# Benchmarking Comparison of Financial Performance and Risk Resilience in the Digital Transformation of Banking: A Comparative Study of China and Kazakhstan

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***Abstract:*** *Banking around the world is being digitised, and as a result, both good and bad things have happened; the extent of these changes and the problems they have caused vary from country to country and at different times. A three-dimensional alignment framework will be introduced in this paper to solve the problems of financial efficiency, risk buffer and digital penetration, and then benchmarking comparisons will be made among the banking sectors in China and Kazakhstan. Based on the above research, the net interest margin of China's banking industry has been falling and non-interest income has been rising; therefore, it is considered to have stable risk resistance, and continuous monitoring of credit risk has been intensified. Kazakhstan's banking sector has a relatively high net interest margin, but it is also very volatile; the elasticity of the cost-to-income ratio is low, and due to a small credit database and external financing, it is exposed to external risks. Here is some cross-country comparison data on the effect of digitalisation in developing and emerging economies.*

***Keywords:*** *Digital Transformation of Banking, Financial Performance, Risk Resilience, China and Kazakhstan Benchmark Comparison*

## Introduction

In recent years, many parts of the financial performance and risk control of banks have been altered by digitalisation, and this has now drawn the attention of many scholars. Most of the previous research has only used single-country or developed-economy empirical data, and there has been no systematic comparison of countries at different stages of digital development. China and Kazakhstan have been chosen because China's banking industry has achieved a certain level of intelligent risk control and data governance, and Kazakhstan is in the process of expanding mobile payment and core system upgrades. Since the two countries are different, they will also be good research subjects for a long time to come. By comparing the adjustment paths of financial performance and the reshaping mechanisms of risk resilience in the two countries, we can determine the reasons for the inflection point in the digital input-output curve and find out how the elasticity of technology adoption moderates the effect on capital buffers and liquidity stability. The theoretical basis of cross-country comparisons with time lags and economies of scale is introduced in this paper. Dimension alignment and indicator calibration are used empirically to rule out the effect of institutional bias on benchmark consistency, and thus a way has been provided for cross-country research on the digital transformation of banking.

## 1. Theoretical Correlation and Comparative Benchmark of Digital Transformation, Financial Performance and Risk Resilience

### *1.1 The Path of Change in Financial Performance During the Era of Digital Transformation*

Digitalisation of banking is not a sudden change in technology; rather, it has been the result of many years of gradual development due to organisational reform and the introduction of new technologies. At this time, there will be fluctuations in the financial performance indicators; that is to say, both the return on assets and the cost-to-income ratio may decrease slightly due to running-in costs of constructing the technology infrastructure and changes in the existing business process. As the substitution effect of digital channels for physical branches is gradually increasing and operating

efficiency improves, there will be changes in the structure of net interest income and non-interest income. As shown in the adjustment path, there is a time lag in the returns of digital investments, and different banks have been adopting technology and organisational learning at various speeds[1].

Cross-country comparisons of the path of change in financial performance are affected by changes in the market structure of banks, shifts in customer behaviour and the adoption rate of new technologies around the world, etc. The higher penetration rate of e-banking in China's banking industry and the fact that Kazakhstan's banking industry is still in the expansion stage of mobile payment show that there are systematic differences between the two countries in the position and slope of the inflection point of the digital input-output curve. Build an adjustment function that accounts for the time lag in technology diffusion and the effect of economies of scale to quantify and compare the response paths of financial performance in the two countries, and provide a basic dynamic reference framework for the construction of benchmarks in the following sections.

### *1.2 Digital Reshaping Mechanism of Risk Resilience*

Digital transformation is not inherently good or bad for the risk resilience of the banking industry; instead, it will change the structure of risk management by altering how frequently risks are discovered, how quickly information spreads, and how closely the health of assets is monitored. At the beginning of the digital era, it was possible to collect transaction data and customer behaviour information regularly to provide input variables for credit risk assessment and reduce the time lag in responding to changes in credit risk. At the same time, there is only one type of technical system, and too much reliance on external service providers is also a new source of operating risk and systemic risk. Therefore, it can be concluded from the above that although the company has improved its risk resistance in the process of digitalisation, new types of risks have also gradually appeared.

Based on the above comparisons, there are differences in the thickness of risk data accumulation, the coverage of the credit information system, and the maturity of the digital identity authentication infrastructure in the banking industry of China and Kazakhstan; therefore, they have developed different forms of the mechanism of digital transformation. China's banking industry has built an older big data-based risk control model and anti-fraud system, and the increase in risk resilience is more evident in the improvement of the accuracy of credit risk identification. With the rapid development of mobile banking in the banking sector of Kazakhstan, so too has the amount of operating risk exposure increased. To make a good cross-country comparison, we first need to know why there are these differences[2].

### *1.3 Construction of Benchmarks and Dimensional Alignment for Cross-border Banking Comparison*

Before using the benchmarks to compare the banking industries in China and Kazakhstan, the two problems of measurement equivalence and scale alignment need to be addressed first. Measurement equivalence is the selection of indicators for financial performance and risk resilience that have the same practical meaning in the banking system of both countries; that is, changes in the return on assets should reflect the same factors driving profit, and fluctuations in the non-performing loan ratio should correspond to changes in the level of risk exposure. Given that there are different accounting standards, loan classification criteria and provisioning rules in the two countries, institutional bias in scale consistency should be eliminated by means of indicator calibration and dimensional mapping.

Dimensional Alignment is the selection of comparison levels and the distribution of weights. Research on the development of the banking industry at the macro level and research on good operating practices for individual banks generally have different purposes; the former studies structural changes, and the latter finds good management models. This paper takes the dimension of the market segment at both levels, that is, the bank categories are divided by asset size and grouped according to digital maturity, and the comparison unit is set here to avoid obscuring within-group heterogeneity with the overall mean. A three-dimensional alignment framework for the dimensions of financial efficiency, risk buffer and digital penetration will be constructed to carry out a more detailed decomposition of the digital transformation performance of the banking industry in the two countries, and thus provide a unified platform for item-by-item benchmarking in the following sections.

## 2. Benchmarking of Financial Performance in the Digital Transformation Era of the Banking Industry in China and Kazakhstan

### *2.1 Cross-country Differences in Return on Assets and Net Interest Margin and Their Attribution*

With the development of digitalisation, the scope of fluctuations in the return on assets of China's banking industry has narrowed, and its net interest margin has been declining. The reason is that digital credit products have changed the traditional model of interest-spread pricing; that is to say, the marginal cost of obtaining online customers and automating approval has fallen, and more competition has entered the loan interest-rate market. Some funds have been reserved for the new mobile wealth management platform, so the proportion of low-cost deposits in liabilities has fallen. Kazakhstan's banking sector has a relatively high spread of return on assets and net interest margin compared with other countries. Some top banks have increased the amount of assets by adding new groups of retail customers through digital channels, but at the same time, small banks have both seen a decline in net interest margin and fluctuations in asset quality[3].

In terms of the causal structure of cross-country differences, the main reason for the deviation in the return on assets of the two banking industries is a moderating effect of digital maturity on the revenue mix. Although there has been some offsetting effect from the drop in net interest margin and the increase in non-interest income of China's banking industry, the improvement in operating efficiency due to digitalisation has not fully compensated for the decline in return on assets caused by a narrow interest margin. Kazakhstan's banking industry has a relatively high net interest margin; therefore, it is assumed that there is a high degree of information asymmetry and limited competition in the credit market, but now, with the introduction of digital technology, this situation is beginning to change. Break down the return on assets into three parts: the contribution of net interest margin, the contribution of non-interest income, and the contribution of costs, and then identify the main reasons for the difference between the two countries.

### *2.2 Comparison of Cost-to-Income Ratio and Operational Efficiency Driven by Digitalisation*

The impact of digitalisation on the cost-to-income ratio in the banking sector of the two countries is different. With the continuous reduction in physical branches and the increase in the transaction substitution rate of online channels in China's banking industry, the proportion of fixed operating costs in total costs has been declining. Investment in R&D for Technology and System Maintenance is now considered a new kind of fixed cost. The total change in the cost-to-income ratio will be due to whether the reduction in branch expenses exceeds the increase in costs of digital construction. Based on the above data, the cost-to-income ratio of large commercial banks in China has dropped slightly since the peak of digital investment, and some joint-stock banks have maintained a relatively high level due to continuous technological innovation.

The Structure of the Cost-to-Income Ratio in Kazakhstan's Banking Industry is not the same. As long as there is a need to build physical branches to ensure the accessibility of banking services in Kazakhstan, they cannot be closed, and thus the expansion of digital channels has taken the form of an increase in total costs rather than a reduction in costs. At the same time, most banks in Kazakhstan have also begun to use an external technology procurement model for the upgrade of their core banking system and mobile application development projects, so the proportion of variable costs in total costs has increased and the cost-to-income ratio is more sensitive to changes in business. By comparing the differences in operating efficiency of the two countries due to digitalisation, we can determine how the relative proportion of fixed and variable costs has changed in the cost structure and thus explain the cross-country variation in the sensitivity of the cost-to-income ratio to digitalisation.

### *2.3 Structural Deviation Analysis of the Proportion of Non-Interest Income*

At the same time, one of the main indicators of how diversified the revenue structure in the banking industry has been during the process of digitalisation is the proportion of non-interest income. The main reason for the increase in the proportion of non-interest income in China's banking industry is the development of wealth management, agency insurance and electronic payment fees; among these, standardized financial products sold through digital channels have shown significant growth. It should be pointed out that there is a structural dependence of tied selling on some non-interest income and on-balance-sheet credit businesses, so the increase in the proportion of non-interest income is not entirely free from the effect of fluctuations in interest income. In addition, the fee regulation

environment and the pattern of market competition for banks of different sizes are not the same, and thus the proportion of non-interest income among them also varies considerably[4].

Kazakhstan's banking sector has the following two characteristics regarding the proportion of non-interest income. First, the income of traditional settlement and remittance services is still a relatively large part of the non-interest income, and it is closely linked to cross-border trade and remittances. Secondly, although many highly digitised banks have added some new fee-based services in recent years, such as wealth management and digital insurance, their proportion of total income is still relatively small. The structural difference in the proportion of non-interest income in the two countries can be attributed to different financial consumption habits; customers of the banking industry in China have been more willing to use digital self-service wealth management, and thus the growth driver for non-interest income has been more retail-oriented. At the same time, due to the lack of a deep capital market and product innovation in Kazakhstan's banking industry, it has been forced to focus more on corporate business areas, such as cross-border payments and trade finance, as the main way to develop non-interest income. From the above, we can see that the digitalisation of revenue structures in the two banking sectors is happening at different speeds and in different directions.

## 3. Benchmarking of Risk Resilience in the Digital Transformation of the Banking Industry in China and Kazakhstan

### *3.1 Comparison of Capital Buffer Adequacy and Counter-cyclical Adjustment Capacity*

Changes in the calculation of risk-weighted assets and the efficiency of capital supplementation are two places where the effect of digitalisation on the capital buffer adequacy of China's banking sector can be observed. Digital credit products have automatic approval and real-time monitoring systems, so the amount of credit risk exposure needs to be identified more frequently, and there has been an increase in the volatility of risk-weighted assets. Increase the capital buffer of the bank to cover the risk of model misestimation. At the same time, the digital channel can reduce the customer acquisition and operation costs of retail businesses, increase the return on capital, and thus improve the capacity for endogenous capital accumulation. The two effects will help to keep the capital-to-asset ratio of the Chinese banking industry at a certain level during the development of digital investment, and its counter-cyclical adjustment ability will be based on the proactive adjustment of capital structure rather than passive absorption[5].

Kazakhstan's banking industry has many kinds of capital buffer allocations. As some banks are still in the process of replacing their old core systems and improving data governance, the increase in the accuracy of risk measurement due to digitalisation has not been fully reflected in the calculation of capital requirements. The amount of capital buffers is more sensitive to changes in external financing conditions and the parent company's capital allocation, and the improvement in operational efficiency due to digitalisation has not yet created a stable internal source of funds. The range of fluctuation for the capital adequacy ratio in Kazakhstan's banking industry is relatively large compared with that in China's banking industry, so it is more vulnerable to shocks from the economic cycle, and digital transformation has not yet built a good buffer for capital adjustment. The capital buffer of the banking sector in Kazakhstan is very sensitive to changes in the exchange rate of the local currency and commodity prices; therefore, the goal of the digital risk control system for cycle identification and capital allocation optimisation has not been fully achieved, and there is an additional lag and volatility in counter-cyclical regulation.

### *3.2 Difference in Non-Performing Loan Generation Rate and Credit Risk Migration Path*

With the progress of digitalisation, the proportion of bad loans in China's banking sector has decreased and is now showing little further decline. Although the addition of big data risk control models and real-time behaviour monitoring technology has increased both the accuracy of pre-loan screening and the timeliness of in-loan early warnings, digitalisation has covered all customers, and thus so too has the speed of new non-performing loan generation. The Structure of the credit risk migration path has also been modified; however, with the help of digital monitoring, the speed at which the specially mentioned loans move from the special-mention category to the substandard category has decreased, and some digital loans with deferred principal and interest repayment still have an underlying migration pressure after being moved to the normal category. There is risk differentiation among the different groups of customers; although the default rate of high-quality customers has fallen,

the risk in the long tail of customers has risen.

The association between the fluctuation of the non-performing loan creation rate and the degree of digitalisation of Kazakhstan's banking industry is weak. Although the development of mobile credit products has expanded the coverage of financial services, the thinness of credit data and the limited application of alternative data have reduced the ability of credit assessment models to distinguish between the risks of some borrowers compared with China's banking industry. The credit risk migration path has a leapfrog characteristic; that is to say, a relatively high proportion of loans are directly moved from the normal category to the doubtful or loss category, and there is no long enough early warning period for overdue payments. It is probably because of the more complete credit information infrastructure in China that many types of data have been collected by the Chinese banking sector, and with the help of federated learning and other technologies, a relatively continuous risk monitoring chain has been built; Kazakhstan's banking sector still has considerable deficiencies in data sharing and iteration of credit-scoring models. Banks in Kazakhstan have been slow to respond to changes in risk, failed to recognise the need for loan loss provisions in time, and as a result, non-performing loans have gone unnoticed for a long time; thus, the "leapfrog" effect in their risk migration path has been worsened.

### *3.3 Cross-country comparison of Liquidity Coverage Ratio and Funding Stability*

As an important index of a company's short-term debt-paying ability, the structure of the liquidity coverage ratio has changed in recent years due to the digitalisation of China's banking industry. Digital Channels have increased the speed of turnover for retail deposits, and mobile banking is convenient for people to transfer funds among various financial institutions frequently. Stable core retail deposits will also be subject to some fluctuation at certain times, and so will wholesale funds. Therefore, some banks have adjusted the structure of their high-quality liquid assets and set transfer limits for digital channels in accordance with the requirements of the liquidity coverage ratio; thus, they have increased their dependence on the stability of the deposit insurance system. Digital transformation has changed the structure of high-quality liquid assets for banks in China as well, and the proportion of government bonds and policy financial instruments used to hedge against the risk of sudden outflows of retail deposits in the digital era has risen[6].

The overall range of fluctuation for the liquidity coverage ratio in the banking sector of Kazakhstan is relatively large, and this is closely linked to the stage of development of digital channels. Mobile payment and instant transfer services have increased the turnover rate of bank deposits, but due to the shallow structure of the domestic interbank market, banks have relatively few asset-realisation channels in the event of a sudden liquidity shortage. The risk of a short-term fund mismatch with a long-term fund is relatively high in the digital age. Based on the comparison of funding stability in the two countries, China's banking system has a relatively large base of retail deposits and a more developed interbank market; therefore, it will be better buffered against liquidity fluctuations caused by digitalisation. Although the banking sector in Kazakhstan has reached the required liquidity coverage ratio, it is still relatively vulnerable to instability due to the large proportion of foreign funds and short-term wholesale funding in its funding structure. Among the high-quality liquid assets in the banking sector of Kazakhstan, the market depth of local currency government securities is relatively shallow, and cross-border liquidity instruments are not widely available. Therefore, it does not have a large buffer for fluctuations in deposits due to digitalisation, and the range of intraday fluctuation for the liquidity coverage ratio is much higher than that in China's banking industry.

## Conclusion

According to this paper, the financial performance and risk control structures of the banking sector in China and Kazakhstan have changed differently due to their different degrees of digitalisation. Although the banking sector in China has been highly digitised, its operating expenses have fallen and continuous monitoring of credit risk has been strengthened; however, there are also problems of compressed net interest margins and increased turnover speed of retail deposits. Kazakhstan's banking industry has a relatively high net interest margin, but due to the lack of credit data and reliance on external funds, it is difficult to increase risk control at the same time. In the future, other developing countries can also use this way to determine whether the digital effect is the same in all areas, add more specific signs, such as the extent of AI use and the number of open-banking links, to check how each component of technology affects the economy, and dynamic panel models can also be used to

distinguish between short-term costs and long-term profits of digital investment and find the point at which the input-output curve shifts.

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