Examine Banks' Share Price Sensitivity Due to Interest Rate Changes: Emerging Markets and Advanced Countries

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Abstract. This study examines the impacts of interest rate on banks' return in 14 international markets. This research covers seven financial ratios as dependent variables as well as the return of the bank. Moreover, size of the banks is a control variable. The sample of data is from 2001 until the end of 2010 and all the ratios collected annually. LM and Hausman test carried out and the results indicate that the data is Random Panel. The regression (OLS) results demonstrated that the behavior of banks towards the changes in interest rate heavily depends on the market that the banks are operating. Since there are several unique economical and financial characteristics for each country, the reaction of banks to changes in interest rate varies from one market to another. Regarding the size of the bank as control variable, only for five 5 out of 14 of countries there is a significant impact of size on the bank's return.

Keywords: Bank return, Interest rate, Financial ratios, Monetary policy, Emerging markets, Advanced markets, Bank risk, Control variable, Size of the bank, Total Assets

1. Introduction

According to big financial crisis in the prior decade such as mortgage and real estate crisis in 2008 to 2009 in US which have effected on some other countries and lead to some banks' runs in that times, CFO of commercial banks concentrated all of their efforts to manage as much as the risks exposed to their own banks. One of the most important risks which exposed to commercial banks is interest rate risk. In respect of commercial banks' nature of liabilities and assets maturities, there are difference between maturity of liabilities and assets of them that lead to affect by unexpected interest rate changes.

Market values of short term liabilities and assets change more than long term liabilities and assets because short terms liabilities and assets are more affected by variation on interest rates rather than long term liabilities and assets that have fixed interest rates. Hence for the banks that has different maturities between their liabilities and their assets, interest expenses and income change unequal when interest rates have been changed. These unequal changes in interest expenses and incomes effect on banks' share market value. Ghazanfari et al. (2006)

There are many factors which affect interest rate and cause to change on it. Monetary policies that implemented by central banks known as one of effective tools used to increase and decrease interest rate. CFO of Commercial banks need to know the effect of interest rate change based on central banks' monetary policies on the return of their banks to find the best solutions to minimize their interest rate risk and maximize their profits. These solutions approached by decrease the maturity gap between liabilities and assets.

CFOs of commercial banks apply some strategies to overcome the interest rate risk. These strategies are marketing strategy like advertising in media for increasing the deposit holders and increasing variable rate's loan, promotion policy and other marketing and financing strategies that are lead to decrease the interest rate gap.

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In this paper we examine two issues: first one is the effect of change in interest rate on return of commercial banks and second one is the strategies which CFOs of commercial banks used in order to overcome interest rate risk.

2. Literature Review

Chance and Lane (1980) didn't find strong evidence that impact of interest rate on return of financial institutions.

Flannery and James (1984) in their study survey the impact of interest rate change on commercial banks' return. They also determined some variables that measure the sensitivity of banks return to change in interest rate. They find that change in interest rate affect the return of commercial banks.

Also they find two variables determine the sensitivity of banks return on change in interest rate. These two variables are mismatch of liabilities and asset maturity and nominal assets held by commercial banks.

In the area of relation between bank risk and interest rate, Jimenz et al. (2007) and Brissimis and Delis (2009) are the authors who focused their studies on that issue. They consider the effects of change in monetary policies on return of bank risk. Jimenz et al. (2007) collect the data from banks in Spain and examine it on the long period. They illustrate that when the government implements expansionary monetary policy, the credit risk of banks become more than other times. Brissimis and Delis (2009) in their study focused on banks' responses to different monetary policies. They examine lending and decision of risk taking of banks during the change in monetary policies.

Stone (1974), Lloyd and Shick (1977), Lynge and Zumwalt (1980), Chance and Lane (1980), Flannery and James (1984), Booth and Officer (1985), Scott and Peterson (1986), and Bae (1990). Choi et al. (1992), Song (1994), Neuberger (1993), Wetmore and Brick (1994), Elyasiani and Mansur (1998); Tai (2000) and Elyasiani and Mansur (2004) are other authors who have study on relationship between return of commercial banks and change in interest rate.

3. Data and Methodology

This research aims to examine the impacts of interest rate on some specific ratios of banks in 14 international markets including Australia, Canada, Denmark, France, Hong Kong, India, Italy, Japan, Malaysia, Norway, Spain, Switzerland, the UK, and the US. This study covers seven ratios and the sample size of this study includes 2001 until 2010 annual data. As the availability of the data is limited, each market has a different number of banks. The financial data in this study gathered from Datastream database. Since the data is Panel, the first test is LM test and it is conducted in STATA to distinguish the exact type of the panel. The result of STATA indicates that the data is not pooled panel, so the panel of data should Random or Fixed. The next test is the Correlated Random Effects Hausman Test in EViews to identify whether the data is Random or Fixed. The P-value of Chi-Sq is above 0.05 for all of the data demonstrating that the data of this research is Random Panel data. Next, Ordinary Least Square (OLS) method is carried out by adjusting the Panel as Random in EViews. As there are seven ratios for each bank, there would be seven equations for each country as follows:

$$R_1 = \alpha + \beta_1 IR + \beta_2 \log(TA)$$
$$R_2 = \alpha + \beta_1 IR + \beta_2 \log(TA)$$
$$R_3 = \alpha + \beta_1 IR + \beta_2 \log(TA)$$
$$R_4 = \alpha + \beta_1 IR + \beta_2 \log(TA)$$
$$R_5 = \alpha + \beta_1 IR + \beta_2 \log(TA)$$
$$R_6 = \alpha + \beta_1 IR + \beta_2 \log(TA)$$
$$R_7 = \alpha + \beta_1 IR + \beta_2 \log(TA)$$

Where R_i is the ratio for each bank; α is the intercept; $\beta_{1,2}$ are the coefficients for independent variables; IR is the specific Interest rate for each country; and Log(TA) is the logarithm of the Total Asset of each bank

to measure the size is considered as a control variable in this research (Delis & Kouretas, 2011). The interest rate is based on 1-year interbank rate for each country.

4. Analysis and Results

For each market, the regression is carried out for the above-mentioned equations. The results of regression analysis are explained here in terms of R-squared and P-value of the coefficients. Analysis of the impacts of interest rate on financial ratios is provided first, and at the end, the analysis of influence on bank return is given[‡]. Regarding the whole model, the F-statistic and P-value indicates that for most of the ratios and countries, the model is fit and fails to reject at 0.05 or 0.1 level; however, there are some exceptions. Turning to the financial ratios, the R-squared varies from 0.67 to zero. Overall, the movements of interest rate and the size of the bank can explain around 17% of the behaviour of the ratios. With some exceptions, the P-values of interest rate and the size of the bank are statistically significant at either 0.1 or 0.05 percent level. The analyses of ratios are as follows:

$$R_1 = \frac{Net\ Interest\ Income}{Re\ venues}$$

Turning to R_1, the R-squared is definitely high for all the samples except for India, Italy, and Switzerland. The average R-squared for the rest of the samples is around 0.40, which means that around 40% of the movements of the R_1 can be explained by interest rate and the size of the bank. About the interest rate, it is strongly significant for most of countries at 0.05 percent level except for India and Switzerland and it has negative impacts on the ratio R_1. Regarding the total asset, that reflects the size of the bank, for few countries it is not acceptable even at 0.1 percent level. However, it is statistically significant at 0.05 percent level for Denmark, France, Hong Kong, Norway, Spain, Switzerland, the UK, and the US. Furthermore, the negative sign of the coefficient reveals that the size of the bank has reverse impacts on the ratio R_1. This means that as the size of the bank increases, the growth of interest income is less than the growth of the bank's revenue.

$$R_2 = \frac{Common\ Shareholders'\ Equity}{Total\ Asset}$$

The overall R-squared for R_2 is around 0.14 meaning that 14% of overall behaviour of R_2 can be explained by the two independent variables, interest rate, and the size. With the exceptions of India, Italy, Norway, and Switzerland, for the rest of the 10 countries interest rate is strongly significant at either 0.1 or 0.05 percent level. Surprisingly, the coefficient of interest rate is positive for two countries namely, Japan, and the US, and it is negative for the rest of the markets. The size of the bank is significant for most of the markets excluding five of them namely Australia, Japan, Malaysia, Norway, and Spain. Same as interest rate, there is an adverse influences of the size on the ratio R_2 for few countries and a positive impacts for most them.

$$R_3 = \frac{Net\ Loans}{Total\ Deposits}$$

Regarding the R-squared, the movements of interest rate and the size of the bank can explain almost 12% of the changes of ratio R_3. For those P-values of interest rate that are less than 0.1, accepted by either by 0.1 or 0.05 percent level, interest rate has positive effects on the ratios of the banks. Surprisingly, the impacts of the size vary from positive to inverse from one market to another one.

$$R_4 = \frac{Total\ Debt}{Common\ Shareholders'\ Equity}$$

As illustrated by R-square, around 15% of the behaviour of the financial ratios can be explained by the fluctuations in interest rate and the size of the bank. Interest rate has a positive impact on ratio R_4 except for

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[‡] All the data and tables of the results are available upon the request from the corresponding author.

Japan that the coefficient is -5.620931. Regarding the size, Malaysia, India, and France get an opposite effect from the size while the rest of the markets size of the banks affect the ratios positively.

$$R_5 = \frac{Net\ Loans}{Total\ Asset}$$

Overall R-square indicates that roughly 22% of movements of the ratios is explained by the changes of interest rate and total asset of the bank. Interest rate has positive impacts on the financial ratios. On the other hand, size of the bank negatively affects the bank and only for India, the size has a positive effect on ratios (0.1402).

$$R_6 = \frac{\Pr ovision\ for\ loan\ losses}{Net\ Loans}$$

The overall R-squared for ratio R_6 shows that around 14% of the movements of the ratio can be explained by the changes of interest rate and total asset of the bank. Interest rate negatively affects the ratio while the impact is positive for Norway and Switzerland. The size of the banks influence the ratio positively however the impact is opposite for three markets namely India, Japan, and Malaysia.

$$R_7 = \text{Re}\,turn\,on\,Equity\,(\%)$$

The overall R-squared for ratio R_7 is near 9%. The results demonstrates that the interest rate positively affect the ratio though there are three exceptions including India, Norway, and Switzerland. Turning to the size of the bank, results illustrates that for eight out of fourteen markets the P-value is not significant even at 0.1 percent level. For the remaining six countries, the impact of the total asset on the ratio is positive for four of them and negative for the UK and Italy.

In order to have broader view about the impacts of interest rate and the size of the bank on bank, the effects of interest rate and the size on bank return examined. The equation is as follows:

$$BR = \alpha + \beta_1 IR + \beta_2 Log(TA)$$

The P-value of Denmark, Hong Kong, India, and Spain are above 0.1 percent level. For the rest of the ten markets, for five of them namely Australia, Japan, Malaysia, Switzerland, and the US both interest rate and total asset are significant. About the remaining ones, either interest rate or the size of the bank is significant. Surprisingly, the coefficients of the variables have different signs for different markets.

5. Conclusion

This research investigates that how a bank react to changes in interest rate and the size of the bank. In order to take the reaction of the bank into consideration, seven financial ratios as well as the bank return set as dependent variables. The study covers the banks of 14 international markets from 2001 until 2010. Results demonstrated that the behaviour of banks is different from one market to another one for each ratio. In terms of bank return, the interest rate positively affects the return of the banks with the exceptions of Norway, India, Japan and Denmark. As the results presented, most of the countries have the same behaviour towards the changes in interest rate; however, few of them are not in line namely India, Switzerland, Japan, Denmark, and Norway. Regarding the size of the banks, for each ratio the impact depend on the market itself, which means that the size affect the financial ratios differently for each market. Hence, it is not practical to reach a comprehensive conclusion for all of the markets. However, the conclusion should be separately considered for each market due to specific banks' characteristics, national monetary policy and the particular economic determinants in each country. The results of this study are definitely useful and helpful for practitioners in stock markets, fund managers, individual and institutional investors and the researchers who are interested about the banks' performance.

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7. References

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