

## Discussion

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This paper addresses the question of whether the effectiveness of the monetary policy has changed during the recent low inflation regime in Korea. Few subjects would be more important for central bankers than the effectiveness of monetary policy. This question has a particular practical implication for Korean central bankers as, while interest rates have recently declined substantially, the corporate investment rate has remained stagnant raising serious concerns about sustainable growth potential of the Korean economy. In pursuing this research question, the present paper contributes to the literature in that it constructs and employs a sizable micro firm level data, which enables a more precise estimation of key structural parameters. Furthermore, it decomposes the sequential impact along the transmission mechanism and endeavors to identify which linkage within the interest rate channel has been particularly affected.

As a background, let us first look at the trend of the investment rate, inflation, and real interest rate before and after the financial crisis in Korea. As we can see in Figure 1, the investment to GDP ratio showed a fairly rapid upward trend during the 1990s reaching almost 40% and then dropped precipitously after the financial crisis in 1997. Since then, the investment to GDP ratio shows a modestly declining trend. Figure 2 shows the CPI inflation rate and the ex-post real interest rate using the benchmark 3-year corporate bond rate in Korea. Note that both inflation and real interest rates show a downward trend since the late 1980s, and have been stabilized at a level below 5% since 2001, as characterized by the 'low inflation' regime in the paper.

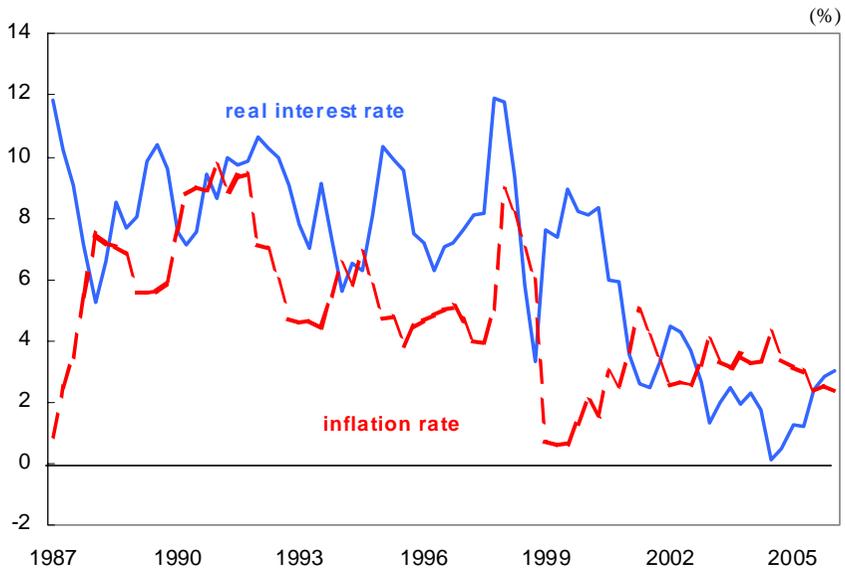
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**Figure 1. Investment to GDP Ratio**



**Figure 2. Real Interest Rate and CPI Inflation Rate**

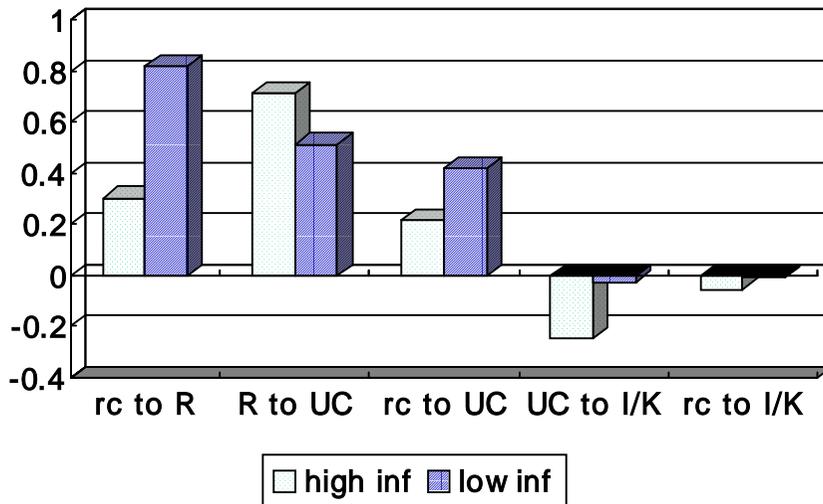


Let me briefly summarize the methodology and major findings of the paper before proceeding to main discussions. As noted above, in studying the effectiveness of the interest rate channel, this paper decomposes the propagation mechanism into four broad parts and focuses on the key linkages along the mechanism by estimating the elasticities utilizing a set of micro panel data for 471 Korean firms.

There are three key linkages in the interest rate channel. The first linkage is from the policy rate, that is, the call rate in Korea, to the financial cost faced by firms. The second linkage is from the financial cost to the firm specific user cost. Up to this second linkage is termed as the first round effect in the paper. The elasticity of average financial cost with respect to the policy rate was estimated by regressing firm borrowing rates on the policy rate, and the firm specific user cost was computed based upon the relative prices and actual composition of tangible assets of respective firms. The third linkage is the effect of the change in the user cost on the investment rate of firms. This second round effect was estimated using the optimizing condition derived under a CES technology, and then, by adding an exogenous dynamic adjustment process. In actual estimation, regressions were estimated with and without cash flow variable to control for a possible impact of the binding cash flow constraint.

As convincingly argued by the author, the main message of the present study is that the effectiveness of the interest rate channel has been substantially undermined during the post-crisis low inflation regime in Korea. I summarize the estimation results in Figure 3 as a diagram. The first bars denote the elasticities estimated in the pre-crisis high inflation period and the second bars are the elasticities estimated in the post-crisis low inflation period. Note that the elasticity of the financial cost ( $R$ ) with respect to the policy rate ( $rc$ ) increased in the post-crisis period, and as a result, the combined first round elasticity from the policy rate to the user cost ( $UC$ ) actually increased from 0.2 to 0.4. However, the elasticity of the investment rate ( $I/K$ ) with respect to the user cost dropped substantially from 0.24 to 0.02 during the post crisis period, and as a result, the overall interest rate effect from the policy rate to the investment rate became significantly weaker.

**Figure 3.** Estimates of Elasticities along the Interest Rate Channel



The findings of this paper are both interesting and stimulating. It is interesting in that, while there have been some recent studies reporting that the real interest rate is not important in optimal capital stock adjustment in Korea (e.g. Oh and Kim 2005), no study has successfully identified which component of the transmission mechanism is the main culprit. The present study is also stimulating because it is silent about what factors have caused the user cost elasticity to fall during the recent low inflation regime.

My comments below will proceed along the four issues or unanswered questions. The first issue is on the methodological front, and addresses whether the interest rate channel can be independently estimated without considering other channels of monetary policy. Second question explores whether there exist potential linkages between the low inflation and the reduced effectiveness of monetary policy in the Korean context. Third issue is more fundamental and addresses why investment rate has been slowing down in post-crisis Korea. Finally, I will conclude by commenting

on the policy scope for the central bank to cope with the recent slowdown in corporate investment.

As is well known there exist other channels of monetary policy through which the policy induced change in interest rates may affect corporate investments. According to Mishkin (2004), such channels can be summarized as in Table 1. For instance, in Tobin's  $q$  channel, an increase in the market value of equity due to the lower interest rate will increase corporate investment since firms now can buy new capital with only a small issue of stocks. Also according to the credit view of monetary policy, lower interest rates will increase corporate investment through channels such as corporate balance sheet and cash flow channels by lowering asymmetric information problems such as adverse selection and moral hazard and thereby facilitating loan making of banks. Also, according to the exchange rate channel, local currency depreciation driven by the lower interest rate due to an expansionary monetary policy may increase investment of exporting firms by raising demand from foreigners

**Table 1.** Interest Rate and Investment in Other Channels of Monetary Policy

Monetary Policy Channel	Transmission Mechanism				
Tobin's Q Channel	$r_c$	$i$	stock price	$q$	Inv
Bank Lending Channel	$r_c$		bank deposit	SME loans	Inv
Corporate B/S Channel	$r_c$	$i$	stock price	asym info	Inv
Cash flow Channel	$r_c$	$i$	cash flow	asym info	Inv
Exchange Rate Channel	$r_c$	$i$	FX depreciation	NX	Inv

Above discussions suggest that a policy induced interest rate shock would affect corporate investment not only through the change in financial cost and thus user cost but also through other channels as well. Note that this implies the interest rate channel may not be independent from other channels of monetary policy. This possibility of

non-independence raises a potentially significant problem on the validity of the estimation method assuming the interest rate channel is independent. In other words, in regression estimations of the user cost elasticity, the effects of other channels may need to be considered by including variables such as  $q$  or stock price to avoid potential misspecification problems and resulting estimation bias for the user cost elasticity.

Furthermore, in case the interest rate channel is non-linearly related with the other channels, the interest rate sensitivity of investment can be directly influenced by the effectiveness of the other channels. For instance, the sensitivity of a firm's investment to the external borrowing cost and thus to user cost may be determined by the degree of availability of internal funds for investment. In this case, the inclusion of an interaction term, for instance, in the form of  $(\Delta UC/UC \cdot CF/K)$ , or explicitly modeling the coefficient of the user cost variable as a function of the cash flow constraint may be rewarding.

The second issue is on the relationship between the low inflation and the reduced effectiveness of monetary policy - in other words, whether the weaker interest rate channel observed in post-crisis Korea is somehow related with low inflations. Note that, as a number of Asian and European countries have experienced deflation, concerns have been raised that a persistently low inflation may lead to the reduced effectiveness of monetary policy. According to the literature, there are couple of theoretical grounds why a persistently low inflation may cause problems for the effectiveness of monetary policy.

First, the zero lower bound for nominal interest rates could limit the capacity of the monetary authority in stabilizing the economy as the consequences of the binding zero bound are not negligible when the economy is subject to stochastic shocks. In this context, Fischer (1996) noted that 'inflation greases the wheels of monetary policy.' Second, as noted by Akerlof, Dickens and Perry (1996), the wage rigidity may deter necessary downward adjustments in real wages leading to higher unemployment. Third, in a deflationary environment, firm's real net worth falls as real debt burden increases, which worsens asymmetric information problems and

thus undermines bank lending capacity.

While the factors just described may cause problems in conducting monetary policies in an environment of low inflation, none of the above arguments seem to be a particularly important practical concern for the monetary authority in Korea. That is, despite the large scale resolution of non-performing loans during the post-crisis financial restructuring period, inflation expectations were stabilized at a positive level. Moreover, the wage growth has not been so rigid and the real wage growth rate often dropped to zero during the post-crisis period in Korea. Indeed, both the low inflation and the smaller elasticity of capital stock recently observed may simply reflect the sluggish investment demand in post-crisis Korea.

Then why has the investment rate been slowing down in Korea? First, many commentators suggest that lower expected returns combined with higher uncertainty in the aftermath of the economic crisis may be one reason. For instance, Lee (2005) using the uncertainty measured by the stock price variability, found a significant negative effect of the uncertainty term on corporate investment in the post-crisis period especially for highly leveraged firms. Second, other commentators indicate that the increased risk averseness of firms and de-leveraging of corporate financial structure may be another culprit of the sluggish investment in Korea. Indeed, the debt to equity ratio of the listed firms fell dramatically from 300 percent in 1997 to 84 percent in 2005. Third factor is the delayed restructuring of the SME and non-manufacturing sector. For instance, Lim (2005) investigated firm level data and found that while the investment slowdown in 1998~2002 had been driven by chaebols' financial de-leveraging as noted above, the subsequent slowdown was mainly due to stagnant investment in the SME and non-manufacturing sectors.

My discussions so far imply that the policy scope would be very much limited for the central bank to cope with the recent slowdown in corporate investment in Korea. Recent research based on firm level data indicates that, rather than monetary policy, accelerating the restructuring of SME and non-manufacturing industries and establishing a more competitive and resilient economic structure would be more

instrumental to revitalization of corporate investment.

However, this does not necessarily mean that the central bank may neglect its duty to prop up the economy's sustainable growth. The role of the central bank must be more focused on providing a more transparent and stable macroeconomic environment as the credibility of the central bank and its strong commitment to price stability feeds into the implementation of corporate investment. Greater transparency and communications with the market help eliminate unnecessary policy uncertainty and thus reduce economic volatility. Finally, it is also required to expand the role of the central bank in monitoring systemic risk and promoting financial stability.

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