Determinants of Profitability of China's Domestically Listed Commercial Banks: Panel Evidence for the Period between 2007-2012

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Abstract—**The purpose of this study is to explore the determinants of 16 China domestically listed commercial banks' profitability over period 2007-2012. This research selects the net interest margin, profit margin and Tobin's q as proxies of the bank profitability, which are measured by three categories: internal determinants, industry-specific determinants and macroeconomic determinants. Panel data model was used to analyze how the determinants affecting the bank's profitability and some recommendations of improving the bank's profitability are provided.**

Keywords—*Commercial Banks, Profitability, Fixed Effect Model, Panel Data, Tobin's q*

I.   Introduction

Since 1978, there was no market-based financial system in China. The People's Bank of China (hereinafter referred to as PBOC) as the only one bank in China which functioned as the central bank and the commercial bank. In 1979, a two-tier banking system was introduced with the four state-owned commercial banks: Bank of China (BOC), China Construction Bank (CCB), Agricultural Bank of China (ABC), and Industrial and Commercial Bank of China (ICBC) established. From 1984, the PBOC began to operate as the central bank and the Big Four state-owned commercial banks (SCOBs) took over the commercial banks services from the PBOC. In 1986, the first state-owned joint-equity bank was established, which is Bank of Communications (BOCCOM). After that, there are many new types of banks which were created such as national joint-stock banks, city commercial banks, urban and rural credit cooperatives and etc. In 2003, another supervisory institution was established which is the China Banking Regulatory Commission (hereinafter referred to as CBRC). According to annual report of the CBRC, there are five large commercial banks, three policy banks & the CDB, 12 joint-stock commercial banks, 144 city commercial banks, 337 rural commercial banks, 42 foreign financial institutions and etc. until end of 2012. There are 14 commercial banks listed in the

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Shanghai Stock Exchange (SSE) and two listed in the Shenzhen Stock Exchange (SZSE).

From 2007, in order to control inflation and stimulate economic development, the PBOC used tight monetary policy to justify the money supply. The major fund of banks which are deposits decreased, people preferred to hold cash on hand rather than save it in the bank. On the other hand, higher reserve ratio will reduce funding of banks and the profits from loans. So, banks are having limited money to lend. In the end of 2012, the balance of foreign and RMB currency denominated loans in all financial institutions increased by RMB 9.1 trillion and compared with the beginning of the year of RMB 67.3 trillion which is growth 15.6%. The balance of RMB denominated loans was RMB 63 trillion, accounting for 93.6% of total loans. The scales of credit growth indicated that China banking sector asset quality are facing greater challenges.

Affected by the global financial crisis since 2009, the domestic economy remains in the doldrums, the aftermath of the economic stimulus gradually reducing. According to CBRC's data [1], the balance of non-performing loans (NPLs) held by domestic commercial banks were gradually increasing since the third quarter of 2011, and as of the end of 2012. In addition, the ratio of non-performing loans decreased slightly for large state-owned commercial banks, while commercial and rural commercial banks had a sharper percentage increase of 0.12% and 0.16% respectively. The rebound of NPLs indicates that the lenders or corporates delay long time repayments or had no capacity to pay; The serious situation will lead to the bank's bankruptcy as the asset quality is more important in the current situation.

According to the Operation Report of the Banking Industry of China [2], the macro-control policies are more benefits for small and rural commercial banks. In contrast, with the economic growth of China slowdown, liberalization of interest rates and increased regulatory capital control had curbed the profit growth of listed commercial banks in China. The large state-owned and joint-stock banks are losing the three natural advantages "monopoly capital, the statutory interest rate and huge customer demand". Thus, the trend of current situation and policies do not benefit for large and joint-stock commercial banks.

The financial innovation of capital markets, non-financial institutions and even the electronic business platform has a shunt effect on banks' capital. Especially accelerate the pace of liberalization of interest rates reform. The marketization of deposit interest rate and the gradual narrowing of interest spreads will reduce the profitability of commercial banks.

Make bank easily falls into tight liquidity situation. So, how to transform the current operating model and reshaping its profit structure to achieve the sustainable development for large and joint-stock commercial banks are more important. Thus, the researcher is interested in what factors and how they affect the listed commercial bank's profitability.

This research focuses how core tier one capital (CARI), liquidity ratio (LTA), demand deposit ratio (DETA), current ratio (CR), bank size (SIZ), dividend yield (DIY), market concentration (C5), banking sector development (BSD), stock market development (SMD), inflation rate (INF), interest rate (INT), unemployment rate (UER) will influence profitability which proxied by net interest margin (NIM), profit margin (PBT) and Tobin's q (TQ). Also, the researcher will test the correlation to investigating the multicollinearity for this study. The researcher targets 16 listed commercial banks currently available in the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) from 2007 to 2012. The annual financial report will be used. These 16 banks are chosen because they are generating profits more than 80% profit volumes of the whole banking industry.

II. Literature Review

A. *The Bank's Profitability*

The main goal for most businesses is to earn profit. If the business is not profitable, it will hardly survive in the long term operation period. Hence, the profitability is the most important variable to measure the success of the business[3].

In the finance area, profit is from trading in financial assets which is redistributing the loanable capital; the surplus value under the contemporary capitalist economies [4]. Rose [5] defined that the bank's profitability as the net income after tax or net earnings of a bank which is normally divided by a measure of bank size. There are several methods to measure the profitability in the banking industry such as return on assets (ROA), returns on equity (ROE), and net interest margins (NIM) are widely employed in the literature to measure the bank's profitability [6], [7]. On the other hand, the bank's profit before tax to total assets (PBT) is also considered as indicator to measure the bank's profit margin [8]. Wernerfelt and Montgomery [9] mentioned that Tobin's q (TQ) as an important indicator to measure the listed firm's performance. In this study, NIM, PBT and TQ was used.

i. **Net Interest Margin (NIM):** NIM is interest income minus interest expenses over total assets [8], higher NIM can measure higher the bank's profitability performance. The calculation of NIM is shown in (1).

NIM = (Net Interest Income – Net Interest Expenses) / Average Earning Assets   (1)

ii. **Profit Margin (PBT):** PBT is the ability of banks to diversify their investment portfolios in order to generate higher profits [8]. It is computed from the income statement of bank annual report which is the bank's before tax profit divided by total assets. The calculation of PBT is shown in (2).

PBT = Before Tax Profit / Average Total Assets   (2)

iii. **Tobin's q (TQ):** TQ was developed by James Tobin. It can predict whether the capital investment in the future will increase or decrease. If the value of q ratio is less than one, it indicates the investment in assets is not attractive. On the contrary, if the value of q ratio is greater than one, it means the investment in assets generates earnings which provide a higher value compared to investment spending [10]. The calculation of TQ is shown in (3).

TQ = (Share price * No. of shares outstanding) + Preferred stock + (Current liabilities – Current asset + Book value of long term debt) / Total Assets   (3)

B. *Internal Determinants*

The banks internal determinants, which are used to analyze the bank's profitability from banks internal environment. In this study, CARI, LTA, DETA, CR, SIZ and DIY are the determinants to measure the bank's profitability.

i. **Core Tier One Capital (CARI):** CARI ratio shows the assets of the depositors and creditors suffer losses in the commercial banks and how banks use their own capital to bear the extent of losses [11]. A higher ratio means strong ability to withstand losses or financial risks, less need of external funding, and then results in higher profit. The calculation of CARI is shown in (4).

CARI = Bank's Core Equity Capital / Total Risk-weighted Assets   (4)

ii. **Liquidity Ratio (LTA):** LTA shows the percentage of the bank's total assets is tied up in bank net loans. So, the liquidity ratio is equal to net loans divided by total assets [7]. Higher liquidity ratio may indicate the bank with good performance. The calculation of LTA is shown in (5).

LTA = Net loans / Total Assets   (5)

iii. **Demand Deposit Ratio (DETA):** DETA shows the percent of deposits compared with the banks total assets. The main source of banks funding is deposits and deposits are also considered as the lowest cost for funds. The more bank deposits transformed to bank loans, the higher bank interest margin and profit [11]. The calculation of DETA is shown in (6).

DETA = Total Demand Deposits / Total Assets   (6)

iv. **Current Ratio (CR):** CR is normally used to measure the firm's short-tern solvency which is the ability of the firm to meet the requirements of its debt at the maturity. The calculation of CR is shown in (7).

CR = Current Asset / Current Liabilities   (7)

v. **Bank Size (SIZ):** SIZ generally used to capture the potential economic or non-economic of scale in the banking sector. This variable also controls for the cost difference, product and risk diversification [12]. Masood and Ashraf [13] mentioned the total assets of a

bank are used as a proxy for bank size and bank size is represented by the natural logarithm of total assets.

vi. **Dividend Yield (DIY):** DIY indicates the rate of shareholders' income earning on shares based on the market values. Wood and Sangster [14] defined that the dividend yield ratio is used to measure the firm's performance by comparing the dividend paid related to the market price of a share. The calculation of DIY is shown in (8).

DIY = Dividend per Share / Market Price per Share   (8)

C. *Industry-specific Determinants*

The industry-specific determinants are used to analyze the bank's profitability from the whole of China's banking industry. C5, BSD and SMD were used as indicators to the industry-specific.

i. **Market Concentration ratio (C5):** C5 is the indicator to measure the percentage of market share in an industry held by the largest firms within that industry. It can use three or five largest banks' assets to the total assets of the whole banking industry in one country [15]. Tan and Floros [12] explained that concentration in China banking industry measured by the largest five banks assets divided by total assets of the whole banking industry. In this study, the data of five largest Chinese state-owned banks were used to measure the concentration ratio particularly for Chinese banking industry. The calculation of C5 in China is shown in (9).

C5 = Total assets of five major stated owned commercial banks / Total assets of the whole banking industry   (9)

ii. **Banking Sector Development (BSD):** The size of banking industry can be measured by the ratio of total assets of a bank to gross domestic product (GDP) [8]. Banking sector development plays a vital role in the economy; it may be reflected more intensely in the well-developed financial system country [16]. The calculation of BSD is shown in (10).

BSD = Bank Assets / Gross Domestic Product   (10)

iii. **Stock Market Development (SMD):** SMD refers to the shares of the listed company's value to GDP in percent [15]. SMD is considered as an important indicator for the bank's profitability. Under a well-developed stock market, the higher SMD ratio will reduce the business risk and generate higher profits for banks [16]. The calculation of SMD is shown in (11).

SMD = Market Capitalization of Listed Companies / Gross Domestic Product   (11)

D. *Macroeconomic Determinants*

The macroeconomic determinants are used to analyze the bank's profitability from the macroeconomic environment. The macroeconomic determinants in this study were represented by INF,INT and UER.

i. **Inflation Rate (INF):** INF shows the percentage change in the price level from the previous period [17]. Colander [18] supplemented that the price level is an index of all prices in the economy and CPI is frequently used as the index of inflation. CPI measures the prices of a fixed basket of consumer goods, weighted depending on the each component's share of an average consumer's spending.

ii. **Real Interest Rate (INT):** INT is the rate of interest that depositors or investors expect to receive after deducting the effect of inflation [17]. The low real interest rate environment combined with the fierce competition between banks may limit the possibility of banks and establish the suitable price for their loans and deposits, putting pressure on its operating profit margins will also bring a negative impact on the profitability of banks [19]. The calculation of INT is shown in (12).

INT = Nominal Interest Rate - Inflation Rate   (12)

iii. **Unemployment rate (UER):** UER is the percentage of the labor force which is unemployed [17]. Normally, unemployment rate is an important indicator to estimate the economy's health. Higher unemployment rate will influence the cash flow streams of households. Also, higher unemployment rate is a signal to indicate that when production decreases effective demand reduces; thus, this situation will lead to a decrease in the firm's revenues. Moreover, the unemployment rate increases which could decrease the aggregate demand and increase the loan default rate; thus, higher unemployment rate will impact the firm's profit [20].

III. **Research Framework and Methodology**

A. *Research Framework*

Based on the reviewed literature in previous section, a conceptual framework was developed to investigate the relationship between three kinds of determinants and the profitability of banks. The framework is shown in Fig. 1. There were 12 hypotheses formulated based on the framework and they are shown as follows:

- H1: There is a significant relationship between core tier one capital and the bank's profitability.

- H2: There is a significant relationship between liquidity ratio and the bank's profitability.

- H3: There is a significant relationship between demand deposit ratio and the bank's profitability.

- H4: There is a significant relationship between current ratio and the bank's profitability.

- H5: There is a significant relationship between bank size and the bank's profitability.

- H6: There is a significant relationship between dividend yield and the bank's profitability.

- H7: There is a significant relationship between market concentration and the bank's profitability.

- H8: There is a significant relationship between banking sector development and the bank's profitability.

- H9: There is a significant relationship between stock market development and the bank's profitability.

- H10: There is a significant relationship between inflation rate and the bank's profitability.

- H11: There is a significant relationship between interest rate and the bank's profitability.

- H12: There is a significant relationship between unemployment rate and the bank's profitability.

B. *Research Methodology*

The main objective of this study is to investigate and evaluate the effects of determinants on the bank's profitability. The descriptive approach was firstly adopted to provide a general overview of the data collected. The panel data research was secondly applied to fulfill the above objective.

The annual data of related firms will be calculated and analyzed to find the annual ratio of CARI, LTA, DETA, CR, SIZ, DIY, C5, BSD, SMD, INF, INT, UER, NIM, PBT and TQ by using "Econometrics Views" (EViews). The descriptive analysis was performed to provide the general value of mean, minimum, maximum and standard deviation for all variables. Then, Fixed Effects model was used to find the relationship between determinants and banks' profitability.

Figure 1. Determinants of profitability of China's domestically listed commercial banks

This study targeted 16 listed commercial banks in China mainland. They are five large state-owned commercial banks which are Industrial and Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BOC), Agricultural Bank of China (ABC) and Bank of Communications (BOCOM); Eight national joint-stock commercial banks which are China Merchants Bank (CMB), Industrial Bank (CIB), China Minsheng Banking (CMBC), Shanghai Pudong Development Bank (SPDB), China Citic Bank (CITIC), China Everbright Bank (CEB), Ping An Bank (PAB) and Hua Xia Bank (HXB); Three city commercial banks which are Bank of Beijing (BOB), Bank of Ningbo (NBCB) and Bank of Nanjing (NJCB). The overall indicators proportion of 16 listed banks accounted for 90% of whole China commercial banks. The data of analyzing the internal determinants were obtained from the SSE and SZSE. Some other important data for analyzing were obtained from China Statistical Yearbook and China Banking Regulatory Commission annual report over the period 2007 to 2012.

Equation (13) is provides the proxy for the bank's profitability as in

$$Y_{it} = (\beta_0 + \eta_i + \lambda_t) + \sum \beta_n X_{nit} + \varepsilon it \qquad (13)$$

Where Y represents dependent variables which are NIM, OBT and TQ, X represents independent variables and ε is error term. β_0 is Y intercept, η_i unobservable heterogeneity and λ is time dummy variable. After test the multicollinearity, the INF and INT had a strong correlation. The researchers maintain INT as independent variables because INT already consider the inflation situation.

IV. **Results and Findings**

Table I reports the summary statistics of the eleven independent variables and three dependent variables during 2004 to 2012. The result shows that average net interest margin during period is 2.64%. The average Tobin's q for all listed commercial banks is 1.0243 which is higher than 1, it indicates the firm create the value for society. On the other hand, the investor had optimistic prospects for the firm's future development which also means the firm's performance will be better. The average core tier one capital adequacy is 9.67% which is fulfill the requirement of Basel III. Average loans and deposits over total assets are greater than 50%. The average current ratio is 42.55% which is higher than the requirement level of China banking industry (25%), it means the all listed commercial banks doesn't have liquidity problem. The average of dividend yield is 2.355 which means the firm's performance well and generate profits for their investors. Moreover, the interest rate and unemployment rate almost keep stable during the period which the average interest rate is 3.22% and the average unemployment rate is 4.13%.

Table II shows that core tier one capital adequacy is insignificant positive related to profitability. Thus, our hypothesis is rejected by the statically insignificant positive
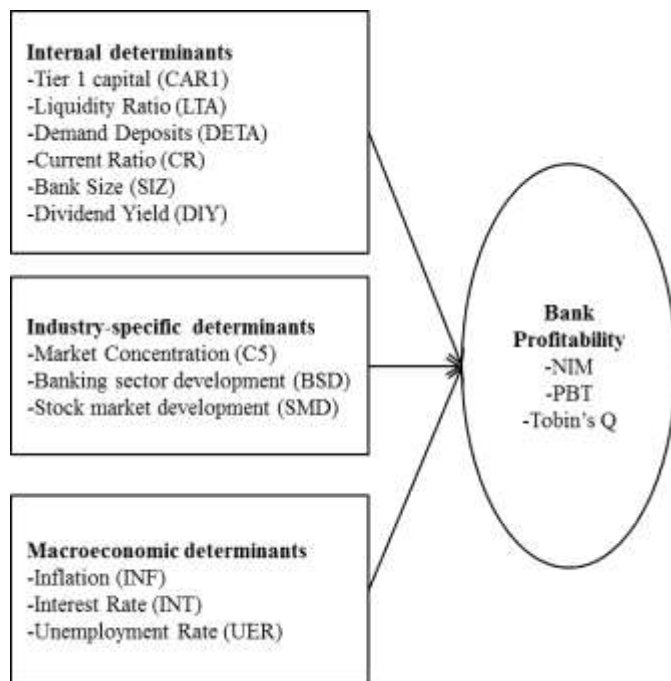
correlation with the bank's profitability. Loans to total assets are significant and negative correlated with NIM and PBT which the coefficient is 0.0334 and 0.0016. It means one unit change in LTA will decrease the bank's NIM by 0.025 and 0.049 for PBT. So, our hypothesis is accepts which is LTA had a significant with the bank's profitability. Deposit ratio has a significant and positive relationship to profitability which represented by NIM and PBT. The coefficient is 0.0238and 0.0359, which our hypothesis is accepted. However, the current ratio, bank size, dividend yield and market concentration are insignificant with the bank's profitability. Thus our hypothesis is rejected. Banking sector development and stock market development has a significant and negative relationship with net interest margin which the coefficient is -0.0939 and -0.00269. On the other hand, banking sector development also has a significant and positive correlation with TQ, thus the hypotheses are failed to reject. For the macroeconomic variables, the interest rate has a significant and positive relationship with TQ which means the one unit change of interest rate will impact TQ increase 23.67. Thus, the hypothesis is accepted. The unemployment rate has a negative relationship with NIM and PBT, but positive relationship with TQ. It means the increases unemployment rate will impact the bank's net interest margin, but it also stimulate the investors expects that the firm's future will better.

Furthermore, the significant F-value and generally high adjusted R-squared statistics showed that each regression indicates that the model is well specified.

TABLE I.   DESCRIPTIVE STATISTICS

	N	Minimum	Maximum	Mean	Std. Deviation
NIM	96	.0166	.0348	.026431	.0035797
PBT	96	.00167	.02092	.0136120	.00357389
TQ	96	.9921	1.1255	1.024344	.0321634
CARI	96	.0503	.2614	.096973	.0325702
LTA	96	.3548	.6132	.496115	.0618134
DETA	96	.555710	.996550	.7351525	.078832976
CR	96	.2707	.6502	.425585	.0845783
SIZ	96	23.0600	28.6600	26.30312	1.3681115
DIY	96	.000143	.059828	.0235527	.015888215
C5	96	.4690	.5400	.514500	.0262057
BSD	96	.4190	5090	.466333	.0302003
SMD	96	.3200	1.3850	.727833	.4350084
INT	96	.0300	.0365	.032245	.0020974
UER	96	.400	.0430	.041333	.0009478
Valid N (listwise)	96				

TABLE II.   TEST OF FIXED EFFECT

Variables	Fixed Effect Model		
	NIM Model	*Profit Margin*	*Tobin's q*
Internal determinants			
CARI	0.1744 (0.016459)	0.2270 (0.018780)	0.4636 (-0.074315)
LTA	0.0334** (-0.025391)	0.0016*** (-0.049356)	0.1699 (0.136410)
DETA	0.0108** (0.023828)	0.0030*** (0.035991)	0.6307 (0.036926)
CR	0.6969 (-0.001709)	0.7068 (0.002120)	0.9019 (0.004543)
SIZ	0.2757 (-0.001734)	0.3182 (-0.002038)	0.8433 (-0.002633)
DIY	0.9666 (0.001090)	0.1825 (0.044915)	0.4844 (0.153438)
Industry-specific determinants			
C5	0.2374 (0.050106)	0.5167 (-0.035203)	0.0784 (-0.631432)
BSD	0.0112** (-0.093923)	0.4081 (0.038527)	0.0077*** (0.831857)
SMD	0.0083*** (-0.002690)	0.7920 (-0.000337)	0.4219 (0.006723)
Macroeconomic determinants			
INT	0.1506 (-1.580017)	0.7096 (0.522072)	0.0117** (23.67281)
UER	0.0404** (-1.796096)	0.8261 (0.243547)	0.0170** (17.68077)
F-value	8.342286***	3.986814***	10.73681***
R-Squared	0.758656	0.600364	0.788693
Adjust R-Squared	0.667715	0.49977	0.709069
DW	1.769589	1.686518	1.555788

Notes: **, *** indicate significance level of 5% and 1% respectively.

v.   Summary and Conclusion

In this study, we specified an empirical framework to investigate the impact of bank internal factors, industry factors and macroeconomic factors on the profitability of China's domestically listed commercial banks for the period of 2007-2012. The factors that set up is in order to maximize the bank's profits or minimize the costs. Through the above empirical analysis, the conclusions as follows:

The profitability of commercial banks impact from both internal and external environment. For the bank internal environment, higher bank loans will leads the liquidity problems for banks. The more demand deposits ratio means the more capital that banks can use, and less needs for external financing. Moreover, if he bank can control the risk well, higher deposits ratio implies the higher profit from lending business. In addition, the bank size has insignificant and negative correlation with the bank's profitability which shows the commercial banks has diseconomies of scale phenomenon.

The industry-specific determinants are not significant impact on the bank's profitability except NIM model. The high growth of banking sector and stock market development will bring more competitions and challenges for the exits

banks. So, the higher BSD and SMD impact the bank's profitability negatively. However, from the investor sight, the higher banking sector development indicates the sector has potential ability gain more in the future. And stock market as an important channel for direct financing. Currently, the development of the China's stock market is not perfect. So, it cannot act as an important and complementary position with banking industry. Thus, Tobin's q from the investors view shows a positive correlation between BSD and the bank's profitability.

Based on the above analysis, we believe that the China's commercial banks must improve the banking system management to increase the bank's own capital and liquidity level. At same time, reduce the non-performing loans. Maintain the bank size at optimal level. Receiving the deposits and control the loans risk well. Moreover, innovate the traditional banking business and vigorously develop the intermediary business to find new ways to gain profits. In addition, need to promote the market structural reform of China banking industry while promote the competitions among banks. In order to improve the capital market of China which means not only actively cultivate the stock market but also strengthen the regulation and control. Thus, reduce the speculative features and make the stock market become truly reliable financing institutions outside the banking sector for both listed companies and investors.

Acknowledgment

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