Micro- and small-sized enterprises' willingness to borrow via internet financial services during coronavirus disease 2019

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Abstract

This paper explores the relationships among micro- and small-sized enterprises' (MSEs) willingness to borrow from internet financial services (IFS) and the related impacts of coronavirus disease 2019 (COVID-19) and then analyses the mediating effects of their beliefs on the advantages and disadvantages of IFS. We further analyse the differences produced by the moderator effects of MSEs' enterprise variables (sector, operating years, entrepreneur's education, profit margin, and employee number) on the above relationships. We collected 632 valid reports by developing an online questionnaire in China and employing judgement sampling of MSEs with fewer than 50 employees and annual operating income less than RMB 5 million. Then, we analysed the findings with partial least squares structural equation modeling. The results show that COVID-19 significantly impacted most Chinese MSEs and that most Chinese MSEs tend to borrow via IFS, but the amount and period of MSEs' willingness to borrow should not be affected by the impacts of COVID-19 on MSEs. Rather, the explanation concerns the greater unfamiliarity or uncertainty concerning IFSs relative to traditional financial instruments. Moreover, MSEs' understanding of IFS's advantages and disadvantages has significant adverse mediating effects on the relationship between MSEs' willingness to borrow via IFS and the impacts of COVID-19. Furthermore, the enterprise variables of MSEs, namely, their industry type, entrepreneur's education, number of employees, profit margin, and operating years, have significant moderating effects on these relationships. The results have implications for the government's comprehensive supervision system for IFS risks, IFS firms' enterprise performance, risk survey, and information disclosure systems, and the development of customer-specific and easy-to-use marketing strategies for IFS firms.

Keywords Coronavirus disease · Lending willingness · Micro- and small enterprises · Internet financial services

Introduction

As of this writing (2021), coronavirus disease 2019 (COVID-19) has had significant negative impacts on the demand and supply of enterprises in various countries, especially micro- and small enterprises (MSEs), and thus, many countries have crafted support policies for MSEs. An increasing number of studies have discussed the impacts of infectious diseases on enterprises, but fewer have studied the impacts of COVID-19, which are global and significantly negative. Therefore, this paper focuses on COVID-19. According to the results of a literature review and survey of experts, the impacts of COVID-19 on enterprises are reduced demand and supply. The reduction in demand is caused by the stagnation in the global flows of people and goods, economic recession, wait-and-see investment or purchase delays, and mass unemployment. The reduction in supply is caused by interruptions in the supply chain and governments' self-isolation policies (McKibbin & Fernando, 2020; OECD, 2020a, 2020b, 2020c, 2020d).

Caiazza et al. (2021) and Santos et al. (2021) found lasting institutional and structural (consumption pattern) changes in the scale and severity of COVID-19, inducing a reordering of the socio-economic environment and opportunities confronting MSEs. Shoss et al. (2021) argued that the individual impacts of COVID-19 might include economic recession and health disasters. Baldwin and di Mauro (2020), iResearch (2020), and Nicola et al. (2020) found that the socio-economic implications of COVID-19 are heterogenous with respect to industry, region, and time, with increased demand for medicine and food and rapidly reduced demand in most other industries. Omorede (2020) found that the impacts of COVID-19 might be driven by an individual's perception of impending personal threats, including COVID-19 exposure and work-hour insecurity. The common explanations for economic crisis and recession are social distancing, bans on gatherings, self-isolation, and travel restrictions. The OECD (2020a) projected two scenarios for global GDP and unemployment: one scenario in which there are two waves of COVID-19 impacting global GDP and the unemployment rate in 2020 and 2021 of -7.6% and 10.0% and 2.8% and 9.9%. The other scenario with a single wave of COVID-19 affecting global GDP and unemployment rates in 2020 and 2021 reports impacts of -6.0% and 9.2% and 5.2% and 8.1%. López-Cabarcos et al. (2020) found that COVID-19 has led to incalculable health, social, economic, and financial losses.

Due to limited public resources, many governments have focused the bulk of their firm subsidy policies for COVID-19 on MSEs, which have relatively poor financial structures. In contrast, large and medium-sized enterprises with relatively sound financial structures can use strategies and adjustments and reorganization to pursue corporate social responsibility and avoid layoffs (McKibbin & Fernando, 2020). According to the results of the literature review and expert interviews, compared with large and medium-sized enterprises, MSEs have a

Table 1 Values of α , rho, C.R., AVE, CL, and VIF for the Variables COVID, WTL, CIA, and CID

Variables	α	rho	CR	AVE	Indicators	OL	VIF
COVID	-0.28	-0.17	0.33	0.23	COVID ₁	0.27	1.01
					COVID ₂	0.38	1.02
					COVID ₃	0.81	1.01
					COVID ₄	-0.23	1.01
WTL	0.92	0.95	0.96	0.92	WTL ₁	0.97	3.56
					WTL ₂	0.95	3.56
CIA	0.17	0.17	0.62	0.31	CIA ₁	0.38	1.09
					CIA ₂	0.76	1.21
					CIA ₃	0.48	1.13
					CIA ₄	0.51	1.13
CID	0.22	0.32	0.63	0.33	CID ₁	0.57	1.19
					CID ₂	0.50	1.16
					CID ₃	0.84	1.32
					CID ₄	0.22	1.19

R² and adjusted R² for **WTL** are 0.16 and 0.16;
R² and adjusted R² for **CIA** are 0.14 and 0.14; and
R² and adjusted R² for **CID** are 0.17 and 0.16

smaller scale and scope and weaker online work and anti-risk capacity. Thus, COVID-19 has a greater impact on MSEs, as their reduced revenue and profits, increased pandemic mitigation costs, and greater cash flow deficits and isolation policy impacts entail greater operational risk affecting their production, sales, financial transactions, capital scheduling, and bill repayment (iResearch, 2020; OECD, 2020a, 2020b, 2020c, 2020d).

The COVID-19 responses of most governments in terms of MSE counselling and support schemes can be divided into financial support, reduced taxation, and innovation support. However, according to the results of literature review and expert survey, MSEs' major problem caused by COVID-19 is cash-flow shortages, so MSEs' cash flows should be the focus of governments' financial support policies to encourage the recovery of MSEs. Chinese MSEs' financial support programs (see Appendix Tables 1 and 2) focus on increasing credit amounts and

Table 2 Evaluation Model of PLS-SEM of Chinese MSEs' Willingness to Borrow via IFS During COVID-19

	Path coefficient	Total Effect
COVID → WTL	-0.02	-0.18**
CIA → WTL	-0.20***	
CID → WTL	-0.24***	
COVID → CIA	0.39***	
COVID → CID	0.41***	
Specific Indirect Effect		
COVID → CIA → WTL	-0.08***	
COVID → CID → WTL	-0.10***	

** $p < 0.01$, *** $p < 0.001$

policy guarantees for MSE loans, while their reduced taxation programs focus on reducing and delaying MSEs' taxes, rent, and social insurance. The U.S. The CARES Act covers US\$ 500 billion in corporate assistance and guaranteed loans. The loans offered to medium enterprises and MSEs (MSMEs) in the U.S. account for more than 70% the total, but companies are forbidden to use these loans to buy back treasury shares or investments, and the government established a committee to supervise the use of corporate assistance loans, which allowed MSMEs to pay for salaries, rents, and utilities. Russia's plan included two-month employee salary subsidies and interest-free salary loans. The employment adjustment subsidy system in Japan increased the suspension subsidy rate for MSMEs that do not dismiss employees to 90%. Canada's MSME program focuses on MSME loans, subsidies (such as 75% salary subsidies), credits, and tax deferral (OECD, 2020a, 2020b, 2020c, 2020d; Omar et al., 2020). Wahyudi (2014) demonstrated that MSMEs' cash flow, capacity, and leverage determine their default probability. Svatošová (2017) found that most MSMEs' financial strategy is to maximize their liquidity.

From the literature review (such as Audretsch et al., 2020; Beliaeva et al., 2020; iResearch, 2020; Kuckertz et al., 2020; Moloney & Moloney, 2020; Negopdiev et al., 2020) and expert surveys, the purpose of governments' MSE financial support schemes is to solve the ongoing problems of MSEs' limited access to direct financial instruments and short-term credit lines from financial institutions. Nevertheless, there is a large gap between MSEs' economic contribution and financial institutions' support for MSEs, and it is difficult to eliminate this gap using government policies. Direct financial instruments include bonds, stocks, commercial paper, and commercial bills of exchange in the capital market; however, high barriers to market entry make these instruments unavailable to MSEs, so loans from financial institutions have been important financing channels for MSEs. Financial institutions have insufficient credit lines for MSEs because there are market risks and credit risks for most MSEs, and there are insufficient risk control and accountability mechanisms for most MSEs. Therefore, most loans from financial institutions for MSEs are mortgage loans, and their credit lines are extremely limited. Because there are limited statistics on MSEs, and most MSMEs are MSEs, we present figures for Chinese MSMEs as an example. In 2019, there were more than 120 million MSMEs (accounting for more than 90.0% of all firms), MSMEs employed more than 230.0 million workers (more than 70.0% of all workers), the value of their final products and services accounted for more than 60.0% of GDP, and their tax payments accounted for more than 50.0% of total tax revenue. However, they accounted for less than 40.0% of all loans from financial institutions.

Due to the rapid development of technologies such as the internet, mobile communications, and big data, internet finance services (IFS) have become an emerging financial model for MSEs as platforms for lending, payments, and financial information transfer. There is no literature on this topic, and thus this article discusses MSEs' IFS loan behaviour and the impacts of COVID-19 on such activity. The content and procedure of IFS firms, which are regarded as new financing models for enterprises, differ from the direct financing instruments of the capital market and banks' indirect financing instruments. Companies related to IFS include

P2P online lending platforms, crowdfunding platforms, and third-party payment platforms.

The scale of lending by Chinese IFS firms has expanded rapidly, with an average growth rate of approximately 400% from RMB 19.77 billion in 2014 to RMB 7.85 trillion in 2018. The innovative financing model of IFS firms and increasing scale of their lending represents a new solution to financing difficulties for MSEs. On the one hand, because the characteristics of IFS firms are higher efficiency, greater convenience, lower cost, lower barriers to entry, and more flexible financing methods than traditional financial instruments, they provide a new solution for the financing problems of MSEs. On the other hand, most countries have a much larger number of MSEs than large and medium-sized firms, and this disparity affects all aspects addressed above. IFS firms could use big data technologies as technical support to reduce the transaction costs of MSEs, thereby reducing the information asymmetry of MSEs in their financing procedures, which facilitates and accelerates the financing relationship for both parties.

This article uses the partial least squares (PLS) method applied to the case of Chinese MSEs to provide theoretical and empirical analysis to address MSEs' financing problems. The major reason for employing PLS is that it can handle a regression model with multiple independent variables on MSEs' willingness to borrow from IFS firms and multiple dependent variables the financial impacts of COVID-19 on MSEs financial conditions and their beliefs regarding the advantages and disadvantages of IFS. Thus, this paper's contributions are as follows: (1) It extends the literature on MSE financing, including how it is influenced by COVID-19 and MSEs willingness to borrow via IFS firms. Although many papers have discussed the issues affecting MSEs' financing, no papers have focused on the relationships among the financial impacts of COVID-19 on MSEs, their willingness to borrow via IFS, their understanding of the advantages and disadvantages of IFS, and their enterprise characteristics (2) Understanding and explaining MSEs' willingness to borrow from IFS firms and the factors influencing this decision could help the government design MSE financial support schemes and help IFS enterprises develop their promotion strategies. (3) This paper extends the empirical literature on Chinese MSEs' financing with and understanding of their willingness to borrow via IFS and the factors influencing this decision. Méndez-Picazo et al. (2021) used PLS to study the effects of sociocultural and economic factors on social entrepreneurship and sustainable development and argued that the advantages of PLS are its causal-predictive analysis and its ability to incorporate variables with non-normal distributions and limited sample sizes.

Following this introduction, the second part of this paper uses the results of the literature review and an expert survey to define the variables capturing the financial impact of COVID-19 on MSEs, MSEs' willingness to borrow from IFS firms, the factors influencing this decision, which are MSEs' beliefs on advantages and disadvantages of IFS and MSEs' enterprise characteristics. The third part describes and analyses the structural equation modelling results, focusing on MSEs' willingness to borrow from IFS firms during COVID-19, the mediating effect of the influencing factors, and the moderating effect of MSEs' corporate

characteristics. The fourth part summarizes the conclusions and directions for future research.

Literature review and statistical analysis

MSEs' importance to the national economy and the financial impacts of COVID-19 on MSEs

According to the literature review and theoretical discussion, compared with large enterprises, MSEs have lower innovation costs for new technologies and production process reorganization due to their smaller scale and higher degree of freedom, lower risk adaptation costs for unstable and unpredictable situations, and low cost of linking to global production or value chains. These advantages of MSEs make them extremely important to the national economy, as demonstrated by the relatively large proportion of MSEs in GDP, total employment, market share, and tax share. Caiazza et al. (2021) found that COVID-19 disrupted the supply chains, consumption patterns, and business models in industries with a large share of MSEs. Caloghirou et al. (2020) proposed that the success factors of high-growth firms in the post-COVID-19 economy are their corporate strategy, human capital and R&D capabilities. Omar et al. (2020), the Malaysia National Entrepreneur and SME Development Council (2019), and Ibrahim et al. (2016) reported that MSMEs are significant contributors to the national economy. Saunila (2020) found that there is a positive relationship between MSEs' innovation capacity and their performance. Degefu (2018) argued that MSEs are important to economic growth and poverty reduction in developing countries.

Due to COVID-19, most countries have imposed restrictions and limitations on high-risk events and areas. Many international industries might delay payment due to unforeseeable circumstances that prevent them from fulfilling contracts, as well as changes in consumer consumption behaviour, namely decreased consumption frequency and amounts and the shift to in-home consumption. Many MSEs are facing problems related to cash-flow shortages, so governments' programs for providing financial support for MSEs include the direct and indirect financing of MSEs' wage bills, the reduction of and subsidies on interest, rent, and taxes, extending deadlines on loans and bills, and the reduction of loan amounts and support for loan guarantees. Hilmersson and Hilmersson (2021) found that networking might accelerate MSEs' innovation and that it might be key for resource-constrained MSEs suffering from the liability of smallness. Kim and Upneja (2021) found that cash flow is crucial to a firm's staying afloat, and corporate business failure depends on profitability and liquidity. Omar et al. (2020) argued that the impacts of COVID-19 on MSMEs are the disruption of their operation and supply chains, the risk to cash flows and of bankruptcy, and uncertainty of the government's packages and plans.

Most governments and the literature have suggested credit guarantee policies and reducing transaction costs with credit to reallocate loans from financial institutions in favour of MSEs. However, the desired effects have often failed to

materialize. The Indian Office of the Development Commissioner (Micro, Small and Medium Enterprises) provides an increasing number of services to MSEs, such as credit-linked capital subsidy schemes, MSE cluster development programs, credit guarantee schemes, procurement, marketing support schemes, and microfinance program schemes.¹ (OECD, 2004; UNCTAD, 2001). MSEs supported by the Canadian Business Credit Availability Program could borrow up to CAD 40,000 for their operating costs, and these loans are fully guaranteed by the public and interest free. For MSEs, Korea introduced a temporary special value-added tax reduction, taxes deferring up to one year, and deferments of social security contributions for up to three months. The Malaysian PRIHATIN Economic Stimulus Package 2020 included MYR 3.3 billion to sustain MSMEs' operations (cash flows and working capital) and employment. The United Kingdom's financial support policies include a statutory sick pay relief package for MSMEs, small business grant funding (GBP 10,000 in receipt of rate relief), and the coronavirus business interruption loan scheme (GBP 5 million in loans for MSMEs) (OECD, 2020a, 2020b, 2020c, 2020d; Omar et al., 2020).

MSE's lending problems due to financial statements and MSEs' beliefs about IFS

The problems that MSEs face when they seek to borrow based on financial statements can be divided into supply and demand considerations. On the demand side, MSEs are likely to face higher administrative costs to meet the requirements of financing firms, such as financial management standards and providing complete financial statements. On the supply side, compared with large enterprises, asymmetric information entails higher transaction costs between banks and MSEs, higher control costs for bank risks and credit on MSEs, and the lower cost-effectiveness of bank financing for MSEs. This arises because MSEs have smaller loan amounts, greater loan frequency, a higher likelihood of bad debt. COVID-19 has increased the loan needs of MSEs due to the reduction in consumer demand and increased cash flow deficits and short-term debt caused by supply chain disruption (UNCTAD, 2001).

IFS firms can provide direct MSE financing, but they can also provide basic information, operating conditions, and commodity types of MSEs to financial institutions to reduce the control and credit reporting costs of financial institutions for pre-loan, mid-loan, and post-loan risks of MSEs. Based on OECD (2020a), a literature review, and expert surveys, government equity investments in MSEs might help their recovery, and this approach could be achieved through IFS. For example, the payment business of Chinese Lakala Payment Co., Ltd. provides MSEs with needed operations services, namely loans, wealth management, insurance, credit card applications, and other services; and its payment system could export anti-fraud systems and risk control engines to financial institutions, which could provide scoring and

¹ The website of India Office of the Development Commissioner (Micro, Small and Medium Enterprises): <http://dcmsme.gov.in/>.

risk control assessments of MSEs to enhance the probability of successful MSE lending.

From the results of the literature review (for example Cambridge Alternative Finance Center, 2018; Luo et al., 2018; Xu et al., 2019) and the expert survey, the IFS models for MSEs are: (1) P2P lending, where loan funds are transferred from funders to MSEs; (2) P2P property lending, where the loans from funders to MSEs are secured by the latter's property; (3) balance sheet lending, where loans are made from platform companies to MSEs; (4) revenue or profit-sharing crowdfunding is defined as investments from crowdfunders to MSEs in exchange for securities, which promises the sharing of revenues or profits; (5) equity-based crowdfunding, where investments from crowdfunders to MSEs are made in exchange for equities; (6) invoice trading, where the loans from funders to MSEs are secured by their invoices or receivable notes at a discount; (7) rewards-based crowdfunding, where investments from crowdfunders to MSEs are made in exchange for nonmoney rewards; and (8) donation-based crowdfunding, which defined as donations from crowdfunders to MSEs (Huang, 2020). The Cambridge Alternative Finance Center (2018) found that the onboarding rate of P2P lending in 2017 was 57.0%, and its success rate was 86.0%, so the success rate of IFS should be higher than that of traditional financial instruments.

Through a literature review and expert interviews, this paper identifies the variables capturing the financial impact of COVID-19 on MSEs, MSEs' willingness to borrow from IFS firms, MSEs' beliefs on the advantages and disadvantages of IFS, and MSEs' enterprise characteristics. The variables capturing the financial impact of COVID-19 on MSEs, which are denoted as **COVID**, include the associated decrease in MSEs' revenues (**COVID**₁), MSEs' increased costs due to pandemic prevention efforts (**COVID**₂), MSEs' increased cash-flow shortfalls (**COVID**₃), and MSEs' increased operational risks (**COVID**₄). MSEs' cash inflow declined substantially following the outbreak of COVID-19, as consumers suspend or delay consumption, revenues are suspended, there are costs for breaching contracts that are temporarily suspended, and there are costs associated with delayed payment. However, most cash outflows of MSEs are fixed and thus less impacted by COVID-19, such as salaries, loans, interest, rent, insurance, water, and electricity expenses. Thus, most MSEs experienced significant cash-flow shortfalls.

The costs of delayed payment are a long-standing problem for MSEs and were exacerbated by COVID-19. There are an increasing number of large (even very large) enterprises in many industries. Such industrial concentrations are increasing due to government policies and market competitiveness, which weakens and marginalizes the positions of MSEs in industry supply chains. Simultaneously, large enterprises transfer their operating and transaction risks to MSEs through delayed payment and the costs of delayed payment, as MSEs' debt and interest were considerably increased by COVID-19 (Acar & Göç, 2011; Gow & Swinnen, 1998; Thwala & Mvubu, 2008, 2009). OECD (2020a) projected that more than 50% of firms would face cash-flow problems in the absence of policy assistance given that confinement measures lasted for seven months, and the reasons they provided are firms' solvency, collateral availability, and indebtedness. However, MSEs consistently face

these challenges. Abdullah et al. (2014) found that MSMEs' liquidity and cash flow are significant causes of their financial problems.

The variables representing MSEs' willingness to borrow via IFS, denoted as **WTL**, include the amount (WTL_1) and the period (WTL_2) of MSEs' willingness to borrow from IFS firms. Rahman et al. (2017) found a positive relationship between the total number of MSEs and interest rates but that it is difficult for micro firms to borrow from traditional financial institutions. Sari et al. (2020) found that MSEs' age, guarantees, and loan period affect their loan amounts.

The variables capturing MSEs' beliefs regarding the advantages of IFS, denoted as **CIA**, include that IFS firms are more efficient (CIA_1), have more convenient procedures (CIA_2), charge lower costs (CIA_3), and present lower barriers to market entry (CIA_4) than traditional financial institutions. IFS firms could facilitate efficient competition in the MSE lending market, which might provide incentives for other financial institutions to offer low-cost and high-performance financial services to MSEs and provide MSEs that are more financially sustainable (independent of further subsidies) with greater probabilities of lending success because competition might strengthen the values of relationship lending and client relationships of financial institutions (Berger et al., 2001a, 2001b; Boot, 2000; Elsas, 2005; Schäfer et al., 2010). Thus, the benefits of IFS are the reduction in MSEs' leverage and default probability and the increase in MSEs' credit ratings.

COVID-19 should have more directly impacted MSEs, but they should also be better able to weather COVID-19 than larger companies, which also have been severely affected, because MSEs should be able to respond more quickly and flexibly to COVID-19 than larger companies. On the other hand, it is difficult for financial institutions to predict the risk and credit control costs for MSEs, so the performance of government policies that provide direct assistance or credit guarantees to MSEs should not be better than those that create a financial environment conducive to MSEs being supported by private sector IFS firms (Berry et al., 2001, 2002; Mulhern, 1996; Özar et al., 2008). Zhang and Sun (2017) argued that the advantages of IFSs for MSEs are their more comprehensive, scientific, and simple procedures, greater guarantee ability, and lower threshold and financing costs.

The variables capturing MSEs' beliefs regarding the disadvantages of IFS, denoted as **CID**, address the privacy risks (CID_1), legal risks (CID_2), credit risks (CID_3), and fraud risks (CID_4) of IFS. Xu et al. (2020) argued that the risks of IFS includes technical risk, operational risk, legal risk, credit risk, business risk, management risk, and strategic risk. Yang et al. (2018) contended that the risks of IFSs are fraudulent information and market frictions.

The variables capturing MSEs' enterprise characteristics include an MSE's sector (MSE_s), years of operation (MSE_A), entrepreneur's education (MSE_E), previous year's profit margin (MSE_P), and number of employees in the previous year (MSE_{EM}). Huang et al. (2019) cited as factors influencing IFS are the development of the economy and traditional finance, industrial structure, human capital, informatization, and geographical adjacency and distance. Gebru (2009) found that the determinants of MSE financing preferences were MSEs' ownership structure, entrepreneur ability, and owners' education level.

According to Becchetti and Trovato (2002), the crucial determinants of MSEs' willingness to borrow should include the socio-economic characteristics of MSEs' entrepreneurs, namely their experience, education, and training; the basic characteristics of MSEs, which are their sector, location, and registration status; and the financial and market characteristics of MSEs, which are their external finance, subsidies, and connections to local and foreign markets. Mead and Liedholm (1998) found that an MSE's sector affects its survival rate, as MSEs in the retail, trade, transport, and chemical sectors faced higher closure risks than MSEs in the real estate, wood processing, wholesale trade, and non-metallic metal sectors. Mead and Liedholm (1998) found that the key determinants of an MSE's survival and growth are its years of operation, past growth, initial size, sector, location, and owner's sex. Moreover, MSE survival rates also varied significantly by sector.

Based on the above review, many issues concerning COVID-19, MSEs' demand for financial services, and IFS have been investigated by many governments, scholars, and enterprises, but the relationships among the financial impacts of COVID-19 on MSEs, their willingness to borrow via IFS, their beliefs regarding the advantages and disadvantages of IFS, and their enterprise characteristics have yet to be discussed. To provide IFS strategies and suggestions for MSE, this paper used PLS to study the structural equation model of the financial impact of COVID-19 on MSEs, MSEs' willingness to borrow via IFS, and the factors influencing these outcomes.

In the present study, 632 valid reports were collected by developing an online questionnaire in China, administered from May 2 to May 20, 2020. Furthermore, the judgement sampling of MSEs included those with fewer than 50 employees and annual operating income less than RMB 5 million. The descriptive statistics of the respondents' enterprise characteristics are presented below. (1) Regarding MSE sector, 44.9% of responding MSEs belong to primary and secondary industries, while the others belong to tertiary industry. (2) In terms of MSEs' years of operation, the respondents had an average of 5.5 years in operation (standard deviation=3.7). (3) Regarding MSE entrepreneurs' education, 64.1% of the respondents had an education level of high school or below, while the others had an education level of college or above. (4) Concerning MSEs' profit margin in the previous year, the respondents' average profit margin in the previous year is 13.3% (standard deviation=8.1%). (5) Regarding the number of employees of respondent MSEs in the previous year, the average is 23.3 (standard deviation=14.4).

Most MSEs reported a financial impact of COVID-19, with 85.3%, 84.7%, 59.8%, and 62.7% of the responding MSEs agreeing that they faced decreased revenues, increased pandemic prevention costs, increased cash-flow shortfalls, and increased operational risk, respectively.

The descriptive statistics for the variables capturing MSEs' willingness to borrow via IFS are presented below. The average amount that MSEs are willing to borrow from IFS firms is RMB 653.6 thousand (standard deviation=375.2). Moreover, the average period that MSEs are willing to borrow from IFS firms is 3.8 years (standard deviation=2.4).

Approximately half of the MSEs reported beliefs regarding the advantages and disadvantaged of IFS: for example, 52.2%, 50.0%, 54.1%, and 46.2% of the responding MSEs, believed that IFS firms are more efficient and have more convenient

procedures, lower costs, and lower barriers to market entry than traditional financial instruments, respectively. However, 48.7%, 52.2%, 45.3%, and 54.4% of the respondent MSEs reported that IFS firms presented privacy risks, legal risks, credit risks, and fraud risks, respectively.

From the above findings and compared with other works in the literature, Chinese MSEs suffered a significant financial impact due to COVID-19. MSEs have strong willingness to borrow via IFS, but not all MSEs understand the advantages and disadvantages of IFS. iResearch (2020) collated survey data and found that approximately 1/4 of Chinese MSEs reported they were severely affected by COVID-19. A total of 67.1% of MSEs indicated that their cash flows could not be maintained for more than three months. A total of 87.6% of MSMEs' operating income declined by more than 20% in 2020.

Theoretical framework and the structural equation model

The literature review indicates that while theories on MSE borrowing have developed for a long time, no theory has discussed the impacts of major emergencies (such as COVID-19) on the willingness of MSEs to borrow and their beliefs related to innovative financial instruments (such as IFS). Theories on MSE borrowing focus on (1) MSEs' financing demand and structure and include the MM theory of capital structure (Modigliani & Miller, 1958), the Miller model (Miller, 1977), trade-off theory (Ang, 1991; DeAngelo & Masulis, 1980; Myers, 1984; Pettit & Singer, 1985), pecking order theory (Graham & Harvey, 2001; Martinez et al., 2018; Myers, 1984), financial growth cycle theory (Sahlman, 1990; Schultz, 2011), and corporate control theory (Mishra & McConaughy, 1999). (2) Other works focus on MSEs' credit rationing (Berardi, 2007; Besanko & Thakor, 1987; Bester, 1985; Levenson & Willard, 2000; Williamson, 1986) and relationship lending (Berger et al., 2001a, 2001b; Brown & Zehnder, 2007; Degryse & Van Cayseele, 2000; Udell, 2002).

An increasing number of papers employ partial least squares structural equation modelling (PLS-SEM) to study enterprises' economic and financial issues due to the advantages of PLS, which are also why this paper uses PLS-SEM to explore the relationships among MSEs' willingness to borrow via IFS and the related impacts of COVID-19. The primary reason is that PLS-SEM can be more easily applied to explore MSEs' willingness borrow via IFS in response to COVID-19 and generate suggestions regarding governments' schemes for providing financial support for MSEs via IFS, address the mediating effects of MSEs' beliefs on the advantages and disadvantages of IFS, and the moderating effects of MSEs' enterprise characteristics. The aim of this model is to construct variables to evaluate MSEs' willingness to borrow via IFS, MSEs' beliefs about the advantages and disadvantages of IFS, and MSEs' enterprise characteristics.

According to the literature review, the advantages of PLS-SEM are as follows: (1) it can handle a regression model with multiple dependent variables and multiple independent variables; (2) it can overcome the problem of multivariable collinearity; (3) its processing can robustly cope with data interference and missing values; (4) it has a strong predictive ability for potential variables; (5) it can simultaneously cope

with both reactive and formative indicators; (6) it is suitable for small samples; and (7) it is not restricted by data distribution. Khan et al. (2020) used PLS-SEM to demonstrate the role of dynamic capabilities in circular economy implementation and firm performance. Lin et al. (2019) reported that the important reasons that papers in e-learning journals used PLS-SEM are their small sample size and nonnormal data. Hernández-Perlines et al. (2017) used PLS-SEM to investigate the influence of a family firm's entrepreneurial orientation and absorptive capacity on its performance. Costa and Monteiro (2016) used PLS-SEM to explore companies' knowledge creation and absorptive capacities as mediating variables in their knowledge acquisition and sharing and organizational innovation.

Many papers have used regression, structural equation modelling, and covariance structure analysis to explore the relationships among traditional financial instruments and MSEs, but fewer papers have discussed MSEs' borrowing behaviour. No paper to date has used PLS to study MSEs' willingness to borrow via IFS and the factors influencing this decision, which include the advantages and disadvantages of IFS and MSEs' enterprise characteristics (Behr et al., 2017; Larrimore et al., 2011; Leng et al., 2017; Ono & Uesugi, 2009). Mahmood and Rosli (2013) used multiple regression analyses to prove that microcredit is important for MSE performance, and its influencing factors are the entrepreneurial values and management competencies of MSE entrepreneurs. Riding et al. (2007) used a logistic regression model of MSEs' loan outcomes to study changes in MSEs' loan guarantees. Cziráky et al. (2005) used structural equation modelling and covariance structure analysis to investigate the determinants of MSEs' loan approval rate. Grunert and Norden (2012) used multivariate cross-sectional probit and ordered probit regression models to study the relationship between bargaining power and information in lending to MSEs.

Fig. 1 Path Diagrams of the Structural Equation Model of MSEs' Willingness to Borrow via IFS in Response to COVID-19

Because most of the variables on **COVID**, **WTL**, **CIA**, and **CID** are highly multicollinear, PLS-SEM is used to research the relationship between **COVID** and **WTL** and the mediator effects of **CIA** and **CID**. Figure 1 illustrates the path diagrams of the structural equation model of MSEs' willingness to borrow from IFS firms in response to COVID-19. The paths (equations) of the model are as follows:

$$WTL = a_1 + \beta_1 COVID + \epsilon_1 \quad (1)$$

$$WTL = a_2 + \beta_2 CIA + \epsilon_2 \quad (2)$$

$$WTL = a_3 + \beta_3 CID + \epsilon_3 \quad (3)$$

$$CIA = a_4 + \beta_4 COVID + \epsilon_4 \quad (4)$$

$$CID = a_5 + \beta_5 COVID + \epsilon_5 \quad (5)$$

$$WTL = a_6 + \beta_6 COVID + \beta_7 CIA + \beta_8 CID + \epsilon_6 \quad (6)$$

$\epsilon_1, \epsilon_2, \epsilon_3, \epsilon_4, \epsilon_5$, and ϵ_6 are residual terms.

Equation (1) tests the alternative hypothesis of H_1 that the relationship between **COVID** and **WTL** is significant (**COVID** → **WTL**), which means that MSEs' willingness to borrow from IFS firms would be significantly impacted by the financial effects of COVID-19 on MSEs. Equations (2), (4), and (6) test the alternative hypothesis of H_2 that there are significant mediating effects of **CIA** on the relationship between **COVID** and **WTL** (**COVID** → **CIA** → **WTL**), which means that MSEs' beliefs about the advantages and disadvantages of IFS are a significant mediator of the relationship between MSEs' willingness to borrow via IFS and the financial impact of COVID-19 on MSEs. Equations (3), (5), and (6) test the alternative hypothesis of H_3 that there are significant mediating effects of **CID** on the relationship between **COVID** and **WTL** (**COVID** → **CID** → **WTL**), which means that MSEs' beliefs about the advantages and disadvantages of IFS are a significant mediator of the relationship between MSEs' willingness to borrow from IFS firms and the impact of COVID-19 on MSEs.

Furthermore, the alternative hypothesis of H_{4a} assumes that there are significant moderating effects on H_1 in from **MSE_s**, which means that the MSE sector is a significant moderator of **COVID** → **WTL**. The alternative hypothesis of H_{5a} assumes that there are significant moderating effects on H_2 of **MSE_s**, which means that the MSE sector is a significant moderator of **COVID** → **CIA** → **WTL**. The alternative hypothesis of H_{6a} assumes that there are significant moderating effects on H_3 of **MSE_s**, and the MSE sector is a significant moderator on **COVID** → **CID** → **WTL**. Following the same logic, we have H_{4b} , H_{5b} and H_{6b} for **MSE_A**; H_{4c} , H_{5c} and H_{6c} for **MSE_E**; H_{4d} , H_{5d} and H_{6d} for **MSE_P**; H_{4e} , H_{5e} and H_{6e} for **MSE_{EM}**.

This paper uses the package SmartPLS (version 3.2.9) to estimate the PLS-SEM of Chinese MSEs' willingness to borrow from IFS firms during COVID-19. This PLS-SEM is a reflective model; the bootstrap replication is set at 1,000, and the path

weighting scheme is set at the highest R^2 value. The analysis consists of reliability, validity, suitability, and multiple group comparisons (Tenenhaus, 2005; Vinzi et al., 2010).

Table 1 presents the values of average Cronbach's alpha (α), Dillon-Goldstein's rho (ρ), composite reliability (CR), variance extracted (AVE), outer loading (OL), and collinearity statistics (VIF) for the variables **COVID**, **WTL**, **CIA**, and **CID**. From Table 1, the PLS-SEM of Chinese MSEs' willingness to borrow from IFS firms during COVID-19 should have acceptable reliability, validity, and suitability. The results of some variables (COVID, CIA, and CID) might not meet the minimum requirements for reliability and validity; they simply mean that respondents' evaluations of the items of COVID, CIA, and CID are not consistent, but these should not make the results unreliable. This is because the measures for COVID, CIA, and CID in this paper come from external measurement items, which is not the same as for the theory of validity and reliability (internal measurement); for example, the financial impact of COVID-19 on MSEs should not be identical across all MSEs. Thus, the inconsistent results for COVID-19 mean that some MSEs considered COVID-19 to be a risk, while others regarded it as an opportunity. The respondent's answer is the MSE's real status, so its validity and reliability coefficients should be 1. On the other hand, an advantage of PLS-SEM is that it is not restricted by the data distribution, so the reliability and validity of the data should not affect the estimation results of PLS-SEM. Both validity and reliability concern the internal measurement items of variables. Validity measures the consistency of measurement items and concepts, and reliability measures the consistency of measurement items under different conditions.

The PLS-SEM model for the evaluation of Chinese MSEs' willingness to borrow via IFS during COVID-19 is presented in Table 2. The results in Table 2 are as follows: (1) The relationship between **COVID** and **WTL** is not significant, which means that the null hypothesis of H_1 is supported. (2) The mediating effects of **CIA** and **CID** on the relationship between **COVID** and **WTL** are significantly negative, which means that the alternative hypotheses of H_2 and H_3 are supported. These results could indicate that financial impact of COVID-19 on Chinese MSEs did not significantly affect MSEs' willingness to borrow via IFS. However, Chinese MSEs have more beliefs about the advantages and disadvantages of IFS; they are less willing to borrow via IFS. The expert survey suggests that we should find greater unfamiliarity or uncertainty regarding IFS firms than traditional financial institutions. Most MSEs financially suffering from COVID-19 do pursue the more unfamiliar or uncertain approach of IFS to address their financial problems.

This paper identified the moderating effects of the Chinese MSE sector (see Table 3) by multi-group analysis, which includes two-way ANOVA and PLS-SEM. From Table 3, there are significant moderating effects of the MSE sector on their willingness to borrow via IFS during COVID-19 and mediating effects of MSE's beliefs regarding the advantages and disadvantages of IFS. Therefore, the alternative hypotheses of H_{4a} , H_{5a} , and H_{6a} for MSEs are supported. The likely explanation is that there were significantly more MSEs in tertiary industry that reported decreasing revenues and increasing pandemic prevention costs than among MSEs in primary and secondary industries.

Table 3 Multi-Group Analysis of Chinese MSEs' Sector

Variables	Indicators	Sector $\neq$ Tertiary(N) Approval and Mean	Sector = Tertiary(T) Approval and Mean	Difference (T-N)
COVID	COVID ₁	70.8%	97.1%	***
	COVID ₂	71.5%	95.4%	***
	COVID ₃	57.4%	61.8%	-
	COVID ₄	66.2%	59.8%	-
WTL	WTL ₁	648.9	657.3	-
	WTL ₂	3.7	3.9	-
		Coefficient (N)	Coefficient (T)	
COVID $\rightarrow$ WTL		-0.07	0.03	***
COVID $\rightarrow$ CIA $\rightarrow$ WTL		-0.09***	-0.07***	***
COVID $\rightarrow$ CID $\rightarrow$ WTL		-0.14***	-0.08***	***

*** $p < 0.001$

The moderating effects of MSEs' years of operation were obtained via multi-group analysis (Table 4). For simplicity, the data were divided into two groups: one group consisting of MSEs' in operation for fewer than six years and another group consisting of MSEs with six or more years in operation. From Table 4, there are significant moderating effects of MSEs' years of operation on their willingness to borrow from IFS firms during COVID-19 and mediating effects of their beliefs regarding the advantages and disadvantages of IFS. Therefore, the alternative hypotheses of H_{4b} , H_{5b} , and H_{6b} for MSE_A are supported. The likely explanation is that there are significantly more MSEs with fewer than six years of operation that reported increasing pandemic prevention costs and increasing cash-flow shortfalls than others; however, MSEs with six or more years in operation are significantly more likely to borrow via IFS and to be willing to do so for a longer period than the others.

Table 4 Multi-Group Analysis of Chinese MSEs' Years of Operation

Variables	Indicators	Years < 6(S) Approval and Mean	Years $\geq$ 6(B) Approval and Mean	Difference (B-S)
COVID	COVID ₁	84.0%	87.6%	-
	COVID ₂	85.2%	83.6%	*
	COVID ₃	63.5%	53.1%	***
	COVID ₄	63.1%	61.9%	-
WTL	WTL ₁	570.3	803.1	***
	WTL ₂	3.2	4.8	***
		Coefficient (S)	Coefficient (B)	
COVID $\rightarrow$ WTL		-0.01	-0.04	***
COVID $\rightarrow$ CIA $\rightarrow$ WTL		-0.09***	-0.03	***
COVID $\rightarrow$ CID $\rightarrow$ WTL		-0.05	-0.13***	***

* $p < 0.05$; *** $p < 0.001$

Table 5 Multi-Group Analysis of Chinese MSEs' Entrepreneur's Education

Variables	Indicators	Education $\leq$ High School(H)	Education $\geq$ Colledge(C)	Difference (C-H)
		Approval and Mean	Approval and Mean	
COVID	COVID ₁	85.7%	84.6%	-
	COVID ₂	84.9%	84.1%	-
	COVID ₃	63.7%	52.8%	*
	COVID ₄	61.7%	64.3%	
WTL	WTL ₁	631.6	692.3	*
	WTL ₂	3.6	4.1	**
CID	CID ₁	52.8%	41.4%	***
	CID ₄	54.8%	53.7%	***
		Coefficient (H)	Coefficient (C)	
COVID $\rightarrow$ WTL		-0.01	-0.03	***
COVID $\rightarrow$ CIA $\rightarrow$ WTL		-0.09***	-0.03	***
COVID $\rightarrow$ CID $\rightarrow$ WTL		-0.09***	-0.13***	***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

The moderating effects of MSEs' entrepreneurs' education were identified by multi-group analysis (Table 5). MSEs' entrepreneurs' education might affect their beliefs about the advantages and disadvantages of IFS, but only their beliefs about IFS firms' privacy and fraud risks are significant. From Table 5, there are significant moderating effects of MSEs' entrepreneurs' education on their willingness to borrow via IFS during COVID-19 and mediating effects of their beliefs about the advantages and disadvantages of IFS. Therefore, the alternative hypotheses of H_{4c} , H_{5c} , and H_{6c} for MSE_E are supported. The probable explanation for this finding is that there are significantly more MSEs with entrepreneurs who have an education level of high school or below and report having increased cash-flow shortfalls, IFS privacy risks, and IFS fraud risks than others; however, MSEs with entrepreneurs who have an education level of college or above are willing to borrow a significantly greater amount via IFS and to do so for a significantly longer period of time than the others.

The moderating effects of MSEs' profit margins were obtained via multi-group analysis (Table 6). For simplicity, the data were divided into two groups: one group for MSEs with profit was less than 15.0% and a second group for MSEs with profit margins greater than or equal to 15.0%. From Table 5, there are significant moderating effects of MSEs' profit margin on their willingness to borrow via IFS during COVID-19 and mediating effects of their beliefs regarding the advantages and disadvantages of IFS. Therefore, the alternative hypotheses of H_{4d} , H_{5d} , and H_{6d} for MSE_P are supported. This is probably because significantly more MSEs with profit margins less than 15.0% reported increasing pandemic prevention costs and increasing cash-flow shortfalls than others; however, MSEs whose profit margins were

Table 6 Multi-Group Analysis of Chinese MSEs' Profit Margin

Variables	Indicators	Margin < 15%(P) Approval and Mean	Margin ≥ 15%(R) Approval and Mean	Difference (R-P)
COVID	COVID ₁	86.4%	83.3%	-
	COVID ₂	87.7%	79.3%	***
	COVID ₃	62.7%	54.6%	***
	COVID ₄	64.2%	59.9%	-
WTL	WTL ₁	593.3	761.0	***
	WTL ₂	3.5	4.4	***
		Coefficient (P)	Coefficient ®	
COVID → WTL		0.01	-0.05	***
COVID → CIA → WTL		-0.05*	-0.09**	***
COVID → CID → WTL		-0.07**	-0.14***	***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

larger than or equal to 15.0% reported being willing to borrow a significantly greater amount via IFS and to do so for a significantly longer period time than the others.

The moderating effects of MSEs' numbers of employees obtained via multi-group analysis (Table 7). For simplicity, the data were divided into two groups: one group for MSEs with fewer than 25 employees and a second for MSEs with 25 or more but fewer than 50 employees (following the definition of an MSE). From Table 5, there are significant moderating effects of MSEs' numbers of employees on their willingness to borrow via IFS during COVID-19 and mediating effects of their beliefs about the advantages and disadvantages of IFS. Therefore, the alternative hypotheses of H_{4e} , H_{5e} , and H_{6e} for MSE_{EM} are supported. We explain this by the significantly larger number of MSEs with fewer

Table 7 Multi-Group Analysis of Chinese MSEs' Number of Employees

Variables	Indicators	Number < 25(L) Approval and Mean	Number ≥ 25(M) Approval and Mean	Difference (M-L)
COVID	COVID ₁	86.0%	84.3%	-
	COVID ₂	85.7%	83.1%	***
	COVID ₃	66.6%	50.2%	***
	COVID ₄	60.4%	65.9%	-
WTL	WTL ₁	601.6	727.4	***
	WTL ₂	3.5	4.3	***
		Coefficient (L)	Coefficient (M)	
COVID → WTL		0.08	-0.07	***
COVID → CIA → WTL		-0.09***	-0.06*	***
COVID → CID → WTL		-0.06	-0.14***	***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

than 25 employees reporting increased pandemic prevention costs and increasing

cash-flow shortfalls than others; however, MSEs with at least 25 but fewer than 50 employees were willing to borrow a significantly greater amount via IFS and to do so for a significantly longer period of time than the others.

Conclusion and future studies

The empirical results in this paper indicate that the financial statements of most Chinese MSEs have suffered from COVID-19, and the most frequently encountered financial problems for MSEs are decreasing revenues and increasing pandemic prevention costs. More than half of Chinese MSEs have problems with increased cash-flow shortfalls and operational risks. IFS firms have become increasingly popular in China, and thus in general, Chinese MSEs are willing to borrow from IFS firms; their average amount borrowed and the average borrowing period are RMB 653.6 thousand and 3.8 years, respectively. However, only half of MSEs have beliefs regarding the advantages and disadvantages of IFS.

The relationship between the financial impacts of COVID-19 on Chinese MSEs and their willingness to borrow via IFS is not significant, while the mediating effects of their beliefs about the advantages and disadvantages of IFS are significantly adverse. According to surveys of experts and MSE entrepreneurs, the likely explanation is that most MSEs that suffered financially from COVID-19 but are more unfamiliar with IFS would not use such services to recover from their financial problems; however for MSE entrepreneurs who are familiar with IFS, the uncertainty of IFS firms makes the entrepreneurs less likely to use IFS.

Chinese MSEs might differ in their impacts from COVID-19 and their willingness to borrow via IFS with respect to their sector, years of operation, entrepreneur's education, profit margin, and number of employees, and there are significant moderation effects on their willingness to borrow via IFS during COVID-19 and mediating effects of their beliefs about the advantages and disadvantages of IFS.

This paper sought to develop theoretical approaches to examine the IFS borrowing approaches of MSEs because most studies have used theoretical approaches only to interpret the loan behaviour of large and medium-sized enterprises. On the other hand, the studies that focus on MSEs' loan behaviour frequently adopt empirical approaches and refer to the theoretical perspectives on borrowing developed for large and medium enterprises while interpreting their results. Few empirical studies on MSEs' borrowing behaviour have conducted or tested with economic models (Evcimen et al., 1991; Özar et al., 2008).

Based on the above discussion, this paper suggests that governments should implement a comprehensive supervision system on IFS firms' risks, namely, privacy risks, legal risks, credit risks, and fraud risks. This paper also suggests that IFS enterprises should strengthen their performance and risk survey system, disclose their knowledge and information to their customers, and formulate customer-specific and easy-to-use marketing strategies.

Future studies could focus on (a) MSEs' willingness to repay and their social responsibility for enterprises' financing policies in response to COVID-19 because the costs of their enterprises' financing policies will be borne by the public. The performance of enterprise financing policies in response to COVID-19 should

include the successful loan or use ratio, the flow of funds, the successful repayment ratio, and corporate social responsibility. For example, the German government proposed a policy of delayed rent payment in response to COVID-19, which applies to firms' late rent payments between April 1 and June 30, 2020; German landlords are not allowed to unilaterally cancel leases. Tenants received grace periods under which rent would not have to be paid until June 30, 2022, but Adidas, H&M, and other large companies have suspended payment of their stores' rent since April, which has led to criticism from the German government and consumers. (b) Future works could also focus on impact of the Chinese governance of IFS on MSEs' willingness to borrow because the Chinese government has announced many laws and regulations to regulate the IFS market, but IFS firms are all non-state players, such as individuals, MSEs, and BAT, namely, Ali baba, Baidu, and Tencent. Xu et al. (2019) argued that the impacts of Chinese campaign-style IFS governance on the IFS market should differ from those of other jurisdictions.

(c) The impacts of IFS on MSEs' willingness to borrow using traditional financial instruments and the intermediating effects of financial variables (such as the interest rate and exchange rate) would also be worthy of study. Luo et al. (2018) found that the impact of IFS on interest rates exhibits a reference point effect and that there are no intermediating effects of social monetization and exchange rates. (d) The intermediating effects of IFS risks could be studied further. This paper only discussed IFS risks themselves, but IFS risks should be studied in the context of contagion and spontaneity risks, which come from IFS and traditional financial instruments. Xu et al. (2020) discussed the IFS system network with multisource risk from IFS firms, regulations, and traditional financial instruments.

(e) The funders' willingness to invest in or lend to MSEs through IFS and factors influencing their decision could be an interesting research avenue. Chen et al. (2019) proved a significant relationship between IFS investor sentiment and their return comovement. Shi et al. (2019) used an ontology-based approach to build IFS user models with decay functions. Lee and Lee (2012) found significant herding behaviour in online P2P lending among funders. (6) The spatial spill-over effects on MSEs' willingness to borrow via IFS warrants further study. Huang et al. (2019) found significant adverse effects of the development of economic and traditional finance, industrial structure, and geographic distance on the spatial spill-over effects of IFS.

(f) The relationships among the closures of MSEs, MSEs' willingness to borrow via IFS, and the factors influencing these outcomes are deserving of research. Mead and Liedholm (1998) found that most closures occur within the first three years of an MSE's existence. Entrepreneurs of MSEs could learn ways to operate a new business during these fragile initial years. Furthermore, significant reasons for MSE closures are a lack of demand and working capital shortages. Other reasons are their lack of financial or economic viability, personal reasons (illness or retirement), better options, and government laws and regulations.

(g) The number of MSEs during COVID-19 is an interesting topic for future work. The number of MSEs during and after the period of COVID-19 might have increased because fewer formal and jobs were available (Degefu, 2018). Berry et al. (2001) found that the productivity of MSMEs in Indonesia before and during the Asian financial crisis in 1997–98 rose substantially, and this rate was not

significantly different from that of larger firms. The reasons are MSMEs' ability to benefit from technology diffusion through foreign buyers, subcontracting in MSME clusters and MSMEs' lesser reliance on formal markets and credit.

Appendix

Appendix Table 2: Chinese MSE financial support policies

Province	City	Delayed Payment		Refund of 50% of unemployment insurance premium	Relief of property tax, land use tax
		Taxes	Social insurance premium		
Hebei	Langfang	✓	✓	✓	✓
	Qinhuangdao	✓	✓	✓	✓
	Zhangjiakou	✓	✓	✓	✓
	Tangshan	✓	✓	✓	✓
Anhui	Tongling	✓	✓	✓	
	Ma Anshan	✓		✓	✓
	Xuancheng	✓		✓	✓
Beijing		✓	✓		✓
Fujian	Fuzhou	✓	✓	✓	✓
	Putian	✓	✓	✓	✓
	Sanming	✓	✓	✓	✓
	Quanzhou	✓	✓	✓	✓
	Jinjiang	✓	✓	✓	✓
Gansu	Lanzhou	✓		✓	
Guangdong	Pruning	✓	✓	✓	✓
Guangdong	Maoming	✓	✓	✓	
Guangxi	Nanning	✓	✓	✓	✓
Hainan		✓	✓	✓	✓
Hainan	Haikou	✓	✓	✓	✓
Heilongjiang		✓		✓	✓

Appendix Table 2: Chinese MSE financial support policies

Province	City	Delayed Payment		Refund of 50% of unemployment insurance premium	Relief of property tax, land use tax
		Taxes	Social insurance premium		
Jiangsu	Xuzhou	✓	✓	✓	✓
	Suzhou	✓	✓	✓	✓
	Taizhou	✓	✓	✓	✓
	Yancheng	✓	✓	✓	✓
Shandong		✓	✓		✓
Shandong	Qingdao	✓	✓	✓	✓
	Binzhou	✓	✓		
	Jinan	✓	✓	✓	✓
	Dongying	✓	✓	✓	✓
	Linyi	✓	✓	✓	✓
Shanxi		✓	✓	✓	✓
Shanxi	Jinzhong	✓	✓	✓	
Yunnan	Qujing	✓	✓	✓	
Zhejiang		✓	✓	✓	✓
Zhejiang	Ningbo	✓		✓	
Chongqing		✓	✓	✓	✓

Authors' contributions (optional: please review the submission guidelines from the journal whether statements are mandatory).

All authors contributed to the study's conception and design. Material preparation, data collection, and analysis were performed by Huang, WeiLun. The first draft of the manuscript was written by Huang, WeiLun and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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