Coverage Breadth of Digital Finance and SMEs' Growth

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Abstract: Small and medium enterprises (SME) always have a hard time getting a loan from the bank. Especially during the covid, SMEs are seeking help due to a dramatic drop in revenues and they're struggling to just stay afloat. On the other hand, digital finance plays an essential role during the COVID-19 and fintech companies are well-placed to deal with digital demand and work from home conditions. This paper investigates the impact of the digital finance coverage breadth on the growth of small and medium enterprises (SME). Using data of Chinese SMEs and corresponding coverage breadth index for the period 2011 to 2018, our results find (1) there is a significant positive correlation between coverage breadth and growth; (2) there is no heterogeneity in the impact of digital finance on the growth of enterprises in which their assets are above the mean and below the mean. The findings shed light on presenting that digital finance boosts the growth of SMEs as an effective complement to existing conventional financial services.

1. Introduction

The development of digital payment in China has made big steps forward in digital finance, driving the shift away from cash in the Chinese economy thereby enabling the country's widespread bank account and smartphone ownership. According to Engen, the eMarketer project reports that the number of mobile payment users from 2015 to 2021 experienced an upward trend, from 173.1M to 624.3M. Likewise, 79.3% of smartphone users made a payment in 2021 compared to 35% in 2015 [1]. Furthermore, a survey from Daxue Consulting confirmed that the payment was made via mobile payment modes in China increased 79.5% from 2011 to 2018, from 3.5% to 83% [2]. The current COVID-19 pandemic in China boosted digital merchant payment through using mobile payment, online payment, and QR payment. It is reported that 1.354 billion online payments daily, an increase of 54.59% year-on-year [3].

The e-commerce giants Alibaba (Alipay) and the gaming company Tencent (Tenpay) pioneered digital merchant payments and they now account for 90 percent of the $17 trillion mobile payments market [4]. Alipay and Tenpay dominate third-party mobile payment in China. The number of active users of WeChat pays increases from 355 million to 1097 million from 2013 to 2018 [5]. Alipay, on the other hand, increased 800% from 2013 to 2018, from 100 million users to 900 million users [6]. The increasing penetration of digital technologies in financial markets is evidenced by the rapid growth of adoption rates of active users as well as promoting the efficiency of business function. During the same period, the net revenue grows 610% in Alibaba and 414% in Tencent, from 8649 million RMB in 2013 to 61,412 million RMB in 2018 and 15,563 million RMB in 2013 to 79,984 million RMB in 2018 respectively [7-10].

The increasing interdependence of world economies has promoted the connection of different parts of the world but resulted in intensified competition in international markets. Because of the globalized markets with a higher rivalry environment, rapid technological changes, and shorter product and technology lifecycles, many firms, especially the small and medium enterprises (SMEs), are focusing on making innovation which is the key driver for sustainable competitive advantage [11]. According to Francis and Bessant in 2005, the profits of companies with a high degree of innovation capability are generated twice those of other companies on average [12]. Therefore, innovation is the key to staying ahead of the competition. However, innovation requires capital investment, from researching

the early stage to filling the patent protection of innovation in the later stage, thus financing plays a vital role in supporting these activities. Indeed, before starting to develop an innovative product or strategy, access to finance is a critical barrier for SMEs to start, sustain and grow as it needs start-up capital to support innovation, whether through existing assets or future liability. In terms of conventional financial services, conventional lending constraints in the capital market restrict the capital investment of SMEs as lower debt-to-income ratios are required [13].

The mission of empowering digitalization in the finance function is a realistic goal resulting from the range of technological advances [14]. Digital tools bring a lot of significant benefits for firms. The emergence of digital finance, such as digitalization, helps boosts financial inclusion that enables firms to reduce costs associated with transport and border operations but also provides firms with access to financing through a stable and secure method, thereby assisting SMEs to integrate into the global market and enhancing the trade services [15]. Large enterprises like Ant Group and Tencent are in the early stages of building digital finance functions as both of them ventured into fintech by embedding their financial services inside the payment features of WeChat Pay and Alipay. In addition to digital payment, financial service like microloan provided by the Ant Group provides loan to small business through the internet after evaluating potential borrowers' creditworthiness based on transactional and behavioral data. In terms of coverage, Alipay covers 54 countries and regions, and WeChat Pay covers 17 currencies in 49 countries and regions [16]. However, there is a lack of results and representative SMEs in analyzing digital finance as well as its coverage breadth, which is hard to prove how digitalization benefits SMEs. This paper will provide evidence that the growth of SMEs is impacted by digital finance.

The processing sections in the proposal are as follows: Section 2 is the literature review; Section 3 describes the empirical method and data. Section 4 reports and discusses the results of the analysis. Section 5 presents the heterogeneity tests. Finally, the conclusions are stated in Section 6.

2. Literature Review

This paper introduces recent research about the growth of SMEs resulting from finance digitalization. While not presenting all literature about SMEs' growth and digital finance – which is too vast to cover here in its entirety – we demonstrate the digital finance inclusion and benefits, financing constraints and digital finance, and the correlation between SMEs' finance and growth. This literature review section aims to summarize the main findings. We will divide this section up into the subdivisions that the literature refers to the most while keeping in mind that not every piece will be used to answer our research question. Aspects from some, however, might be worth noting and using in our methodology and data collection as well. While not relating directly to our topic, it is important to understand what researchers before us had done to obtain their results before we attempt to do so ourselves.

2.1 Digital finance inclusion and benefits

Digital finance leads to financial inclusion that indicates basic financial products and services become more accessible to individuals as well as businesses. In terms of digital financial inclusion, it is evidenced that nearly 50% of active mobile phone users are in developing countries [17]. Ozili discusses several benefits of digital finance and financial inclusion in 2018 such as broadening access to finance among poor individuals, reducing the cost of financial intermediation for banks, and reducing risks of loss, theft, and other financial crimes posted by cash-based transactions [18]. Meanwhile, digital finance improves the gross domestic product (GDP) as well. Ozili indicates that digital finance helps individuals as well as small, medium, and large businesses to improve access to a diverse range of financial products and services, thereby boosting the gross domestic product (GDP) of digitalized economies [19]. It is reported that the widespread use of digital finance could boost the annual GDP of all emerging economies by $3.7 trillion at the end of 2025, a 6% increase versus a business-as-usual scenario [20].

2.2 Financing constraints and digital finance

Zhiqiang, Junjie, Hongyu, and Khuong's research confirms that digital finance and digital finance inclusion bring benefits to business, which is conducive to alleviating financing constraints for SMEs as they access various services provided by banks through a digital transaction platform, which is more accessible than before when applying for and obtaining loans [21]. Unlike large-sized firms, financial constraints exerted on SMEs allow firms to be more dependent on the external financing supplied by banks since they are not qualified to raise money from the stock market and there is a high sensitivity of firms' investment to the availability of internal funds [22]. Furthermore, the information asymmetry between banks and SMEs can be reduced due to the usage of big data technology [23]. Besides, Zhiqiang, Junjie, Hongyu, and Khuong indicate that the costs of the banking sectors are lower than before resulted from the benefits provided by the digital financial inclusion that allows banks to offer more services and products specially designed to suit the needs of SMEs [24].

2.3 SMEs finance and growth

Abbasi, Wang, and Alsakarneh's study in 2018 demonstrates that SMEs are the pillar sectors of any economy due to their capabilities to fuel financial development as they are the base of innovation, and are drivers of advancement [25]. The study also confirms that it is difficult for SMEs to obtain financing as they lack financial adequacy, face rigorous terms and conditions, and lack proper acceptable collateral [26]. Although this article presents that supply chain finance (SCF) helps SMEs overcome financing challenges and benefits for all stakeholders in SMEs, it gives the common takeaways is obtaining financing is an indispensable sector to strengthen firms' financial ability that enhances customer satisfaction, promote the effectiveness and efficiency of business operations, penetrate new markets and, overall, grow more profitably [27].

3. Research Design

3.1 Data

The study is based on firms listed on the SME board of China (stock ID starting with 002) over the period from 2011 to 2018 with variables, the geographical location, enterprise size, ROA, Lev, Cinten, ownership concentration, listing age, ownership type, and growth, from the China Stock Market & Accounting Research (CSMAR) Database. To be included in this study, the listed SME must have coverage breadth of digital finance available. The paper was able to obtain the index for SME within 377 cities above the prefecture-level in China from the Peking University Digital Financial Inclusion Index of China (PKU-DFIC) at the end of each calendar year from 2011 to 2018.

The study selected sample from 2011 to 2018 PKU-DFIC includes 31 provinces, 377 cities. During that period, some regions in China carried out reforms such as "setting up cities by withdrawing regions" and "changing counties into municipal districts", which adjusted the regional names and regionalism codes but did not affect the statistics of this index. The codes of prefecture-level cities in this index retained both versions of 2014 and 2018, while the county names and regionalism codes were based on the codes at the end of 2014. The study screened the samples according to following procedure: (1) Selected 2014 prefecture level cities and its corresponding coverage breadth from PKU-DFIC; (2) Selected all Chinese public traded firms with control variables and dependent variable listed above in the period from 2011 to 2018 in CSMAR, (2.1) Dropped public traded firms under special treatment (ST and *ST), (2.2) Dropped firms in the finance industry, (2.3) Excluded samples with missing values of key variables, (2.4) Dropped firms exclude SME where stock ID starting with 002 and its corresponding variables; (2.5) Filtered out duplicated values of SME in each respect variable among 2011 to 2018, (3) Combined the same stock ID and geographical location of each selected SME with prefecture level cities in 2014 with the explanatory variable, growth breadth, (4) Sorted data by stock ID, institution name, institution ID, provinces, cities, index of coverage breadth, enterprise size, ROA, Lev, Cinten, ownership concentration, listing age, ownership type, and growth.

As for data quality control, the data are from reliable sources, CSMAR, and a research team from the Institute of Digital Finance at Peking University. To minimize the double-counting of assets and liability, the paper excludes the financial firms from the above sample since the main assets of financial firms are claims on other firms. Similarly, the paper also filters out enterprises under special treatment (ST and *ST) status as they have already received risk warnings by the stock exchange.

3.2 Research Model Design and Variables

The study is based on the Ordinary Least Squares (OLS) regression model to measure the relationship between the independent variables and dependent variables. The model is as follow:

$$Growth_{it} = \alpha_0 + \alpha_1 \times Coverage\ Breadth_{it} + X_{it}\beta + \varepsilon_{it} \tag{1}$$

where the X_{it} represents control variables, including two dummy variables, listing age, listing age square, the logarithm of asset, logarithm of debt, the largest shareholder's shareholding ratio (top1), the board size, number of independent directors, the logarithm of salary and ROA. We set SOE and Foreign as the dummy variables, where both of them take the value 1, which represents the enterprise is considered as a state-owned enterprise and foreign-owned enterprise respectively. In equation (1), where the study sets growth as the dependent variable of firm i, year t, which is calculated through the average of the major operating income growth rate of the current year and the previous year. α_0 is the constant value. Besides, coverage breadth is shown as the explanatory variable. Moreover, the study applies the largest shareholder's shareholding ratio to represent the ownership concentration referred to Top1. The listing age of selected SMEs is calculated by using the year of corresponding data subtracted from the date of listing. Besides, the nature of ownership type is divided into two types: private enterprises and state-owned enterprises. ROA is calculated by the ratio of current net profit to the periodic total asset.

3.3 Variables Descriptive Statistics

Descriptive statistics are shown in Table I. To exclude extreme values, the continuous variables in this paper have been processed by 1% winsorize. In this table, Obs, Mean, Std. Dev., Min, and Max represent the sample size, standard deviation, minimum value, average value, and maximum value. The calculation results are rounded up to 4 digits after the decimal point. In terms of growth, we found that the mean value, 0.3467, which is close to the standard deviation, 0.7688. The maximum number of growth is 11.4398 and the minimum number is -0.8482. On the contrary, the mean value of coverage breadth is the approximately triple amount of its standard deviation. Besides, the maximum number of coverage breadth is 290.3175, around 4.5 times that of its standard deviation and 1.5 times of its mean value.

Table 1 variables' descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
growth	3264	.3467	.7688	-.8482	11.4398
Coverage Breadth	3264	184.883	62.227	5.1	290.3175
Age	3264	6.2157	2.996	0	14
Age-sq	3264	47.6078	40.3468	0	196
Ln asset	3264	21.9219	.9515	19.1987	26.1516
Ln debt	3264	20.7889	1.3616	17.4067	25.9776
top1	3264	33.9074	14.8227	4.15	86.49
SOE=1	3264	.2004	.4003	0	1
Foreign=1	3264	.0502	.2185	0	1
Board Size	3264	8.523	1.468	5	15
No. of Independent Director	3264	3.1345	.4743	2	5
Ln salary	3264	14.8203	.7459	11.9685	16.9982
ROA	3264	.047	.0582	-.3281	.2342

4. Empirical results

Table II presents the results of the fixed effects estimator according to the OLS regression. In the first column of the results of the fixed-effects model, the paper found that the dependent variables include the coverage breadth and constant, which indicates that there is a significant positive correlation between digital finance (coverage breadth) and SMEs growth as with 1 unit increase in coverage breadth resulted in 0.15% increase in SMEs growth. To eliminate the omitted variable bias, the study adds more firm-level control variables and two dummy variables as shown in column 2. The result shows the coefficient of growth breadth is positive and significant at 1% level, implying that the coverage breadth of digital finance is sensitive to SME growth.

Table 2 Ols Regression Model Results

VARIABLES	(1) Panel FE Growth	(2) Panel FE Growth
Coverage Breadth	0.0015**	0.0021***
	(0.0008)	(0.0005)
Age		-0.0029
		(0.0187)
Age-sq		0.0001
		(0.0013)
Ln asset		0.0430
		(0.0453)
Ln debt		0.0445
		(0.0312)
top1		0.0015
		(0.0012)
SOE=1		0.1169***
		(0.0392)
Foreign=1		0.1586*
		(0.0863)
Board Size		-0.0173
		(0.0141)
No. of Independent Director		0.0495
		(0.0383)
Ln salary		-0.0651*
		(0.0355)
ROA		0.4854
		(0.3930)
Constant	0.2008***	-0.8274
	(0.0636)	(0.5539)
Observations	3,264	3,264
R-squared	0.0058	0.0273
Number of id	408	408
Year	Yes	Yes
Industry Effect	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Heterogeneity tests

Table III shows the results of the heterogeneous test based on examining the different impacts of digital finance toward large-sized and small-sized firms. It should be noticed that large-scale firms are considered as firms with total assets at and above the median are considered, as shown in the dummy variable. Small-sized firms are defined as firms with total assets below the median. The explanatory variables involve the dummy variable and the product of the dummy variable and the coverage breadth. The first column includes the coverage breadth, dummy, dummy#coverage breadth, and constant. Besides, the coefficient of interaction is -0.0025 with the significant level above 10%, which demonstrates that the coverage breadth of digital finance has the greatest impact on small-sized firms. To eliminate the omitted variable bias, the study added firm-level control variables and two dummy variables as shown in column 2, the result shows that the coefficient of the interaction is insignificant. This paper follows the result in the second column with controlling the firm-level variables, thereby indicating that there is no heterogeneity in the impact of digital financial on the growth of large-sized firms and small-sized firms.

Table 3 heterogeneity analysis

variables	(1) panel FE Growth	(2) panel FE growth
Coverage Breadth	0.0017**	0.0022***
	(0.0008)	(0.0005)
dummy	0.5348	0.3714
	(0.3944)	(0.4040)
Dummy # Coverage Breadth	-0.0025*	-0.0022
	(0.0015)	(0.0016)
Age		-0.0032
Age-sq		0.0000
		(0.0013)
Ln asset		0.0558
		(0.0462)
Ln debt		0.0445
		(0.0312)
top1		0.0015
		(0.0012)
SOE=1		0.1181***
		(0.0391)
Foreign=1		0.1607*
		(0.0862)
Board Size		-0.0175
		(0.0141)
No. of Independent Director		0.0474
		(0.0383)
Ln salary		-0.0662*
		(0.0354)
ROA		0.5198
		(0.3906)
Constant	0.1869***	-1.0868*
	(0.0645)	(0.5814)
Observations	3,264	3,264
R-squared	0.0085	0.0295

Number of id		408	408
Year		Yes	Yes
Industry Effect		Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

Facing the continuous growth of technologies and innovation in China, digitalization is a realistic goal in the finance industry as it not only provides stable and safety financing options but also improves the efficiency and effectiveness of business operations. Two Chinese tech juggernauts Alibaba and Tencent are the pioneers in performing digitalization into their core business that reshaped China's payment landscape as it lowers the cost of providing financial services and boosts the availability of business data. The increasing number of active mobile users, as well as the net revenue growth, evidenced that digital finance provides a path toward high-performance business. Despite the rapid increases in digital adoption and the use we have seen in the large enterprise, there is less information on how digitalization works and impacts the different sizes of enterprises, like small and medium-size enterprises due to the lack of representative firms in adopting financial digitalization into the business.

This paper focuses on the 3264 Chinese firms in SME board during 2011 to 2018 with variables including two dummy variables, listing age, listing age square, the logarithm of asset, logarithm of debt, the largest shareholder's shareholding ratio (top1), the board size, number of independent directors, the logarithm of salary and ROA, and gives further evidence on how variables affect the growth of SMEs. The analysis is based on the OLS regression model, and the study employed the heterogeneity analysis to estimate the impact on digital finance toward the different sizes of enterprises. The study found that the coverage breadth on digitalization has a huge impact on the growth of SMEs, while other factors are insignificant. In the OLS regression model, the paper found that there is a strong correlation between the dependent variable Growth and the independent variable Coverage Breadth with the significant level of 5% and 1% in the first and second panel fixed effects regression respectively, which provides strong evidence to explain the relation. In terms of the heterogeneity of different impacts on digital finance toward large-scale and small-scale businesses, the results show that compared to the large-scale firms, the coverage breadth of digital finance has a greater impact on SMEs. It should be noted that after adding control variables, the interaction term becomes insignificant compared to the significant level 10% before. Therefore, the study indicates that there is no heterogeneity in digital financial on the growth of SMEs.

References

[1] Engen, J. There is no disputing that China is ahead of the rest of the world in mobile payments. What insight does it offer U.S. bankers? Retrieved from https://www.americanbanker.com/news/why-chinas-mobile-payments-revolution-matters-for-us-bankers

[2] Daxue Consulting. Payment methods in China: How China became a mobile-first nation, 2021, retrieved from https://daxueconsulting.com/payment-methods-in-china/

[3] Daxue Consulting. Payment methods in China: How China became a mobile-first nation, 2021, retrieved from https://daxueconsulting.com/payment-methods-in-china/

[4] OGAP. China: A Digital Payments Revolution, 2019, retrieved from https://www.cgap.org/research/publication/china-digital-payments-revolution

[5] Statista. (n.d.). Digital Payments. Retrieved from https://www.statista.com/markets/413/topic/984/digital-payments/; Xiang Bo. Alipay seems more mobile users in 2017, Xinhua, January 2, 2018, retrieved from

http://www.xinhuanet.com/english/2018- 01/02/c_136867491.htm; "Alipay active users exceeding 900 million across the globe," China Plus, November 29, 2018, retrieved from http://chinaplus.cri.cn/news/china/9/20181129/216184.html; Steven Millward, "Wechat is close to a billion users," Tech in Asia, August 16, 2017, retrieved from https://www.techinasia.com/wechat-near-billion-users.

[6] Statista. (n.d.). Digital Payments. Retrieved from https://www.statista.com/markets/413/topic/984/digital-payments/; Xiang Bo. Alipay seems more mobile users in 2017, Xinhua, January 2, 2018, retrieved from http://www.xinhuanet.com/english/2018- 01/02/c_136867491.htm; "Alipay active users exceeding 900 million across the globe," China Plus, November 29, 2018, retrieved from http://chinaplus.cri.cn/news/china/9/20181129/216184.html; Steven Millward, "Wechat is close to a billion users," Tech in Asia, August 16, 2017, retrieved from https://www.techinasia.com/wechat-near-billion-users.

[7] Alibaba Group Holding Limited. Fiscal Year 2020 Annual Report, 2020, p106, retrieved from https://doc.irasia.com/listco/hk/alibabagroup/annual/2020/ar2020.pdf

[8] Tencent Holding Limited. 2013 Annual Report, 2013, p15, retrieved from https://static.www.tencent.com/storage/uploads/2019/11/09/790cf80e9b17ac1cdfc84c87ebb2d85a.pdf

[9] Alibaba Group Holding Limited. Form 20-F, p2, retrieved from https://www.alibabagroup.com/en/ir/pdf/agm160524_ar.pdf

[10] Tencent Holding Limited. 2020 Annual Report, 2020, p3, retrieved from https://static.www.tencent.com/uploads/2021/04/08/960eae1f18dd716fd3a7d704e123d7a5.pdf

[11] Dadfar, H., Dahlgaard J. Brege, S and Alamirhoor, A. Linkage between Organizational Innovation Capability, Product Platform Development and Performance - The case of pharmaceutical SMEs in Iran, 2013, p819-834, retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.877.7638&rep=rep1&type=pdf

[12] Francis, D and Bessant, J (2005). Targeting Innovation and Implications for Capability Development. P2, Retrieved from https://www.researchgate.net/publication/223832747_Targeting_Innovation_and_Implications_for_Capability_Development

[13] UMLC. Advantages and Disadvantages of Conventional Lending, 2017, Retrieved from https://www.utahmortgageloan.com/blog/2017/07/10/advantages-and-disadvantages-of-conventional-lending/

[14] Chandra, K., Plaschke, F., and Seth, I. Memo to the CFO: Get in front of digital finance—or get left back, 2018, retrieved from https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/memo-to-the-cfo-get-in-front-of-digital-finance-or-get-left-back

[15] OECD. The digital transformation of SMEs, retrieved from https://www.oecd.org/industry/smes/PH-SME-Digitalisation-final.pdf

[16] Chen, T. The cross-border payment war of WeChat Pay and Alipay, 2019, retrieved from https://walkthechat.com/the-cross-border-payment-war-of-wechat-pay-and-alipay/

[17] Rizzo, M. Digital Finance: Empowering the Poor via New Technologies, 2014, retrieved from https://www.worldbank.org/en/news/feature/2014/04/10/digital-finance-empowering-poor-new-technologies

[18] P.K. Ozili. (December 2018). Impact of digital finance on financial inclusion and stability. [online]. 18(4). Pp. 329-340. Available: https://www.sciencedirect.com/science/article/pii/S2214845017301503?via%3Dihub

[19] CPA. The power of digital finance, 2016, retrieved from https://www.cpacanada.ca/en/members-area/profession-news/2016/november/the-power-of-digital-finance

[20] Z. Lu, J. Wu, H. Li, and D.C. Nguyen. (April 2021). Local Bank, Digital Financial Inclusion and SME Financing Constraints: Empirical Evidence from China. IPAG BUSINESS SCHOOL. [online]. Available: https://faculty-research.ipag.edu/wp-content/uploads/recherche/WP/IPAG_WP_2021_008.pdf

[21] P.K. Ozili. (December 2018). Impact of digital finance on financial inclusion and stability. [online]. 18(4). Pp. 329-340. Available: https://www.sciencedirect.com/science/article/pii/S2214845017301503?via%3Dihub

[22] W.A. Abbasi, Z. Wang, and A. Alsakarneh. (April 2018). Overcoming SMEs Financing and Supply Chain Obstacles by Introducing Supply Chain Finance. Journal of Business and Public Administration. [online]. 9(1). Pp. 7-22. Available: https://www.sciendo.com/article/10.1515/hjbpa-2018-0001