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## **NORMALIZATION OF UNCONVENTIONAL US MONETARY POLICY AND ITS IMPLICATIONS: KOREA'S MONETARY POLICY CASE**

### **Abstract:**

This study offers some empirical evidence that changes in the US monetary policy affect Korean financial market volatilities, and the efficacy of the Bank of Korea's policy interest rate to market long-term rate channel of monetary policy since 2000, with emphasis on the post-2008 period, notable for unconventional US monetary policy. In addition, some structural issues related to the financial health of Korean central bank's balance sheet are reviewed. Results suggest that capital inflow had weakened the efficacy of monetary policy since 2008. The resulting expanded domestic liquidity appears to have contributed to the trend of steady growth in Korean household indebtedness. Given the severe fluidity of the external monetary/financial situation in the short term, having more flexibility in policy rates in both directions seems advisable. It would also be desirable to grant more autonomy to the Bank of Korea in disposing its operating profits so that it could build up its equity reserves. This measure would enhance monetary policy credibility in the medium term by allaying concerns that monetary policy deliberations might be encumbered by potential operating losses, which could lead to onerous consequences for the Bank of Korea.

### **Keywords:**

Monetary policy, Unconventional, U.S., Korea

**JEL Classification:** E52, E58, E44

## I. Introduction

The policy interest rate is expected to rise from the near zero level for the first time since December 2008, and it will lead to a challenging new monetary policy environment outside the United States, and Korea is no exception. The Korean economy's dependency on external demand still remains high and the short term outlook for global economic growth, which the United States is expected to power singlehandedly, appears not very robust. Soft domestic economic conditions add to pressure to further lower Korea's policy interest rate which has already been lowered twice in the second half of 2014.

This demand for further easing seems to gain support from the consistently mild trends seen in general price levels in recent years. However, lowering of the interest rates in Korea when the US rates are moving the opposite direction could lead to financial market instability and large movements of foreign capital in a disorderly fashion and in unexpected ways given the current volatile conditions in international financial markets. In certain circumstances, monetary policy tightening—rather than easing—might be needed to restrain capital outflow. Some studies have found that capital inflows and outflows in Korea to have been more mobile than in other emerging economies during the past couple of decades, partly due to its liquid securities markets.<sup>1</sup>

This study examines sequentially three topics that characterize the state of Korea's monetary policy deliberations in the coming period of normalization of the hitherto unconventional monetary policy of the US Federal Reserve (Fed, hereafter). The first is the linkage between the Fed's monetary policy and Korea's financial market volatility. Rapid capital flows are expected to affect Korea's stock market and exchange rate volatility. This paper offers an explicit empirical examination of whether there has been a significant linkage between the US monetary policy and Korean financial market volatility since 2000. Special attention is given to the post-2008 period, notable for unconventional US monetary policy. To the extent that financial market stability is a part of the central bank mandate, the Bank of Korea (BOK) will take this relationship into consideration in policy deliberations.

The second topic is the impact of capital inflows on the efficacy of Korea's monetary policy, especially during the US quantitative easing (QE) period. The impact of US QE on the effectiveness of monetary policy in the emerging Asian economies has been of interest to many researchers (Jain-Chandra and Unsai, 2012; Miyajima, Mohanty, and Yetman, 2014). This paper offers results of empirical examinations of the case of Korea. This topic has special relevance to the monetary policies of Korea owing to the

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<sup>1</sup> For example, see Park, Lee, and Chung (2013). Some observers go as so far as to describe Korea as "the ATM of emerging markets" for international investors. This view points to the depth and liquidity of the stock, bonds and foreign exchange markets in Korea that allows foreign financial capital to flow in and out of the country with ease.

high indebtedness of households that has grown steadily over the past decade, even during the period immediately following the 2008 global financial crisis, when deleveraging was more common in advanced economies. A large stock of household debt with relatively short maturity and variable interest payments could work as a weight restraining any upward movement in policy interest rate. This paper examines the role of capital inflow, indirectly measured by the US long-term interest rate, in holding down the post-2008 market interest rates and finds that this inflow appears to have contributed to the growth of the debt.

Finally, an observation is made on the financial health of the Korean central bank in terms of balance sheet size and composition, and on how they could affect the deliberations of the course of monetary policy actions going forward. This topic deserves attention in light of two strands of recent academic as well as policy-oriented discussions, namely, of the central bank's financial health issues implied by the composition of its assets/liabilities, and policy credibility. Both groups use the term "carry trade" to describe the modality of how assets on a central bank's balance sheet are financed by liabilities having implications on its profit/loss over time. The first modality may be called "foreign carry trade" since it is related to how foreign reserve assets, with low returns, are financed by domestic currency denominated central bank liabilities, with high costs, in many Asian economies (Filardo and Grenville, 2012). What has been happening to the Swiss National Bank since 2011 with the installation of the exchange rate peg of the Swiss franc to euro is an apt example. The second modality, maybe called "domestic carry trade" and relates to the enlarged marketable domestic security holdings on the asset side (of the Fed), matched by commercial bank reserves as a consequence of QE (Goodfriend, 2014).<sup>2</sup> Korea belongs to the first category. If the BOK's loss entails onerous consequences such as further diminution of central bank independence, monetary policy deliberations could be encumbered by the central bank's profit/loss implications of policy changes. Thus, this is an important issue that deserves further attention.

The remainder of this paper is organized as follows. Section II presents observations on the linkage between the US monetary policy and Korean financial market volatility. Section III presents empirical results of influences of US QE on the efficacy of Korea's monetary policy. Section IV discusses the financial health issues of the Bank of Korea and how they might influence monetary policy deliberations. Section V concludes with a brief discussion of policy implications of evidence and observations.

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<sup>2</sup> See Rudebusch (2011), Carpenter et al. (2013), and Hall and Reis (2013) for more detailed discussions of issues of the Fed.

## II. Korean Financial Market Volatility and the US Monetary Policy

Financial markets first respond to actual as well as anticipated monetary policy changes. In the current globalized financial markets with fluid financial capital flows, the international transmission of US monetary policy action, significant even before 2008, has become more visible during the post–2008 period with the advent of various unconventional monetary policy measures such as QE.

Despite exhibiting exemplary scores on dimensions such as current account records, the size and the maturity composition of external liabilities, the inflow and outflow of capital in Korea have been volatile. Regardless of whether Korea can be considered as the “ATM of emerging markets,” the country seems to experience bouts of financial market volatility that roughly coincides with notable events in the US and other key financial markets. Thus, financial market volatility is a matter of concern to monetary policy makers to the extent that the stability of financial markets is a part of the central bank’s mandate. The remainder of this section empirically investigates the linkage between the US monetary policy and Korean financial market volatility.

Our strategy is to run regressions with the measures of financial market volatility as the dependent variable on two sets of explanatory variables: the US monetary policy related variables, and the Korean real economic activity variables that influence financial market volatility. First, monthly volatility of stock and foreign exchange markets series were created using the standard deviations of daily observations;  $vol(ex)$ , for the exchange rate, and  $vol(stk)$ , the stock market index. The first group of explanatory variables include: two interest rate spreads the short–term ( $sspread$ ) and the long–term ( $lspread$ ) interest rate spreads of the US and Korea: KRW/USD exchange rate ( $exch$ ). The variables in the second set include the difference between the US and Korean CPIs ( $cpid$ ), and additional Korean macroeconomic variables of industrial production ( $kip$ ) and exports ( $exp$ ), both monthly growth rates, to account for the real sector developments affecting stock prices and the exchange rate. Two US variables are also included. First, the US monetary policy interval index, which measures the number of months between the dates of two neighboring Fed policy rate changes ( $intval$ ).<sup>3</sup> This variable captures the notion of a rate change after a long period of inaction having different impacts compared to a policy change during a period of frequent policy actions. Second, the Chicago Board Options Exchange Volatility Index ( $vix$ ) that measures the US financial market volatility is included.<sup>4</sup> The equation is as

<sup>3</sup> For the post–2008 period, key QE dates are used as equivalents to funds rate change dates in the pre–2008 period.

<sup>4</sup> The sources for the Korean and US variables are respectively Ecos for the BOK and the FRED of St. Louis Fed. For  $sspread$ , differences between the 3–month USD LIBOR (US) and 3–month CD (Korea) rate are used. For  $lspread$ , differences between the yields on 5-year US Treasury (US) and 5-year Korean government bonds are used. Logged series are used with some linear smoothing adjustments, such as adding a constant positive number to a series to make it positive before log transformation.

follows:

$$\begin{aligned} vol(exch)_t = & \alpha + \beta_1 ssread_t + \beta_2 lspread_t + \beta_3 exch_t + \beta_4 ssread_t * intval_t \\ & + \beta_5 lspread_t * intval_t + \beta_6 lvix_t + \sum_{i=1}^k \gamma_i vol(exch)_{t-i} \\ & + \sum_{i=1}^l \delta_i cpid_{t-i} + \sum_{i=1}^m \theta_i kip_{t-i} + \sum_{i=1}^n \pi_i exp_{t-i} + \varepsilon_t \end{aligned} \quad (1).$$

The timing convention of the included variables stipulates whether a given series was available the month when the dependent variable was created. That is, as of time  $t$ ,  $ssread$ ,  $lspread$ ,  $exch$ ,  $intval$ , and  $vix$  are known, whereas  $cpid$ ,  $kip$ , and  $exp$  are not known. The lag structures of equation (1) are motivated to focus on the contemporaneous influences of the US monetary policy-related variables on the Korean financial variables. The equation for the monthly stock price index variability, equation (2), is obtained by using  $vol(stk)$  as the dependent variable instead of  $vol(exch)$  of the equation (1).

These equations are estimated with the full specification of eleven lags of the dependent variable,<sup>5</sup> as well as six lags of other applicable explanatory variables (that is,  $k = 11$ ,  $l = m = n = 6$ ) for the sample period from January 1999 to November 2014. Then, only the terms that are significant at the 10% level or less are retained and the model is re-estimated. The estimation results show variations when different sample periods are used. <Table 1> compares the estimation results for different sample periods.<sup>6</sup>

The estimation results show a clear linkage between the US monetary policy and Korean financial market volatilities. In the  $vol(exch)$  model,  $exch$  and short-term interest spreads ( $ssread$ ) interacted with the US monetary policy interval term ( $intval$ ), and  $vix$  have significant impacts on the KRW/USD exchange rate volatilities over different sample periods. In the stock market index model, in addition to the number of variables significant in the  $evol(exch)$  model, the long-term interest rate ( $lspread$ ) and  $lspread$  interacted with  $intval$  are also significant in some sample periods.

The key implication of results of this section is that exchange rate depreciation (e.g., bigger  $exch$ ) and instability of the US financial market add to the volatility in foreign exchange as well as stock markets. While narrowing down of long-term interest rate spreads between the US and Korea adds to stock market volatility, narrowing down the short-term interest rate spreads tends to reduce both foreign exchange and stock

<sup>5</sup> This is to account for the seasonality in the data.

<sup>6</sup> Either level or first differenced series are used depending on the Augmented Dick-Fuller (ADF) unit root test results. The first differenced series is used if the series is found to have a unit root. For both equations first-differenced  $ssread$ ,  $exch$ ,  $cpid$ , and  $kip$  are used for all subsamples. For  $lspread$ , the first-differenced series is used in the full as well as the 2005~2014 period sample estimations and level series for the 2009~2014 period sample. This choice is based on the ADF test results for all subsample periods.

market volatility.

<Table 1> Estimation results for equation (1) and (2)

Dependent variable	<i>vol(exch)</i>			<i>vol(stk)</i>		
	Jan. 1999 ~Oct. 2014	Jan. 2005 ~Oct. 2014	Jan. 2009 ~Oct. 2014	Jan. 1999 ~Oct. 2014	Jan. 2005 ~Oct. 2014	Jan. 2009 ~Oct. 2014
# of obs.	190	118	70	190	118	70
Explanatory variables						
$\alpha$	-0.53 (0.34)	-0.70* (0.36)	0.36 (0.27)	0.93*** (0.32)	1.71*** (0.33)	1.72*** (0.34)
$\beta_1$	8.88 (21.50)	-15.12 (24.79)	-21.15 (38.10)	26.75 (16.92)	33.37 (21.82)	18.59 (31.53)
$\beta_2$	24.08 (16.50)	30.94 (21.95)	10.85 (13.98)	8.77 (13.05)	35.19* (19.13)	41.72*** (11.27)
$\beta_3$	6.33*** (1.64)	8.96*** (1.73)	9.85*** (2.97)	4.03*** (1.27)	3.52** (1.44)	6.40** (2.51)
$\beta_4$	-43.06* (25.33)	-32.01 (37.28)	-48.07 (88.06)	-38.25* (19.99)	-10.49 (33.24)	-174.72** (70.23)
$\beta_5$	4.12 (20.00)	27.15 (32.45)	6.78* (3.52)	-19.76 (15.92)	-57.28* (28.96)	-0.64 (2.93)
$\beta_6$	0.51*** (0.14)	0.58*** (0.16)	0.53 (0.40)	0.30*** (0.10)	0.62*** (0.11)	0.62* (0.33)
$\gamma_1$	0.35*** (0.06)	0.27*** (0.08)	0.41*** (0.10)	0.18*** (0.07)		
$\gamma_2$				0.23*** (0.07)	0.16* (0.08)	0.23* (0.11)
$\gamma_4$	0.15** (0.07)	0.28*** (0.07)	0.30*** (0.10)			
$\gamma_5$	-0.11 (0.07)	-0.14* (0.08)	-0.20* (0.11)	0.14** (0.07)		
$\gamma_6$	0.15** (0.07)	0.13* (0.07)	0.21** (0.09)			
$\gamma_{10}$				-0.11* (0.06)	-0.20*** (0.07)	
$\delta_1$	16.61* (9.20)	31.64*** (10.36)				
$\delta_5$				-7.06 (7.06)		
$\pi_1$				0.59* (0.32)		
Adjusted $R^2$	0.52	0.72	0.59	0.36	0.47	0.39
Jarque-Bera <sup>2</sup>	2.04(0.36)	2.51(0.28)	0.86(0.65)	1.76(0.42)	1.99 (0.37)	1.92(0.38)

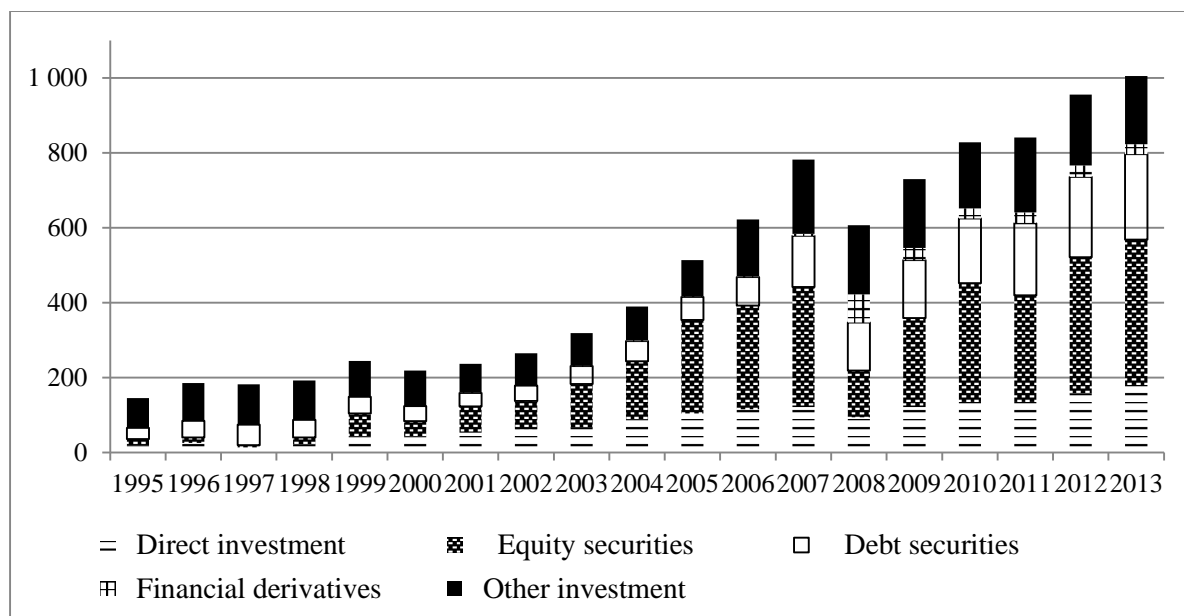
1. The figures in parentheses are standard errors; \*\*\*, \*\*, \* denote significant cases at the 1%, 5%, and 10% levels, respectively.

2. This shows the test statistics for the null hypothesis that the residuals have normal distributions and the numbers in parenthesis are the p-values. The null is not rejected even at the 10% significance level. The residual terms were also checked for serial correlation using the Breusch-Godfrey serial correlation LM test and all cases the null hypothesis of no AR(1) or AR(2) could not be rejected at 10%.

### III. Effects of the Post–2008 US Quantitative Easing and Monetary Policy Efficacy in Korea<sup>7</sup>

This section offers evidence of non-trivial effects of the post-2008 US quantitative easing on the efficacy of Korea's monetary policy by using the Johansen cointegration approach–based empirical analysis. Capital inflows into Korea started to grow briskly in the mid-2000s, as shown in <Figure 1>. After a sharp fall in 2008, the inflow of capital resumed to grow from the low base of 2008. One noticeable trend in the composition of capital inflow since 2007 is the discrete increase in inflow to the bond market. Foreign investment in debt securities did not fall even in 2008, when equity investment more than halved from the 2007 level, and has continued to grow.

<Figure 1> Composition of foreign investment (billion USD, 1995-2003)<sup>1</sup>



1. 'Other investment' includes bank lending. Source: Ecos, The Bank of Korea.

Monetary policy actions are believed to influence economic activities via changes in short–term policy interest rates that propagate to long–term market interest rates. This section's investigation focuses on the monetary policy transmission mechanism short–term to long–term interest rates. An empirical model is employed to check the stability of the estimated monetary policy transmission mechanism over different sample periods. Jain-Chandra and Unsai (2012) and Miyajima, Mohanty and Yetman (2014) examined this issue for different Asian economy groups by using a slightly different empirical methodology.

<sup>7</sup> This section is based on the author's earlier research paper titled "Korea's Monetary Policy Challenges in the Wake of the U.S. Quantitative Easing and its Tapering" (2014, in Korean).

Two cointegration relationship–based vector error correction models (VECMs) are estimated using the US and Korean monthly variable data sets. Model 1 include the call market interest rate (the Korean counterpart of the US federal funds rate, CALL), the KRW/USD exchange rate (KORUS), the yield on 3-year Korean Treasury bonds (KT3), and the consumer price index (INF). Model 2 is constructed by adding the 10-year US Treasury bond yields (UST10) to Model 1.<sup>8</sup>

First, it is investigated whether the variables of Model 1 have a stable cointegration relationship throughout the sample period from January 2000 to December 2013 by using the vector autoregression (VAR) based Johansen (1991) test. A stable cointegration relationship for the full sample period is not found, but two separate cointegration relationships are found for the two sample periods delineated by 2007 and 2008. The results are shown in <Table 2>.

In contrast to Model 1, Model 2 shows a stable cointegration relationship for five variables for relatively long sample periods starting from 2005 as shown in <Table 3>. These results give rise to a couple interesting points. First, while no stable cointegration relationship is found in a set consisting of only Korean monetary and financial variables in a full sample period, two distinct ones from two almost disjoint samples are found, suggesting a structural shift in the relationship between those variables in the vicinity of 2007 and 2008. Second, US monetary policy seems to have had a measurable influence on Korea’s monetary/financial variables even before the 2008 global financial crisis because the cointegration relationship of the variables of Model 2 started in 2005. This finding can be explained by the observation that capital inflows started to grow in the mid-2000s, as shown in <Figure 1>.

For a comparison of the impulse response patterns of long–term interest rate (KT3) to a monetary policy shock (CALL) from the two versions of Model 1 estimated from two samples, see <Figure 2>. The figures offer an illuminating evidence of a change in efficacy of monetary policy in Korea during the post–2008 period. The response pattern for the pre-2008 version of Model 1 conforms to the general expectation on how a change in short–term policy rate leads to a similar response in long–term interest rate. However, the pattern seen for the post-2008 version of Model 1 is quite distinct from that of the pre–2008 version in that the positive effect is short– lived and

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<sup>8</sup> The model estimation involves the estimation of the following general VECM that provides the basis for the Johansen test:

$$\Delta X_t = \sum_{i=1}^k \Gamma_i \Delta X_{t-i} + \Pi X_{t-1} + \mu + \psi D + \epsilon_t.$$

Here,  $\mathbf{X}$  denotes the vectors of four (for Model 1) and five (for Model 2) logged explanatory variables respectively;  $\Delta$  represents the first-difference operator;  $\Gamma$ ,  $\Pi$ , and  $\Psi$  are coefficient matrices;  $\mu$  represents constant terms;  $\mathbf{D}$  denotes dummy variables; and  $\epsilon$  denotes a vector of normally distributed mean–zero error terms. The Johansen test relates to the rank of the  $\Pi$  matrix, which determines the number of stationary relationships among  $\mathbf{X}$ . Lag length  $k = 1$  was chosen (based on various information criteria). A model specification that allows a linear deterministic trend in data is used. Centered monthly seasonal dummies are used. Additional dummy variables are used in some outlier cases to ensure that the multi-normal distribution assumption of error terms is held.



weak.

<Table 2> Cointegration test results of Model 1(CALL–KORUS–KT3–INF)<sup>1</sup>

Johansen cointegration test						
	Trace statistic			Max eigenvalue statistic		
$H_0$	$r = 0$	$r = 1$	$r = 2$	$r = 0$	$r = 1$	$r = 2$
$H_1$	$r = 1$	$r = 2$	$r = 3$	$r = 1$	$r = 2$	$r = 3$
Full sample (October 2000~December 2013) <sup>2</sup>						
	41.34 (47.86)	16.71 (29.80)	8.69 (15.49)	24.63 (27.58)	8.02 (21.13)	4.44 (14.26)
Pre-2008 version (October 2000~December 2008)						
	59.87***	22.36	9.88	37.52***	12.48	7.59
Post-2008 version (January 2007~December 2013)						
	61.05***	12.47	4.45	48.58***	8.01	4.25

\*\*\*, \*\*, \* denote significant cases at the 1%, 5%, and 10% confidence level, respectively.

1. This shows the ordering of variables in Model 1.

2. The top figures are test statistics and ones in parentheses are the 5% critical values as provided in *Eview 7*. These indicate that there is no cointegrating relationship in the full sample.

<Table 3> Cointegration test results of Model 2(UST10–CALL–KORUS–KT3–INF)<sup>1</sup>

Sample period: January 2005~December 2013 <sup>2</sup>						
	Trace statistic			Max eigenvalue statistic		
$H_0$	$r = 0$	$r = 1$	$r = 2$	$r = 0$	$r = 1$	$r = 2$
$H_1$	$r = 1$	$r = 2$	$r = 3$	$r = 1$	$r = 2$	$r = 3$
	83.95***	36.68	13.45	47.26***	23.23	7.17

1. This shows the ordering of the variables in Model 2.

2. Notations are the same as explained in the footnote of <Table 2>.

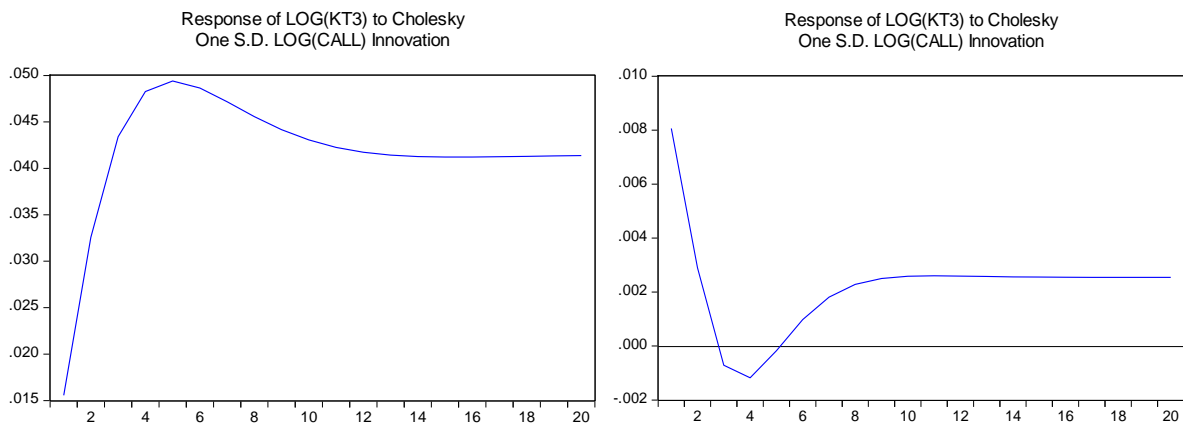
Next, <Figure 3> shows the response patterns of KT3 to shocks in the US long-term interest rate (UST10) and the Korean policy rate (CALL) from Model 2. The pattern of how KT3 responds to a UST10 shock is very similar to that seen in the pre-2008 version of Model 1, whereas the response pattern of KT3 to a CALL shock is perceptibly subdued, similar to that seen in the post-2008 version of Model 1. It appears that since the mid-2000s, the US interest rate has played the role of Korean

policy interest rate vis-à-vis the Korean long-term interest rate for the 2000–2008 sample period.

These results together suggest that the interest rate channel of the BOK has changed since the late 2000s and that the influences of the exogenous inflows of capital captured by the US long-term interest rate have grown in the same time frame. This observation is broadly consistent with the findings of related studies such as Jain-Chandra and Unsai (2012) and Miyajima, Mohanty and Yetman (2014)

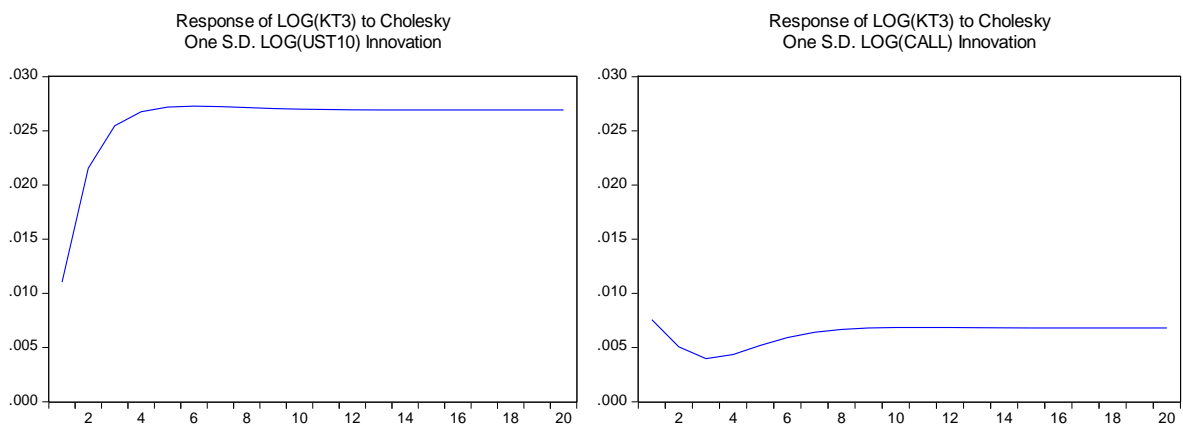
<Figure 2> Responses of Korean long term interest rate (KT3) to policy rate shock, Model 1

Pre-2008 version (left), and Post-2008 version (right)



<Figure 3> Responses of Korean long term interest rate (KT3) to shocks, Model 2

UST10 shock (left), and CALL shock (right)



#### IV. Central Bank Financial Health

The BOK showed accounting losses for several years during the past decade and a half, as can be seen in <Table 4>. According to Archer and Moser-Boehm (2013), “Central banks exist for different purposes than commercial banks. ... Their financial results are often a poor guide to their success.”<sup>9</sup> While it is not rare for a central bank to incur losses (see Kluh and Stella, 2008, for Latin American cases, and Sweidan, 2011, for Asian cases), such losses are rare in advanced economies. This is because “financial results may be important for a central bank even though it can always create money to pay its bills, cannot be declared bankrupt by a court, and does not exist to make profits. Losses or negative capital may raise doubts – however erroneous – about the central bank’s ability to deliver on policy targets, and expose it to political pressure.”<sup>10</sup>

According to its annual report for 2013, the BOK conducts “... sterilization policy whereby excess liquidity supplied through the overseas sector is absorbed chiefly by issuing Monetary Stabilization Bonds (MSBs). Accordingly, its assets are largely made up of foreign-currency assets including foreign currency securities and due from banks. Its liabilities ...are mostly composed of MSBs issued and foreign-currency deposits.”<sup>11</sup> Thus, the won–denominated profit/loss of the BOK is determined by interest rates receives on its US Treasuries holdings, interest rate it pays to MSBs and on the liquidity control–related deposits, and the KRW/USD exchange rate.

<Table 4> Key factors affecting the financial health of the Bank of Korea (2003~2011)<sup>1</sup>

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
2-year US Treasury (%)	1.65	2.38	3.85	4.82	4.36	2.01	0.96	0.70	0.45
2-year MSB (%)	4.59	4.09	4.24	4.83	5.33	5.47	3.84	3.67	3.71
KRW/USD	1191.9	1144.7	1024.3	955.5	929.2	1102.6	1276.4	1156.3	1108.1
BOK profit/loss <sup>2</sup>	2,175.0	-150.2	-	-	-	3,402.9	2,865.5	3,513.3	3,135.0
BOK Assets/GDP (%) <sup>3</sup>	27.1	28.9	29.5	31.4	31.0	28.3	31.6	30.3	34.2

1. Loss making years are shaded. 2. Billion KRW.

3. Sources: FRED, St. Louis Fed, and Ecos, and Annual Reports, BOK.

<Table 4> seems to confirm the importance of the interest rates paid to MSBs and

<sup>9, 8</sup> Page 4, Archer and Moser-Boehm (2013). Similar points are made by Stella (2008).

<sup>11</sup> Page 129, The Bank of Korea Annual Report (2013).

the KRW/USD rate on the BOK profit/losses. The shaded years are when the BOK recorded operating losses. The interest income on foreign securities must not fluctuate much because fixed coupon payments make up a big part of the receipts. The exchange rate change seems to dominate the profit/loss outcome of the BOK rather than the changes in interest rates of foreign securities (asset) and the MSB (liability). A similar point was made by Filardo and Grenville (2011) and Cook and Yetman (2012). The latter estimated the sterilization costs of interest rate changes as well as the exchange rate appreciation of the East Asian economies.<sup>12</sup>

The extent to which the profit/loss of the BOK is of sensitive political issue is likely to be a factor influencing the BOK's monetary policy, a point made by many economists with regards to central banks in general (e.g., Stella, 2008; Archer and Moser-Boehm, 2013; Goodfriend, 2014). Higher domestic interest rates in relation to those of the US and stronger KRW/USD exchange rates are factors that can tip the BOK into red. The extent of bias that these facts cause on the BOK's mode (slow and infrequent vs. prompt and frequent) as well as the direction of policy making are not clear.<sup>13</sup>

It might not be too unreasonable to assume some influences on previous decision makers as one hears the critical comments made by Korean observers that the BOK tends to be sluggish in its policy interest rate decisions. For example, a simple comparison of the frequency of policy interest rate changes and the range of rates for the period 2000–2008 for the US and Korea offers some evidence. The Fed changed the policy interest rate 43 times (20 increases and 23 decreases), whereas the BOK changed the rate 23 times (11 increases and 12 decreases). The US federal funds rate ranged between 6.5% and 0.25%, while the same for the BOK's rate ranged between 5.25% and 3.0% for the same period.<sup>14</sup> These differences stand out, given the patterns of CPI inflation rates in both countries were quite similar in terms of highs and lows and variability.

The bottom line of <Table 4> shows the ratio of total BOK assets to nominal GDP. A large asset size means commensurate MSBs and deposits employed for liquidity control purposes, meaning higher costs in terms of interest payments on these balance sheet liability items for the central bank. The relative ratio of GDP to BOK asset size is larger than that of the central banks of advanced economies whose asset size has grown rapidly since 2008 as a consequence of domestic central bank carry trades. For example, the ratios for the Federal Reserve, Bank of England, and European Central Bank remain below 30% as of 2014, the Bank of Japan is an

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<sup>12</sup> Table 13, page 61, Cook and Yetman (2012).

<sup>13</sup> The concern is "that poorly-capitalized central banks are often constrained in their policy choices or, even when not so constrained, sometimes loosen policy to avoid large losses for reputational or political economy reasons." (page 4, Stella, 2008).

<sup>14</sup> The lowest federal funds rate target before 2008 was 1%, reached in June 2003. This relatively narrow range of policy rate in Korea might be a case in point of Asian economies with large foreign exchange reserves that "do not seem to be able to use the interest rate setting vigorously enough to impinge on the demand for credit when it is growing rapidly." (page 101, Filardo and Grenville, 2012)

exception—their quantitative easing measures in recent years have pushed the ratio close to 50%. The degree to which the financial health of a central bank becomes an issue could be expected to be roughly commensurate with its asset size.

#### **IV. Conclusion and Policy Implications**

This paper offered some empirical evidence that changes in the US monetary policy affect Korean financial market volatilities and the efficacy of the BOK's policy interest rate to market long-term rate channel of monetary policy since 2000, with special attention on the post-2008 period. In addition, it reviewed some structural issues related to the financial health of the Korean central bank's balance sheet. The results indicate perceptible influences of the unconventional US monetary policies since 2008, such as quantitative easing. In addition, the results suggest that the inflow of capital weakened the BOK's policy efficacy especially after 2008, offering evidence of incomplete sterilization. Although not discussed in this paper, the expanded domestic liquidity due to capital inflows appears to have contributed to the trend of steady growth of household indebtedness in Korea which has become a key challenge to the promulgation of monetary policy.

Major changes can be expected in the external environment for monetary policy making in Korea in the near future, following the upward drift of the US policy interest rate after staying near zero for 6 years. In addition to the unconventional accommodating monetary policy continuing in Japan, similar measures are expected to be implemented soon by the European Central Bank. In addition, the divergent macroeconomic performance of the US on one side and Europe and Japan on the other is likely to persist for some time. Moreover, conditions exist for unusual turbulences in global capital flows. As the plot thickens, it could prove beneficial to hold large foreign exchange reserves.

The BOK lowered the country's policy rate by 50 basis points to 2% around the mid-2014, joining the efforts of the government's new economic policy makers to nudge the housing market out of its doldrums and boost domestic spending. One visible consequence of the measures taken about six months back is a noticeable pickup in household debt. External economic circumstance might unfold soon, and it may become prudent or necessary to raise the Korean policy interest rate this year. It would reflect well for the Korean government to refrain from forcing alternative courses of action on the BOK, considering its earlier efforts to accommodate the government policy initiatives when the external economic conditions were less threatening.

Furthermore, it might be desirable for the government to grant more autonomy to the BOK in utilizing its operating profits to build up its capital reserves so that the central bank would not be encumbered by potential operating losses when pondering policy

actions.<sup>15</sup> Such a change would bolster the efficacy of monetary policy by enhancing its credibility in the medium term. This is particularly important in view of enhanced awareness of the linkage between the central bank's financial health and credibility of monetary policy in key advanced economies such as the US.

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<sup>15</sup> The Bank of Korea Act was revised to increase the proportion of net profit to be allocated to the legal reserve from 10% to 30%.

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