

# Research on Risk Taking Mechanisms of Chinese Commercial Banks from the Perspective of Digital Transformation

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**How to cite this paper:** Li, R., & Zhang, H. M. (2024). Research on Risk Taking Mechanisms of Chinese Commercial Banks from the Perspective of Digital Transformation. *Theoretical Economics Letters*, 14, 735-746.

<https://doi.org/10.4236/tel.2024.143038>

**Received:** January 20, 2024

**Accepted:** April 27, 2024

**Published:** April 30, 2024

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## Abstract

Based on the possible impact model of individual digital transformation of Chinese commercial banks on their risk taking, this paper discusses how digital transformation can reduce the risk taking of Chinese commercial banks, and makes an empirical analysis based on the relevant data of Chinese commercial banks from 2010 to 2021. It is found that the development of digital transformation in Chinese commercial banks reduces the level of banks' risk taking by reducing the management cost and improving the operational efficiency. Heterogeneity analysis shows that digital transformation has a certain difference in the impact on the risk taking of commercial banks of different sizes, and the reduction effect on the risk taking of smaller banks is more obvious. Finally, based on the realistic background, the research results and related analysis, the paper puts forward relevant suggestions for the digital transformation development of Chinese commercial banks.

## Keywords

Digital Transformation, Risk Taking, Chinese Commercial Banks, Mediating Effect

## 1. Introduction

In recent years, China has vigorously promoted the construction of digital China, *The "14th Five-Year Plan" for Digital Economy Development* has raised the digital transformation of the financial field to a national strategic height, and *The "Overall Layout Plan for the construction of Digital China"* issued by The State Council in February 2023 has emphasized accelerating the application of

digital technology innovation in key areas such as finance. We will promote the deep integration of digital technologies and the real economy to comprehensively enable economic and social development. Commercial banks as the core of the financial system, Digital Transformation (DT) has become a “must”, all kinds of banks actively explore the combination of digital technology and financial business, many banks’ technology investments account for more than 4% of revenue. With the rapid development of the Internet, the bank is no longer a single outlet to provide customers with service channels, and now, the bank can provide customers with various services in a variety of channels. After the Bank 2.0 and 3.0, banks are gradually moving towards the Bank 4.0 to build smart banks. In terms of the cognition of DT, the banking industry has gradually developed from simple digital thinking to the construction of digital organizations and the development of digital products, and the DT has become more in-depth.

However, the great changes brought about by DT put forward further requirements for commercial banks’ risk bearing. In the context of DT, it is of great practical significance to study the relationship between DT and bank risk taking and its mechanism of action, which provides important practical guidance and theoretical basis for scientific construction of risk monitoring and supervision mechanism in the process of DT of banks and guarantees the stability and safety of China’s financial system.

The current research on the DT of banks at home and abroad is not mature, and the relationship between them is rarely mentioned. Thus, this paper focuses on the DT of banks, brings it into the banks’ risk-taking, and studies the relationship between the two and the mechanism of action, in order to provide a useful reference for the DT and risk management of Chinese commercial banks under the background of digital development.

## **2. Theoretical Analysis and Research Hypothesis**

### **2.1. Digital Transformation and Risk Taking of Commercial Banks**

According to the existing research, the impact of DT on the risk of banks may help to reduce their management costs, improve their operating profits and effectively reduce their risk bearing level. In recent years, the rapid development of financial technology has brought DT opportunities to traditional financial institutions. The use of financial technology by banks can reduce the information asymmetry between financial institutions and enterprises, supplement the traditional credit information system, and improve the quality of loans in multiple dimensions. Banks can use fin-tech to “digitalise” inclusive finance (Guo & Zhu, 2021), improve business efficiency (Du et al., 2021), reduce banking risks (Banna & Alam, 2021; Demertzis et al., 2018), and promote banking strategy transformation.

In addition, DT has effectively alleviated the occurrence of information asymmetry in the banking industry. Banks use big data, cloud computing and other technologies to broaden the channels of information collection, strengthen the

ability of commercial banks to process information, reduce labor costs, and help banks accurately identify customers' credit status (Chen et al., 2020), so as to provide loans at different interest rates to different consumers.

In the process of continuous economic development, data is continuously accumulated, and structured and unstructured data bring great difficulty to manual review. Big data, cloud computing and other technologies help banks to save and analyze data completely (Wu et al., 2021), improve the efficiency of banks' use of useful data, and promote the development of bank credit business. While absorbing high-quality customers, it reduces the high-risk projects brought by low-credit customers, thus reducing the risk bearing of commercial banks. Based on this, this paper proposes the following hypothesis:

H1: Digital transformation helps reduce Chinese banks' risk taking.

## 2.2. The Mediating Role of Management Cost and Operational Efficiency

In the process of DT of banks, DT can promote the online products and services of commercial banks, the networking of marketing and business scenarios, and the digitalization of credit assessment and risk control, which can reduce the cost of capital use (Huang et al., 2021), fixed asset investment and operation and management expenses of banks, and help improve the cost efficiency of banks.

Through big data, cloud computing, artificial intelligence and other digital technologies, commercial banks re-evaluate all aspects of bank risk management, formulate scientific management processes for management pain points, and clarify the division of responsibilities. Through the big data platform, data sharing and logical connection are realized, corresponding processes are optimized and integrated, and pre-event, in-event and post-event resources are reasonably matching (Jiang et al., 2023). Through the systematic platform, information isolation island is eliminated, various departments of the bank are interconnected, information transmission efficiency is increased, links before and after the information platform are connected, and a safe, compliant and neutral risk management process is established. Achieve business breakthroughs and strengthen risk management and control (Guo & Shen, 2019), re-clarify the content and responsibilities of each management department in risk management, standardize the risk management process, and improve management efficiency.

DT can improve the management mode and decision-making process of commercial banks, indirectly improve the operating income of banks, and directly affect the efficiency of business services and asset utilization of banks. At the same time, DT can also promote the online indebtedness of banks, which not only improves the coverage of indebtedness and expands the access channels for deposit-related liabilities, but also absorbs a large amount of idle funds of residents by means of convenient payment, improves the deposit absorption capacity of commercial banks, and thus reduces the dependence of banks on financing. In addition, DT can promote the interconnection among banks, customers, prod-

ucts and services, reduce banks' dependence on physical outlets to a large extent, promote the asset-light development of commercial banks, and help reduce their fixed asset investment. Therefore, the use of digital technology by banks will help improve their operational efficiency. Therefore, this paper puts forward Hypothesis 2 to observe the mechanism of the DT of commercial banks on their risk taking from the perspective of management cost and operational efficiency.

H2: Management cost and operation efficiency are the important mechanism of DT affecting bank risk taking.

### 3. Research Design

#### 3.1. Sample and Data Source

Based on the implementation and popularity of the concept of DT of Chinese commercial banks, this paper selects the period from 2010 to 2021 as the sample interval. Considering the completeness and availability of business data of Chinese commercial banks, 229 banks are selected as the research objects, including 6 large state-owned banks, 12 joint-stock banks, 128 city commercial banks, 54 rural commercial banks and 29 foreign banks. The data came from CSMAR database, China Financial Statistics Yearbook and annual reports of commercial banks. Some missing values were supplemented by manual search of bank financial statements and interpolation method.

#### 3.2. Variable Selection

The dependent variable, commercial bank risk-taking (Risk), refers to the risk that commercial banks actively undertake, which requires internal resources to compensate for losses. It is the result of commercial banks making business choices based on maximizing profits. Regarding its measurement indicators, Z-value is one of the most commonly used indicators to measure the risk-taking of commercial banks. However, the Z-value only reflects the bankruptcy risk of the bank rather than all risks, and the practical significance of measuring the change in risk-taking using the change in Z-value is relatively weak. [Qiu et al. \(2018\)](#) used the proportion of risk weighted assets to total assets to measure a bank's risk-taking, which is a comprehensive measure that takes into account both pre-risk management and regulatory capital. This article selects the proportion of risk weighted assets to total assets as an indicator of bank risk-taking, measuring the bank's prior risk-taking. In the robustness test, the dependent variable is replaced with the non-performing loan ratio, and the robustness of the results is tested from the perspective of post risk assumption.

Explanatory variables (DTI). In terms of the measurement of banks' digital transformation, some scholars are limited to the one-sided perspective of financial technology, Internet finance or digital inclusive finance. In this paper, the "Digital Transformation Index of Chinese Commercial Banks" constructed by [Xie and Wang \(2022\)](#) is referred to as the explanatory variable. The index inno-

vatively constructs an indicator system from three dimensions of strategic digitalization, business digitalization and management digitalization of commercial banks, and forms a more comprehensive and objective measurement of the DT situation and development trend of China's commercial banks, covering the characteristics of banks' DT relying on digital technology and service industry. Therefore, this paper uses this index to measure the level of DT of commercial banks.

Control variables. With reference to the research of Gu and Yang (2018), control variables are selected from two aspects: micro bank characteristics and macroeconomic environment. Asset is measured by logarithmic total assets. Profitability is measured by the net profit rate on total assets (ROA) and the net profit rate on operating income (NOP), respectively. Income from interest-bearing assets is measured by Net Interest Margin (NIM). At the macro level, the main proxy variables are the banking industry prosperity index (BCI) and the ratio of M2 to GDP (M2GDP).

The mediator variables. The ratio of management expenses to operating income (CIR) reflects the management input of the bank and represents the management cost of the bank. The Total Assets Turnover (TAT) ratio is used to measure the operating efficiency of the bank. The higher the total assets turnover ratio, the stronger the operating capacity of the bank.

### 3.3. Model Construction

For the panel data of Chinese commercial banks, the Hausman Test indicates that the fixed effect model should be used in the selection of regression model. Since the disturbance terms of the same bank between different years are usually auto-correlated, the clustering robust standard error is used in this paper. In this paper, the following fixed-effect regression model is constructed:

$$Risk_{i,t} = \beta_0 + \beta_1 DTI_{i,t} + \gamma Controls + \delta_i + \theta_t + \varepsilon_{i,t} \quad (1)$$

Secondly, the recursive equation model is constructed to investigate whether the DTI affects the risk taking of banks through the two paths of management cost and operational efficiency:

$$Mediator_{i,t} = \beta_0 + \beta_1 DTI_{i,t} + \gamma Controls + \delta_i + \theta_t + \varepsilon_{i,t} \quad (2)$$

$$Risk_{i,t} = \beta_0 + \beta_1 Mediator_{i,t} + \beta_2 DTI_{i,t} + \gamma Controls + \delta_i + \theta_t + \varepsilon_{i,t} \quad (3)$$

In Equations (1)-(3),  $Risk_{i,t}$  represents the risk level of bank  $i$  in year  $t$ ,  $DTI_{i,t}$  represents the DTI of bank  $i$  in year  $t$ .  $Controls$  stands for a set of control variables. The individual fixed effect and time fixed effect of banks are expressed by  $\delta_i$  and  $\theta_t$  respectively.  $\varepsilon_{i,t}$  represents an unobservable random error term.

## 4. Empirical Analysis

### 4.1. Descriptive Statistics

The descriptive statistics of "bank-annual" panel data of 229 Chinese commer-

cial banks were finally obtained in this paper, as shown in **Table 1**. From the results of descriptive statistics, the mean and standard deviation of Risk show that the average risk level of the banking industry is relatively small, but the internal differences are large, and these differences may be caused by the size of the bank. The distribution of the Digital Transformation Index (DTI) is more dispersed, indicating that the level of digital transformation of different banks is also significantly different.

In addition, the correlation test and multicollinearity test were conducted on the data, and the results showed that there was a correlation between the explanatory variable DTI, series control variables and the explained variable Risk at the level of at least 10%, and the correlation was not caused by multicollinearity, so subsequent model regression could be carried out.

## 4.2. Regression Result Analysis

The data supplemented by the missing value is the balanced panel data, and the cross-section number is larger than the ordinal number, so the stationarity of the unit root test is not carried out. For the sake of robustness, three regression results of Ordinary Least Squares (OLS), Fixed Effect (FE) model and Random Effect (RE) model are also reported in this paper, as shown in Column (1), Column (2) and Column (3) of **Table 2**. Under the three estimation methods, the estimated coefficients of DTI are  $-0.0057$ ,  $-0.0052$  and  $-0.0060$  respectively, all of which are negative and significant at 1% level, indicating that there is a significant negative relationship between DTI and banks' risk taking, that is, banks' Digital Transformation will help reduce their risk taking.

In addition, the Hausmann test result is less than 0.05, so it is more reasonable to choose the Fixed Effect (FE) model for subsequent estimation.

**Table 1.** Descriptive statistics.

	N	mean	p50	sd	min	max
risk	2146	-4.023	-4.355	1.764	-9.965	0
npl	1918	1.507	1.400	1.012	0	13.97
dti	2151	53.16	49.59	38.02	0	197.1
asset	1912	25.81	25.57	1.607	21.56	31.14
roa	1912	0.833	0.824	0.389	-1.226	2.748
nop	1905	30.95	32.32	11.26	-73.87	62.16
nim	1742	2.529	2.290	1.450	0.870	22.67
bci	2151	71.26	70.20	7.062	60.50	87.20
m2gdp	2151	1.976	2.014	0.120	1.745	2.158
cir	1582	34.53	32.94	10.58	12.38	152.9
tat	1971	2.707	2.670	1.146	0	10.84

**Table 2.** Basic regression result.

	(1) OLS	(2) FE	(3) RE
dti	-0.0057*** (-3.71)	-0.0052*** (-2.64)	-0.0060*** (-3.59)
asset	-0.0924*** (-3.41)	-0.3924** (-2.33)	-0.0863** (-2.11)
roa	0.3632* (1.96)	0.9551** (0.64)	0.8384** (1.41)
nop	-0.0211** (-1.53)	-0.0284** (-0.74)	-0.2295** (-1.05)
nim	0.0551** (0.25)	0.2020** (0.90)	0.0998** (0.57)
m2gdp	-0.4879 (-0.71)	1.4748* (1.67)	0.0763 (0.11)
bci	-0.0151 (-1.51)	0.0015 (0.15)	-0.0082 (-0.87)
_cons	0.1866 (0.08)	3.0635 (0.69)	-1.6405 (-0.70)
r <sup>2</sup>	0.1397	0.3713	
F-test		6.38	
		Prob > F = 0.0000	
Wald chi <sup>2</sup>			68.82

Note: t statistics in parentheses, \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ , same below.

### 4.3. Robustness Test

#### 1) Replace the explained variable

In order to ensure the robustness of the regression results, this paper chooses to replace the explained variables for empirical test. Based on the above discussion, the NPL is used to measure the risk bearing level of commercial banks, so as to ensure that the established model does not have errors caused by variable selection. NPL is mainly used to measure the credit risk of banks. Although banks are actively carrying out diversified business, the credit business still occupies an important position at present. Therefore, the adoption of NPL can reflect the risk bearing level of banks to a certain extent, and the robustness test can be carried out. Non-performing loan ratio is used to measure the risk of commercial banks, and the DTI of commercial banks can significantly reduce their risk. As shown in Column (2) of **Table 3**.

#### 2) One-phase lag

In reality, one-phase lag may take some time for bank DT to affect the choice

**Table 3.** Robustness test.

	(1) Risk	(2) NPL	(3) One-phase lag
dti	-0.0052*** (-2.64)	-0.0039** (-0.57)	-0.0045** (-0.47)
asset	-0.3924** (-2.33)	-0.0980*** (-2.62)	-0.3134* (-1.85)
roa	0.9551** (0.64)	0.6530*** (2.90)	0.8821** (2.45)
nop	-0.0284** (-0.74)	-0.0246** (-1.63)	-0.0351** (-1.53)
nim	0.2020** (0.90)	0.1030** (1.02)	0.1836** (0.84)
m2gdp	1.4748* (1.67)	-0.4203 (-0.67)	0.7277 (0.89)
bci	0.0015 (0.15)	-0.0191** (-2.15)	-0.0125 (-1.31)
L.risk			0.2672*** (6.71)
_cons	3.0635 (0.69)	1.3481 (0.63)	4.0188 (0.93)
Individual	YES	YES	YES
Time	YES	YES	YES
r <sup>2</sup>	0.3713	0.4072	0.1540
F-test	6.38	5.52	1.50
	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0025

and change of bank risk taking, so the main explanatory variable bank DTI is processed one period later. At the same time, all the control variables are delayed by one period in order to avoid the influence of the endogeneity of the control variables. The correlation variables were treated with a one-stage lag before regression, which alleviated the endogenous bias of two-way causation to a certain extent. The regression results are shown in Column (3) of **Table 3**. The F-test result is 1.50, which is still significant at the 5% level, indicating that the model with a one-stage lag considers the time relationship between the explained variable Risk and the explanatory variable DTI, thus weakening the bidirectional relationship between Risk and DTI.

#### 4.4. Influence Mechanism Study

In the process of DT of banks, when the realization of digital technology reduces management costs and improves profitability, banks have less motivation to transfer risks to depositors, thus reducing their risk bearing.

As shown in the results of the intermediary effect in **Table 4**, the estimated coefficients of DTI are  $-0.0247$  and  $-0.0012$  respectively, and are significant at least at the 10% level, indicating that DT can significantly reduce the management cost of banks and improve their operating efficiency. The estimated coefficient of management cost is  $0.0330$ , indicating that the higher the management cost, the stronger the motivation of commercial banks to transfer the risk to depositors, and the higher the level of risk taking. The estimated coefficient of operating efficiency is  $0.2872$ , and it is significant at 5% level, indicating that the higher the operating efficiency, the higher the level of risk-taking of banks.

Therefore, management cost and operational efficiency are important intermediary mechanisms for DT to affect bank risk taking. It can be concluded that through digital transformation, commercial banks can save their own management costs and improve operational efficiency, thus reducing the level of risk taking of banks.

#### 4.5. Further Analysis

Heterogeneity Analysis. The different types of Chinese commercial banks bring different corporate culture, business and customers, and have a continuous impact on the risk taking of commercial banks in the inter-period. Therefore, based

**Table 4.** Influence mechanism study.

	CIR	Risk	TAT	Risk
DTI	$-0.0247^{**}$ ( $-1.40$ )	$-0.5050^{**}$ ( $-0.45$ )	$-0.0012^*$ ( $-0.24$ )	$-0.0047^*$ ( $-0.37$ )
CIR		$0.0330^{**}$ ( $1.10$ )		
TAT				$0.2872^{**}$ ( $0.11$ )
Controls	YES	YES	YES	YES
_cons	$131.2668^{***}$ ( $6.97$ )	$-1.2488$ ( $-0.23$ )	$5.0684^{***}$ ( $4.28$ )	$3.8316$ ( $0.88$ )
Individual	YES	YES	YES	YES
Time	YES	YES	YES	YES
F-test	$4.31$	$4.72$	$3.57$	$3.55$
	Prob > F = $0.0000$	Prob > F = $0.0000$	Prob > F = $0.0000$	Prob > F = $0.0000$

**Table 5.** Scale heterogeneity test.

	(1) State-owned bank	(2) Joint-stock bank	(3) City commercial bank	(4) Rural commercial bank	(5) Foreign bank
DTI	-0.2900* (-0.0092)	-0.1939* (-0.0043)	-0.1126* (-0.0029)	-0.0931* (-0.0078)	-0.1760* (-0.0037)
Controls	YES	YES	YES	YES	YES
_cons	143.2172** (70.9990)	13.5522 (13.7758)	6.8569 (5.0727)	4.2993 (18.3085)	-6.7645 (14.5441)
Individual	YES	YES	YES	YES	YES
Time	YES	YES	YES	YES	YES
r <sup>2</sup>	0.1743	0.1473	0.1275	0.1347	0.1326
F-test	3.90	3.39	3.10	2.34	2.01
	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000

on different types of commercial banks, the following regression is carried out according to state-owned large commercial banks, joint-stock commercial banks, city commercial banks, rural commercial banks and foreign banks. The regression results are shown in **Table 5**.

The regression coefficient of DTI is significantly negative in different scale banking groups, but it is larger and more significant in small scale banking groups such as rural commercial banks, indicating that DT has a greater inhibitory effect on the risk taking level of smaller banks. The possible explanation is that large and medium-sized commercial banks, such as state-owned banks, have rich experience in risk management and tend to serve large customer groups with relatively fixed customers. Under the influence of regulatory and other factors, its business strategy is relatively conservative, coupled with sufficient mortgage guarantee of large customer groups, it has good profitability, and the probability of material default is low.

## 5. Conclusion and Suggestion

This study examines the impact of the development of DT on the risk taking of commercial banks. By using the relevant data collected from CSMAR database, Peking University Digital Finance Research Center, commercial bank statements, statistical yearbook, etc., the research hypothesis and part of the influence channels are verified through empirical methods, and the following conclusions are drawn:

- 1) The development of DT is conducive to reducing the risk taking of Chinese commercial banks.
- 2) Among different types of Chinese commercial banks, the impact of DT is

different. For smaller banks such as city commercial banks, DT has a more significant effect on reducing their risk taking.

Bank's DT is a gradual process, but it must be a project that the bank not only in the strategic level but also in the execution, and the DT should be in line with the actual development of various banks according to local conditions. Chinese Commercial banks should take advantage of DT through their own research and development, active cooperation and other ways to enhance their risk control capabilities, and actively respond to the national call to build a digital China.

Firstly, effectively increase the support and investment in digital technology and innovation, accelerate the pace of DT, comprehensively promote the DT of the banking industry, and achieve sustainable development. Secondly, small-sized and medium-sized commercial banks should seize the transformation opportunities brought by digital technology, systematically plan their own DT strategies, and prevent the phenomenon of digital technology and business development from being independent, so as to build their own competitive advantages. Thirdly, in order to ensure the steady development of the DT of the banking industry and supervise the process of financial digitalization, it is also necessary to update the relevant laws of digital finance, make DT and development accept legal protection, supplement the field of financial business supervision, pay attention to the communication and coordination among various regulatory agencies, strengthen information exchange and scientific links, determine the scope of power and responsibility, and delineate the trade boundaries between regulatory agencies.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- Banna, H., & Alam, M. R. (2021). Does Digital Financial Inclusion Matter for Bank Risk-Taking? Evidence from the Dual-Banking System. *Journal of Islamic Monetary Economics and Finance*, 7, 401-430. <https://doi.org/10.21098/jimf.v7i2.1320>
- Chen, J., Huang, S., & Liu, Y. H. (2020). From Empowerment to Empowerment—Enterprise Operations Management in a Digital Environment. *Management World*, 36, 117-128+222.
- Demertzis, M., Merler, S., & Wolff, G. B. (2018). Capital Markets Union and the Fintech Opportunity. *Journal of Financial Regulation*, 4, 157-165. <https://doi.org/10.1093/jfr/fjx012>
- Du, E. Q., Ji, M., & Yuan, B. (2021). Research on Promoting High Quality Development of Small and Medium Sized Banks in China through Digital Transformation. *Journal of Northwest University (Philosophy and Social Sciences Edition)*, 51, 109-116.
- Gu, H. F., & Yang, L.X. (2018). Internet Finance and Bank Risk Taking: Evidence Based on China's Banking Industry. *World Economy*, 41, 75-100.
- Guo, L. H., & Zhu, K. D. (2021). Financial Technology, Banks' Risk and Business Performance, Based on the Perspective of Pratt & Whitney Financial. *Journal of international financial research*, 7, 56-65.

- Guo, P., & Shen, Y. (2019). Internet Finance, Deposit Competition and Bank Risk Bearing. *Financial Research*, 8, 58-76.
- Huang, L. H., Zhu, H. L. et al. (2021). Digital Transformation and Management of Enterprises: Research Framework and Prospects. *Journal of Management Science*, 24, 26-35.
- Jiang, H., Tang, S. F., & Wu W.Y. (2023). Research on the Impact of Digital Transformation on Risk Taking of Commercial Banks: Theoretical Logic and Empirical Evidence. *International Finance Research*, 1, 62-73.
- Qiu, H., Huang, Y. P., & Ji, Y. (2018). The Impact of Financial Technology on Traditional Banking Behavior—Based on the Perspective of Internet Financing. *Financial Research*, 11, 17-29.
- Wu, F., Hu, H. Z., Lin, H. Y., & Ren, X. Y. (2021). Digital Transformation of Enterprises and Capital Market Performance: Empirical Evidence from Stock Liquidity. *Management World*, 37, 130-144+10.
- Xie, X. L., & Wang, S. H. (2022). Digital Transformation of Commercial Banks in China: Measurement, Process, and Impact. *Economics (Quarterly)*, 22, 1937-1956.  
<https://doi.org/10.2139/ssrn.4355883>