The Impact of Bank Specific and Macroeconomic Factors on China's Bank Performance

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This paper examines the impact of bank specific and macroeconomic factors on the performance of Chinese banking from 2004 to 2010. The results suggest that banks with lower credit risk, which are well capitalised tend to be more profitable while banks with higher expense preference exert a negative impact on bank performance. The macroeconomic variables suggest that China's financial services tend to grow along with economic growth. The results suggest that greater economic integration via increased trade and capital flows coincide with an increase in bank profitability.

JEL Codes: G21 and G32

1. Introduction

Upon joining the World Trade Organisation (WTO) in December 2001, China was given five years to completely open up its banking system to international competition. Chinese banks have been renowned for their mounting nonperforming loans and low efficiency, this is especially the case in regards to the operations of their State Owned Big Four banks. Several Chinese scholars believe the task of creating an environment of open competition for these banks encapsulated in monopolistic control was virtually impossible within the timeframe set by the WTO. Correspondingly an IMF study[i] (1997) found that the majority of emerging markets that attempted financial liberalization resulted in bank failures.

This paper attempts to analyse Chinese banks from the perspective of an empirical investigation into the determinants of Chinese banks performance taking account of ownership structures. In a previous study of Chinese banks Lin and Zhang (2009) discovered that the four big state-owned banks were less profitable, had a higher proportion of non–performing loans compared to commercial privately owned banks in China. However the Lin and Zhang research included a significant time frame where reforms of state-owned banks had not commenced. Our paper however, covers a time frame over which China's state-owned banks had undertaken significant reforms. Unlike previous research which focused on a small number of bank specific factors, our research performs a panel approach to assess the determinants of bank performance by employing bank specific, macroeconomic and globalization variables.

The paper is organized as follows: section two provides a brief introduction into Chinese banking followed by an analysis of banking studies with a particular emphasis on emerging markets. The third section discusses concerns with data and methodology related to bank studies, finally in section four we discuss our empirical results.

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2. Profile of the Chinese Banking Sector

Until 2003, China has maintained a government-dominated financial system (Debray and Wei, 2005) which includes, entry barriers to commercial banking and investment banking, encouraging lending to favoured sectors while discouraging others.

Before 1978, China's banking was operating under a non-bank financial system. The People's Bank of China (PBOC) was established in September 1984 with sole responsibility for the conduct of monetary and exchange policies, foreign reserve management, deposit taking, commercial lending activities, and financing of development projects (Garcia-Herrero et al., 2006).

In April 2003, China Banking Regulatory Commission (CBRC) was created as a separate identity to the PBOC and became the primary government agency and point of contact for the commercial banks. The CBRC areas of governance included the supervision of the commercial banking operations, the formulation of rules and regulations governing banking institutions; termination and scope of business and conducting on-site and off-site surveillance of business operations. The objectives set by the CBRC were to protect the interest of depositors and maintain market confidence through prudential and effective supervision.

Today the Chinese banking sector (see figure 1)[ii] is comprised of three policy banks[iii], five state owned commercial banks[iv], twelve joint stock commercial banks[v], 1 postal savings bank[vi], 120 city commercial banks, 65 rural commercial banks, 31 urban credit cooperatives, 86 new rural financial institutions, 75 foreign financial institutions, 31 trust companies, 45 financial companies, 8 financial leasing companies, 7 auto finance companies, 3 monetary and financial companies, and 2 consumer finance companies.

Figure 1 Structure of China's Banking Sector
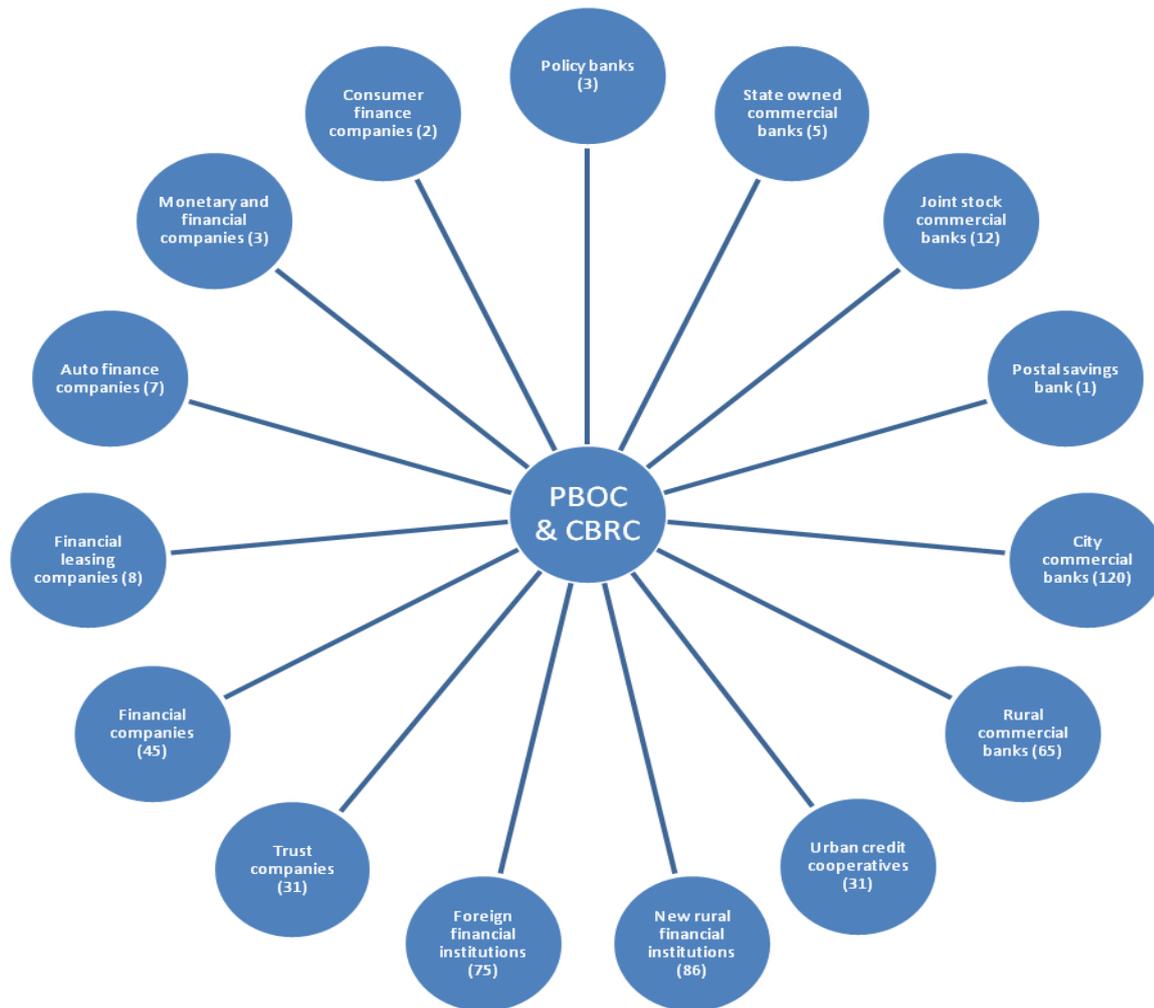
Source: CBRC website, update on 23rd October 2012.

3. Literature Review

In the banking literature, the determinants of bank performance are usually studied from the perspective of internal and external determinants. Financial ratios are normally used to measure internal influence, such as capital structures (equity/assets), credit risk (loan loss provisions/total loan), operating expenses capability (operating expenses/total assets), and ownership structure. External determinants, so called macroeconomics variables are identified as the inflation rate, economic activity (GDP or GDP growth rate), and banking concentration. According to the stated objectives of the particular research direction numerous explanatory variables can be also be incorporated across both categories.

Early bank studies mainly concentrated on cross-country analysis for example, Grigorian and Manole (2002) estimate indicators of commercial bank efficiency by applying a version of Data Envelopment Analysis (DEA) to bank-level data from a wide range of developing countries. Their analysis included a variety of macroeconomic, prudential, institutional and bank-specific variables. Similar studies were also performed by Manandhar and Tang (2002), and Bonin, Hasan, and Wachtel (2005). Previous

studies have made many gratifying findings and given us a lot of inspirations. However, we do not intend to continue this research method, because most banks are joint-stock banks these days, it is difficult to be identified by countries only. Moreover, a international bank has branches or agencies all over the world, we can not simply compared their performances by countries.

Other studies by Molyneux and Thornton (1992), Willianms (2002), Athanasoglou, Brissimis and Delis (2008), and Heffernan and Fu (2008) applied a General Methods of Moments (GMM) technique to a country's panel data. These studies examined the effect of bank-specific, industry-specific and macroeconomic determinants of bank profitability.

Bourke (1989) examined the internal and external determinants of bank performance across twelve countries or territories in Europe, North America and Australia. Altunbaş and Marqués (2008) employed explanatory variables, relative size and mergers, to indentify the relationship between mergers and acquisitions and bank performance. Berger, Hasan and Zhou (2010) investigated the effects of focus versus diversification on bank performance using data from Chinese banks during the 1996–2006 period.

More recently, ownership structure has become a popular variable employed by researchers, especially in China's bank performance studies. Here, Yan (2005) studied the relationship amongs ownership structure, efficiency and bank performance for Chinese banks. Heffernan and Fu (2008) investigated how well different ownership types of Chinese banks performed between 1999 and 2006. Lin and Zhang (2009) assess the effects of bank ownership on performance by using a panel of Chinese banks over the 1997–2004. Berger, Hassan and Zhou (2009) performed an analysis of bank ownership and efficiency in China which indicated that the Big Four banks were by far the least efficient; foreign banks the most efficient; while minority foreign ownership was associated with significantly improved efficiency.

Current research in banking has turned attention to an examination of the impact of globalization on bank performance. Globalization is a double-edged sword, it allows services, capital, technology, and labour to move freely while it may exacerbate the gap between developed and developing countries, create global financial crisis, cause political and cultural issues, and lead to environmental degradation. In general these studies report no consensus on the influence of globalization on bank profitability. García-Herrero and Santabárbara (2008) found empirical evidence that suggests the Chinese banking sector to have benefited from globalization through higher profitability and increased efficiency of the banking system, while Lensink, Meesters and Naaborg (2008) find that globalization negatively affects bank efficiency by using stochastic frontier analysis for a sample of 2095 commercial banks in 105 countries for the years 1998–2003.

4. Data and Methodology

This paper employs annual bank specific level data from commercial banks operating in China (mainland only) during the period 2004-2010 made available from Bank Scope. We choose this period based on two reasons: Chinese banks, especially the Big Four banks, finished their joint-stock reform during these years; China's banking sector gradually fully unrestricted for foreigners in this period. Our research employs

macroeconomics variables (China's Statistic Yearbook, UNCTAD database, World Bank) to study the influence of China's record economic growth on bank performance. In addition, we include globalization variables from the KOF globalization index, the social globalization index, and the political globalization index. Because of missing data points for some banks and/or for certain years, our research employs an unbalanced panel of 124 banks, providing us with a total of 338 observations.

The variables employed include return on assets (ROA) as a measure of profits earned per dollar on assets and reflects management's ability to utilize bank's financial and real investment resources to generate profits (Hassan and Bashir, 2003). In addition ROA reflects the influence of bank's policy decisions and factors relating to the economy and government regulations. One advantage of employing banks ROA is due to the non dictionary affect of high equity multipliers typically recorded for banks (Rivard and Thomas, 1997). Return on Equity (ROE) is the ratio of net income of a business during a year to its stockholders' equity during that year. It is a measure of profitability of stockholders' investments. It shows net income as percentage of shareholder equity and reflects how effective bank management utilizes shareholders funds. ROE is employed as an independent variable in our regressions, in addition we employ lagged ROA (-1)) as an independent variable given that previous returns on assets may have a positive effect on the next period's asset return.

4.1 Banking Sector Specific Determinants

Five banking sector specific variables are included in this chapter. The ratio of loan loss provisions to total loans (LLP/TL) is our proxy for credit risk, we expect a negative relationship between LLP/TL and bank performance because bad loans tend to exert a regressive impact on bank performance. Here, Mester (1996) points out that if banks spend more resources on credit control and loan monitoring there would be less problem loans but this would be at the expense of higher operating costs. Miller and Noulas (1997) suggest that the greater the exposure of the financial institutions to high risk loans, the higher would be the accumulation of unpaid loans and profitability would be lower. Furthermore, they argue that the decline in loan loss provisions are in many instances the primary catalyst for increases in profit margins.

The ratio of total equity to total assets (E/A) represents our measure of bank capitalization or leverage, the latter has been demonstrated to be important in explaining the performance of financial institutions, however the impact on bank performance is ambiguous. Ross (1997) argues that lower, rather than higher, capital ratios signal positive information, however Berger (1995) shows that lower capital ratios suggest a relatively risky position, leading one to expect a negative coefficient for this variable.

We use the ratio of non-interest expenses to total assets (NIE/TA) as a measure of bank's operating costs. Non-interest expenses include service charges and com-missions, expenses of general management affairs, salaries, and other expenses (Yeh, 1996). NIE/TA represents total amount of wages and salaries, as well as the costs of running branch office facilities (Sufian, Habibullah, 2012). Most related researches support that lower expenses raises the profitability of a financial institution, for example, Bourke (1989) finds a negative relationship between operating expenses ratio and bank profitability.

Total deposits (LND) calculated as the log of total deposits is our proxy measure for network embeddedness[vii], where we expect a positive relationship to exist between total deposits and bank profitability. Chu and Lim (1998) suggest that banks with large branch networks are able to attract more deposits, which is a cheaper source of funds. Furthermore, Randhawa and Lim (2005) point out that the large banks may attract more deposits and loan transactions and in the process command larger interest rate spreads. On the other hand, the smaller banking groups with smaller deposits base might have to resort to purchasing funds in the inter-bank market, which is costlier (Sufian, Habibullah, 2012).

The accounting value total assets (LNTA) enter our regression model as a proxy for size in an attempt to capture the possible cost advantages associated with economies of scale. Here a positive relationship between size and bank performance may be expected if there are significant economies of scale (Akhavein et al. 1997; Bourke, 1989; Molyneux and Thornton, 1992; Bikker and Hu, 2002; Goddard et al., 2004). Furthermore, Eichengreen and Gibson (2001) suggest that the effect of a growing bank's size on profitability may be positive up to a certain limit. Beyond this point the effect of size could be negative due to bureaucratic and other reasons. Hence, the size versus profitability relationship may be expected to be non-linear. Also, the result in table 4 indicates we should use the natural logarithm of the accounting value of the total assets in this chapter.

4.2 Macroeconomics Determinants

Bank performance is affected by both internal and external factors, to represent these we employ some variables to measure macroeconomic and financial market influences which may have changed the underlying production technology and the associated production functions.

GDP is one of the most commonly used macroeconomic variables to measure cyclical output effects within an economy where GDP is expected to influence numerous factors related to the supply and demand for loans and deposits. Sufian and Habibullah (2009) suggest that favourable economic conditions will effect positively on the demand for banking services, but may have either positive or negative influence on bank profitability levels. Neely and Wheelock (1997) use per capita income and suggest that this variable exerts a strong positive effect on bank earnings. In general we expect a positive relationship between GDP and bank performance.

The inflation rate measures the effect of changes in both costs and revenues of banks on bank profitability. Perry (1992) suggests that the effects of inflation on bank performance depend on whether the inflation is anticipated or unanticipated. Furthermore, Sufian and Habibullah (2009) conclude that in the anticipated situation interest rates are adjusted so that revenues increase at a faster rate than costs which in turn lead to a positive impact on bank profitability. In the unanticipated case banks may be slow to adjust their interest rates resulting in a faster increase in bank costs than bank revenues, consequently having negative effects on bank profitability.

In our regression models the variable CR4 is used as a proxy variable for the banking sector's concentration, where we expect a positive relationship between concentration and profits. CR4 is measured as the concentration ratio of the four major banks in terms

of total assets. Evanoff and Fortier (1988) suggest that increased concentration to have a significant positive impact on bank profits.

Z-SCORE indicates bank soundness by measuring how many standard deviations a bank is away from exhausting its capital base (a distance-to-default measure). Cihák et al. (2009) points out that a higher Z-Score implies a lower probability of insolvency, providing a more direct measure of soundness than, for example, simple leverage measures (Cihák et al., 2009). This index combines profitability, leverage and return volatility in a single indicator as follows:

$$Z = (ROA + K) / (Vol. (ROA)$$

Where ROA (profitability measure) is the average return on assets, K (leverage measure) is the average equity-to-asset ratio, Vol. (ROA) is the standard deviation of return on assets to measure return volatility.

Finally under macroeconomic indicators we employ an indicator of financial development computed as the ratio of stock market capitalization as a fraction of the national GDP MKTCAP/GDP. Naceur and Omran (2011) find that MKTCAP/GDP indicates complementarily or substitutability between bank and equity market financing. Stock market capitalization to bank assets is negatively related to bank margins and suggested that the relatively well developed stock markets can substitute for bank Finance (Demirguc Kunt and Huizinga, 1999). We therefore expect this variable to be negatively related to bank performance.

4.3 Globalization Determinants

In order to examine the effects of globalization on the performance of the Chinese banking sector, we employ KOF globalization index which includes three different dimensions of globalization namely: economic globalization, social globalization and political globalization detailed in Table 1.

Table 1: KOF Index of Globalization

Indices and Variables	Weights
A. Economic Globalization	[36%]
i) Actual Flows	(50%)
Trade (percent of GDP)	(22%)
Foreign Direct Investment, stocks (percent of GDP)	(29%)
Portfolio Investment (percent of GDP)	(22%)
Income Payments to Foreign Nationals (percent of GDP)	(27%)
ii) Restrictions	(50%)
Hidden Import Barriers	(22%)
Mean Tariff Rate	(28%)
Taxes on International Trade (percent of current revenue)	(27%)
Capital Account Restrictions	(23%)
B. Social Globalization	[38%]
i) Data on Personal Contact	(33%)
Telephone Traffic	(26%)
Transfers (percent of GDP)	(2%)
International Tourism	(26%)
Foreign Population (percent of total population)	(20%)
International letters (per capita)	(25%)
ii) Data on Information Flows	(36%)
Internet Users (per 1000 people)	(36%)
Television (per 1000 people)	(37%)
Trade in Newspapers (percent of GDP)	(28%)
iii) Data on Cultural Proximity	(31%)
Number of McDonald's Restaurants (per capita)	(43%)
Number of Ikea (per capita)	(44%)
Trade in books (percent of GDP)	(13%)
C. Political Globalization	[26%]
Embassies in Country	(25%)
Membership in International Organizations	(28%)
Participation in U.N. Security Council Missions	(22%)
International Treaties	(25%)

Source: Dreher, Axel, 2006, Does Globalization Affect Growth, Empirical Evidence from a new Index, Applied Economics 38, 10: 1091-1110.
Updated in: Dreher, Axel; Noel Gaston and Pim Martens, 2008, Measuring Globalization Gauging its Consequence, New York: Springer.

4.4 Regression Model

Our regression models include bank specific, macroeconomic, financial and globalization variables. We have four models in all: the first model is used to investigate the relationship between bank specific, macroeconomic factors and bank profitability. Our next model employs globalization variables (economic, social and political

globalization indices) in regressions 2, 3 and 4, respectively. One important advance of panel data over cross-section or time-series is that the researcher can allow for differences in behaviour across individuals and/or time period, Greene et al (2003). In this study we use panel data corresponding to a large number of cross-sectional observations on a range of variables, with variables held in single series stacked form.[viii] The following model is our basic structural representation:

Regression one:

$$ROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_2 ROE_{i,t} + \beta_3 \frac{LLP}{TL}_{i,t} + \beta_4 \frac{E}{A}_{i,t} + \beta_5 \frac{NIE}{TA}_{i,t} + \beta_6 LND_{i,t} + \beta_7 LNTA_{i,t}$$

$$+ \beta_8 LNGDP_t + \beta_9 INF_t + \beta_{10} CR4_t + \beta_{11} Z - SCORE_t + \beta_{12} \frac{MKT}{GDP}_t + \varepsilon_{i,t}$$

Regression two:

$$ROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_2 ROE_{i,t} + \beta_3 \frac{LLP}{TL}_{i,t} + \beta_4 \frac{E}{A}_{i,t} + \beta_5 \frac{NIE}{TA}_{i,t} + \beta_6 LND_{i,t} + \beta_7 LNTA_{i,t}$$

$$+ \beta_8 LNGDP_t + \beta_9 INF_t + \beta_{10} CR4_t + \beta_{11} Z - SCORE_t + \beta_{12} \frac{MKT}{GDP}_t + \beta_{13} ECONOMIC_t + \varepsilon_{i,t}$$

Regression three:

$$ROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_2 ROE_{i,t} + \beta_3 \frac{LLP}{TL}_{i,t} + \beta_4 \frac{E}{A}_{i,t} + \beta_5 \frac{NIE}{TA}_{i,t} + \beta_6 LND_{i,t} + \beta_7 LNTA_{i,t}$$

$$+ \beta_8 LNGDP_t + \beta_9 INF_t + \beta_{10} CR4_t + \beta_{11} Z - SCORE_t + \beta_{12} \frac{MKT}{GDP}_t + \beta_{13} SOCIAL_t$$

$$+ \varepsilon_{i,t}$$

Regression four:

$$ROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_2 ROE_{i,t} + \beta_3 \frac{LLP}{TL}_{i,t} + \beta_4 \frac{E}{A}_{i,t} + \beta_5 \frac{NIE}{TA}_{i,t} + \beta_6 LND_{i,t} + \beta_7 LNTA_{i,t}$$

$$+ \beta_8 LNGDP_t + \beta_9 INF_t + \beta_{10} CR4_t + \beta_{11} Z - SCORE_t + \beta_{12} \frac{MKT}{GDP}_t + \beta_{13} POLITICAL_t + \varepsilon_{i,t}$$

Where i denotes the bank, t is the time period, and ε shows the disturbance term, other variables are discussed in Table 2

Table 2: Explanation of the variables used in the regression models

Variable	Definition	Source	Expected sign
Dependent			
ROA	A proxy measure of bank performance measured as the return on average total assets of the bank in year t	BankScope	
Independent			
Bank specific determinants			
ROE	A proxy measure of bank profitability measured as the return on average total equity of the bank in year t	BankScope	+
LLP/TL	The ration of loan loss provisions to total loans. A measure of credit risk, which shows how much a bank is provisioning in year t relative to its total loans	BankScope	-
E/A	An indicator of bank's capital strength in year t, calculated as the ratio of equity to total assets. High capital asset ratio is assumed to be indicator of low leverage and therefore lower risk.	BankScope	+
NIE/TA	Ratio of non-interest expense to total assets, provides information on the efficiency of the management regarding expenses relative to the assets in year t. Higher ratios imply a less efficient management	BankScope	-
LND	Calculated as the log of total deposits of the bank in year t, and indicates network embeddedness	BankScope	+
LNTA	Calculated as the log of accounting value of the total assets of the bank in year t	BankScope	+/-
External determinants			
LNGDP	Log of gross domestic products	China's Statistic Yearbook	+
INF	Annual inflation rate	China's Statistic Yearbook	-
CR4	The four largest banks	Chinese Banking	+

	asset concentration rate	Regulatory Commotion database and own calculation	
Z-SCORE	The Z-score index	UNCTAD	+
MKT/GDP	The ratio of stock market capitalization	UNCTAD	-
Globalization determinants			
ECONOMIC	Economic globalization index	World dataBank	+
SOCIAL	Social globalization index	World dataBank	-
POLITICAL	Political globalization index	World dataBank	+

5. Empirical Results

The regression results reported in the tables (below) represent the relationships between Chinese bank performance and the explanatory variables discussed above in Table 2. Several general comments regarding the test results are warranted. Firstly, Table 3 provides a summary of the descriptive statistics for all variables used in our model. Secondly, the results for most variables remains stable across the various regressions tested as Table 4. Thirdly, the Hausmann test identifies the optimal model[ix] as illustrated in Table 5. Finally, Table 6 presents the baseline regression results; the number of observations in model 1 is 435, due to some missing values, the number of observations in models 2, 3 and 4 is reduced to 338.

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Table 3: Summary Statistic of Variables Used to Estimate

Variable	Mean	SD	Maximum	Minimum
ROA	17.88368	183.8359	2010.000	-3.62
ROE	14.51662	19.02706	293.1800	-193.9
LLP/TL	0.792920	1.434966	10.61000	-23.8477
E/A	8.338638	8.670421	73.10000	-13.714
NIE/TA	1.403797	0.987180	14.94000	0.110000
D	492514.6	1499700	11145557	1.060000
TA	6511102.2	1847395	13458622	15.05500
GDP	2790.442	1106.18	4428.463	1490.39
INF	2.913614	2.219566	5.864384	-0.70295
CR4	58.57187	8.196608	71.91856	49.50043
Z-SCORE	15.68046	1.87632	17.93221	13.0423
MKT/GDP	0.621776	0.346296	1.318388	0.31894
ECONOMIC	52.62416	1.542610	54.74117	50.88301
SOCIAL	49.77551	5.054118	52.96189	40.82236
POLITICAL	84.79321	1.745732	89.65316	82.84850

Note: ROA: return on assets; ROE: return on equity; LLP/TL: ratio of loan loss provisions to total loans; E/A: ration of total equity to total assets; NIE/TA: ratio of non-interest expenses to total assets; D: total deposits; TA: total assets; GDP: gross domestic product; INF: annual inflation rate; CR4: ratio of the four major banks in terms of total assets; Z-SCORE: Z-Score; MKT/GDP: ratio of stock market capitalization to GDP. ECONOMIC, SOCIAL and POLITICAL are globalization indexes from KOF.

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Table 4: Summary Pool unit root test

Variable	Levin, Lin & Chu t*		Im, Pesaran and Shin W-stat		ADF - Fisher Chi-square		PP - Fisher Chi-square	
	Statistic	Prob.**	Statistic	Prob.**	Statistic	Prob.**	Statistic	Prob.**
ROA	-51.9458	0.0000	-14.0496	0.0000	275.822	0.0000	344.860	0.0000
ROE	-54.8011	0.0000	-16.1981	0.0000	317.751	0.0000	414.058	0.0000
LLP/TL	-19.2147	0.0000	-6.0759	0.0000	189.214	0.0001	232.339	0.0000
E/A	-26.7808	0.0000	-17.1534	0.0000	265.190	0.0001	324.435	0.0000
NIE/TA	-21.6993	0.0000	-7.09802	0.0000	196.012	0.0000	257.249	0.0000
D	27.0421	1.0000	26.8119	1.0000	32.8126	1.0000	39.1217	1.0000
LND	-236.284	0.0000	-17.7362	0.0000	199.520	0.0001	241.460	0.0000
TA	-4.75985	0.0000	1.35145	0.9117	115.873	0.8687	126.827	0.6574
LNTA	-29.1242	0.0000	-7.0743	0.0000	209.086	0.0000	254.712	0.0000

Note: ** Probabilities for Fisher tests are computed using an asymptotic Chi--square distribution. All other tests assume asymptotic normality.

Table 5: Summary Hausmann test

	Regression 1			
Variable	Fixed	Random	Var(Diff.)	Prob.
ROA(-1)	0.111310	1.000252	0.002121	0.0000
ROE	0.005673	0.005482	0.000000	0.7478
LLP/TL	-0.281666	-0.349354	0.000092	0.0000
EQASS	0.027228	-0.008613	0.000098	0.0003
NIE/TA	-0.125766	0.018459	0.001055	0.0000
LND	-0.342552	-0.088052	0.012975	0.0255
LNTA	0.605884	0.094456	0.026270	0.0016
LNGDP	0.883141	1.301307	0.039195	0.0347
INF	-0.043897	-0.051212	0.000006	0.0038
CR4	0.104464	0.073847	0.000054	0.0000
Z	0.394502	0.418056	0.000470	0.2773
MKT	-0.111310	-1.000252	0.002121	0.0000
ECONOMIC	0.005673	0.005482	0.000000	0.7478
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Cross-section random	516.250922	12	0	
	Regression 2			
Variable	Fixed	Random	Var(Diff.)	Prob.
ROA(-1)	0.003622	0.999887	0.002414	0.0000
ROE	0.005118	0.003765	0.000001	0.1774
LLP/TL	-0.245649	-0.375129	0.000105	0.0000
EQASS	0.020914	-0.018189	0.000106	0.0001
NIE/TA	-0.150575	0.003269	0.001756	0.0002
LND	0.285246	-0.111590	0.036972	0.0390
LNTA	0.009280	0.082188	0.045389	0.7322
LNGDP	1.181735	0.870055	0.019061	0.0240
INF	-0.013289	-0.008275	0.000005	0.0257
CR4	0.056387	0.095938	0.000062	0.0000
Z	0.003622	0.999887	0.002414	0.0000
MKT	-0.394502	0.077163	-5.112598	0.0000
ECONOMIC	0.005118	0.003765	0.000001	0.1774
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Cross-section random	642.379174	13	0	
	Regression 3			
Variable	Fixed	Random	Var(Diff.)	Prob.
ROA(-1)	0.195839	1.000608	0.001386	0.0000
ROE	0.006141	0.005725	0.000000	0.4598
LLP/TL	-0.275818	-0.313268	0.000059	0.0000
EQASS	0.019718	0.000349	0.000065	0.0160
NIE/TA	-0.230514	-0.038933	0.000571	0.0000
LND	-0.377987	-0.116359	0.006921	0.0017

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Variable	Fixed	Random	Var(Diff.)	Prob.
LNTA	0.469415	0.125968	0.013611	0.0032
LNGDP	-0.009857	-0.403670	0.019607	0.0049
INFL	-0.054265	-0.092377	0.000006	0.0000
CR4	0.005021	-0.001853	0.000001	0.0000
Z	0.128382	0.017412	0.000254	0.0000
MKT	0.195839	1.000608	0.001386	0.0000
SOCIAL	0.044219	0.178124	0.000103	0.0000

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	644.372979	13	0

Regression 4

Variable	Fixed	Random	Var(Diff.)	Prob.
ROA(-1)	0.206581	1.000628	0.001369	0.0000
ROE	0.006271	0.005614	0.000000	0.2453
LLP/TL	-0.273544	-0.313369	0.000061	0.0000
EQASS	0.020371	0.000328	0.000065	0.0131
NIE/TA	-0.224677	-0.040503	0.000570	0.0000
LND	0.408884	0.112673	0.006708	0.0003
LNTA	0.437943	0.122732	0.013537	0.0067
LNGDP	0.043387	-0.398181	0.018954	0.0013
INF	0.061847	0.089273	0.000007	0.0000
CR4	0.002291	-0.00229	0.000001	0
Z	0.000713	-0.036099	0.000033	0
MKT	-0.128382	-0.017412	0.000254	0.0000
POLITICAL	-0.020338	0.044624	-0.455753	0.6490

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	635.076673	13	0

Notes: ROA is the return on average total assets; ROE is the return of total average equity; LLP/TL is a measure of bank risk calculated as the ratio of total loan loss provisions divided by total loans; E/A is a measure of capitalization, calculated as book value of shareholders equity as a fraction of total assets; NIE/TA is a proxy measure for costs, calculated as non-interest expenses divided by total assets; LND is a proxy measure of bank network embeddedness, calculated as the log of total deposits; LNTA is a proxy measure of size, calculated as a natural logarithm of total bank assets; LNGDP is natural log of gross domestic products; INF is the rate of inflation; CR4 is the three largest banks asset concentration ratio; Z-SCORE is the Z-Score index; MKT/GDP is the ratio of stock market capitalization; ECONOMIC, SOCIAL and POLITICAL are globalization indexes from KOF.

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Table 6: Panel regression results

Variables	Model 1	Model 2	Model 3	Model 4
Constant	16.62507 (0.0000)***	8.828622 (0.0000)***	13.22179 (0.0000)***	13.09836 (0.0000)***
ROA(-1)	0.111310 (0.0164)**	0.941316 (0.0036)***	0.941359 (0.0036)***	0.941389 (0.0036)***
ROE	0.005673 (0.0000)***	0.005118 (0.0004)***	0.005118 (0.0004)***	0.005118 (0.0084)***
LLP/TL	-0.281666 (0.0000)***	-0.245649 (0.0000)***	-0.245649 (0.0000)***	-0.258931 (0.0000)***
E/A	0.027228 (0.0185)**	0.020914 (0.0799)*	0.020914 (0.0799)*	0.089987 (0.0598)*
NIE/TA	-0.125766 (0.0094)***	-0.150575 (0.0100)**	-0.150575 (0.0100)**	-0.219505 (0.0007)***
LND	0.342552 (0.0136)**	0.285246 (0.0303)**	0.285296 (0.1692)	0.382981 (0.0078)***
LNTA	0.985639 (0.0011)***	0.967498 (0.0092)***	0.967475 (0.0099)***	0.895742 (0.0139)**
LNGDP	0.140144 (0.6130)	0.655300 (0.0006)***	0.245164 (0.4853)	0.567254 (0.1982)
INF	-0.883141 (0.0025)***	-0.135382 (0.0413)**	-0.11298 (0.0669)*	-0.539740 (0.0098)***
CR4	0.043897 (0.0000)***	0.075009 (0.6891)	0.454765 (0.0044)***	0.187521 (0.0028)***
Z-SCORE	0.104464 (0.0114)**	0.009863 (0.9852)	0.013932 (0.4547)	0.002597 (0.1572)
MKT/GDP	-0.394502 (0.0000)***	-0.079158 (0.1528)	-0.311512 (0.4547)	-0.331982 (0.0598)*
ECONOMIC		0.372698 (0.0178)**		
SOCIAL			0.159253 (0.0119)**	
POLITICAL				0.598612 (0.0582)*
Observations	435	338	338	338
R-squared	0.889997	0.860494	0.891675	0.831567

Notes: ROA is the return on average total assets; ROE is the return of total average equity; LLP/TL is a measure of bank risk calculated as the ratio of total loan loss provisions divided by total loans; E/A is a measure of capitalization, calculated as book value of shareholders equity as a fraction of total assets; NIE/TA is a proxy measure for costs, calculated as non-interest expenses divided by total assets; LND is a proxy measure of bank network embeddedness, calculated as the log of total deposits; LNTA is a proxy measure of size, calculated as a natural logarithm of total bank assets; LNGDP is natural log of gross domestic products; INF is the rate of inflation; CR4 is the three largest banks asset concentration ratio; Z-SCORE is the Z-Score index; MKT/GDP is the ratio of stock market capitalization; ECONOMIC, SOCIAL and POLITICAL are globalization indexes from KOF. All specifications include year fixed effects. *, ** and *** indicate significance at 10%, 5%, and 1% levels, respectively.

Table 6 confirms a positive and highly significant relationship between profits (ROA) and return on assets lagged ROA (-1) and return on equity (ROE) across all four models.

Our measure of bank risk LLP/TL calculated as the ratio of total loan loss provisions divided by total loans appears with a negative coefficient showing a highly statistically significant relationship at the 1 per cent level, this result is due to the impact that increasing profits has in reducing loan loss provisions (Miller and Noulas, 1997). Lower loan loss ratio creates more profits for banks at lower levels of risk.

Capitalisation variable E/A appears in the results with a positive sign and is significant at the 5 and 10 per cent levels. This finding suggests those more profitable banks, ceteris paribus, use more leverage (less equity) compared to their peers. Sufian (2009) points out that a strong capital structure is essential for financial institutions in developing economies, since it provides additional strength to with-stand financial crises and provides increased security for depositors during unstable macroeconomic conditions. Furthermore, lower capital ratios in banking imply higher leverage and risk, and therefore greater borrowing costs. Thus, profitability level should be higher for better capitalized banks.

The coefficient for our cost measure NIE/TA appears in the regression model with a negative sign and is statistically significant at the 1 and 5 per cent levels in different models (1% significant in model 1 and 4 while 5% in model 2 and 3). NIE/TA is used to provide information on variation in operating costs across the financial system and reflects employment, total wages and salaries, as well as the cost of running branch office facilities. For the most part, the literature argues that reduced expenses tend to improve the profitability of financial institutions (Bourke, 1989). Thus, a high NIE/TA ratio will reduce the bank performance negatively because efficient banks are expected to operate at lower costs. Furthermore, Sufian (2009) finds that the use of new electronic technology, like ATMs and other automated means of delivering services, has caused the wage expenses to fall (as capital is substituted for labour).

LND is a proxy measure for branch networks embeddedness which appears to be significant and positively related to banks profitability except in model 3 (positive but not significant) supporting the earlier findings by Randhawa and Lim (2005) and Sufian (2007, 2009), who found that banks with extensive branch networks tend to be relatively efficient from a management perspective. It could be argued that banks with extensive branch networks across the nation could have the advantage over their counterparts as they may attract more deposits and loan transactions and in the process command larger interest rate spreads and subsequently higher levels of profitability.

LNTA is our proxy measure for size measured by the natural logarithm of total bank assets; our results indicate that LNTA has a significantly positive effect on ROA at 1% and 5% levels. This result implies that larger banks tend to produce higher profits; this result appears to be inconsistent with previous research which implied that China's four biggest state onward banks are less profitable. Here we need to emphasize that most related studies use data before 2005 but we use data from 2004 to 2010 the latter period includes the fully opened period up period for China's financial sector. During this period, four state owned banks finished their market-orientated reform and the Chinese government specially funded them to help reduce their non-performing loans. Our result indicates that the four state owned banks increased their profitability which is

supported by the banks' ranking (Industrial and Commercial bank of China is one of the top 3 banks measured by profitability in the world in 2011). More evidence can be found in Table 7 indicating that banks' size rank (measured by total assets) and bank profitability improved significantly in recent rankings compared to prior measures.

Table 7: Rank of bank size and profitability in China, 2010

Bank name	Country rank by assets	World rank by profitability
Industrial and Commercial Bank of China	1	7
Bank of China	2	14
China Construction Bank Corporation	3	15
Agricultural Bank of China	4	28
Bank of Communications	6	49
China CITIC Bank	8	67
China Minsheng Banking Corp.	9	80
China Merchants Bank	11	81
Industrial Bank	12	97
Shanghai Pudong Development Bank	13	108

Source: World Bank database and BankScope database.
Note: 3 policy banks are ranked in No. 5, 7 and 10 by size but they do not have rank by profitability in the world because they are not commercial banks.

Our results do not support a significant relationship between GDP and ROA (except in model 2). As Table 6 indicates, LNGDP exhibits a positive relationship with bank profitability in our regression models but it is only statistically significant in model 2. Sufian (2009) suggests that demand for financial services tend to grow as economies expand and societies become wealthier while the volatile economic growth during the period under study could have resulted in banks experiencing a lower demand for their financial services and more loan defaults.

Inflation variable INF appears in the regression model as negatively and statistically significant at the 10% level (model 3), 5% level (model 2) and 1% level (model 1 and 4). Our results suggest that a higher inflation rate has negative impact on Chinese banks' profitability. As we discussed before that inflation may have direct effects, for example, increases in the price of labour and indirect effects or changes in interest rates and asset prices on the profitability of banks (Staikouras and Wood, 2003). Here, we must admit that the actual effect of inflation rate on bank profitability is more complicated. Generally, a high inflation rate will cause a rise in bank operating costs (because of price increase) and a decline of the effective interest rate (if the bank maintains the nominal interest rate unchanged), but at the same time the total value of bank's assets will increase (also because of price increase) and the bank can control its interest margin by changing the spreads between deposit and loan. Therefore, the extent of the inflation influence depends on numerous determinants which can be one of our research directions in the future.

Does banking concentration impact on bank performance? Our research result supports this hypothesis. It can be observed that the coefficients for the top four banks concentration ratio (CR4) exhibits a positive relationship with profits and is statistically significant at the 1% level in our model 1, 3 and 4 estimated. To some extent, our finding seems to support the Structure-Conduct-Performance (SCP) hypothesis which states that banks in highly concentrated markets tend to collude and therefore earn monopoly profit (Molyneux et al., 1996).

We find a positive relationship between Z-Score and bank profitability while this effect is significant only in model 1 (at 10%), using a firm Z-Score to measure banking credit risk we employed this variable to estimate its influence on banking performance. In theory, higher Z-Score indicates a lower possibility of bankruptcy. To some extent a higher Z_SCORE certificates a better operating capacity and higher profitability.

It can be observed from Table 5.6 that the impact of stock market capitalization (MKT/GDP) is negative on Chinese banks' profitability (statistically significant at the 1% in model 1 and 10% level when we apply control variable of political globalization). The results clearly indicate that during the period under study, the Chinese stock markets serves as a substitute rather than complementing products and services that banks offer to borrowers. In China, most people make their investment decision between banks and stock market because there are not many other investment choices.

To address the issue whether globalization factors influence the performance of China's banking sector, we employed three different dimensions of globalization namely economic globalization, social globalization and political globalization. The relationships between the three dimensions of globalization and Chinese banks' performance are provided in regression models 2, 3 and 4, respectively. Table 6 suggests that higher economic globalization (statistically significant at 5%) is positively associated with banking sector performance in China. Likewise, social globalization (statistically significant at 5%) and political globalization (statistically significant at 10%) seem to exert positive effects on the profitability of Chinese banks. Regards the relationship between profits and our measure of globalization index the KOF, we can draw the following conclusions: (1) the expansion of international trade and investment stimulates the development of China's banking sector. For example, cash income of China's commercial banks is 45,552,789 million yuan in 2003 but this amount surges to 80,761,250 million yuan in 2008 which is nearly doubled (refer to table 5.8). (2) Trade and capital liberalization seem to work in favour of the Chinese banking sector. Obviously, such liberalization brings competition to the whole banking industry but our results indicate that China's banks perform in this competition. (3) Social globalization, expressed as cultural mixing, information globalization and external links, appears to be positively related to banks' profitability. Mayer-Schoenberger and Hurley (2000) explain this phenomenon by a decrease of cross-border transaction costs. (4) Political factors also affect bank performance but this influence is not as significant as economic and social determinants.

Table 8: Cash Income of China's Commercial Banks, 100 million yuan, %

Item	2003	%	2004	%
Total Income	455527.89		567879.15	
Income from Commodity Sales	48545.93	10.66	57943.88	10.20
Income from Service Trade	19369.25	4.25	22864.95	4.03
Income from Taxes	2513.66	0.55	2880.27	0.51
Income from Urban and Rural Individual Business	15458.07	3.39	19109.48	3.37
Income from Savings Deposits	321577.79	70.59	404743.91	71.27
Income from Other Financial Institutions	2272.24	0.50	2565.18	0.45
Income from Repayment of Loans by Residents	8062.83	1.77	10290.10	1.81
Income from Remittances	5091.69	1.12	5444.28	0.96
Income from Securities	1124.33	0.25	1147.95	0.20
Other Income	31512.10	6.92	40889.15	7.20
Income from Exchange of Foreign Currencies	164.93	0.04	185.50	0.03
Item	**2007**	**%**	**2008**	**%**
Total Income	824836.07		807612.50	
Income from Commodity Sales	69472.95	8.42	68023.12	8.42
Income from Service Trade	28524.93	3.46	28226.42	3.50
Income from Taxes	4764.88	0.58	5179.57	0.64
Income from Urban and Rural Individual Business	21904.94	2.66	21797.47	2.70
Income from Savings Deposits	619271.75	75.08	601905.48	74.53
Income from Other Financial Institutions	2057.22	0.25	1840.00	0.23
Income from Repayment of Loans by Residents	13474.02	1.63	13474.52	1.67
Income from Remittances	5550.06	0.67	4733.69	0.59
Income from Securities	1130.07	0.14	743.94	0.09
Other Income	58684.25	7.11	61688.29	7.64
Income from Exchange of Foreign Currencies	691.55	0.08	765.45	0.09

Source: Chinese Statistic Yearbooks and own calculation.

6. Conclusion

Our research examines the impact of bank specific, macroeconomic determinants and globalization factors on the performance of banks operating in the Chinese banking sector from 2004 to 2010. By employing bank specific variables, our results suggest

that the upfront capital return rate and current return on equity have positive effects on the bank profitability. The empirical results also indicate that large scale Chinese banks with low credit risk and adequate capital tend to be more profitable while higher expense preference behaviour exerts a negative impact on banks performance.

Our external variables suggest that financial services tend to grow along with economic prosperity while banks' profitability may be decreased by rising production costs. Inconsistent with previous studies, we find a positive relationship between bank profits and top four state owned banks concentration ratio's implying that these larger banks tend to earn monopoly profits. The results also confirm that higher profitability can be expected as a consequences of better operating capability. Since the Chinese stock markets serves as a substitute rather than complementary market, we find that the impact of stock market capitalization has an negative impact on Chinese banks' profitability.

By examining different components of economic globalization, our results suggest that greater economic integration via higher trade and capital flows and greater trade and capital liberalization causes an increase in bank profitability. The impact of social globalization exert positive influence on the profitability of banks operating in the Chinese banking sector. Our empirical results show that political factors seem to work in favour of the Chinese banks but this effect is not statistically significant.

We think that following issues will be important in our future research which can well explain Chinese issue : (1) identify the impact of bank ownership on bank performance; (2) investigate how extent the inflation rate will influence bank profitability. In addition, we will continue focusing on globalization influence and trying to find out more suitable variables to match China's special situation since KOF index did not considering the similarity of language (Mandarin and/or Cantonese) and traditional cultural when calculated social globalization index.

Endnotes

[i] "Banking in Emerging Markets" (April 12, 1997), The Economist. This source cites an IMF, U.S. Federal Reserve commissioned study which found that in 18 of the 25 cases of financial crises studied, "the financial sector had been liberalized at some point during the five years leading up to the crisis." The other three causes of financial crisis were: macroeconomic volatility, connected (or insider) lending, and government involvement.

[ii] All data comes from CBRC website on 23rd October 2012. Bank of Communications became the fifth state owned bank recently, but we use previous four stat owned banks in this paper.

[iii] The Export Import Bank of China, the Agriculture Development Bank of China, China Development Bank.

[iv] The Agricultural Bank of China, the Bank of China, the China Construction Bank, the Industrial and Commercial Bank of China, and Bank of Communications.

[v] China Minsheng Banking Corporation, , China CITIC Bank, Shanghai Pudong Development Bank, China Merchants Bank, Guangdong Development Bank, Hua Xia Bank, Shenzhen Development Bank, Evergrowing Bank, Industrial Bank, China Everbright Bank, Bohai bank, and China Zheshang Bank.

[vi] Postal Savings Bank of China.

[vii] Based on the result of pool unit root test (see table 1).

[viii] Generally speaking, we distinguish between the two by noting that pooled time-series, cross-section data refer to data with relatively few cross-sections, where variables are held in cross-section specific individual series, while panel data correspond to data with large numbers of cross-sections, with variables held in single series in stacked form (Eviews 7 guide, P564).

[ix] Fix effects or random effects.

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[ix] Fix effects or random effects.

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