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ARE THE EFFECT OF HOUSING PRICES ON BANK PERFORMANCE DIFFERENT AMONG KOREAN COMMERCIAL, REGIONAL AND SPECIALIZED BANKS?

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Abstract:

This study analyzes the effect of housing prices on banking performance in Korea. The findings of the study reveal that the impact of housing price changes on banking performance was different in the commercial banks, regional banks and specialized banks. This seems to be due to the different characteristics of each bank. The three types of banks in Korea have different functions, and thus the impact of changes in housing prices on their respective banking performance is different. Therefore, it would be desirable for Korea's financial regulatory authorities to draw up policies and perform its supervisory functions in consideration of these points.

Key words: *Bank performance, EGARCH, Housing price, Bank risk*

1. Introduction

In general, banks are exposed to information asymmetry and credit risk in the implementation of loans. Bank generally require collateral rather than trying to directly access potential borrowers when offering loans. Banks make loan decisions based on collateral provided by borrowers. The credit market is an incomplete market where information asymmetry exists between the the lender and the borrower, and collateral serves to prevent moral hazard of the borrower. Banks determine lending rates based on the value of collateral assets. An increase in housing prices increase the value of bank assets, increasing the value of assets held as collateral by banks. It lowers the risk on bank assets, reducing the probability of getting into financial trouble. On the contrary, increasing housing prices may increase bank risk. If banks believe housing prices will continue to rise, they may offer loans at unreasonably low interest rates, in which case, if housing prices reverse, the bank is in danger of falling into financial distress. As such, fluctuations in housing prices can have both positive and negative effects on the bank management performance. Thus, fluctuations in housing prices have a significant impact on the loan growth rate, profitability and soundness of the banking sector.

There are many studies on the relationships between housing prices and bank management performance. Goodhart and Hofmann (2008) argue that there is evidence of

a significant multidirectional relationships between housing prices and macroeconomic variables. Che et al. (2011) argue that bank lending plays a crucial role in raising housing prices in China, and that if bank increase lending, housing prices rise. Cloyne et al. (2017) argue that the impact of housing prices on bank loans in the UK is significant. Ok et al. (2019) argue that if housing prices in Korea rise, banks increase their lending and improve their soundness. Unlike these studies, however, some studies show that changes in housing prices have no or negative effects on baning performance. Koetter and Pohosyan (2010) find that, in the case of the German real estate market, changes in housing prices are negative to bank instability, but not related to changes in price levels. Banai and Vágó (2018) find that rising housing prices increase bank risk and that the higher the proportion of mortgage loan, the greater the impact. Kok and Ismail (2019) argue that the higher the housing price, the more stable the bank is, but if the housing price exceeds a certain level, the impact of the housing price on bank stability becomes negative. Killins (2020) finds that housing price volatility has little effect on the risk of bank earnings in Canada.

In this paper, we analyze the effect of housing prices on bank performance in Korea. The first goal is to empirically examine the relationship between housing price changes and the banking performance in Korea. Next, we analyze whether the effect of housing prices on bank performance different among Korean commercial, regional and specialized banks.

2. Methodology and data

There are three types of banks in Korea: commercial banks, regional banks and specialized banks. Regional banks are allowed to operate within their regions, and specialized banks are funded by government to support specific industries. The sample period is from the first quarter of 2011 to the fourth quarter of 2019.

In general, the financial time series is known to be unstable. Therefore, it is necessary to test the stationarity of time series through unit root test. The Augmented Dickey Fuller test and the Phillips-Perron test were used for unit root tests. Most of the variables were found to be unstable in the level but stationary in the first differential variables. Based on the unit root test results, we used first-differenced variables for analysis. We selected the GARCH model for analysis based on the cointegration test results and the characteristics of volatility clustering. We selected EGARCH(1,1)-student's t model as the most suitable model based on AIC and HQIC information criteria. We contruct a EGARCH model.

$$BP_t = \alpha_0 + b_1 HP_t + b_2 GDP_t + b_3 CR_t + b_4 BIS_t + b_5 IR_t + b_6 LC_t + \varepsilon_t$$

$$\ln h_t = \alpha_1 + \beta \ln(\sigma_t^2) + \gamma|\varepsilon_{t-1}/h_{t-1}| + \delta\, \varepsilon_{t-1}/h_{t-1} + c_1 \ln\varepsilon_{HP}^2 + c_2 \ln\varepsilon_{GDP}^2 + c_3 \ln\varepsilon_{CR}^2 + c_4 \ln\varepsilon_{BSI}^2 + c_5 \ln\varepsilon_{IR}^2 + c_6 \ln\varepsilon_{LC}^2$$

Where BP, HP, GDP, CR, BIS, IR and LC indicate bank performance, housing price growth rate, GDP growth rate, call rate, BIS capital ratio, interest revenue and loan constitution, respectively.

3. Empirical results

Table 1 shows the summary statistics. BIS capital ratio of commercial banks is higher than those of regional and specialized banks, but interest revenue and loan constitution of commercial banks are smaller than those of regional and specialized banks.

Table 2 reports the effect of housing price changes on lending growth as a bank performance measure. The coefficient of housing prices was shown to be statistically significant at the 5% level in commercial banks and regional banks, but not in specialized banks. If the housing price increases, the lending growth rate of commercial banks and regional banks increase. We found the leverage effect in the δ coefficient of the variance equation. And we found that the increase in housing price changes significantly increases the volatility of lending growth rate of commercial banks and regional banks.

Table 1: Summary Statistics by Types of Banks

Variables	Commercial banks		Regional banks		Specialized banks	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Housing price	0.309	0.535	0.309	0.535	0.309	0.535
GDP	2.855	0.578	2.855	0.578	2.855	0.578
Call rate	2.216	0.757	2.216	0.757	2.216	0.757
BIS capital ratio	12.849	1.982	11.069	2.641	11.389	2.146
Interest revenue	84.527	6.667	99.308	5.393	89.152	7.566
Loan constitution	87.195	4.463	226.202	34.215	263.459	17.016

Table 2: EGARCH results: Lending growth as a bank performance measure

Explanatory Variables	Commercial banks	Regional Banks	Specialized Banks
Panel A: Mean equation			
Housing price	1.494(2.377**)	1.211(2.148**)	0.233(1.519)
GDP	0.625(2.642**)	0.618(2.377**)	0.403(0.482)
Interest rate	-0.410(-0.688)	-0.010(-0.488)	0.102(0.227)
BIS capital ratio	-0.302(-2.316**)	-0.002(-2.198**)	-0.036(-0.607)
Interest revenue	0.008(0.769)	0.007(0.554)	-0.043(-1.203)
Loan constitution	-0.158(-1.900*)	-0.146(-1.703*)	-0.017(-0.624)
Panel B: Variance equation			
β	0.889(9.247***)	0.879(9.873***)	0.891(5.166***)
γ	0.106(0.884)	0.109(0.912)	0.094(1.231)
δ	-0.042(-3.965***)	-0.082(-5.603***)	-0.021(-2.741**)
Housing price	4.083(2.594**)	3.872(3.782***)	4.030(1.327)
GDP	0.205(1.992*)	0.315(1.301)	-1.374(-0.952)
Call rate	0.630(0.354)	0.571(0.428)	-1.204(-0.966)
BIS capital ratio	0.106(0.207)	-0.237(-0.311)	0.954(0.329)
Interest revenue	0.305(0.569)	0.524(0.706)	-0.477(-0.455)
Loan constitution	-0.371(-0.167)	-0.703(-0.638)	0.441(0.568)
$\overline{R^2}$	0.516	0.507	0.489

Table 3 reports the effect of housing price changes on return on assets as a bank performance measure. The effect of housing price changes on return on assets was positive and significant in commercial banks and regional banks, but negative in specialized banks and not statistically significant. The impact of changes in housing prices on return on assets was greater in regional banks than on commercial banks. This is almost the same in BIS capital ratio. Macroeconomic variables such as GDP growth rate and call rate have shown no significant impact on banks' profitability. As Killins (2020) show, housing price volatility has little effect on the banks' profitability in Korea. Our findings that rising housing prices had a significantly positive impact on banks' profitability were the same as previous studies (Choi et al., 2011; Kim et al., 2012; Park and Bang, 2017), but this effect was not found in specialized banks.

Table 4 shows the effect of housing price changes on non-performing loans as a bank performance measure. The result shows that the coefficient of housing price was negative and significant in commercial banks and regional banks, but negative in specialized banks and not statistically significant. The effect of macroeconomic variables were not as significant as in previous cases. The coefficient of BIS capital ratio showed positive and significant in commercial banks, but it showed negative and significant in regional banks. As the proportion of household loans secured by collateral increased, non-performing loans decreased in all banks. However, the effect was sigficant only for commercial banks and specialized banks.

Table 3: EGARCH results: Return on asset as a bank performance measure

Explanatory Variables	Commercial banks	Regional Banks	Specialized Banks
Panel A: Mean equation			
Housing price	0.537(2.156**)	0.897(3.853***)	-0.268(-1.435)
GDP	-0.523(-1.586)	-0.682(1.603)	-0.079(-0.564)
Interest rate	-0.553(-1.470)	-0.482(-0.941)	0.349(1.547)
BIS capital ratio	0.269(1.876**)	1.063(3.057***)	-0.524(-2.465**)
Interest revenue	-0.383(-1.125)	-0.607(-1.426)	-0.167(0.285)
Loan constitution	-0.383(-2.075**)	0.442(1.256)	0.122(0.486)
Panel B: Variance equation			
β	0.793(7.303***)	0.817(5.331***)	0.856(5.940***)
γ	0.193(0.611)	0.178(1.234)	0.124(0.806)
δ	-0.185(-2.669)**	-0.078(-2.842**)	-0.216(-2.941***)
Housing price	5.706(1.364)	3.786(1.597)	0.941(1.568)
GDP	-0.623(-0.856)	-0.468(-0.647)	-0.169(-1.023)
Call rate	1.423(0.966)	-0.775(-0.634)	0.328(0.534)
BIS capital ratio	0.231(0.656)	0.564(0.871)	0.097(0.307)
Interest revenue	2.314(1.036)	1.984(1.222)	-0.036(-0.168)
Loan constitution	-4.336(-1.025)	0.876(0.645)	2.094(1.324)
$\overline{R^2}$	0.398	0.345	0.318

Table 4: EGARCH results: Non-performing loans as a bank performance measure

Explanatory Variables	Commercial banks	Regional Banks	Specialized Banks
Panel A: Mean equation			
Housing price	-0.408(-2.262**)	-1.068(3.881***)	-0.292(-1.106)
GDP	0.637(0.532)	0.203(1.216)	-0.072(-0.806)
Interest rate	-0.389(-1.053)	0.308(0.721)	0.092(0.857)
BIS capital ratio	-0.175(-5.673***)	0.298(2.050**)	-0.225(-0.375)
Interest revenue	0.023(0.633)	0.422(1.395)	-0.025(-0.951)
Loan constitution	0.729(4.049***)	0.374(1.282)	0.923(2.751**)
Panel B: Variance equation			
β	0.903(8.974***)	0.891(7.861***)	0.887(6.994***)
γ	0.631(0.871)	0.106(0.687)	0.110(1.036)
δ	-1.206(-4.848***)	-0.972(-3.645***)	-0.174(-5.002***)
Housing price	3.821(1.634)	1.638(0.842)	0.357(1.531)
GDP	1.069(1.537)	1.781(1.428)	3.674(1.934*)
Call rate	-0.354(-0.985)	3.216(1.314)	-0.859(-1.116)
BIS capital ratio	0.466(0.846)	-0.067(-0.098)	0.233(0.637)
Interest revenue	0.268(0.345)	0.785(0.964)	1.439(1.324)
Loan constitution	-0.036(-0.863)	0.852(0.237)	0.361(1.522)
$\overline{R^2}$	0.476	0.481	0.463

4. Conclusion

This paper analyzed the effect of housing prices on bank performance and whether the effects differ among commercial, regional and specialized banks in Korea.

Major empirical results are as follows. First, changes in housing prices positively and significantly affect banks' loans in commercial banks and regional banks. Second, the effect of housing price changes on banks' profitability was positive and significant in commercial banks and regional banks, but negative in specialized banks and not statistically significant. The impact of changes in housing prices on return on assets was greater in regional banks than on commercial banks. Third, the effect of housing price changes on non-performing loans was negative and significant in all banks, but the effect was not statistically significant in specialized banks. Finally, Banking performance has shown to be affected by bank characteristic variables rather than by macroeconomic variables.

After all, the above empirical results show that the effect of housing price changes on banking performance have different among the three types of banks in Korea. Therefore, our findings have important implications for Korean financial regulatory authorities to draw up policies and perform its supervisory functions.

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