Mexico, China, the UK, Taiwan, Korea, Singapore, Hong Kong, Malaysia, Brazil, Switzerland, Thailand, Philippines, Australia, Indonesia, India, Israel, Saudi Arabia, Russia, Sweden, Argentina, Venezuela, Chile and Colombia.

11) 1-month interest rates are a good proxy for policy rates.

1.2 IP Differential

Industrial product (IP) is a proxy variable for economic growth indicator for expected returns.¹²⁾ IP growth¹³⁾ that is strong relative to other countries makes it more attractive to invest in assets in that country. Therefore, the IP growth rate differential is an appropriate indicator of expected return for foreign capital. As shown in Figure 3, the IP growth differential has fluctuated over the sample period, widening in 2009 until 2011 with Korea's faster pace of recovery from the GFC, but then narrowing as IP growth slowed more in Korea than the US.¹⁴⁾

1.3 Risk Factors

There are two major risk factors to be considered: the VIX and CDS for Korea. However, the correlation coefficient between the VIX and CDS is 0.9, so CDS need to be transformed to obtain sound and useful results. We can get residuals from a linear regression of CDS to the VIX, which is orthogonalized to the change of the VIX, as a country-specific risk factor. In addition to typical risk factors, DXY is considered particularly for the capital flows to Korea. Avdjiev et al. (2018) highlight the USD exchange rate as a global risk factor since a strong USD (and thus higher DXY) is associated with a decrease in USD-denominated cross-border bank flows and lower real investment in emerging economies. With regard to Korea's real and financial linkages to the global economy, DXY can be a good proxy indicator of exchange rate risk for foreign investors.¹⁵⁾

12) Ahmed and Zlate (2014) use GDP difference since they have quarterly data. For monthly data, IP can be a good proxy for growth.

13) In both Korea and the US, IP indexes measure real output for all domestically located facilities.

14) In Figure 3, the graph shows the differential on log transformed IPs normalized to US scale, so its slope indicates the IP growth differential between Korea and the US.

15) Since the sectoral capital balances as well as the foreign currency reserves in major central banks are expressed in US dollar, DXY is not a variable to represent the foreign exchange rate between Korean won and US dollar.

1.4 Foreign Currency Reserves

One of the explanatory variables that should be focused on is the total foreign currency reserves in foreign central banks, especially in 13 countries¹⁶⁾ and the euro area. In order to stabilize the financial and foreign exchange markets and due to the current account surpluses, such countries appear to increase their accumulation of foreign currency reserves after the GFC. However, the costs accrued by keeping trillions (in USD) foreign currency reserves could be enormous and those have to be paid from investment returns. Thus those central banks actively invest their foreign currency reserves to make up for the costs. Meanwhile, their reserve management has to satisfy certain compliance criteria, such as limitation to risk exposure. In this regard, government and institutional bonds in major countries appear to be appropriate vehicles for central banks to manage their foreign currency reserves. In addition, central banks often operate their investments as portfolios consisting of government and institutional bonds of many countries, maximizing returns and minimizing risks, according to the portfolio theory of Markowitz (1952). Therefore, Korean government bonds and financial stability bonds (FSB) can be good alternative assets for these central banks. As Figure 4 presents, the capital balances of foreign central banks in Korean bond market are a mirror image of major central banks' total foreign currency reserves. Considering the capital balances of foreign central banks account for more than half of the total capital balance in the Korean bond market, the foreign currency reserves of major central banks may be an important factor as a whole.

2. Empirical Model

As in the previous studies, the empirical model is not derived from any structural model of cross-border capital flows. However, the specification is

16) Brazil, the Czech Republic, Hong Kong, India, Indonesia, Japan, Mexico, Russia, Singapore, Switzerland, Thailand, the UK, and the US.

consistent with the portfolio theory: explanatory variables consist of determinants that could directly affect the differences between expected returns of investment in Korean bonds, and a measure of global and local risk aversion. Regarding the time series nature of the data, stationarity tests were conducted. An augmented Dickey-Fuller test was employed and it turned out that most series have unit roots as shown in Table 1.

2.1 Error Correction Model

As the non-stationary time series are of financial variables, it is feasible to test possible cointegration and control the long-run relationships to ensure meaningful results out of sound inferences. In view of goings-on in capital flows over the sample periods it might be interesting to inquire whether capital flow behavior can be modeled as a case of long-run equilibrium plus error correction. If variables such as foreign currency reserves ultimately derive sectoral capital movements from the fact that they are the available sources of investment that drive continued capital influx to Korea, it seems feasible to suppose that capital balances reflect the stream of foreign currency reserve accumulation by major central banks. A hypothesis is that in the long-run some sectoral capital balances should be proportional to foreign currency reserves as shown in Figure 4. Meanwhile, it is possible that capital balances are not equal to these long-run equilibrium values at all times, but if they diverge from these values the “errors” will tend to be corrected over time. Beside long-run error correction from a common trend, we can obtain useful short-run dynamics from an analysis. Therefore, an error correction model (ECM) is a valid framework to examine the development of capital balances in the Korean bond market, identifying short-run relationships among the variables by way of a sound and reliable approach. In addition, we can consider the error correction term as a control variable in order to sterilize the non-stationarity of the variables caused by unit roots and possible cointegration.¹⁷⁾

2.2 Normalization

Since capital flows and balances have different characteristics by sector, they are normalized with respect to corresponding balances.¹⁸⁾ Normalized gross capital flows (\overline{CF}_t) in sector j are defined as,

$$\overline{CF}_{j,t} = \frac{CF_{j,t}}{CB_{j,t-1}} \approx cb_{j,t} - cb_{j,t-1} = \Delta cb_{j,t}$$

where, CF_j , CB_j denote gross capital flows and balances, respectively, for sector j and lowercases are log transformed. Considering that present capital flow can be defined as a difference between present and previous capital balances, i.e. $CF_{j,t} = CB_{j,t} - CB_{j,t-1}$, the normalized capital flows also represent the rates of increase in capital balances, which are comparable by sector. The sectors are total capital (TC), SWF (SWF), central banks (CB), private funds (Fund), and private banks (Bank) such that $j = \{TC, SWF, CB, Fund, Bank\}$.

2.3 ECM and Lag Orders

In economics, models with lagged dependent variables are known as dynamic models. We know that lag orders can differ variable by variable in a model and that lagged dependent variables can cause major estimation problems if orders have been arbitrary selected, but we are often oblivious to these issues. Engle and Granger (1987) introduced an ECM in which the order of integration needs to be predetermined and the lag orders are the same for all the variables. However, this approach may lead to insufficient or redundant lag variables according to the characteristics of the time series, which may cause bias in estimation. In this regard, there are some advantages in an

17) The long-run relationships are not a major interest of this study.

18) The trends of sectoral balances do not go along with that of GDP in Korea. Hence, sectoral balances cannot be normalized as in Ahmed and Zlate (2014) with GDP size to make them comparable among the sectors.

autoregressive distributed lag (ARDL) model approach and lag order determination by criteria (Giles, 2013; Kripfganz and Schneider, 2016). This approach can be applied to a set of variables comprising a mixture of $I(0)$ and $I(1)$ series. Different variables can be assigned with different lag orders, so there is no need to preassign nor assign identical lag lengths.¹⁹⁾ In this study, an ARDL model approach with Bayesian information criteria is employed to specify lag orders for the variables. With simple calculation and reparameterization, an ARDL model becomes an ECM.

$$\begin{aligned}
 cb_{j,t} = & c + \sum_{i=1}^p \phi_i cb_{j,t-i} + \sum_{i=0}^q \alpha_i IRD^{m_{t-i}} + \sum_{i=0}^r \beta_i vix_{t-i} \\
 & + \sum_{i=0}^s \gamma_i res_{t-i} + \sum_{i=0}^u \delta_i dxy_{t-i} + \sum_{i=0}^v \xi_i ip_{t-i}^{KR-US} \\
 & + \sum_{i=0}^w \eta_i cds_{t-i} \epsilon_{j,t}
 \end{aligned} \tag{1}$$

Equation (1) is an ARDL representation of the model. Notice that the dependent variable is capital balances in sector j , where IRD^m , vix , res , dxy , ip^{KR-US} , and vix represent IRD in m (month or year) maturity government bonds, the VIX index, the total foreign currency reserves in major central banks, the difference in industrial products between Korea and the US, and CDS for Korea orthogonalized to VIX, respectively and lowercases indicate log transformed. Throughout the models of sectoral capital balances, selected lag lengths are mostly 0, 1, and 2, which appear to be appropriate considering the models are of financial market behaviors. After reparameterization, we can derive error correction models with differenced variables representing short-run relationships:

19) However, this approach cannot be used to analyze $I(2)$ data (Pesaran and Shin, 1998; Pesaran et al., 2001). In this study, all data sets are tested to be $I(1)$.

$$\begin{aligned}
\overline{CF}_{j,t} = & c + \rho(cb_{j,t-1} - \theta x_{t-1}) \\
& + \sum_{i=1}^p \phi_i \overline{CF}_{j,t-i} + \sum_{i=0}^q \alpha_i \Delta IRD_{t-i}^m + \sum_{i=0}^r \beta_i \Delta vix_{t-i} \\
& + \sum_{i=0}^s \gamma_i \Delta res_{t-i} + \sum_{i=0}^u \delta_i \Delta dxy_{t-i} + \sum_{i=0}^v \xi_i \Delta ip_{t-i}^{KR-US} \\
& + \sum_{i=0}^w \eta_i \Delta cds_{t-i} + \epsilon_{j,t}
\end{aligned} \tag{2}$$

In the ECM representation, the error correction term, i.e. $cb_{j,t-1} - \theta x_{t-1}$, is for controlling common trends of the variables, where θ is a vector of parameters and

$$x_{t-1} = IRD_{t-1} + vix_{t-1} + res_{t-1} + dxy_{t-1} + ip_{t-1}^{KR-US} + cds_{t-1}$$

IV. Empirical Results

Table 3 presents the empirical results from the ECM model estimation with total gross foreign capital, SWE, central bank, private fund, and private bank flows as dependent variables. Explanatory variables are lagged dependent variables, ΔIRD for each maturity, global and country-specific risk indicators (Δvix and Δcds), foreign currency reserves in major central banks (Δres), trade-weighted dollar index (Δdxy), IP growth differentials (Δip^{KR-US}), and some lagged variables depending on the lag order specification. ($L\Delta IRD^{1m}$, $L\Delta IRD^{1yr}$, and $L\Delta vix$).

1. IRDs

As the results show, IRDs are typically not the main drivers of foreign capital flows into the Korean bond market. The only sectoral flows influenced by IRDs are private banks: 0.05%p and 0.07%p for 1-month and 1-year, respectively, which implies a 1%p rise in 1-month or 1-year

IRDs results in a 5% or 7% increase in capital flows from foreign private banks. Since private banks concentrate on short-term security trading, borrowing at low interest rates and investing in higher-yielding securities (Yun, 2018), the results appear to describe their behavior reasonably well.²⁰⁾ The responses from other sectors, including the total foreign capital, stand in stark contrast with those of private banks: no coefficient is statistically significant throughout the models even with different IRDs. SWF and central banks who invest in rather long-term bonds do not have to deal with short-term IRDs, however, it is interesting that they do not seem to care about long-term IRD, either, which implies there are other factors that influence investment decisions for institutions or governments in those sectors (Grubel, 1968). It is also interesting that IRDs are not a significant factor for private funds, either.

2. IP Difference

IP difference is meaningful for total capital flows but not so much for some sectoral flows. Total capital flow elasticities for IP growth differential are 0.20-0.22, and the only sector that significantly responds to IP growth differential is the central bank sector, for which elasticities are 0.20-0.23. The results imply that central banks take into consideration the growth rate difference. Considering more than half of total capital comes from central banks, total capital flows can reflect the responses from central banks flows, in which IP growth differences are significantly influential.

20) Regarding cross-border bank flows to Korea, most of the targeted securities are short-term bonds, amounting to 2.0 trillion Korean won, and those banks actively traded 85.8% of their security holdings, on average, from 2004 to 2017 (Yun, 2018). The literature on this issue points out that private banks have decrease their business on short-term bonds trading through the Korean branches while foreign capital flows have firmly increased even after the introduction of macroprudential regulatory measures such as the leverage cap regulation on FX derivative positions, which is valid only for domestic residents. Considering that private bank flow took up to 60% at the beginning of 2008 in total foreign capital balances and did not significantly decrease for a while, and arbitrage opportunity was still attractive in the Korean bond market, private banks were plausibly exploiting the market via directly buying and selling short-term bonds.

3. Risk Factors

In line with previous studies (Nier et al., 2014; Friedrich and Guerin, 2016), the global risk indicator is essential for capital flows. As shown in Table 3, coefficients for the VIX range from -0.05 to -0.16 and are significant, which is conformable with previous studies. The results indicate that, at least in the Korean bond market, all the sectoral capital flows are under the influence of global risk. Between global and country-specific risk indicators, however, the VIX appears to explain more of the variation than CDS, which is significant only for total capital flows. Another risk factor, DXY, is also economically important to total capital and some sectoral flows. When DXY is highly volatile, investors would have to worry about devaluations of their assets in USD value, particularly for foreign investors in emerging economies who fund in USD and invest in local currency denominated assets.

4. Foreign Currency Reserves in Major Central Banks

The most impressive factor is the foreign currency reserves of major central banks, for which most of the estimated coefficients are larger than unit value. For total foreign capital, a 1%p increase in the foreign currency reserves results in a 1.47-1.49%p rise in flows to the Korean bond market. Considering the coefficients actually represent elasticities of normalized capital flows to changes in foreign currency reserves, the results show that all the sectors, as well as total capital flows, are reasonably sensitive to changes in foreign currency reserves. The coefficients for central banks and private funds are just as big as those for total foreign capital, which is reasonable considering the capital balances of the central bank and private fund sectors take up more than 70% of total foreign capital. The coefficients for the private bank sector is even larger than those of others. A feasible explanation for the coefficients for private sectors (funds and banks) is that foreign currency reserves are

managed either directly by central banks or indirectly by way of trust funds operated by private institutions according to specific guidelines. Thus, an increase in foreign currency reserves means an increase in funding for the investment of private institutions.

V. Discussion

This section will discuss why IRDs have become a minor factor in capital flows in the Korean bond market. According to this study, IRDs, particularly in the short term, matter only for private banks. This is in contrast with previous studies that conclude IRDs are significant in capital flows to Korea (Cho and Suh, 2005; Ahmed and Zlate, 2014; Yun, 2018). The underlying reasons behind the conflicting results are below.

1. Changes in Sectoral Proportion of Capital

Before the GFC in 2008, the balance of foreign bank capital in the Korean bond market was 25.7 billion USD, which was more than 60% of the total capital balance. The operations of foreign banks in Korea were primarily focused on short-term securities trading. Short-term IRDs in particular, as well as swap points, were likely to be a crucial factor in short-term securities trading. Since bank capital flows took a major share of the total balance up until the GFC, IRDs (including policy target rate differentials) would have appeared to be significant for total capital flows as in previous studies. After the GFC, however, the capital balances of foreign banks started to decrease, eventually falling to 3% of the total balance. Foreign banks' capital no longer represents total capital flows, and thus IRDs have become an insignificant factor in capital flows to the Korean bond market.²¹⁾

21) At the same time, capital flows from foreign central banks continued to increase from 1.1 to 46.2 billion USD and 2.7% to 50.2% in the total capital balance. Central banks are now major investors in the Korean bond market, and they seem not to be sensitive to IRDs throughout all maturities.

2. Introduction of Regulations

The decline of foreign bank capital flows can be attributed to the introduction of new regulation after the GFC. A series of macroprudential policy measures were introduced for the international banks; Basel III, ring-fencing, bail-in and so on.²²⁾ Among them, Basel III is a set of regulatory measures developed by the Basel Committee on Banking Supervision in the aftermath of the GFC. Basel III standards are minimum requirements with the intention of strengthening bank capital requirements, which apply to internationally active banks. The Ring-fencing is for the large banks in the UK to separate their retail sectors from investment banking, by which ordinary deposits are less likely to be exposed to the risks from running their investment business. Considering the UK banks are among the major investors in the Korean bond market, such a measure must have restricted overall capital inflows from the private banks. A bail-in is the opposite to a bailout, which has been commonly used to salvage banks during the GFC that creditors and depositors take a loss on their holdings in ahead of a government rescuing financial institutions using tax. Due to these global regulatory measures, banks are being less aggressive to take the burden to lower leverage ratios by investing in emerging economies such as Korea.

3. Risk Management

According to the portfolio theory, higher yields are not always good for the principles of investment: return maximization and risk minimization. Investing with externally funded resources usually entails maturity matching issues, in which operations could be exposed to interest rate

22) In Korea, the leverage cap regulation on FX derivative positions (currency swaps and forwards) has introduced in 2010 as a part of macroprudential policy, which is known as the driver of decreasing capital inflows from private banks via the branches. However, the leverage cap regulation on FX derivative positions is not applicable to nono-residential foreigners such as foreign private banks. Therefore, as in this occasion, domestic macroprudential regulation measure have no direct effects on foreign capital flows to the Korean bond market.

risks unless durations on both sides of balance sheets are closely matched enough. Borrowing at low interest rates and investing in higher-yielding assets makes durations on the liability side larger than the asset side.²³⁾ Whenever interest rates move downward, changes in valuations of liabilities could exceed those of assets.²⁴⁾ As investment in higher-yielding assets increases, maturity matching to avoid such risks becomes more crucial.²⁵⁾ In this regard, widening IRDs are not always good for investors.²⁶⁾

Widening IRDs matter when they are supported by strong risk appetite. When the global economy is recovering and risk appetite is sufficiently strong, investors aggressively purchase bonds with higher yield, such as government bonds in emerging economies. However, duration mismatch issues imply that whenever global financial market conditions change, investors will struggle to rebalance their portfolios to make by matching the maturities of assets and liabilities. This is why global and local risk indicators (the VIX and CDS) are important factors in capital flows.

23) Durations are longer for lower-yield assets or liabilities. Investors would not borrow at higher-yield than their investments, and thus liabilities usually have longer durations.

24) The total returns from security investment consist of interest and capital gains. Interest gains come from coupon rates such that higher coupon rates are always good for interest gains. Meanwhile, at any given maturity, a higher coupon rate decreases the duration of a bond, which implies that bond price becomes less elastic to interest rate changes. Suppose there is an investor who borrows at 1% and invests in an emerging market at 3%. Assuming that both the asset and liability maturities are the same, then the duration of the liability is larger. When interest rates fall, capital gains from the liability side exceed those of the asset. If this capital gain gap exceeds the interest rate gap, which is 2%p, the total returns will reduce even down to be minus.

25) Public institutions such as central banks that prioritize risk minimization face similar issues as any other investor. Since maintaining foreign currency reserves has some costs, such as interest payments on financial stability bonds, risk management should basically be the same in the public and private sectors.

26) However, a narrowing IRD or reversal does not necessarily mean those assets are attractive.

4. The Foreign Currency Reserves

One of the contributions of this study is the finding that the foreign currency reserves of major central banks are the most important factor influencing capital flows. Throughout sectoral flows, no other factor has a stronger impact on capital flows than the foreign currency reserves, even for the private sector. Although this study examines capital flows in Korea, the results can be reasonably generalized to other countries receiving investment from foreign central banks. For such countries, the foreign currency reserves of major central banks are an important factor affecting capital flows.

VI. Conclusion

At least in the Korean bond market, a “new phase” in capital flows has dawned as foreign currency reserves have started to cross borders more and more, and macroprudential measures to regulate arbitrageurs have stabilized financial markets, with IRDs becoming less significant than ever. The Korean financial markets used to be vulnerable to foreign capital flow fluctuation. The series of international macroprudential measures to regulate leverage ratios turned out to be effective in restructuring foreign capital flows into the Korean bond market: short-term private capital balances decreases while long-term public capital balances increases. In consequence, foreign capital flows have become stable, with subdued volatility and less sensitivity to IRD changes. However, it is recommended for the authority in Korea to watch global risk and make the financial and foreign exchange markets stabilized in order to assure the stable foreign capital inflows.

This study leaves some limitation and questions unresolved. First of all, the behavior of SWFs has not been fully uncovered; neither oil prices nor foreign currency reserves can sufficiently explain SWF

behavior. Second, due to the relatively short period of the time series available (from 2008), it is hard to tell what would be different if the IRD reversal lasts for a long time because it has not happened yet. Although capital balances today are mostly composed of flows not sensitive to IRDs, capital flows might change their behavior over certain thresholds or periods of IRD reversals. These questions are left for future studies.

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Table 1: Unit Root Test Statistics

This panel shows augmented Dickey-Fuller test statistics for bond capital flows into Korea and the set of variables used to estimate the ECM. All variables are log transformed except for interest rate differentials. $\ln CDS$ is the orthogonalized CDS of Korea to the VIX.

	Statistics	Mackinnon approximate p-value
Total	-1.173	0.916
Sovereign wealth fund	-0.576	0.980
Central bank	-1.143	0.926
Private fund	-2.034	0.583
Private bank	-2.107	0.542
IRD^{1m}	-2.448	0.354
IRD^{1yr}	-1.971	0.617
IRD^{10yr}	-3.461	0.044
res	-1.160	0.918
vix	-3.869	0.013
dxy	-1.350	0.875
ip^{KR-US}	-2.166	0.509
cds	-3.848	0.014

Table 2: Correlation among Capital Flows by Sectors

This panel shows the correlation coefficients for capital flows by sectors in the Korean bond market (periods: January 2008 to December 2017)

	TC	SWF	CB	$Fund$	$Bank$
TC	1.000				
SWF	0.869*** (0.00)	1.000			
CB	0.940*** (0.00)	0.913*** (0.00)	1.000		
$Fund$	0.782*** (0.00)	0.555*** (0.00)	0.767*** (0.00)	1.000	
$Bank$	-0.460*** (0.00)	-0.745*** (0.00)	-0.625*** (0.00)	-0.150 (0.00)	1.000

Note: *, **, *** denote statistical significance at the 10%, 5%, 1% level, respectively.

Table 3: Short-run Relationships

This panel shows short-run relationships between foreign capital flows into the Korean bond market and sets of explanatory variables.

	Sectoral capital flows														
	Total			Sovereign wealth fund			Central bank			Private fund			Private bank		
Adj.coeff.(ρ)	-0.19*** (0.00)	-0.19*** (0.00)	-0.22*** (0.00)	-0.04 (0.11)	-0.03 (0.24)	-0.04 (0.16)	-0.03 (0.23)	-0.02 (0.47)	-0.03 (0.22)	-0.06*** (0.04)	-0.04 (0.25)	-0.05* (0.06)	-0.17*** (0.00)	-0.18*** (0.00)	-0.19*** (0.00)
$L\Delta y$													0.39*** (0.00)	0.41*** (0.00)	0.39*** (0.00)
ΔIRD^{1m}	-0.00 (0.77)			0.05 (0.15)			0.01 (0.65)			-0.04 (0.15)			0.05* (0.08)		
$L\Delta IRD^{1m}$										0.04 (0.11)					
ΔIRD^{1yr}		-0.01 (0.57)			0.04 (0.37)			0.01 (0.53)			-0.06 (0.15)			0.07** (0.03)	
$L\Delta IRD^{1yr}$											0.04 (0.29)				
ΔIRD^{10yr}			-0.00 (0.81)			0.04 (0.58)			-0.04 (0.14)			0.01 (0.61)			0.03 (0.44)
Δvix	-0.13*** (0.00)	-0.12*** (0.00)	-0.13*** (0.00)	-0.30 (0.68)	-0.13 (0.10)	-0.16** (0.05)	-0.09*** (0.00)	-0.05** (0.04)	-0.06* (0.06)	-0.11*** (0.00)	-0.07** (0.03)	-0.11*** (0.00)	-0.11** (0.04)	-0.12** (0.02)	-0.08 (0.13)
$L\Delta vix$	-0.07*** (0.00)	-0.07*** (0.00)													
Δres	1.49*** (0.00)	1.49*** (0.00)	1.47*** (0.00)	0.27 (0.28)	0.36 (0.15)	0.59** (0.03)	1.52*** (0.00)	1.57*** (0.00)	1.56*** (0.00)	1.42*** (0.01)	1.74*** (0.00)	1.34*** (0.00)	2.14*** (0.01)	2.12*** (0.01)	2.04** (0.02)
Δdxy	-0.32** (0.01)	-0.35*** (0.01)	-0.31*** (0.00)	0.47 (0.25)	-0.22 (0.61)	0.40 (0.16)	0.06 (0.70)	0.11 (0.45)	-0.20 (0.64)	-0.05 (0.79)	-0.44** (0.03)	-0.04 (0.77)	-0.24 (0.58)	-0.09 (0.83)	-0.72 (0.02)
Δi_p^{KR-US}	0.20*** (0.00)	0.20*** (0.00)	0.22*** (0.00)	0.14 (0.51)	0.14 (0.49)	0.10 (0.64)	0.25 (0.20)	0.20** (0.05)	0.23* (0.02)	0.19 (0.18)	0.06 (0.66)	0.14 (0.27)	0.07 (0.71)	0.02 (0.90)	-0.01 (0.96)
Δcds	-0.07*** (0.00)	-0.07*** (0.00)	-0.06** (0.00)	0.07 (0.12)	0.05 (0.29)	-0.04 (0.54)	0.00 (0.80)	0.02 (0.27)	0.03 (0.22)	0.01 (0.76)	0.01 (0.70)	0.01 (0.78)	0.01 (0.90)	0.01 (0.75)	-0.02 (0.72)
Const.	-1.39 (0.18)	-1.07 (0.38)	-1.07 (0.34)	-6.21 (0.13)	-6.63 (0.12)	-10.78** (0.02)	1.07 (0.62)	2.31 (0.27)	2.58 (0.21)	4.76*** (0.00)	6.11*** (0.00)	4.39*** (0.00)	8.79*** (0.00)	7.04*** (0.01)	8.99*** (0.00)
R^2	0.57	0.57	0.53	0.05	0.08	0.11	0.40	0.37	0.41	0.38	0.36	0.34	0.32	0.33	0.30

Note: Data covers the period from January 2008 to December 2017. Adj.coeff.(ρ) represents a adjustment coefficient which is a parameter value for a longterm relationship term in ECM. L denotes a lag operator that operates on an element of a time series to produce the previous element. y denotes dependent variables. Variables in lowercase are log transformed. *, **, *** denote statistical significance at 10%, 5%, 1% level, respectively.

Figure 1: Monetary Policy Spillover and Interest Rate Reversal

This figure shows monetary policy cycles, policy target rates and their differentials for Korea and the US.

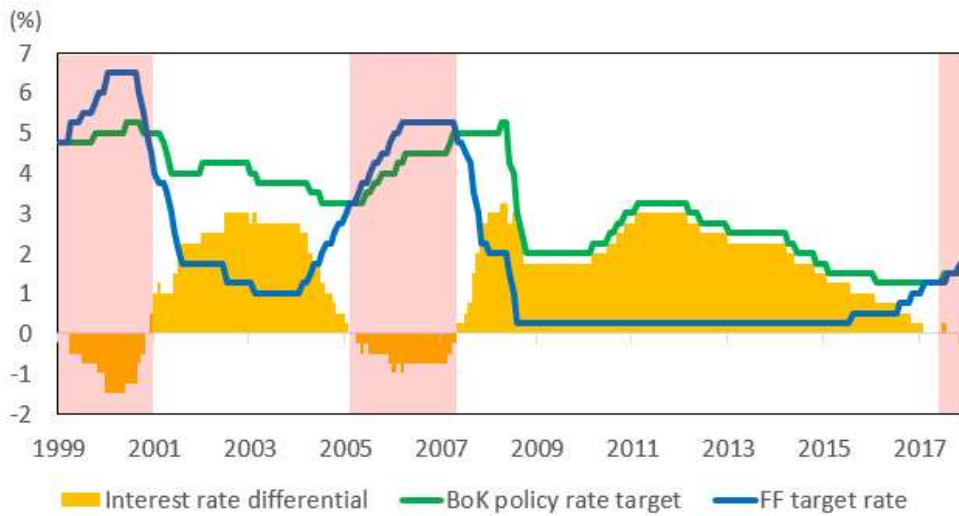


Figure 2: Public and Private Capital Balances in Korean Bond Market

The figures show public and private sectoral capital balances in the Korean bond market. The upper panel is for the public capital balances and the lower panel is for private.

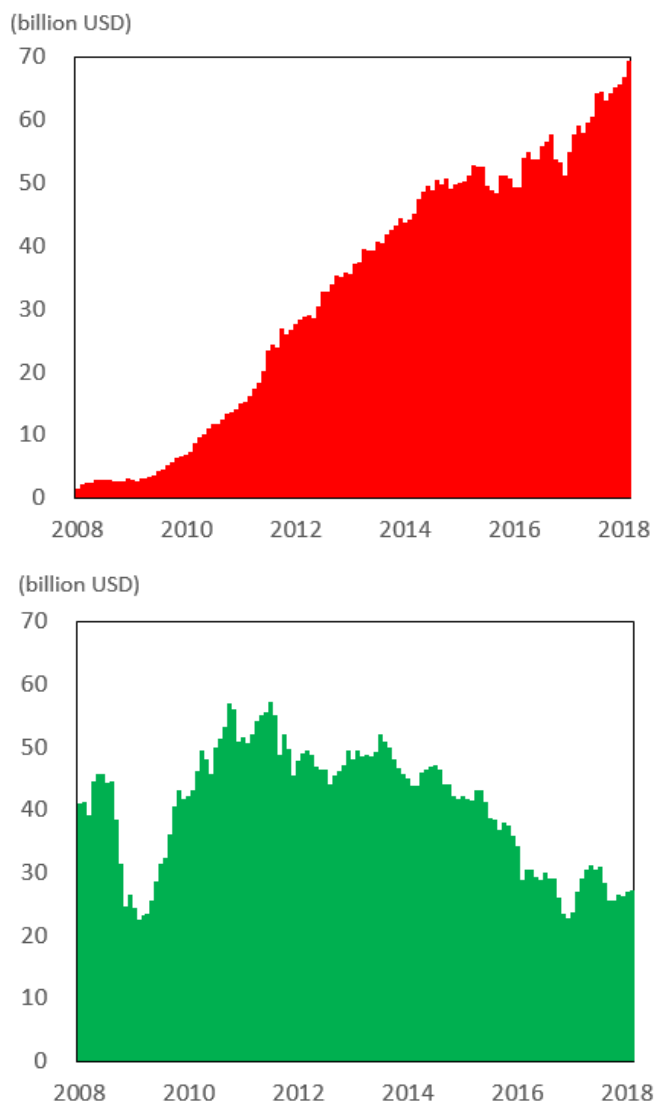


Figure 3: Common Trends and Cointegration

The figures show time series for the explanatory variables as well as the total foreign capital balances in the Korean bond market.

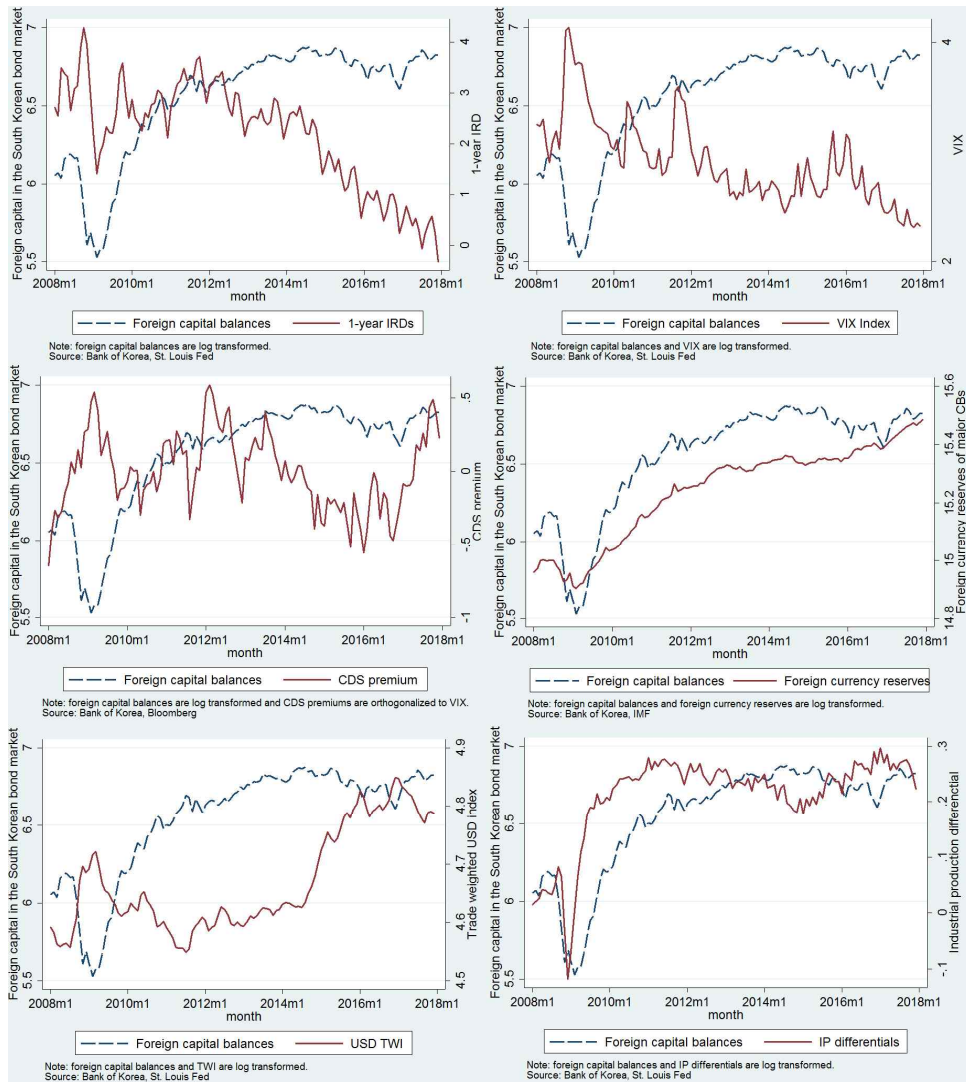
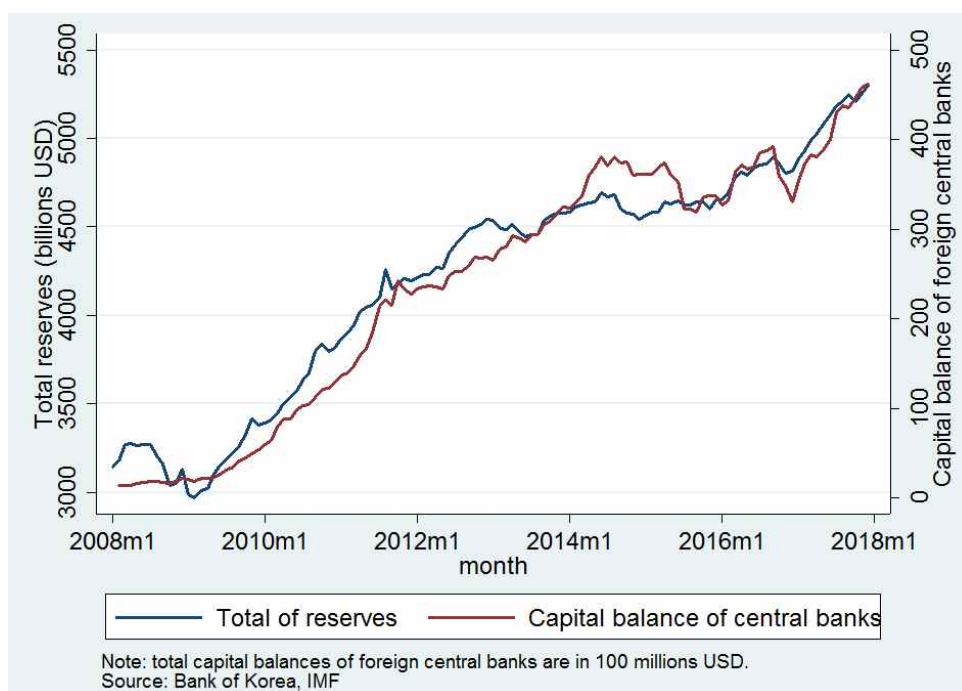


Figure 4: Total foreign Currency Reserves of Central Banks

This figure shows the capital balances of central banks in the Korean bond market and the total foreign currency reserves of 16 countries (Brazil, the Czech Republic, Hong Kong, India, Indonesia, Italy, Japan, Mexico, Russia, Singapore, Switzerland, Thailand, the UK, and the US) and the euro area.



한국 채권시장의 해외자본 유출입 결정요인

김수현*

본고는 지난 글로벌 금융위기 이후 주요 해외중앙은행의 투자가 증대되고 글로벌 자본의 단기 차익거래가 감소하여 자본이동의 내외금리차 민감도가 하락함에 따라, 우리나라로 유입되는 자본흐름에도 새 국면이 도래하였음을 보여주고 있다. 국내 채권시장에 유입된 해외채권자본을 투자주체별로 구분하여 분석한 결과 해외민간자본 중 은행자본은 내외금리차에 유의하게 반응하는 것으로 나타난 반면 여타 투자주체의 자본은 반응하지 않는 것으로 나타났다. 한편 주체별 해외채권자본 유입에 가장 큰 영향을 미치는 요인은 주요 해외중앙은행이 축적한 외환보유액이며, 글로벌 및 국가 리스크 요인도 중요한 것으로 추정되었다. 이와 같이 해외채권자본이 내외금리차에 민감하지 않게 된 원인은 국내 채권시장의 해외자본 구성 변화, 바젤 III 등 국제적 은행자본 규제, 자본 운영 주체의 리스크 관리, 주요국 외환보유액의 유입 증대 등으로 분석할 수 있다.

핵심 주제어: 자본이동, 채권시장, 내외금리차, 외환보유액

JEL Classification: C22, E44, G50

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BOK 경제연구 발간목록

한국은행 경제연구원에서는 Working Paper인 『BOK 경제연구』를 수시로 발간하고 있습니다. 『BOK 경제연구』는 주요 경제 현상 및 정책 효과에 대한 직관적 설명 뿐 아니라 깊이 있는 이론 또는 실증 분석을 제공함으로써 엄밀한 논증에 초점을 두는 학술논문 형태의 연구이며 한국은행 직원 및 한국은행 연구용역사업의 연구 결과물이 수록되고 있습니다. 『BOK 경제연구』는 한국은행 경제연구원 홈페이지(<http://imer.bok.or.kr>)에서 다운로드하여 보실 수 있습니다.

제2015 -1	글로벌 금융위기 이후 주요국 통화정책 운영체계의 변화	김병기 · 김인수
2	미국 장기시장금리 변동이 우리나라 금리기간구조에 미치는 영향 분석 및 정책적 시사점	강규호 · 오형석
3	직간접 무역연계성을 통한 해외충격의 우리나라 수출입 파급효과 분석	최문정 · 김근영
4	통화정책 효과의 지역적 차이	김기호
5	수입중간재의 비용효과를 고려한 환율변동과 수출가격 간의 관계	김경민
6	중앙은행의 정책금리 발표가 주식시장 유동성에 미치는 영향	이지은
7	은행 건전성지표의 변동요인과 거시건전성 규제에 영향	강종구
8	Price Discovery and Foreign Participation in The Republic of Korea's Government Bond Futures and Cash Markets	Jaehun Choi · Hosung Lim · Rogelio Jr. Mercado · Cyn-Young Park
9	규제가 노동생산성에 미치는 영향: 한국의 산업패널 자료를 이용한 실증분석	이동렬 · 최종일 · 이종한
10	인구 고령화와 정년연장 연구 (세대 간 중첩모형(OLG)을 이용한 정량 분석)	홍재화 · 강태수
11	예측조합 및 밀도함수에 의한 소비자물가 상승률 전망	김현학
12	인플레이션 동학과 통화정책	우준명
13	Failure Risk and the Cross-Section of Hedge Fund Returns	Jung-Min Kim
14	Global Liquidity and Commodity Prices	Hyunju Kang · Bok-Keun Yu · Jongmin Yu

제2015-15	Foreign Ownership, Legal System and Stock Market Liquidity	Jieun Lee · Kee H. Chung
16	바젤Ⅲ 은행 경기대응완충자본 규제의 기준지표에 대한 연구	서현덕 · 이정연
17	우리나라 대출 수요와 공급의 변동요인 분석	강종구 · 임호성
18	북한 인구구조의 변화 추이와 시사점	최지영
19	Entry of Non-financial Firms and Competition in the Retail Payments Market	Jooyong Jun
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21	Costs of Foreign Capital Flows in Emerging Market Economies: Unexpected Economic Growth and Increased Financial Market Volatility	Kyoungsoo Yoon · Jayoung Kim
22	글로벌 금리 정상화와 통화정책 과제: 2015년 한국은행 국제컨퍼런스 결과보고서	한국은행 경제연구원
23	The Effects of Global Liquidity on Global Imbalances	Marie-Louise DJIGBENOU-KRE · Hail Park
24	실물경기를 고려한 내재 유동성 측정	우준명 · 이지은
25	Deflation and Monetary Policy	Barry Eichengreen
26	Macroeconomic Shocks and Dynamics of Labor Markets in Korea	Tae Bong Kim · Hangyu Lee
27	Reference Rates and Monetary Policy Effectiveness in Korea	Heung Soon Jung · Dong Jin Lee · Tae Hyo Gwon · Se Jin Yun
28	Energy Efficiency and Firm Growth	Bongseok Choi · Wooyoung Park · Bok-Keun Yu
29	An Analysis of Trade Patterns in East Asia and the Effects of the Real Exchange Rate Movements	Moon Jung Choi · Geun-Young Kim · Joo Yong Lee
30	Forecasting Financial Stress Indices in Korea: A Factor Model Approach	Hyeongwoo Kim · Hyun Hak Kim · Wen Shi

제2016 -1	The Spillover Effects of U.S. Monetary Policy on Emerging Market Economies: Breaks, Asymmetries and Fundamentals	Geun-Young Kim · Hail Park · Peter Tillmann
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3	Spillovers from U.S. Unconventional Monetary Policy and Its Normalization to Emerging Markets: A Capital Flow Perspective	Sangwon Suh · Byung-Soo Koo
4	Stock Returns and Mutual Fund Flows in the Korean Financial Market: A System Approach	Jaebeom Kim · Jung-Min Kim
5	정책금리 변동이 성별·세대별 고용률에 미치는 영향	정성엽
6	From Firm-level Imports to Aggregate Productivity: Evidence from Korean Manufacturing Firms Data	JaeBin Ahn · Moon Jung Choi
7	자유무역협정(FTA)이 한국 기업의 기업내 무역에 미친 효과	전봉걸 · 김은숙 · 이주용
8	The Relation Between Monetary and Macroprudential Policy	Jong Ku Kang
9	조세피난처 투자자가 투자 기업 및 주식 시장에 미치는 영향	정호성 · 김순호
10	주택실거래 자료를 이용한 주택부문 거시 건전성 정책 효과 분석	정호성 · 이지은
11	Does Intra-Regional Trade Matter in Regional Stock Markets?: New Evidence from Asia-Pacific Region	Sei-Wan Kim · Moon Jung Choi
12	Liability, Information, and Anti-fraud Investment in a Layered Retail Payment Structure	Kyoung-Soo Yoon · Jooyong Jun
13	Testing the Labor Market Dualism in Korea	Sungyup Chung · Sunnyoung Jung
14	북한 이중경제 사회계정행렬 추정을 통한 비공식부문 분석	최지영

제2016 -15	Divergent EME Responses to Global and Domestic Monetary Policy Shocks	Woon Gyu Choi · Byongju Lee · Taesu Kang · Geun-Young Kim
16	Loan Rate Differences across Financial Sectors: A Mechanism Design Approach	Byoung-Ki Kim · Jun Gyu Min
17	근로자의 고용형태가 임금 및 소득 분포에 미치는 영향	최충 · 정성엽
18	Endogeneity of Inflation Target	Soyoung Kim · Geunhyung Yim
19	Who Are the First Users of a Newly-Emerging International Currency? A Demand-Side Study of Chinese Renminbi Internationalization	Hyoung-kyu Chey · Geun-Young Kim · Dong Hyun Lee
20	기업 취약성 지수 개발 및 기업 부실화에 대한 영향 분석	최영준
21	US Interest Rate Policy Spillover and International Capital Flow: Evidence from Korea	Jieun Lee · Jung-Min Kim · Jong Kook Shin
제2017 -1	가계부채가 소비와 경제성장에 미치는 영향 - 유량효과와 저장효과 분석 -	강종구
2	Which Monetary Shocks Matter in Small Open Economies? Evidence from SVARs	Jongrim Ha · Inhwan So
3	FTA의 물가 안정화 효과 분석	곽노선 · 임호성
4	The Effect of Labor Market Polarization on the College Students' Employment	Sungyup Chung
5	국내 자영업의 폐업률 결정요인 분석	남윤미
6	차주별 패널자료를 이용한 주택담보대출의 연체요인에 대한 연구	정호성
7	국면전환 확산과정모형을 이용한 콜금리 행태 분석	최승문 · 김병국

제2017-8	Behavioral Aspects of Household Portfolio Choice: Effects of Loss Aversion on Life Insurance Uptake and Savings	In Do Hwang
9	신용공급 충격이 재화별 소비에 미치는 영향	김광환 · 최석기
10	유가가 손익분기인플레이션에 미치는 영향	김진용 · 김준철 · 임형준
11	인구구조변화가 인플레이션의 장기 추세에 미치는 영향	강환구
12	종합적 상환여건을 반영한 과다부채 가계의 리스크 요인 분석	이동진 · 한진현
13	Crowding out in a Dual Currency Regime? Digital versus Fiat Currency	KiHoon Hong · Kyoungsoon Park · Jongmin Yu
14	Improving Forecast Accuracy of Financial Vulnerability: Partial Least Squares Factor Model Approach	Hyeongwoo Kim · Kyunghwan Ko
15	Which Type of Trust Matters?: Interpersonal vs. Institutional vs. Political Trust	In Do Hwang
16	기업특성에 따른 연령별 고용행태 분석	이상욱 · 권철우 · 남윤미
17	Equity Market Globalization and Portfolio Rebalancing	Kyungkeun Kim · Dongwon Lee
18	The Effect of Market Volatility on Liquidity and Stock Returns in the Korean Stock Market	Jieun Lee · KeeH.Chung
19	Using Cheap Talk to Polarize or Unify a Group of Decision Makers	Daeyoung Jeong
20	패스트트랙 기업회생절차가 법정관리 기업의 이자보상비율에 미친 영향	최영준
21	인구고령화가 경제성장에 미치는 영향	안병권 · 김기호 · 육승환
22	고령화에 대응한 인구대책: OECD사례를 중심으로	김진일 · 박경훈

제2017 -23	인구구조변화와 경상수지	김경근 · 김소영
24	통일과 고령화	최지영
25	인구고령화가 주택시장에 미치는 영향	오강현 · 김솔 · 윤재준 · 안상기 · 권동휘
26	고령화가 대외투자에 미치는 영향	임진수 · 김영래
27	인구고령화가 가계의 자산 및 부채에 미치는 영향	조세형 · 이용민 · 김정훈
28	인구고령화에 따른 우리나라 산업구조 변화	강종구
29	인구구조 변화와 재정	송호신 · 허준영
30	인구고령화가 노동수급에 미치는 영향	이철희 · 이지은
31	인구 고령화가 금융산업에 미치는 영향	윤경수 · 차재훈 · 박소희 · 강선영
32	금리와 은행 수익성 간의 관계 분석	한재준 · 소인환
33	Bank Globalization and Monetary Policy Transmission in Small Open Economies	Inhwan So
34	기존 경영자 관리인(DIP) 제도의 회생기업 경영성과에 대한 영향	최영준
35	Transmission of Monetary Policy in Times of High Household Debt	Youngju Kim · Hyunjoon Lim
제2018 -1	4차 산업혁명과 한국의 혁신역량: 특허자료를 이용한 국가기술별 비교 분석, 1976-2015	이지홍 · 임현경 · 정대영
2	What Drives the Stock Market Comovements between Korea and China, Japan and the US?	Jinsoo Lee · Bok-Keun Yu
3	Who Improves or Worsens Liquidity in the Korean Treasury Bond Market?	Jieun Lee

제2018 -4	Establishment Size and Wage Inequality: The Roles of Performance Pay and Rent Sharing	Sang-yoon Song
5	가계대출 부도요인 및 금융업권별 금융취약성: 자영업 차주를 중심으로	정호성
6	직업훈련이 청년취업을 제고에 미치는 영향	최충 · 김남주 · 최광성
7	재고투자와 경기변동에 대한 동학적 분석	서병선 · 장근호
8	Rare Disasters and Exchange Rates: An Empirical Investigation of Korean Exchange Rates under Tension between the Two Koreas	Cheolbeom Park · Suyeon Park
9	통화정책과 기업 설비투자 - 자산가격경로와 대차대조표경로 분석 -	박상준 · 육승환
10	Upgrading Product Quality: The Impact of Tariffs and Standards	Jihyun Eum
11	북한이탈주민의 신용행태에 관한 연구	정승호 · 민병기 · 김주원
12	Uncertainty Shocks and Asymmetric Dynamics in Korea: A Nonlinear Approach	Kevin Larcher · Jaebeom Kim · Youngju Kim
13	북한경제의 대외개방에 따른 경제적 후생 변화 분석	정혁 · 최창용 · 최지영
14	Central Bank Reputation and Inflation-Unemployment Performance: Empirical Evidence from an Executive Survey of 62 Countries	In Do Hwang
15	Reserve Accumulation and Bank Lending: Evidence from Korea	Youngjin Yun
16	The Banks' Swansong: Banking and the Financial Markets under Asymmetric Information	Jungu Yang

제2018-17	E-money: Legal Restrictions Theory and Monetary Policy	Ohik Kwon • Jaevin Park
18	글로벌 금융위기 전·후 외국인의 채권투자 결정요인 변화 분석: 한국의 사례	유복근
19	설비자본재 기술진보가 근로유형별 임금 및 고용에 미치는 영향	김남주
20	Fixed-Rate Loans and the Effectiveness of Monetary Policy	Sung Ho Park
21	Leverage, Hand-to-Mouth Households, and MPC Heterogeneity: Evidence from Korea	Sang-yoon Song
22	선진국 수입수요가 우리나라 수출에 미치는 영향	최문정 • 김경근
23	Cross-Border Bank Flows through Foreign Branches: Evidence from Korea	Youngjin Yun
24	Accounting for the Sources of the Recent Decline in Korea's Exports to China	Moon Jung Choi • Kei-Mu Yi
25	The Effects of Export Diversification on Macroeconomic Stabilization: Evidence from Korea	Jinsoo Lee • Bok-Keun Yu
26	Identifying Uncertainty Shocks due to Geopolitical Swings in Korea	Seohyun Lee • Inhwan So • Jongrim Ha
27	Monetary Policy and Income Inequality in Korea	Jongwook Park
28	How the Financial Market Can Dampen the Effects of Commodity Price Shocks	Myunghyun Kim
29	Which External Shock Matters in Small Open Economies? US Economic Policy Uncertainty vs. Global Risk Aversion	Youngju Kim • Hyunjoon Lim
30	Do Korean Exports Have Different Patterns over Different Regimes?: New Evidence from STAR-VECM	Sei-Wan Kim • Moon Jung Choi
31	기술진보와 청년고용	심명규 • 양희승 • 이서현

제2018 -32	북한지역 장 거주택수요 및 연관 주택건설투자 추정	이주영
33	기업규모간 임금격차 원인 분석	송상윤
34	우리나라 고용구조의 특징과 과제	장근호
35	창업의 장기 고용효과: 시군구 자료 분석	조성철 · 김기호
36	수출입과 기업의 노동수요	음지현 · 박진호 · 최문정
37	청년실업의 이력현상 분석	김남주
38	노동시장 이중구조와 노동생산성: OECD 국가를 중심으로	최충 · 최광성 · 이지은
39	한국과 일본의 청년실업 비교분석 및 시사점	박상준 · 김남주 · 장근호
40	노동시장의 이중구조와 정책대응: 해외사례 및 시사점	전병유 · 황인도 · 박광용
41	최저임금이 고용구조에 미치는 영향	송헌재 · 임현준 · 신우리
42	최저임금과 생산성: 우리나라 제조업의 사례	김규일 · 육승환
43	Transmission of U.S. Monetary Policy to Commodity Exporters and Importers	Myunghyun Kim
44	Determinants of Capital Flows in the Korean Bond Market	Soohyon Kim
