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## Research on the impact factors of Chinese state-owned commercial bank investment returns

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### ABSTRACT

As one of the three major decisions of financial activities, the investment is an important factor to the survival and development for a company. Investors have a particular concern for the influencing factors of investment returns, especially the national state-owned commercial bank which is the key industry to keep the nation financial system security and stability. In order to analyze the influencing factors of Chinese state-owned commercial banks, this paper chooses quarterly data since 2006 of the four Chinese state-owned commercial banks to analyze statistically, and uses software excel and Eviews6.0, constructs an empirical research based of ordinary least squares regression, and finally concludes that there is a significant correlation between investment returns and considering stock returns of cash dividends, earnings per share, return on assets, return on equity, net profit growth, equity ratio, which provides some important information for investors.

### KEYWORDS

Commercial bank; Investment returns; Regression analysis.



## INTRODUCTION

Investment decisions, financing decisions and allocation decisions are known as the three modern financial decisions. In terms of the modern corporate finance, the decisions about investment activities are the most important, because only investment activities can really make a listed company generate cash flows. In fact, the company's financial activities are serving for the investment activities, and dividend distribution activities may be possible only after the investment profits. Welch<sup>[1]</sup> argued that the fundamental purpose of corporate finance was not trying to raise the funds required in investment activities, but the capital allocation to the highest efficiency of the investment in the project. The banking industry is a key industry in the nation financial system, and the state-owned commercial banks occupy half of the banking industry, and it is the backbone of national economy development. State-owned commercial banks attract the attention of investors because of its good asset quality and high growth of profits. As a result, its investment returns become a problem which investors concerned about most.

Investment is one of the three major financial activities for a company, and it is very important for a company. Xiong Hang<sup>[2]</sup> introduced the method of calculating the return on investment with an example of Nanchang real estate investment. Fairley W B<sup>[3]</sup> made an empirical analysis about the relation between investment income and profit margins in property-liability insurance. Feltham-Ohlson<sup>[4]</sup> established a F-O model on the basis of the company's financial statements, which became the classic models for the company's investment returns and empirical study. Yang Yang, Yao Meng, Lin Shuang<sup>[5]</sup> selected stock index, bond index and fund index to study affecting factors of company's investment returns, made an empirical analysis with views software, and concluded that stock index and investment returns had significant impact. Zhou Xiaohua, Fu Nengpu<sup>[6]</sup> used panel data made the regression analysis on the individual stocks in China A-share market, and found that market value and book value ratio, net operating assets, price-to-book and management costs had a significant influence on stock returns.

In the study of bank investment returns, Mukherjee et al<sup>[7]</sup> concluded that dividend rate, expected growth rate and future earnings risk had strong ability of explanation to the bank's share price based on multivariate analysis. Beaver<sup>[8]</sup> built a two-stage model, studied the impact on stock price from the defaulted loans, loans and loan portfolio. Barth<sup>[9]</sup> made a regression from net income, equity book value and the market value of the bank, and concluded that the bank's financial information and stock price had highly relevant. Subramanyam<sup>[10]</sup> concluded that accounting earnings, operating cash flow effect the bank equity value based on analysis of historical data. Gao Yinchao Yu Bo<sup>[11]</sup> based on F - O model, made an empirical research on the influences of stock price from the residual income, net worth, non-performing loans and capital adequacy ratio of the listed banks since 1999, finally found that net assets and residual income had the all explain ability. Rosen R J, Lloyd-Davies P R, Kwast M L, et al<sup>[12]</sup> found New banking powers, which was a portfolio of bank investment in real estate.

Throughout the above researches, it can be found that there is almost no about the factors of commercial banks investment returns, neither the empirical research. But those factors are of particular interest to investors, even may directly affect their investment decisions, therefore it is very important to study the factors of the commercial banks investment returns. This article is trying to study this problem, and selects the four state-owned commercial banks namely Bank of China, Industrial and Commercial Bank of China, China Construction Bank, Agricultural Bank of China as the research object, based on econometric theory, using the method of ordinary least squares regression, analyzes its factors. This paper first introduces the research background and literature review and research significance, followed by theoretical explanations and indicators selection, and then analyzes using ordinary least squares regression, and the final is the conclusion.

## THEORETICAL ANALYSIS AND VARIABLES SELECTION

Investment refers to the business act or process that put the valuable asset, including money, manpower and intellectual property into a company, project or economic activity in order to obtain economic returns. Enterprise's investment activities can obviously divided into two categories: First, the

internal enlarged reproduction, that is to acquire fixed assets, intangible assets and other long-term assets; the other is the external expansion, namely external equity, cash debt payments.

In order to evaluate the investment returns, this paper chooses the return on equity (ROE) as the standard, that is to say ROE is the dependent variable. ROE is the percentage of net profit and average shareholders' equity is the percentage of profit after tax divided by net assets. The indicator reflects the level of equity returns. The higher the index is the higher returns the investment brings.

To measure the impact of factors of investment returns, the paper selects earnings per share (EPS), net assets per share (NAPS), return on assets (ROA), return on equity (ERN), net profit growth (NPG), shareholders' equity ratio (ERO), profit cash ratio (PCR), and quarterly return on equity considering cash dividends (QSR) as explanatory variables.

Earnings per share refer to the ratio of after-tax profit and total equity. It is an important indicator which comprehensively reflects the profitability of the company. The net asset per share is the ratio of shareholders' equity and total number of shares. This indicator reflects the present value of a share. The higher the net asset per share is, the more present value owned by the shareholders. Return on assets is the ratio of pre-tax profits and average total assets, which is an important indicator to evaluate the overall corporate profitability. Return on equity is the ratio of after-tax profits of the company and its share capital, shows an average net profit per hundred acquired. Net profit growth is the growing rate that the current period than the previous period, the larger the index value, the stronger the profitability of the business representatives. Shareholders' equity ratio is the ratio of shareholders' equity to total assets. Profitable cash ratios is the ratio of net operating cash flow and net profit, the greater the ratio is, the stronger the quality of corporate earnings.

## THE CONSTRUCTION OF THE MODEL

First, introduce the data sources. In this paper, the data of stock returns is from GTA CSMAR database, and the others are from sina finance and economics online. In order to avoid the special circumstances of individual banks, have a better stability result, this paper selects the data of the four major state-owned commercial bank, those are the Bank of China, Industrial and Commercial Bank of China, China Construction Bank, Agricultural Bank of China. This paper selects 30 sample data from the third quarter of 2006 to the fourth quarter of 2013, first sort out each bank's data with Excel2003, and then calculates all the indicators average of the four banks, the data result is in appendix.

Then construct the model. Least squares method is a kind of mathematical optimization techniques. It matches the data by minimizing the sum of squared errors to find the best function. Using the least square method can easily solve the unknown data, and make the error between the calculated and the actual data minimum. This paper chooses return on equity (ROE) as the dependent variable, and the earnings per share (EPS), net assets per share (NAPS), return on assets (ROA), return on equity (ERN), net profit growth (NPG), shareholders' equity ratio (ERO), profitable cash ratio (PCR), and quarterly return on equity considering cash dividends (QSR) as the explanatory variables, selects Eviews6.0 software to build models. Practical result achieved by stepwise regression method is as follows:

Dependent Variable: ROE				
Method: Least Squares				
Date: 04/14/14 Time: 10:14				
Sample: 2006Q3 2013Q4				
Included observations: 30				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.150435	1.565940	4.566518	0.0001
QSR	-11.22628	2.766556	-4.057852	0.0005
EPS	33.11852	3.677054	9.006808	0.0000
ROA	14.47213	1.011017	14.31443	0.0000
ERN	-0.301082	0.035396	-8.506212	0.0000
NPG	-0.018431	0.006149	-2.997281	0.0064
ERO	-1.033969	0.233986	-4.418943	0.0002
R-squared	0.977199	Mean dependent var	12.53437	
Adjusted R-squared	0.971250	S.D. dependent var	4.943623	
S.E. of regression	0.838226	Akaike info criterion	2.685907	
Sum squared resid	16.16034	Schwarz criterion	3.012853	
Log likelihood	-33.28860	Hannan-Quinn criter.	2.790500	
F-statistic	164.2848	Durbin-Watson stat	1.698766	
Prob(F-statistic)	0.000000			

**Figure 1 : Result of the regression analysis**

Then construct the preliminary model:

$$\text{ROE} = 7.16 - 11.22\text{QSR} + 33.12\text{EPS} + 14.47\text{ROA} - 0.30\text{ERN} - 0.02\text{NPG} - 1.03\text{ERO}$$

$$(4.57) \quad (-4.06) \quad (9.01) \quad (14.31) \quad (-8.51) \quad (-3.00) \quad (-4.42)$$

$$R^2 = 0.9772, F = 164.28.$$

$R^2$  is 0.9772, indicating the goodness of fit of the model is 97.72%, it means that 97.72% of ROE can explained by QSR, EPS, ROA, ERN, NPG and ERO. And  $164.28 > F_{0.05}(6,23) = 2.53$ , proving that the regression equation passes the F test.  $t_{0.05/2}(23) = 2.07$ , so that all single variables of the regression equations pass the t test.

**APPENDIX**

date	ROE	QSR	EPS	NAPS	ROA	ERN	NPG	ERO	PCR
2006Q3	8.34	13.83	0.14	7.72	0.75	15.00	-1.22	0.00	0.69
2006Q4	10.54	27.70	0.20	5.44	1.46	133.14	17.03	0.23	1.09
2007Q1	4.41	12.48	0.13	7.09	2.50	16.22	2.32	-0.01	0.31
2007Q2	12.42	33.28	0.22	6.32	2.13	37.01	2.43	-0.03	0.89
2007Q3	15.27	34.27	0.34	6.72	2.28	24.41	1.74	0.08	0.94
2007Q4	16.75	59.34	0.32	1.76	0.28	185.63	2.10	0.05	1.61
2008Q1	5.97	10.92	0.11	6.74	1.79	73.79	1.05	-0.09	0.40
2008Q2	11.44	27.75	0.20	6.50	1.77	54.93	0.68	-0.05	0.98
2008Q3	15.53	29.42	0.29	6.69	1.86	38.97	0.81	-0.05	1.03
2008Q4	17.38	39.90	0.25	5.91	1.69	23.00	4.34	-0.06	1.36
2009Q1	4.89	9.80	0.10	5.99	1.98	-9.44	2.04	0.04	0.29
2009Q2	10.15	21.70	0.20	5.71	1.96	-1.68	-0.75	0.12	0.81
2009Q3	14.71	28.09	0.28	5.87	2.06	5.16	0.88	-0.03	0.85
2009Q4	18.24	48.63	0.36	5.42	1.94	22.30	1.34	0.04	1.33
2010Q1	5.83	11.98	0.12	5.36	2.28	31.32	7.70	-0.02	0.31
2010Q2	11.73	33.54	0.23	5.16	2.00	26.69	3.82	-0.06	0.84
2010Q3	15.49	34.97	0.35	5.68	2.20	29.86	3.20	0.00	0.88
2010Q4	18.30	56.89	0.44	6.07	2.28	32.32	1.37	0.01	1.49
2011Q1	5.84	14.34	0.14	6.07	2.43	31.92	4.12	0.02	0.35
2011Q2	11.66	37.44	0.28	5.83	2.40	33.67	1.88	0.01	0.88
2011Q3	16.57	42.49	0.42	6.06	2.53	29.95	1.87	-0.04	1.00
2011Q4	19.65	70.16	0.53	6.20	2.64	24.58	1.47	0.02	1.61
2012Q1	5.77	16.34	0.16	6.12	2.82	15.16	9.06	0.01	0.34
2012Q2	11.39	42.76	0.32	5.98	2.80	13.69	5.82	-0.01	0.88
2012Q3	16.17	48.37	0.48	6.29	2.96	14.08	3.41	-0.02	1.01
2012Q4	19.49	81.10	0.60	6.42	3.06	14.86	2.08	0.04	1.67
2013Q1	5.55	18.24	0.18	6.46	3.26	11.09	1.25	0.00	0.36
2013Q2	11.27	52.92	0.36	6.31	3.20	12.99	-0.68	0.00	1.02
2013Q3	15.96	54.21	0.54	6.52	3.36	12.44	0.29	0.00	1.04
2013Q4	19.37	91.66	0.67	6.62	3.45	12.08	0.44	-0.01	1.73

**THE TEST OF THE REGRESSION MODEL**

Regression model is based on three assumptions including linear, unbiased and minimum variance. So after the model parameter estimation, we need to check whether the parameter is reliable, whether conform to the theory, so the model need to be tested by heteroscedastic, autocorrelation and multicollinearity test.

One of the assumptions of the regression model is that it has the same variance, and thus we need to test the model by heteroscedasticity test. White method is used to test the model, the results is shown in Figure 2:

Heteroskedasticity Test: White			
F-statistic	6.498702	Prob. F(27,2)	0.1419
Obs*R-squared	29.66191	Prob. Chi-Square(27)	0.3296
Scaled explained SS	26.61465	Prob. Chi-Square(27)	0.4847

Figure 2 : Heteroscedasticity test

From the figure we can know Obs\*R-squared is 29.66, and  $TR^2=29.66 < \chi_{0.05}^2(27) = 40.113$ , so this model passes the White test, and there is no heteroscedasticity in this model.

One of the basic assumptions of the regression equation is that there is no autocorrelation between the variables, so autocorrelation test is carried out on the model. In this paper, LM test method is used to test the model. The result is shown in figure:

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.321576	Prob. F(1,22)	0.5764
Obs*R-squared	0.432195	Prob. Chi-Square(1)	0.5109

Figure 3 : Autocorrelation test

At the case of  $\alpha$  is 5%, a degree of the freedom is 1, the  $LM=TR^2=0.432 < \chi_{0.05}^2(1) = 3.841$ , so the model passes the LM test, and there is no autocorrelation.

Test the model with Klein discrimination method to see whether it exits multicollinearity, we can see from the result that the correlation coefficient between the variables are all less than 97.72%, so the model passes the multicollinearity test.

Correlation							
	ROE	QSR	EPS	ROA	ERN	NPG	ERO
ROE	1.000000	0.004220	0.852687	0.926266	0.854140	0.080289	-0.188501
QSR	0.004220	1.000000	0.005552	0.139182	0.039050	0.294868	-0.253033
EPS	0.852687	0.005552	1.000000	0.805144	0.940808	-0.114091	0.004691
ROA	0.926266	0.139182	0.805144	1.000000	0.908643	0.252961	-0.276361
ERN	0.854140	0.039050	0.940808	0.908643	1.000000	0.059273	-0.176706
NPG	0.080289	0.294868	-0.114091	0.252961	0.059273	1.000000	-0.679589
ERO	-0.188501	-0.253033	0.004691	-0.276361	-0.176706	-0.679589	1.000000

Figure 4 : Multicollinearity test

As a result, after the overall test (F test, t test), heteroscedasticity, autocorrelation and multicollinearity test, finally construct the regression model:

$$ROE=7.16 - 11.22QSR + 33.12EPS +14.47ROA - 0.30ERN - 0.02NPG - 1.03ERO$$

$$(4.57) (-4.06) (9.01) (14.31) (-8.51) (-3.00) (-4.42)$$

$$R^2=0.9772, F=164.28.$$

After the above regression analysis, it can be found that there is a significant correlation between quarterly return on equity considering cash dividends, earnings per share, return on assets, return on equity, net profit growth, equity ratio and ROE, and that is the impact indicators of investment returns.

At the same time in the research process there are also some shortcomings: ROE is just one of the indicators that can reflect investment returns, so this paper selects ROE to measure the returns on investment companies is not comprehensive. Secondly, the explained variables in this paper are all from a financial point of view, and do not consider the other qualitative factors.

## CONCLUSIONS

With the development of social economy, investment activity is becoming a new focus in the corporate finance activities. An empirical analysis of the influence factors on investment returns can provide certain references for investors, and can make enterprise investment activities more efficient, thus has the vital significance. This article is to cater to this hot spot, through the regression analysis of the four major state-owned Bank of China, and can get the following conclusions: there is a significant correlation between quarterly return on equity considering cash dividends, earnings per share, return on assets, return on equity, net profit growth, equity ratio and ROE, and that is impact indicators of investment returns. Therefore, corporate or individual investors should focus on the quarterly return on equity considering cash dividends, earnings per share, return on assets, and return on equity, net profit growth and equity ratio when making investments.

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