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To anticipate the bankruptcy of Baoshang Bank based on CAMELS rating system

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Abstract

On 7 February 2021, the Baoshang Bank was declared bankrupt, which raised concerns about the sustainability of the Chinese financial system. This study intends to assess the usefulness of the CAMELS system in predicting the bankruptcy of Chinese banks and reach the causes of the bank collapse according to the system. The findings reveal that the CAMELS framework could be able to predict the bankruptcy of Baoshang Bank, and that the asset emptying of Baoshang Bank by Tomorrow Group is the bank's primary cause of insolvency. The supervisory authorities should have also realised that Baoshang Bank was showing multiple indicators of collapse and taken strong measures to prevent the bank's bankruptcy. This paper contributes to the current literature on bank failure and predictive models by employing the CAMELS model. Additionally, regulatory authorities are interested in forecasting bank failure so that they can intervene in the crisis.

Keywords: CAMELS; bankruptcy prediction; Chinese commercial banks, Boashang Bank, bankruptcy predictors

JEL: G01, G17, G18, G21, G33

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1. Introduction

On 24 May 2019, the China Banking and Insurance Regulatory Commission (CBIRC) and the People's Bank of China (PBC) jointly announced that the China Construction Bank (CCB) had taken over the Baoshang Bank (PBC 2019). On 16 November 2020, Baoshang Bank declared that it had written down the whole RMB 6.5 billion in tier-two capital bonds due to the fact that it was "seriously insolvent and unable to survive" (Baoshang Bank 2020). This research employs Baoshang Bank as the case study mainly based on the following reasons. To begin with, Baoshang Bank was declared bankrupt by the Beijing No. 1 Intermediate People's Court on 7 February 2021, making it the first Chinese commercial bank to experience bankruptcy since the establishment of the Deposit Insurance Regulations (Shi 2022), which is representative. Meanwhile, Baoshang Bank appears to have an excellent corporate governance structure, but it is not operating as it should. To monitor the warning indicators of its insolvency, a more reliable performance evaluation system is therefore required. While the PBC attempted to characterise Baoshang Bank as an exception, a handful of other banks have suffered comparable difficulties, and widespread anxiety has been sparked. It is believed that the takeover of Baoshang Bank raised worries about contagion (Reuters 2019). For example, banks with credit ratings below AAA faced massive funding constraints following the takeover, and the interbank lending market was tightened, bringing China's Lehman moment closer (Bloomberg News 2019). Also, interbank creditors of Baoshang Bank with exposures of more than RMB 50 million were forced to absorb losses of up to 30% (PBC 2019). Meanwhile, the Negotiable Certificate of Deposit (NCD) market experienced a sudden significant interest rate spread after the Baoshang Bank takeover (Yin, Li 2019). Therefore, in order to establish a stable and healthy banking industry, it is necessary to employ a supervisory control system to predict the likelihood of bank failure and prevent such large-scale catastrophes from occurring.

The CAMELS framework is one of the most prevalent financial metrics used by academics (Muhmad, Hashim 2015), utilizing specific financial ratios to indicate various aspects of a bank's performance (Sahajwala, Van der Bergh 2000). It is possible to use the CAMELS rating system to analyse bank competitiveness because there is a positive association between the degree of rating and bank competitiveness. Also, due to its strong focus on risk and safety, availability of indicator data, comprehensive perspective, and the Federal Bank's high priority, CAMELS is widely acknowledged all over the globe among numerous rating systems (Guan et al. 2019). According to Sebastião (2019), the CAMEL model could forecast bank failure with an accuracy rate of 72.5% three years prior, 86.1% two years prior, and 97.3% one year earlier. Thomson (1991) also stated that the CAMELS model could accurately identify 93% of failing banks in the United States before 6–12 months of oncoming failure. Consequently, the CAMELS framework serves to summarise the important compliance information required by regulatory authorities. They may use it to verify that the level of supervisory concern and the type of supervisory reaction is sufficient to produce early warnings in order to reduce the negative consequences on banks. Therefore, the CAMELS framework is vital for forecasting bank failure, which is the main reason for this research to employ the CAMELS framework to predict the bankruptcy of Baoshang Bank.

Various studies on the CAMELS' bankruptcy predictability of financial institutions in the United States and Europe have been conducted (see: Cole, White 2012; Citterio 2020; DeYoung, Torna 2013; Iwanicz-Drozdowska, Witkowski, Valverde 2020; Borsuk, Kostrzewa 2020; Salhuteru, Wattimena 2015; Barker, Holdsworth 1993; Christopoulos, Mylonakis, Diktapanidis 2011; Bobykin 2010). Few studies

have tested the CAMELS framework in the setting of the Chinese banking system, and almost no academics have utilised the CAMELS rating system to predict the bankruptcy of a specific Chinese commercial bank. Also, existing CAMELS academics mainly follow the banking regulations and rules of the United States, which cannot be directly applied to the Chinese banking system. As a result, it requires adaptability to the Chinese market. This paper aims to assess the usefulness of the CAMELS system in predicting the bankruptcy of Chinese banks and reach the causes of the collapse according to capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk of Baoshang Bank. Also, during the testing process, the obstacles and importance of applying the CAMELS rating system to the Chinese banking industry could be highlighted. As a result, this study fills a gap in the financial performance of Chinese commercial banks by utilizing the CAMELS framework. This research is likely to contribute to the following parties: firstly, accounting academics and scholars might use this paper as a reference to carry out another study for a similar situation in the future; secondly, the findings of this study will aid Chinese commercial banks in improving their financial performance; thirdly, this research might contribute to Chinese government entities detecting banks that have the likelihood of failure, and further taking preventive measures to avoid the bankruptcy of banks.

2. Background information of CAMELS rating system

The Federal Financial Institutions Examination Board created and implemented the CAMEL system to evaluate the safety and soundness of banks in the United States in 1979. Then the National Credit Union Administration implemented it in October 1987 (Dang 2011). In 1995, the US Federal Reserve (Fed) and the Comptroller of the Currency added another assessment area: sensitivity to market risk, so CAMEL was replaced by CAMELS since then (Hafer 2005). It applies to every credit union and bank in the United States and is carried out by other financial supervisors outside the United States. CAMELS is a ratio-based approach for evaluating and ranking the performance of banks. This model has become one of the most extensively used methods for assessing commercial banks' financial stability (Roman, Sargu 2013). Also, "CAMELS rating has become a concise and indispensable tool for examiners and regulators" (Barr et al. 2002). Using a wide range of information sources, including financial statements, funding sources, macroeconomic statistics, budgets, and cash flow, the CAMELS rating system ensures whether a bank is in a healthy condition or not. Capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk are the six components of "CAMELS". CAMELS' overall ranking for banks is based on a scale of 1 to 5. If a bank's average score is less than 2, it is regarded as a high-quality institution, whereas banks with average scores larger than 3 are considered less-than-satisfactory (Federal Deposit Insurance Corporation 1997).

3. Literature review

The CAMELS framework has become widely used in the research on banking failure prediction (see: Cole, White 2012; Citterio 2020; DeYoung, Torna 2013; Iwanicz-Drozdowska, Witkowski, Valverde 2020; Borsuk, Kostrzewa 2020; Salhuteru, Wattimena 2015; Barker, Holdsworth 1993; Christopoulos, Mylonakis, Diktapanidis 2011; Bobykin 2010). According to Barker and Holdsworth (1993), the CAMELS

system functions as a predictive model for bank collapse, and it is a powerful and valuable tool for detecting insolvent banks and financial institutions. Under the CAMELS framework, if a bank's score is less than 2, it is considered to be a high-quality bank, while organizations with scores of 4 or 5 are considered to be financially bankrupt, which assists in determining whether or not banks need extra regulatory attention well before the bank goes bankrupt (Curry, Elmer, Fissel 2003). Salhuteru and Wattimena (2015) explained that the CAMELS model is an excellent performance evaluator and predictor of failure rates in the banking industry. Furthermore, Sarker (2005) revealed that CAMELS ratings could examine a bank's overall soundness and anticipate various risk factors that could lead to the bank becoming a crisis or insolvent bank. In addition, Christopoulos, Mylonakis and Diktapanidis (2011) employed the CAMELS rating system to analyse the warning indicators that Lehman Brothers was about to go bankrupt and demonstrated that the event should have been predicted. Bobykin (2010) demonstrated that models based on the CAMEL system have around 90% predictive power and indicated that banks with inadequate capital and liquidity, as well as poor asset quality, are more likely to fail. Nurazi and Evans (2005) explored the feasibility of using CAMEL(S) ratios to anticipate bank collapse. The findings indicated that capital adequacy ratio, assets quality, management, earnings, liquidity, and bank size play a statistically significant role in explaining bank failure. Nurazi and Evans (2005) utilised bank size to indicate sensitivity to market risk. This measure represents the issue of too--big-to-fail, wherein large banks are less likely to fail.

First of all, capital adequacy refers to a bank's ability to maintain an adequate level of its own funds (capital) to sustain its operations and act as a reserve in the event of a dire circumstance or shock (Heffernan 2005). Regulators would advocate for greater minimum requirements in order to avoid bank failures, whereas bankers claim that additional equity is expensive and difficult to obtain and that stricter rules limit their competitiveness. Beckmann (2007) argued that a high capital ratio results in low profitability because risk-averse banks overlook potentially dangerous investment possibilities. As a result, investors want a lower rate of return on their capital in exchange for reduced risk. However, García-Herrero, Gavilá and Santabárbara (2009) suggested that, despite the fact that capital is costly in terms of potential return, adequately capitalised banks have a lower risk of insolvency and less reliance on external financing, particularly in emerging nations, where external borrowing is challenging. Thus, banks with adequate capital should be more profitable than those with insufficient capital. In addition, Christopoulos, Mylonakis and Diktapanidis (2011) demonstrated a consistent downward trend in the capital adequacy ratio of Lehman Brothers from 2003 to 2007, which indicated that the company's financial status was precarious and continued to deteriorate year after year. Lehman Brothers' faulty and dubious claims were extremely high, and access to financing markets was tight. Therefore, there is an agreement regarding the utility of capital adequacy.

Secondly, the asset quality of banks is a key factor in determining their risk profile. Quick declines in the value of highly risky assets may result in rapid losses and significant reductions in capital cushions, hence increasing the risk of failure. The outcome of the asset quality ratio in Lehman Brothers tended to deteriorate from 2003 to 2007. It suggested a limited ability to recognise, evaluate, analyse, and control credit risks while also taking into account its poor and suspicious claims for Lehman Brothers. The policy of loan issuance had been demonstrated to be the worst. Giving loans to high-risk and insolvent clients resulted in an increase in non-performing loans, also known as bad and doubtful loans (Christopoulos, Mylonakis, Diktapanidis 2011). Also, poor asset quality was a contributing factor to a large number of bank failures in Kenya during the early 1980s (Olweny, Shipo 2011). According

to Waweru and Kalani (2008), most financial firms that collapsed in 1986 were brought down by non-performing loans (NPLs), and the majority of the larger bank collapses involved considerable insider lending, typically to politicians. Meanwhile, banks with strong loan growth frequently take on greater risk, since their credit analysis and review procedures are less stringent than those of other banks (Hempel, Simonson, Coleman 1994).

In addition, a bank's performance and success are directly related to the management's competence and skill. The more competent the management, the less vulnerable the bank and the less likely it is to make poor mistakes. "The ultimate determinant of whether or not a bank fails is the ability of its management to operate the institution efficiently and to evaluate and manage risk" (Seballos, Thompson 1990). The highest ranking in management quality indicates that these banks are experiencing rapid expansion as well as high levels of competency among their staff, both of which will support the bank in its future growth (Majithiya, Pattani 2010). The management ratio of Lehman Brothers had been steadily declining (Christopoulos, Mylonakis, Diktapanidis 2011). Many of the loans were faulty and were granted as a result of inadequate borrower assessment, which was the responsibility of the Lehman Brothers management at the time of the loan's approval (Christopoulos, Mylonakis, Diktapanidis 2011). While this relationship is sound, its significance is difficult to measure using financial data. Liu et al. (2021) argued that the challenging dimension is how to evaluate management quality, given that other variables of CAMELS could be assessed using financial data. It is not a quantitative component for an individual institution; it is primarily a qualitative factor. When predicting bank failure, there is little or no predictive potential in the management component ratings.

Furthermore, the ability to generate long-term earnings and profits allows banks to increase their competitiveness, solvency, and financial performance, potentially preventing them from collapsing. Aryati and Manao (2002) examined whether the financial ratios calculated with a CAMELS model differ considerably between healthy and unsuccessful banks. Earnings ratios from the CAMELS model have been found to be effective in assessing the performance of banking businesses and have had a significant impact on earnings management methods. Also, an examination of Lehman Brothers' earnings ratios demonstrates that its profits are insufficient and inadequate. This raises the possibility that the bank will face survival challenges during periods of potential turbulence or unanticipated hazards if profits and profit quality do not improve (Christopoulos, Mylonakis, Diktapanidis 2011).

Moreover, difficulties meeting liquidity requirements (e.g. repaying debtors or depositors) might result in financial strain and, consequently, bank default risk. A liquidity shortage at a single bank can have systemic consequences (Central Bank of Kenya 2009). It is stated that when banks hold large amounts of liquidity, they do so at the expense of investments that could yield substantial profits (Kamau 2009). The typical trade-offs between return and liquidity risk are proven by the fact that moving from short-term securities to long-term securities or loans boosts a bank's return while simultaneously increasing its liquidity risks and vice versa. As a result, a high liquidity ratio suggests a bank that is profitable and less hazardous (Hempel, Simonson, Coleman 1994). According to Christopoulos, Mylonakis and Diktapanidis (2011), Lehman Brothers' liquidity ratio is poor. The bank would be unable to liquidate 60% of its entire cash reserves, claims against derivatives investments, transaction portfolios, and other banking institutions in the case of an emergency. Overall, the bank's liquidity situation was inadequate compared to its liabilities, and its management lacked a contingency plan that could provide the necessary flexibility.

Finally, sensitivity to market risk has been largely ignored or neglected by previous academics (Avkiran, Cai 2012), which might be due to the inability to reflect this relationship with financial and accounting data. As a result, some scholars use bank size as a rough approximation. Bank size is used by Abrams and Huang (1987), Wheelock and Wilson (2000), Kolari et al. (2002), Nurazi and Evans (2005), Dincer et al. (2011) and Avkiran and Cai (2012), to represent sensitivity to market risk. This metric reflects the too-big-to-fail issue, in which big banks are less prone to failure (Avkiran, Cai 2012). However, this metric ignores that bank size is not always correlated with market exposure. A tiny savings bank, for example, has a low market sensitivity, whereas a small specialised trading bank has a high market sensitivity. While it is necessary to consider the bank size, it is insufficient to replace the sensitivity component with the size indication.

4. Methodology and data collection

This research considered the financial performance of Baoshang Bank from 2013 to September 2017, since the bank did not disclose its financial statements after that date. This paper involves both primary data and secondary data. The primary data relating to the extensive quantitative information are gathered from the bank's disclosed financial statements, budget, funding sources, and cash flow. In addition, secondary data are collected to verify whether these primary data are authentic. This paper collects data mainly through the following sources: (1) financial reports of Baoshang Bank; (2) Chinese government departments' websites, including CBIRC, PBC, and CSRC; (3) Wind, Bankscope, and CSMAR (China Stock Market & Accounting Research Database); (4) research articles, textbooks, and other internet sources, etc.

The process of calculating the CAMELS rating of Baoshang Bank in this research is mainly as follows.

1. Sub-parameters of each aspect of the CAMELS framework. Existing research mainly adopts financial indicators as the sub-parameters of each aspect of the CAMELS framework. The authenticity of Baoshang Bank's published annual reports is quite suspicious, and the Chinese banking market is not as mature as in Western countries, so it is not enough to purely employ financial indicators to measure the rating score of Baoshang Bank. Thus, this study also utilises qualitative data as crucial components of the sub-parameters.

Capital adequacy. In order to assess the capital adequacy of Baoshang Bank, this study uses the Capital Adequacy Ratio (CAR), the Tier 1 Capital Adequacy Ratio (TCAR), and the Core Capital Adequacy Ratio (CCAR), as these are the three metrics that CBIRC primarily uses to assess the capital adequacy of Chinese commercial banks (Lee, Chih 2013).

Asset quality. This research employs the NPLs to Total Loans to evaluate Baoshang Bank's asset quality. Frost (2005) recommended Non-Performing Loans (NPLs) as a proxy for asset quality. Commercial banks are highly leveraged, and the rise of NPLs to Total Loans would erode the capital adequacy and lead to insolvency in serious cases, which is the main reason for the bankruptcy of commercial banks. Meanwhile, this study employs qualitative data to measure the asset quality of Baoshang Bank from the following aspects: the authenticity of its financial statements, non--performing loans from controlling shareholders, and corporate governance failure.

Management quality. This study combines both quantitative and qualitative data to evaluate Baoshang Bank's management quality. Although some financial ratios serve as measures of management efficiency, financial ratios could partially demonstrate a bank manager's ability to organise the bank's resources efficiently, maximise profit, and minimise operating costs. In order to evaluate management quality using quantitative data, this research follows the advice of Desta (2016) and uses Total Asset Growth Rate, Loan Growth Rate, and Earning Growth Rate. In addition, this article evaluates the management efficiency of Baoshang Bank by using qualitative data, such as complete failure of the corporate governance mechanism, management's illegal operation, abuse of power by the top management, etc.

Earning ability. This research employs the most commonly used earnings metrics, including Net Interest Margin (NIM), Return on Assets (ROA), and Return on Equity (ROE), to measure the earning ability of Baoshang Bank. Meanwhile, the authenticity of the financial statements is analysed to assess the earning ability of Baoshang Bank.

Liquidity. This study measures the liquidity of Baoshang Bank using Total Loans to Customer Deposits, Liquidity Ratio, and Liquidity Coverage Ratio, as these three metrics are frequently utilised by CBIRC to evaluate the liquidity of Chinese commercial banks.

Sensitivity to market risk. As mentioned in the literature review, it is improper to utilise the bank size to measure the sensitivity to market risk. This research purely adopts qualitative data to measure the sensitivity to market risk of Baoshang Bank from the following aspects, involving risk management departments, risk assessment systems, risk management professionals, etc.

2. The rating of each aspect is calculated through the average value of sub-parameters, since it is hard to measure which sub-parameter is more critical than others. For example, this study employs NIM, ROA, and ROE to measure the earning ability of Baoshang Bank, while there are no commonly recognised criteria to measure which indicator should be given a higher weight than other indicators.

3. Overall CAMELS rating score. This research employs the geometric mean of the six aspects' rating to obtain the overall rating score of the CAMELS framework, which could reduce the impact of extreme values on the overall score.

Overall Rating Score = $\sqrt[6]{CA \times AQ \times MQ \times EA \times LQ \times SMR}$

where:

CA – average rating of capital adequacy,
AQ – average rating of asset quality,
MQ – average rating of management quality,
EA – average rating of earning ability,
LQ – average rating of liquidity quality,
SMR – average rating of sensitivity to market risk.

5. Results and discussions

5.1. Capital adequacy

According to Table 1, Baoshang Bank's capital adequacy ratio, Tier 1 capital adequacy ratio and core capital adequacy ratio continued to decline, and especially in 2017, the decline speed of these three

indicators accelerated. These three indicators decreased to 9.52%, 7.38%, and 7.38%, respectively, by September 2017 (see Table 1). However, according to the requirements of CBIRC, in 2017, systemically important banks should reach 11.1%, 9.1%, and 8.1%, respectively in these three ratios, and non--systemically important banks, like Baoshang Bank, should reach 10.1%, 8.1% and 7.1% respectively (Lin 2021). Therefore, these three indicators of Baoshang Bank were far below the regulatory requirements by September 2017, indicating that Baoshang Bank's anti-risk ability was declining and the possibility of credit risk outbreak was increasing. It can also be found that these three indicators of Baoshang Bank were lower than the average ratios of other Chinese commercial banks, and the gap had been widening in those years, indicating that under the same operation level, Baoshang Bank's risk resistance ability had lagged behind the peer level. This means that Baoshang Bank's businesses would be limited, and regulatory authorities should have taken measures such as restricting the scale of lending, limiting employee compensation, limiting dividends to shareholders, restricting the opening of new branches, and restricting investments. Baoshang Bank should have either reduced the allocation of risky assets, shrunk the size of risky assets, or expanded capital through other methods. Therefore, Baoshang Bank issued a restructuring announcement in June 2018 and planned to introduce strategic partners (Baoshang Bank 2018). From that time onwards, Baoshang Bank never disclosed financial statements.

Based on these data, the capital of Baoshang Bank faced great difficulties and challenges. Baoshang Bank's profitability continued to decline, so it was a severe challenge to replenish endogenous capital. Also, it was difficult for Baoshang Bank to supplement its capital through the capital market since the bank had never publicly traded. Meanwhile, Baoshang Bank was highly dependent on its controlling shareholder, Tomorrow Group, so when it was on the verge of bankruptcy in 2017 (Caixin Global 2019), it was hard for Baoshang Bank to replenish the capital through its shareholders. The founder of Tomorrow Group, Xiao Jianhua, is being investigated for graft and has been absent from the public eye since January 2017 (Caixin Global 2019). Therefore, Baoshang Bank was under great pressure to make its capital adequacy meet the regulatory requirements. The continuous failure of capital adequacy weakened Baoshang Bank's ability to resist risks, leading to a severe credit crisis, eventually resulting in its takeover and bankruptcy. Based on the above analysis, an average rating of 5 is granted regarding capital adequacy in 2017 and 4.33 in 2016.

5.2. Asset quality

As can be observed from Table 2, the NPLs to total loans ratio rose from 1% in 2013 to 1.72% in September 2017. It seems that the NPLs to total loans ratio of Baoshang Bank was better than the average ratio of other Chinese commercial banks from 2015 to 2017, with 1.41%, 1.68%, and 1.72% compared to 1.54%, 1.75%, and 1.74% respectively. However, Baoshang Bank's annual reports were completely different from the statements of the takeover team leader, Zhou Xuedong (2020). For example, the balance of "receivables investment" was RMB 178.678 billion at the end of 2017, nearly 80% of its loans. The overdue and non-performing loans in its financial statements were only limited to the loans issued and did not include the receivables investment of RMB 178.678 billion (Xu 2020). Therefore, the authenticity of the financial statements of Baoshang Bank is debatable, and there should be a huge gap between the disclosed non-performing loans and the actual figures.

The asset quality of Baoshang Bank continued to decline, mainly due to manipulation by its controlling shareholder (Tomorrow Group) and corporate governance failure. Firstly, although Baoshang Bank's ownership structure was diversified based on its registration data, nearly 89% of its shareholding was controlled by Tomorrow Group through various means (CCTV 2019), such as cross--shareholding between subsidiaries and shadow shell companies. The financial statements of Baoshang Bank from 2010 to 2016 all disclosed that there is "no correlation among the top ten shareholders", "no significant related transactions", and "no non-performing loans in related transactions". Obviously, Baoshang Bank did not disclose its financial information faithfully. In the 15 years from 2005 to 2019, Tomorrow Group registered 209 shadow shell companies and borrowed 347 loans from Baoshang Bank, with a total amount of RMB 156 billion, nearly all of them turned into non-performing loans (Wen 2021). So, a substantial amount of Baoshang Bank's assets had been occupied by Tomorrow Group illegally, resulting in the creation of non-performing loans and the subsequent credit crisis (CCTV 2019). Caixin Global (2019) reported that "Baoshang Bank doesn't function normally as a financial institution. It's a cash machine for Tomorrow Holding". Secondly, the corporate governance of Baoshang Bank was ineffective. For example, the work of its internal audit department was often difficult to carry out. The management refused to accept the audit in the name of keeping secrets, and the problems found in the audit inspection were never dealt with. In addition, according to the financial reports of Baoshang Bank in 2016, it can be found that most of the loan customers had big problems and even could not carry out their everyday business activities. Among the top ten loan customers of Baoshang Bank, 6 had the large qualification and credit problems, which proves that Baoshang Bank had huge weaknesses in credit management, resulting in the continuous increase of non-performing loans (Ma 2020). Therefore, the bank is granted an asset quality average rating of 4 for 2013 and 2014 and 5 from 2015 to 2017.

5.3. Management quality

Baoshang Bank's total assets and loans maintained a stable growth trend from 2013 to 2017, reaching the peak point of 33.50% and 41.29%, respectively, in September 2017 (see Table 3). However, the earnings growth rate of Baoshang Bank maintained an annual growth rate of around 22% from 2013 to 2016 and recorded a 21.91% decline in September 2017 (see Table 3).

According to financial reports of Baoshang Bank (2016), there was a reasonable organizational structure in the bank, including a board of shareholders, board of directors, board of supervisors and the management, but the bank was completely controlled by the chairman of the board, Li Zhenxi, who had worked for Baoshang Bank for 11 years before the bank was taken over by the government. He was promoted by Xiao Jianhua, the founder of Tomorrow Group. Li Zhenxi had used his authority to facilitate Tomorrow Group and became the "agent" of Tomorrow Group in Baoshang Bank. Meanwhile, Li Zhenxi set up a "Day After Tomorrow Group" within Baoshang Bank, and transferred RMB 50 billion to himself (He 2021). In addition, according to Baoshang Bank's financial reports (2016), it had seven supervisors on its board of supervisors, but four of them were middle and senior managers of Baoshang Bank. So the independence of the board of supervisors was completely lost.

In addition, the senior management should have been responsible for implementing the decisions approved by the shareholders' meeting and the board of directors and carrying out the daily business

of the commercial bank. However, in the case of the complete failure of the corporate governance mechanism of Baoshang Bank, the management's illegal operation became a driving force for Tomorrow Group to "empty" the bank. The management of Baoshang Bank completely ignored the rules and regulations of the Chinese banking industry and issued a large number of loans in violation of the regulations. Most of the loans were illegally issued by the bank's management through the so--called "green channels" and did not need to be approved by the board of directors or the board of shareholders, and 98% of these loans had become non-performing loans when the bank was taken over by CBIRC (Zhao 2021). Meanwhile, some leaders utilised their powers arbitrarily on important matters, such as the appointment and removal of important personnel, performance appraisal, salary structure, and centralised procurement. Salaries were adjusted based on the leaders' relationships and preferences, and large purchases were made without collective research or bidding. Consequently, major internal management deficiencies appeared in most aspects of Baoshang Bank (Wen 2021). Therefore, based on this non-financial information, an additional rating of 4 is given for 2013, 2014, and 2015, and 5 for 2016 and 2017. On average, a score of 3 is granted for 2017 and 2.75 for 2016 regarding management quality.

5.4. Earning ability

Baoshang Bank's earning ability indicators were stable and acceptable from 2013 to 2016, indicating that although credit risks had continued to emerge in the bank, the likelihood of bankruptcy was not very high, so a rating of 3 is given for the years 2013 to 2016 (see Table 4). In 2017, these three indicators experienced a sharp decline, so a score of 5 is granted. The authenticity of the financial statements is suspicious. Tomorrow Group had "emptied" the bank's funds through related loans, inter-bank businesses, etc. which would definitely lead to large drops in earnings indicators and draw the attention of regulators. The real profits of Baoshang Bank should have been very different from those in its financial statements, and it had even reached a severe loss condition. For example, according to Baoshang Bank's financial statements in March 2017, there was a RMB 2.285 billion profit, but Yu (2021) calculated that Baoshang Bank's real profit should have been around RMB -9.146 billion in March 2017. Also, in October 2018, Dagong International changed Baoshang Bank's rating to negative, which confirmed that the earnings of Baoshang Bank were pessimistic. In addition, Baoshang Bank had entrusted Dahua Accounting Firm to audit its financial status from 2012 onwards. Dahua Accounting Firm issued standard and unqualified audit reports over these years and never found any financial problems. However, Dahua Accounting Firm was warned and fined by the China Securities Regulatory Commission (CSRC) many times due to its auditing problems. In particular, it was fined RMB 6.26 million in 2018 (CSRC 2018). Therefore, an average rating of 5 is given regarding earning ability in 2017.

5.5. Liquidity quality

The total Loans-to-Customer Deposits (LTD) ratio rose from 49.77% in 2013 to 86.64% in 2017 (see Table 5). The higher the LTD ratio, the greater the bank's profitability. A high LTD ratio means the bank has smaller deposits and larger loans. Deposits are low-cost liabilities and loans are high-yield

assets. However, in order to ensure that commercial banks have the ability to resist certain risks and satisfy the cash requirements of customers, the Commercial Bank Law of China[1] stipulated that the LTD ratio of Chinese commercial banks should not exceed 75%. Baoshang Bank kept the ratio below 75% from 2013 to 2015, meeting the regulatory requirement. However, the Commercial Bank Law of China[2] cancelled the 75% requirement of the LTD ratio. The LTD ratio of Baoshang Bank rose to 80.82% in 2016 immediately, which aimed to earn interest profits generated between the low cost of deposits and the high yield of loans. The increase in the LTD ratio reduced the deposits that could be converted into liquid assets for short-term debt repayment. Meanwhile, in order to maintain the regulatory requirements of liquidity ratio and liquidity coverage ratio, the bank replenished its capital through high-cost debt, such as issuing interbank certificates of deposit and bonds, etc.

The liquidity ratio of Baoshang Bank was 57.97% in 2013 and 62.22% in 2014 (see Table 5), which was a satisfactory condition. However, the liquidity ratio increased to 87.57% and 85.23% in 2015 and 2016, which might be caused by its excessive receivables, since China's overall monetary policy was relatively loose and commercial banks had relatively less debt burden in 2015 and 2016. The receivables of Baoshang Bank increased rapidly in 2015 and 2016, which resulted in excessive short-term assets and high ROE ratios (14.04% in 2015 and 15.03% in 2016). Thus, Baoshang Bank allocated a large number of assets with high short-term returns (such as short-term loans, bills, bonds, etc.), resulting in a rebound in net profit growth in 2016. Such assets bring underlying problems for the balance between assets and liabilities when the regulations become stricter. That's why the earnings of Baoshang Bank declined rapidly when the liquidity requirements tightened in 2017 and the appearance of a liquidity crisis when the regulatory policies became stricter in 2018. Meanwhile, Baoshang Bank's borrowings from the central bank (PBC) had reached RMB 10.6 billion by the end of September 2017, compared with RMB 1.2 billion in 2016 and RMB 1.9 billion in 2015 (Gao 2021). Under normal circumstances, commercial banks' borrowings from the central bank could only be used to adjust the bank's reserves temporarily or mediate the unexpected needs of emergencies. They could not be used to issue loans or investments (Singh 2010). Although the liquidity risk might have been temporarily resolved, the credit risk was increasing. It could be considered that the bank's liquidity capacity was seriously inadequate.

The Liquidity Coverage Ratio (LCR) of Baoshang Bank was 370.57%, 228.34%, 380.99%, and 307.23%, respectively, from 2013 to 2016 (see Table 5), and CBRC (2014) stipulated that the LCR of Chinese commercial banks should exceed 100%. The LCR of Baoshang Bank was obviously higher than the regulatory requirements, but presented an unstable status. Generally, maintaining a relatively stable LCR indicates its strong liquidity management ability. Baoshang Bank's LCR reflects its relatively unstable management of liquid assets.

Total loans to customer deposits, the liquidity ratio, and the liquidity coverage ratio of Baoshang Bank had all increased from 2013 to 2017, but its earning ability had reduced in these years. It might be speculated that in order to deliver benefits to Tomorrow Group and handle related transactions, Baoshang Bank had absorbed a large amount of deposits to maintain its high level of liquidity. Taking all this information into account, an average rating of 5 is granted in 2017, 3.67 in 2016, and 3 in 2015, which indicates that Baoshang Bank was continuing to deteriorate in terms of liquidity.

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[1] Commercial Bank Law of the People's Republic of China, Chairman's Order No. 47, as approved on 1 May 1995, http://www.pbc.gov.cn/.

[2] Commercial Bank Law of the People's Republic of China, Chairman's Order No. 35, as amended on 29 August 2015, http://www.pbc.gov.cn/.

5.6. Sensitivity to market risk

Baoshang Bank had lagged behind in market risk monitoring and had not established risk analysis and rating models. First of all, risk management departments were unable to process and analyse customer information in a timely and effective manner, and they failed to recognise risk events from customers, regulators, and other external entities. Besides the financial data, Baoshang Bank had no other scientific risk evaluation tools. Most of the loan materials of Baoshang Bank were provided by its customers, which were mainly verified through credit investigation records and field investigations. The borrowers' background, preferences and property status were achieved through the application form provided by customers (Xu 2020). Obviously, Baoshang Bank's risk assessment systems were less effective. For example, in 2015, Baoshang Bank's Beijing branch issued a loan of RMB 200 million to a coal factory without carefully reviewing the materials submitted by the factory and without due diligence before issuing the loan. The coal factory only paid part of the interest, and the principal of RBM 200 million was never returned. However, the coal factory had gone out of production in 2013 and had been listed as an abnormal operation for many years. In addition, Baoshang Bank was short of risk management professionals. Only 17% of its risk management professionals had more than five years of working experience, so it was difficult to cultivate senior risk management professionals in an environment of high personnel turnover (Fu 2020). Therefore, Baoshang Bank was operating in a high-risk situation: even if the bankruptcy had not been caused by Tomorrow Group directly, it might have erupted in another form in the future. In regard to the sensitivity to market risk, the bank thus is given a rating of 4 in 2013 and 2014 and a rating of 5 from 2015 to 2017 (see Table 6).

5.7. Overall CAMELS rating scores

The component and composite ratings of CAMELS are given from 1 to 5. If a bank's rating is less than 2, it is considered to be a high-quality bank, whereas organizations with ratings of 4 or 5 are considered to be financially bankrupt (Curry, Elmer, Fissel 2003). If a bank's CAMELS rating score deteriorates, the likelihood of it going bankrupt increases (Kaya 2001). Baoshang Bank suffered a significant deterioration in the rating score. The CAMELS ratings of Baoshang Bank increased from 2.56 in 2013 to 4.6 in 2017 (see Table 7). These ratings are determined using both quantitative and qualitative data. The best years in terms of combined evaluation for Baoshang Bank employing the CAMELS technique are 2013 and 2014, whereas the CAMELS ratings deteriorated significantly in the following years, with 2017 being the worst year in the five-year period analysed. A score of 4.6 in 2017 means that Baoshang Bank faced an extremely serious danger of bankruptcy due to its significant financial vulnerabilities in the foreseeable future. In 2021, Baoshang Bank was declared bankrupt. This situation coincides with the argument of Thomson (1991), which stated that a bank's likelihood of insolvency could be predicted by the CAMELS framework up to four years earlier.

Through a complete analysis of the six aspects of the CAMELS framework, it can be concluded that Tomorrow Group emptied the assets of Baoshang Bank, which was the most fundamental cause of its bankruptcy. Tomorrow Group acquired Baoshang Bank's capital by manipulating several subsidiaries and shell corporations. It also failed to repay the principal and interest, resulting in a substantial amount of non-performing assets for Baoshang Bank, which would lead to significant drops in earning

indicators. In return, Baoshang Bank was highly dependent on Tomorrow Group, so when it was on the verge of bankruptcy in 2017, it was hard for Baoshang Bank to replenish the capital through its shareholders. Also, the corporate management system of Baoshang Bank was ineffective, and the management's illegal operation had become a driving force for Tomorrow Group to "empty" the bank. As a result, Baoshang Bank's liquidity to depositors and operational stability worsened, and its sensitivity to market risk deteriorated. Baoshang Bank's ability to resist risks also weakened, leading to a severe credit crisis, eventually resulting in its takeover and bankruptcy.

Availability of data is an obstacle during the calculation of the CAMELS framework. Firstly, alternative ratios may be used to evaluate the CAMELS rating, but they were excluded from the study due to their confidentiality implications. As a result, the study was only able to employ ratios derived from publicly available data. Secondly, the primary data are the bank's audited annual reports for the years 2013 to 2017, which are regarded as suspicious since the data statistics from other external sources are not consistent with the annual reports given by the bank. Therefore, this research employs a considerable amount of external data that could coincide with each other.

It is also discovered that the CAMELS rating system has the following importance in the Chinese banking industry. Based on the data collected and the analysis performed, the CAMELS model could be utilised to anticipate the bankruptcy of Baoshang Bank, even after accounting for a wide variety of publicly available data on the performance of the bank. The assessment of the bank is based on both quantitative and qualitative information. Based on the CAMELS' rating results, the supervisory authorities should have realised that Baoshang Bank was showing multiple indicators of collapse, and strong measures should have been taken to prevent the collapse of the bank. During the 2008 financial crisis, the CAMELS rating was utilised by the American government to determine which banks required special assistance, which prevented the failure of several struggling banks (Dang 2011). However, since the CAMELS model is not widely utilised in the Chinese banking sector, there is no relevant literature or regulators using the model to evaluate Baoshang Bank's operating circumstances in 2016 and 2017. Consequently, Baoshang Bank's inevitable collapse was not anticipated in advance. Therefore, the CAMELS framework could also aid regulators in determining the level of supervisory concern and the appropriate supervisory response in order to issue early warnings that reduce the adverse consequences on banks.

6. Conclusions and recommendations

This paper aims to assess the usefulness of the CAMELS system in predicting the bankruptcy of Chinese banks and reach the causes of the collapse according to capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk of Baoshang Bank. This study examines Baoshang Bank's financial performance as regards its capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk from 2013 to September 2017. The primary source is the audited financial statements of Baoshang Bank, but they are suspicious. A handful of other secondary data are therefore collected. This study attempts to use external data consistent with each other when the financial statements of Baoshang Bank conflict with the other sources of information. In addition, mathematical and statistical tools, as well as financial ratios, have been used to derive relevant results from the data obtained in this research.

The financial performance of Baoshang Bank in the CAMELS framework is concluded as follows. Firstly, in regard to capital adequacy, Baoshang Bank's capital adequacy ratio, Tier 1 capital adequacy ratio and core capital adequacy ratio all continued to decline, and far below the peer level and regulatory requirements, so an average rating of 5 is given in 2017. Secondly, the asset quality of the bank continued to decline, so a rating of 5 is granted in 2017, but the real non-performing loans should be far higher than the disclosed figures based on other sources. Thirdly, the quantitative management quality ratios performed well in these tested 5 years; however, from the qualitative analysis, the major internal management deficiencies appeared in most aspects of the bank, it is therefore given an average rating of 3 in 2017. Fourthly, the earning ability indicators were stable and acceptable from 2013 to 2016, with a sharp decline in 2017; nevertheless, nearly all secondary external data revealed that the real earnings of Baoshang Bank may have reached a severe loss condition, so an average rating of 5 is given in 2017. Fifthly, three liquidity ratios of Baoshang Bank increased significantly from 2013 to 2017, so a rating of 5 is assigned in 2017. Finally, Baoshang Bank was operating in a high-risk situation, so a rating of 5 is given for sensitivity to market risk, and this component is purely analysed through qualitative data due to the unavailability of numeric data. The CAMELS overall ratings of Baoshang Bank are 2.56 in 2013, 2.8 in 2014, 3.68 in 2015, 3.92 in 2016, and 4.6 in 2017. The findings reveal that the CAMELS framework should be able to predict the bankruptcy of Baoshang Bank, even only based on the publicly available data disclosed by the bank and other secondary data. It is certain that if the real financial statements of Baoshang Bank were disclosed, the CAMELS ratings would be far worse than the above results. In addition, based on a thorough examination of the six components of the CAMELS framework, it is possible to infer that the asset emptying of Baoshang Bank by Tomorrow Group is the bank's primary cause of insolvency.

There are certain limitations to the current research. Firstly, the sample size only includes Baoshang Bank, so the results may not be applied to other Chinese commercial banks. In order to resolve this drawback, future research should take into account non-financial information about the bank under research in addition to financial information, such as the corporate governance structure, the level of professionalism of the employees, the background of the controlling shareholders, the bank's capacity to manage risk, etc. The CAMELS score is then taken into account in its entirety. Secondly, there is a limitation in the research period due to the unavailability of data. Thirdly, the CAMELS structure is not intended to be comprehensive; for instance, other types of bank risk are not taken into account, such as credit risk.

This study has the following implications. Firstly, there is little research on the CAMELS framework in China, and other scholars may wish to investigate whether the CAMELS model is capable of being employed as a banking supervisory metric in China or not. This paper could be used as a reference in future research to broaden the scope and improve the research results. Furthermore, the findings of the study may be useful to the management of other Chinese commercial banks in improving their financial performance and formulating strategies to improve their performance. Moreover, this study could be used by policymakers and regulatory agencies to follow the processes of constructing early warning systems for banks.

Future studies could further investigate other types of Chinese commercial banks and concentrate on other financial institutions, such as insurance companies, mutual funds, and investment banks. Additional research can be conducted to incorporate additional risk elements into the framework, resulting in a more comprehensive evaluation of banking performance. Aside from that, the results of

the analysis of CAMELS ratings could be compared to those of other international regulatory rating systems in order to determine whether the rating system should be tailored to the needs of the local banking industry.

References

Abrams B.A., Huang C.J. (1987), Predicting bank failures: the role of structure in affecting, *Applied Economics,* 19(10), 1291–1302.

Aryati T., Manao H. (2002), Rasio keuangan sebagai prediktor bank bermasalah di Indonesia, *The Indonesian Journal of Accounting Research,* 5(2), 27–44.

Avkiran N.K., Cai L.C. (2012), *Predicting bank financial distress prior to crises*, New Zealand Finance Colloquium.

Baoshang Bank (2016), *Financial Reports of Baoshang Bank Co., LTD in 2016,* www.bsb.com.

Baoshang Bank (2018), *Announcement of Baoshang Bank Co., ltd. on information disclosure in 2017,* www.bsb.com.cn/tzzgx/201806/P020180629612962809682.pdf.

Baoshang Bank (2020), *Notice regarding the complete write-down of the principal amount of the "Baoshang Bank Co., LTD's Tier 2 Capital Bond in 2015" and the cessation of interest payments,* https://www.chinamoney.com.cn/.

Barker D., Holdsworth D. (1993), *The causes of bank failures in the 1980s,* Research Paper, 9325, Federal Reserve Bank of New York.

Barr R.S., Killgo K.A., Siems T.F., Zimmel S. (2002), Evaluating the productive efficiency and performance of US commercial banks, *Managerial Finance*, 28(8), 3–25.

Beckmann R. (2007), *Profitability of Western European banking systems: panel evidence on structural and cyclical determinants*, SSRN 1090570.

Bloomberg News (2019), *China's Lehman moment is drawing closer,* www.bloomberg.com.

Bobykin L. (2010), *Ukrainian Bank Failure Prediction Using Efficiency Measures*, unpublished thesis, Kyiv School of Economics.

Borsuk M., Kostrzewa K. (2020), Miary ryzyka systemowego dla Polski. Jak ryzyko systemowe wpływa na akcję kredytową banków?, *Bank i Kredyt,* 51(3), 211–238.

Caixin Global (2019), *Five things to know about the Baoshang Bank takeover,* www.caixinglobal.com/2019-05-30/fifive-things-to-know-about-the-baoshangbank-takeover-101421827.html.

CBIRC (2020), *CBIRC's reply on Baoshang Bank Co., LTD.'s bankruptcy*, https://baijiahao.baidu.com/s?id=1684150177265127702&wfr=spider&for=pc.

CBRC (2014), *Guidance on Liquidity Risk Management of Securities,* http://www.csrc.gov.cn/.

CCTV (2019), *The central bank once again made public statement on the Baoshang Bank,* www.weibo.com/ttarticle/p/show?id=2309404378825696888920&sudaref.

Central Bank of Kenya (2009), *Bank Supervision Annual Report 2009,* https://www.centralbank.go.ke/images/docs/Bank%20Supervision%20Reports/Annual%20Reports/bsd2009B.pdf.

Christopoulos A.G., Mylonakis J., Diktapanidis P. (2011), Could Lehman Brothers' collapse be anticipated? An examination using CAMELS rating system, *International Business Research,* 4(2), 11.

Citterio A. (2020), *Bank failures: review and comparison of prediction models*, available at SSRN 3719997.

Cole R.A., White L.J. (2012), Déjà vu all over again: the causes of US commercial bank failures this time around, *Journal of financial services Research,* 42(1), 5–29.

CSRC (2018), *Administrative Penalty Decision of China Securities Regulatory Commission (Dahua Accounting Firm, Zhang Xiaoyi, Gao Dehui, Tan Rong) in 2018,* http://www.xinxipiluwang.com/nd.jsp?id=411.

Curry T.J., Elmer P.J., Fissel G.S. (2003), Using market information to help identify distressed institutions: a regulatory perspective, *FDIC Banking Review,* 15, 1.

Dang U. (2011), T*he CAMEL rating system in banking supervision. A case study,* bachelor's thesis*,* Arcada University of Applied Sciences.

Desta T.S. (2016), Financial performance of "the best African banks": a comparative analysis through CAMEL rating, *Journal of Accounting and Management,* 6(1), 1–20.

DeYoung R., Torna G. (2013), Nontraditional banking activities and bank failures during the financial crisis, *Journal of Financial Intermediation,* 22(3), 397–421.

Dincer H., Gencer G., Orhan N., Sahinbas K. (2011), A performance evaluation of the Turkish banking sector after the global crisis via CAMELS ratios, *Procedia-Social and Behavioral Sciences,* 24, 1530–1545.

Federal Deposit Insurance Corporation (1997), *History of the Eighties – lessons for the future: an examination of the banking crises of the 1980s and early 1990s,* vol. 1, https://www.fdic.gov/bank/historical/history/.

Frost S.M. (2005), *The Bank Analyst's Handbook: Money, Risk and Conjuring Tricks,* John Wiley & Sons.

Fu M. (2020), Viewing the operational risk status and future development of small and medium--sized banks from Baoshang Bank*, Financial Times,* 2(10), 67–90.

Gao Y. (2021), *Research on risk prevention of small and medium-sized banks in China – take Baoshang Bank as an example*, master's thesis*,* Lanzhou University of Finance and Economics.

García-Herrero A., Gavilá S., Santabárbara D. (2009), What explains the low profitability of Chinese banks?, *Journal of Banking & Finance,* 33(11), 2080–2092.

Guan F., Liu C., Xie F., Chen H. (2019), Evaluation of the competitiveness of China's commercial banks based on the G-CAMELS evaluation system, *Sustainability,* 11(6), 1791.

Hafer R.W. (2005), *The Federal Reserve System: An Encyclopedia,* ABC-CLIO.

Heffernan S. (2005), *Modern Banking,* John Wiley & Sons.

He T.Y. (2021), *Research on Corporate Governance of Domestic Small and Medium-sized Banks – Based on the Analysis of Baoshang Bank*, master's thesis, Tianjin University of Commerce.

Hempel G., Simonson D., Coleman A. (1994), *Bank Management: Text and Cases*, John Wiley and Sons.

Iwanicz-Drozdowska M., Witkowski B., Valverde S.C. (2020), "When in Rome, do as Romans". Similarities of banks performance drivers in CESEE, *Bank i Kredyt,* 51(5), 467–504.

Kamau A.W. (2009), *Efficiency in the banking sector: an empirical investigation of commercial banks in Kenya,* doctoral dissertation, University of Nairobi.

Kaya Y.T. (2001), Türk bankacılık sektöründe CAMELS analizi*, Bankacılık Düzenleme ve Denetleme Kurumu, MSPD Çalışma Raporları,* 6, 1–20.

Kolari J., Glennon D., Shin H., Caputo M. (2002), Predicting large US commercial bank failures, *Journal of Economics and Business,* 54(4), 361–387.

Lee T.H., Chih S.H. (2013), Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks, *The North American Journal of Economics and Finance,* 26, 705–724.

Lin C. (2021), *Case study on the bankruptcy of Baoshang Bank – based on the perspective of corporate governance and credit risk,* master's thesis, Jiangxi University of Finance and Economics.

Liu L.X., Liu S., Sathye M. (2021), Predicting bank failures. A synthesis of literature and directions for future research, *Journal of Risk and Financial Management*, 14(10), 474–498.

Ma Y.C. (2020), *Case analysis of the operation crisis of the Baoshang Bank – based on the perspective of exit path,* master's thesis, Hebei University.

Majithiya R., Pattani A. (2010), *Rating the performance of the bank through CAMELS model,* post diploma thesis, Tolani Institute of Management Studies, Gandhidham.

Muhmad S.N., Hashim H.A. (2015), Using the camel framework in assessing bank performance in Malaysia, *International Journal of Economics, Management and Accounting,* 23(1), 109–127.

Nurazi R., Evans M. (2005), An Indonesian study of the use of CAMEL(S) ratios as predictors of bank failure, *Journal of Economic & Social Policy,* 10(1), 143–167.

Olweny T., Shipho T.M. (2011), Effects of banking sectoral factors on the profitability of commercial banks in Kenya, *Economics and Finance Review,* 1(5), 1–30.

PBC (2019), *Announcement of the People's Bank of China, China Banking and Insurance Regulatory Commission on the takeover of Baoshang Bank Co., LTD. 2019*, People's Bank of China, www.pbc.gov.cn.

Reuters (2019), *China's Baoshang bank takeover raises contagion fears,* www.reuters.com.

Roman A., Şargu A.C. (2013), Analysing the financial soundness of the commercial banks in Romania: an approach based on the camels framework, *Procedia Economics and Finance,* 6, 703–712.

Sahajwala R., van der Bergh P. (2000), *Supervisory risk assessment and early warning systems*, Basel Committee on Banking Supervision Working Papers, 4, Bank of International Settlements.

Salhuteru F., Wattimena F. (2015), Bank performance with CAMELS ratios towards earnings management practices in state banks and private banks, *Advances in Social Sciences Research Journal,* 2(3).

Sarker A. (2005), CAMELS rating system in the context of Islamic banking: a proposed 'S' for Shariah framework, *Journal of Islamic Economics and Finance,* 1(1), 78–84.

Seballos L., Thomson J.B. (1990), Underlying causes of commercial bank failures in the 1980, *Economic Commentary,* 9/15/1990.

Sebastião O. (2019), *Estudo de caso sobre estabilidade bancária angolana: aplicação do modelo CAMELS*, doctoral dissertation, Tilburg University.

Shi Y.F. (2022), *Research on Baoshang Bank bankruptcy case based on corporate governance perspective*, master's thesis, Shandong University of Finance and Economics.

Singh R.K. (2010), *The role of central bank in crisis management*, SSRN 1567617.

Thomson J.B. (1991), Predicting bank failures in the 1980s, *Federal Reserve Bank of Cleveland Economic Review,* 27(1), 9–20.

Waweru N., Kalani V.M. (2008), Commercial banking crises in Kenya: causes and remedies, *Global Journal of Finance and Banking Issues,* 3(3), 23–43.

Wen H. (2021), *Study on the invasion behavior of major shareholders of City commercial banks and its economic consequences – case study of Baoshang Bank*, master's thesis, Inner Mongolia Agricultural University.

Wheelock D.C., Wilson P.W. (2000), Why do banks disappear? The determinants of US bank failures and acquisitions, *Review of Economics and Statistics,* 82(1), 127–138.

Xu L. (2020), Research on risk management of small and medium-sized banks under COSO framework – based on Baoshang Bank, *Market Modernization*, 8, 68–71.

Yin R.Z., Li Y.Z. (2019), *Will the Baoshang Bank incident shock credit markets?,* http://www.newone.com.cn/research/read/2312214.

Yu Q. (2021), *The research of Baoshang Bank on "tunneling" of major shareholders and earnings management based on the perspective of regulatory catering*, master's thesis, Shandong University.

Zhao W.L. (2021), *Case research on corporate governance failure of Baoshang Bank*, master's thesis, Northeast Agricultural University.

Zhou X.D. (2020), *The financial risk of small and medium-sized banks mainly comes from the failure of corporate governance – the key to corporate governance of small and medium-sized banks from the takeover of Baoshang Bank,* http://bank.hexun.com/2020-08-03/201807585.html.

Appendix

Table 1
Baoshang Bank's capital adequacy ratios and CAMELS ratings in 2013–2017

Ratios and ratings		2013	2014	2015	2016	September 2017
Capital Adequacy Ratio (%)	Baoshang Bank	12.05	11.19	12.22	11.69	9.52
	Other banks	12.87	12.88	13.35	13.17	12.63
Rating		3	3	3	5	5
Tier 1 Capital Adequacy Ratio (%)	Baoshang Bank	11.42	10.59	9.34	9.07	7.38
	Other banks	11.34	11.25	11.33	10.75	9.86
Rating		2	3	4	4	5
Core Capital Adequacy Ratio (%)	Baoshang Bank	11.42	10.58	9.33	9.07	7.38
	Other banks	11.37	11.39	11.46	11.03	9.77
Rating		2	3	4	4	5
Average rating		**2.33**	**3**	**3.67**	**4.33**	**5**

Source: Wind; Bankfocus; CSMAR; CBIRC; Baoshang Bank's financial statements.

Table 2
Baoshang Bank's asset quality ratio and CAMELS ratings in 2013–2017

Ratios and ratings		2013	2014	2015	2016	September 2017
NPLs to total loans (%)	Baoshang Bank	1	1.37	1.41	1.68	1.72
	Other banks	0.97	1.13	1.54	1.75	1.74
Rating		**4**	**4**	**5**	**5**	**5**

Source: Wind; Bankfocus; CSMAR; CBIRC; Baoshang Bank's financial statements.

Table 3
Baoshang Bank's management quality ratios and CAMELS ratings in 2013–2017

Ratios and ratings	2013	2014	2015	2016	September 2017
Total Asset Growth Rate (%)	16.86	28.98	12.69	22.40	33.50
Rating	2	2	3	2	1
Loan Growth Rate (%)	26.23	28.21	28.45	28.52	41.29
Rating	2	2	2	2	1
Earning Growth Rate (%)	22.05	22.06	18.41	23.18	-21.91
Rating	2	2	3	2	5
Non-financial rating	4	4	4	5	5
Average rating	**2.5**	**2.5**	**3**	**2.75**	**3**

Source: Wind; Bankfocus; CSMAR; CBIRC; Baoshang Bank's financial statements.

Table 4
Baoshang Bank's earning ability ratios and CAMELS ratings in 2013–2017

Ratios and ratings	2013	2014	2015	2016	September 2017
Net Interest Income Margin (NIM)	3.35	3.37	3.06	2.74	2.01
Rating	3	3	3	4	5
Return on Asset (ROA)	1.05	1.04	1.03	1.07	0.67
Rating	3	3	3	3	5
Return on Equity (ROE)	12.67	13.81	14.04	15.03	10.52
Rating	3	3	3	3	5
Average rating	**3**	**3**	**3**	**3.33**	**5**

Source: Wind; Bankfocus; CSMAR; CBIRC; Baoshang Bank's financial statements.

Table 5

Baoshang Bank's liquidity ratios and CAMELS ratings in 2013–2017

Ratios and ratings	2013	2014	2015	2016	September 2017
Loans to Customer Deposits (LTD) (%)	49.77	55.92	68.56	80.82	86.64
Rating	1	1	3	5	5
Liquidity Ratio (%)	57.97	62.22	87.57	85.23	
Rating	1	1	5	5	
Liquidity Coverage Ratio (LCR) (%)	370.57	228.57	380.99	307.23	
Rating	1	2	1	1	
Average rating	**1**	**1.33**	**3**	**3.67**	**5**

Source: Wind; Bankfocus; CSMAR; CBIRC; Baoshang Bank's financial statements.

Table 6

Baoshang Bank's sensitivity to market risk ratings in 2013–2017

	2013	2014	2015	2016	September 2017
Rating	4	4	5	5	5

Source: Xu (2020), Fu (2020).

Table 7
Overall CAMELS rating scores of Baoshang Bank from 2013 to 2017

	2013	2014	2015	2016	September 2017
Capital adequacy	2.33	3	3.67	4.33	5
Asset quality	4	4	5	5	5
Management quality	2.5	2.5	3	2.75	3
Earnings	3	3	3	3.33	5
Liquidity	1	1.33	3	3.67	5
Sensitivity to market risk	4	4	5	5	5
Overall rating	**2.56 (satisfactory)**	**2.8 (fair)**	**3.68 (marginal)**	**3.92 (marginal)**	**4.6 (unsatisfactory)**

Source: Wind; Bankfocus; CSMAR, CBIRC, Baoshang Bank's financial statements (Xu 2020), Fu (2020).

Predykcja upadłości banku Baoshang z wykorzystaniem systemu ratingowego CAMELS

Streszczenie

System ratingu CAMELS jest szeroko stosowany w badaniach nad przewidywaniem upadłości banków w Stanach Zjednoczonych i Europie, podczas gdy niewiele dotychczasowych badań zostało poświęconych testowaniu kondycji chińskiego systemu bankowego z wykorzystaniem metody CAMELS. Bank Baoshang ogłosił upadłość 7 lutego 2021 r. i tym samym stał się pierwszym chińskim bankiem komercyjnym, który zbankrutował. Artykuł poświęcono analizie przypadku upadłości banku Boashang. Celem artykułu jest dokonanie na tej podstawie oceny przydatności metody CAMELS do przewidywania upadłości chińskich banków oraz zidentyfikowanie przyczyn ich ewentualnej upadłości. Jako predyktory potencjalnych kłopotów przyjęto sześć następujących zmiennych: współczynnik wypłacalności, jakość aktywów, zarządzanie, zyski, płynność i wrażliwość banku Baoshang na ryzyko rynkowe. Proces testowania pozwolił na zweryfikowanie przydatności metody CAMELS dla chińskiego systemu bankowego, jak również wskazał na ograniczenia w jej stosowaniu.

W badaniu wykorzystano metodę CAMELS do przewidywania upadłości banku Baoshang przez analizę jego sprawozdań finansowych z okresu od 2013 r. do września 2017 r. (po tym czasie bank nie publikował sprawozdań finansowych). Artykuł opiera się zarówno na danych pierwotnych, jak i wtórnych. Dane pierwotne obejmują informacje ilościowe pochodzące ze sprawozdań finansowych banku, budżetu, źródeł finansowania i rachunku przepływów pieniężnych. Z kolei informacje wtórne służą jako dane kontrolne, pozwalające ocenić autentyczność danych pierwotnych.

Ogólna ocena banku Baoshang według ratingu CAMELS to: 2,56 w 2013 r., 2,8 w 2014 r., 3,68 w 2015 r., 3,92 w 2016 r. oraz 4,6 w 2017 r. Najlepsze lata banku, uwzględniając łączną ocenę według CAMELS, to zatem 2013 i 2014 r. W kolejnych latach ocena banku ulegała systematycznemu znacznemu pogorszeniu. Wynik 4,6 w 2017 r. oznacza, że bank Baoshang był już poważnie zagrożony upadłością ze względu na znaczną ekspozycję na ryzyko finansowe w nadchodzącej przyszłości.

Z przeprowadzonej analizy wynika, że rating przy użyciu systemu CAMELS pozwalał przewidzieć upadłość banku Baoshang, nawet przy wykorzystaniu jedynie publicznie dostępnych danych (danych pierwotnych) oraz danych wtórnych. Dodatkowo, po zbadaniu sześciu predyktorów systemu CAMELS można wnioskować, że na bankructwo banku Baoshang duży wpływ miało wycofywanie aktywów przez Tomorrow Group. Zastosowanie metody CAMELS pokazuje, że chińskie organy nadzoru powinny zauważyć wczesne sygnały zagrożenia upadłością w przypadku banku Baoshang i odpowiednio interweniować, aby zapobiec jego upadłości.

Powyższa analiza ma jednak pewne ograniczenia. Po pierwsze, badaniem objęto jedynie bank Baoshang, co powoduje, że wyników nie można bezkrytycznie odnosić do innych chińskich banków komercyjnych. Po drugie, ograniczeniem jest zakres danych – okres po 2017 r. nie został przeanalizowany, ponieważ dane nie były dostępne. Po trzecie, struktura systemu CAMELS nie jest kompleksowa. Niektóre rodzaje ryzyka bankowego (np. ryzyko kredytowe) nie są uwzględniane w tej metodzie.

Słowa kluczowe: CAMELS, przewidywanie upadłości, chińskie banki komercyjne, bank Baoshang, predyktory upadłości