

The Gender Gap in Access to Finance: Evidence from the COVID-19 Pandemic

Accepted Version- *Finance Research Letters*

Volume 46, Part A, May 2022, 102329

<https://doi.org/10.1016/j.frl.2021.102329>

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Abstract

Using gender as a theoretical framework, we analyse the dynamics of bank, micro and equity finance during the COVID-19 pandemic for a cross-country sample of 8,921 private firms. We provide evidence of slight female favouritism in the debt market during the pandemic. On average, female-owned/led firms access bank and micro finance more compared to their male counterparts as the main mechanism of dealing with cash flow shortages during the COVID-19 pandemic. We find no evidence of gender differences in access to equity finance. The results are robust after controlling for a larger number of firm-specific characteristics and selection bias. We challenge the assumption of “gender-based discrimination” in the credit market, speculating that in the context of high uncertainty, prototypical forms of femininity may perhaps be slightly advantageous as financial institutions seek to hedge their risk by favouring more conservative borrowers.

Keywords: COVID-19; Females; credit; equity; Heckman model; Blinder-Oaxaca decomposition

1. Introduction

Across the world, temporary lockdowns during the COVID-19 pandemic resulted in a dramatic and abrupt fall in cash inflow and revenue receipts to firms from customers. With liquidity being the most important element to their survival, private firms and female-owned/led firms are struggling most to meet their current and ongoing financial obligation during periods of high economic uncertainty (Liu et al., 2021; Brown & Rocha, 2020). Drawing on a survey of over 5,800 small businesses in the United States, Bartik et al. (2020) shows that three-quarters of respondents had just two months or less in cash in reserve during the early stages of the COVID-19 pandemic. Evidence of a lack of access to finance is presented by Brown and Rocha (2020), showing that in first quarter of 2020 small firms in China saw a 60% decline in equity investments. For the United Kingdom, Brown et al. (2020) show that in entrepreneurial finance deals dropped by 30%, result from a lack of seed and early-stage financing. [Female entrepreneurs have been disproportionately hit hard by the COVID-19 pandemic. Liu, Wei, and Xu \(2021\) show that female-led firms are closed longer for just one week on average, which is less than one standard deviation from the mean.](#) In this paper we examine whether gender played an important role in the problem of access to finance when dealing with cash flow problems during the COVID-19 pandemic. Our paper is motivated by the fact that a significant proportion of MSMEs globally are female-owned/led (Bruhn et al., 2017), the importance of these firms in driving female participation in the economy, and COVID-19 which may have put any progress made towards women's empowerment at risk (Liu et al., 2021).

The literature on gender differences in access to finance suggests that under “normal” economic conditions, female-owned firms are more prone to financial constraint (Cavalluzzo et al., 2002; Chaudhuri et al., 2020). Discrimination theory, widely cited in finance, helps to explain

female access to finance (Aterido et al., 2013; Pham and Talavera, 2018). It focuses on prejudice or taste-based discrimination and statistical discrimination (Han, 2004). In the classical model adopted by Becker (1957), taste-based discrimination highlights adverse and unjustified attitudes towards a specific individual (group) stemming from cultural beliefs, such as stereotypes of female characteristics which are deemed to be of lower value than those associated with masculinity (Koenig, 2018; Ramiah et al., 2010). In a male-dominated financial system this could result in female-owned/led firms being offered restricted access to finance and on less favourable terms (Alesina et al., 2013; Andrés et al., 2020; Aterido et al., 2013; Bellucci et al., 2010; Cozarenco and Szafarz, 2018; Kende-Robb, 2019; Xu et al., 2016). Notwithstanding, there may be a number of reasons females have a lower demand for credit, reflecting their personal choices and motivation (Coleman, 2002; Cowling et al., 2020; Moro et al., 2017; Ongena and Popov, 2016). For example, they may be less inclined to apply for a loan, fearing rejection by lenders (Chaudhuri et al., 2020; Moro et al., 2017), or rely more on their own capital or on funds from family members, which may lead to less demand for external credit, including start-up loans (Andrés et al., 2020).

A lack of information about a borrower's ability to pay leads to statistical discrimination in the credit market. Statistical discrimination is the solution to a signal extraction problem. If capital providers observe a noisy signal of borrowers' ability and has prior information about correlates of ability (let's say a group-specific mean), then the expectation of borrowers' ability should place weight on both the signal and the mean. Hence, in such situations, they apply group stereotypes to individual borrowers (Wellalage and Locke, 2017). For example, unobservable factors of borrower's credit situation encourages lenders to use the borrower's gender as a proxy for the individual's ability to pay (Andrés et al., 2020). Gender discrimination in the availability of

external finance may worsen during crisis periods when finance providers apply tougher conditions to less attractive borrowers (Cowling et al., 2012; Robb et al., 2013).

We contribute to the literature of gender in finance, by providing the first cross-country study examining the impact of gender in accessing external finance during the COVID-19 pandemic. For a sample of 8,921 private firms from 19 (mostly developing) countries, we find no evidence that suggests that female-owned/led firms were disadvantaged in terms of their access to external finance during the pandemic, controlling for a larger number of other firm-specific variables. Propensity matching and Blinder-Oaxaca decomposition tests confirm the baseline regression results. In particular, we find female-owned/led firms accessed bank and micro finance slightly more (by up to 2 percentage points) during the pandemic, compared to their male counterparts. Our findings are in support of the proposition of Cowling et al. (2020), but contrary to existing prejudicial belief, that in the context of high economic uncertainty, prototypical forms of femininity actually become advantageous as banks seek to hedge their risks by favouring more conservative lenders.

The rest of our paper is organised as follows. Section 2 presents the sample and empirical method. Section 3 discusses the empirical findings, whilst Section 4 provides a number of robustness checks. Section 5 concludes.

2. Data and Method

2.1 Data

Our exploration of the relationship between gender and access to finance during the COVID-19 pandemic proceeds using business level data drawn from the World Bank Enterprise

Surveys (WBES) and World Bank COVID-19 follow up surveys from the same organisation (World Bank, 2020).

The follow-up surveys re-interview respondents of recently completed WBES to collect information about closures, changes in sales, employment and finance, government support, policy responses and expectations as a response to the COVID-19 pandemic. The surveys encompass a representative random sample of firms across the world using the same core questionnaire and sampling method. Face-to-face interviews were held with the owner/manager or representative of each firm. The responses provide firm level information about private businesses of all sizes, including firm characteristics and owner/manager demographics.

We merge the two datasets (WBES and the COVID-19 follow up surveys) using unique firm identifiers (ID) provided. It provides information for 8,921 private firms from 19 (mostly developing) economies; 32% of firms are female-owned and 16% female-led. The number of respondent firms per country are reported in Table 1. Greece has the highest proportion of female-owned firms (51%) whilst Mongolia has the highest proportion of female-led firms (51%). Also shown is the Global Gender Gap Index (GGGI), designed by the World Economic Forum to measure gender equality in a country. As expected, there is a strong positive correlation ($\rho=0.50$) between GGGI and the proportion of female-owned/led firms. Finally, we include the Government Response Stringency Index (GRSI), which embodies nine government response initiatives¹ to address the spreading of the COVID-19 virus. The GRSI scores varies from a high 87.04 in Guatemala to a low 13.89 in Niger (100 = strictest government response).

[Insert Table 1]

¹ These include school closures, workplace closures, cancellation of public events, restrictions on gathering, closure of public transport, public information campaign about COVID, stay home requirements, restrictions on internal movement, international travel controls, testing policy, and contact tracing.

Table 2 shows that to deal with cash flow shortages during the pandemic, about 14% of firms accessed equity finance, 10% accessed bank finance, while just 1% accessed micro finance. About 12% of sample firms are exporters, 33% are product or process innovators; 3% are micro-sized, 47% small-sized (<19 employees), 32% are medium-sized (19-100 employees), and 18% are large (>100 employees). Just over half of firms were temporary closed during the pandemic, 70% experienced a drop in cashflows and 10% delayed payments to suppliers, landlords or tax authorities. The bulk of firms are from the Manufacturing Industry (47%), followed by Other Services (34%) and Retail (19%). Firm were started, on average, 22 years ago; over 36% of firms' shares are family-owned; whilst one-quarter of firms operate as sole proprietors.

[Insert Table 2]

Table 3 shows that female-owned/led firms accessed bank and micro finance by up to 2 percentage points more than their male counterparts. However, tests of mean differences show that none of the reported univariate differences are statistically significant at conventional levels (<10%).

[Insert Table 3]

2.2 Method

A heckprobit model (probit model with sample selection), which assumes the existence of an underlying relationship between gender and financing is constructed. This enables us to capture possible gender differences in access to external finance—from banks, micro finance institutions and equity—during the pandemic². The main equation is as follows:

² Although the heckprobit model is widely used in literature, this method is not without its drawbacks. Freedman, D. A., & Sekhon, J. S. (2010) indicate some potential problems. Nevertheless, these issues have not been developed in the subsequent literature, indicating no widespread concern with the appropriateness of heckprobit analysis in cross group comparison. Therefore, we judge the heckprobit model to be an acceptable robust estimation model to analyse the dichotomous credit access variable

$$Probit(Financing_{ic} = 1) = \alpha_c + (\alpha + \beta Female_{ic} + \gamma X_{ic} + \varepsilon_{ic}) \quad (1)$$

where $Financing_{ic}$ takes the value of one if the firm accessed finance from either banks, micro finance institutions, or equity. $Female$ takes the value of one if the firm has at least one female owner or top manager, and zero otherwise. Vector X captures various firm and ownership characteristics to minimise the omitted correlated variable problem given that female-owned/led firms tend to systematically differ from male-owned/led firms (Cesaroni and Paoloni, 2016; Cooper et al., 1988; Shaw et al., 2001; Stefani and Vacca, 2013).

Since the ability of the firm to access finance is only observable if the firm applies for finance, this raises the issue of selection bias. To address this potential bias, we specify the following sample selection equation:

$$Probit(Cashflow_Down_{ic} = 1) = \alpha_c + \alpha + \beta Female_{ic} + \gamma X_{ic} + \partial_1 Temp_Closed_{ic} + \partial_2 Delay_Pay_{ic} + \varepsilon_{ic} \quad (2)$$

where $Cashflow_Down$ takes the value of “1” if the firm reports a decrease in cash flow during the pandemic, and “0” otherwise. We include two instrumental variables in the selection equation: $Temp_Closed$ and $Delay_Pay$. The first instrumental variable $Temp_Closed$ takes the value of “1” if the firm reports a temporary shutdown of business during the pandemic, and “0” otherwise. $Temp_Closed$ indicates less cashflow, thus increasing the need for financing. The second instrumental variable $Delay_Pay$ takes the value of “1” if the firm delays their payments, and “0” otherwise. A delay in payments increases the firm’s cash availability, reducing the need for external credit. From a firm’s perspective, both $Temp_Closed$ and $Delay_Pay$ are exogenous and plausibly random, and the nature of these variables are unlikely to directly affect a firm’s access to finance (Pham and Talavera, 2018; Qi and Ongena, 2020). Accordingly, the two selected instrumental variables are plausibly valid.

3. Empirical Results

Table 4 and 5 report the two-stage heckprobit regression results for female-owned and managed businesses, respectively.³ Reported are the marginal effects estimated around the mean point. Column I and II show that female owned/led firms accessed bank and micro finance up 2 percentage points more during the pandemic than their male counterparts. Although the economic significance is small, they nevertheless align with Cowling et al. (2020) who argue that periods of high financial uncertainty, when financial intermediaries become self-protective and more cautious in their allocation of risk capital (Caballero and Krishnamurthy, 2008), may benefit women, who tend to be more risk averse. More specifically, they argue that in a context of financial recessions, prototypical forms of femininity become advantageous as banks seek to hedge risks by favouring more conservative lenders. We find no evidence of gender differences in access to equity finance during the pandemic (Column III).

Compared to micro firms (base case), larger firms (*Large, Median* and/or *Small*) accessed external finance less during the pandemic. This is expected, since larger firms tend to have higher cash holdings and accounts payable suggesting less severe liquidity problems compared to micro firms during crises. Family owned firms and sole proprietors accessed bank and micro finance more, consistent with the fact that these firms are less subject to credit restrictions than other firms during crises (Crespi-Cladera and Martin-Oliver, 2014). Finally, firms in countries with a smaller gender gap (high GGGI score) accessed micro finance less. We find no evidence that the severity of government initiatives to address the spreading of the COVID-19 virus, as proxied by GRSI, impacted the firm's access to finance. This may be explained by large government subsidies received during mandatory lockdowns.

³ The first stage results are unreported for brevity but is available upon request.

[Insert Tables 4 & 5]

4. Robustness

We apply two robustness checks: propensity score matching (PSM) and Blinder–Oaxaca decomposition technique. We perform PSM in order to pair firms that have female ownership/leadership with other firms that have exclusive male ownership/leadership. It is then assumed that the matched firms would have non-systematic differences in response to the treatment, so they provide valid counterfactual evidence. The Blinder-Oaxaca decomposition technique is widely used to identify and quantify the separate contributions of differences in measurable characteristics to group differences in the outcome of interest. Table 6 panels A and B provide the results for three PSM techniques. The average treatment effect on the treated (ATT) is positive for both bank and micro finance. That is, female-owned/led firms accessed bank and micro finance by up to 1.0 and 1.9 percentage points more respectively during the pandemic.

The results for the Blinder–Oaxaca decomposition technique are reported in Table 7, which shows that the bank finance accessibility gender gap is between 0.5 to 1.7 percentage points, favouring female-owned/led firms. Panel B shows little to no gender gap in access to micro finance or equity finance during the pandemic. Overall, the results are consistent with the results provided by the Heckprobit model.

[Insert Table 6 & 7]

5. Summary and Conclusions

We analysed the dynamics of debt and equity finance in female- and male-owned/led businesses for a cross-country sample of private firms during the COVID-19 pandemic. While the impacts of the pandemic have been particularly severe for females, our study shows that female-owned/led firms accessed external finance more during the pandemic. This is somewhat surprising given the prevalence of findings of lack of access of females to external finance, in particularly debt.

Nevertheless, our results are not entirely inconsistent with the literature. Using European Central Bank data, Stefani & Vacca (2013) find that different patterns of genders in terms of access to finance are largely explained by firm characteristics that make female firms structurally different from those led by men, without leaving room for a significant gender effect. Cowling et al. (2020) apply a formal Oaxaca–Blinder decomposition to test whether gender impacts upon the supply and demand for debt finance by females during recessions. Contradicting accepted wisdom, they find that women who did apply for bank loans were more likely to be successful. More importantly, they argue that in a context of financial recessions, prototypical forms of femininity actually become advantageous as banks seek to hedge risks by favouring more conservative lenders. Another piece of the puzzle is provided by Galli et al. (2019) who find signs of gender bias arising during the upside phase of the economy. To test whether gender patterns in access to external finance move with the cycles of the economy requires a longitudinal approach. We leave this for others to explore. Lastly, our research has a number of limitations, including sparse contributions to the "gender diversity" literature as this would require data on the number of male/female managers and/or owners, something which cannot be fully mitigated because of data limitations.

References

- Alesina, A.F., Lotti, F., Misturilli, P.E., 2013. Do women pay more for credit? Evidence from Italy. *J. Eur. Econ. Assoc.* 11, 45-66. doi:<https://doi.org/10.1111/j.1542-4774.2012.01100.x>
- Andrés de, P., Gimeno, R., Cabo, R.M., 2020. The gender gap in bank credit access. *J. of Corp. Financ.* In Press (November). doi:<https://doi.org/10.1016/j.jcorpfin.2020.101782>
- Aristei, D., Gallo, M., 2016. Does gender matter for firms' access to credit? Evidence from international data. *Financ. Res. Lett.* 18, 67-75. doi:<https://doi.org/10.1016/j.frl.2016.04.002>
- Aterido, R., Beck, T., & Iacovone, L., 2013. Access to finance in Sub-Saharan Africa: is there a gender gap? *World Dev.* 47, 102-120. doi:<https://doi.org/10.1016/j.worlddev.2013.02.013>
- Bartik, A.W., Bertrand, B., Zoë, B., Cullen, B.Z., Glaeser, E.L., Luca, M., Stanton, C.T., 2020. How are small businesses adjusting to COVID-19? Early evidence from a survey. NBER working paper series, No. 26989, NBER. <http://www.nber.org/papers/w26989> (accessed on 6 May 2020).
- Becker, G. S., 1957. *The Economics of Discrimination*. Chicago: The University of Chicago Press.
- Bellucci, A., Brisov, A., Zazzaro, A., 2010. Does gender matter in bank-firm relationships? Evidence from small business lending. *J. Bank. & Financ.* 34, 2968-2984. doi:<https://doi.org/10.1016/j.jbankfin.2010.07.008>
- Brown, R., Rocha, A., 2020. Entrepreneurial uncertainty during the Covid-19 crisis: Mapping the temporal dynamics of entrepreneurial finance. *J. Bus. Ventur. Insights.* 14(November). doi:<https://doi.org/10.1016/j.jbvi.2020.e00174>
- Brown, R., Rocha, A., Cowling, M., 2020. Financing entrepreneurship in times of crisis: Exploring the impact of COVID-19 on the market for entrepreneurial finance in the United Kingdom. *International Small Bus. J.: Res. Entrep.* 38, 380-390. doi:<https://doi.org/10.1177/0266242620937464>
- Bruhn, M., Hommes, M., Khanna, M., Singh, S., Sorokina, A., Wimpey, J.S., 2017. MSME finance gap: Assessment of the shortfalls and opportunities in financing micro, small and medium enterprises in emerging markets. International Finance Corporation (IFC), World Bank Group. <https://www.ifc.org/wps/wcm/connect/03522e90-a13d-4a02-87cd-9ee9a297b311/121264-WP-PUBLIC-MSMEReportFINAL.pdf?MOD=AJPERES&CVID=m5SwaQA> (accessed on 11 June 2021)
- Caballero, R.J., Krishnamurthy, A., 2008. Collective Risk management in a flight to quality episode. *J. Financ.* 63, 2195-2230. doi:<https://doi.org/10.1111/j.1540-6261.2008.01394.x>
- Cavalluzzo, K.S., Cavalluzzo L.C., Wolken, J.D., 2002. Competition, small business financing, and discrimination: Evidence from a new survey. *J. Bus.* 75, 641-679. doi:<https://doi.org/10.1086/341638>
- Cesaroni, F.M., Paoloni, P., 2016. Are family ties an opportunity or an obstacle for women entrepreneurs? Empirical evidence from Italy. *Palgrave Commun.* 2, 1-7. doi:[10.1057/palcomms.2016.88](https://doi.org/10.1057/palcomms.2016.88)
- Chaudhuri, K., Sasidharan, S., Raj, R.S.N., 2020. Gender, small firm ownership, and credit access: Some insights from India. *Small Bus. Econ.* 54, 1165-1181. doi:<https://doi.org/10.1007/s11187-018-0124-3>

- Coleman, S., 2002. Constraints faced by women small business owners: Evidence from the data. *J. Dev. Entrepr.* 7, 151-174.
- Cozarenco, A., Szafarz, A., 2018. Gender biases in bank lending: Lessons from microcredit in France. *J. Bus. Ethics*, 147(3), 631-650.
- Cooper, A.C., Woo, C.Y., Dunckelberg, W., 1988. Entrepreneurs' perceived chances for success. *J. of Bus. Venturing* 3, 97-108. doi:[https://doi.org/10.1016/0883-9026\(88\)90020-1](https://doi.org/10.1016/0883-9026(88)90020-1)
- Cowling, M., Liu, W., Ledger, A., 2012. Small business financing in the UK before and during the current financial crisis. *International Small Bus. J.* 30, 778-800. doi:<https://doi.org/10.1177/0266242611435516>
- Cowling, M., Marlow, S., Liu, W., 2020. Gender and bank lending after the global financial crisis: are women entrepreneurs safer bets? *Small Bus. Econ.* 55, 1-28. doi:<https://doi.org/10.1007/s11187-019-00168-3>
- Crespi-Cladera, R., Martín-Oliver, A., 2014. Do Family firms have better access to external finance during crises? *Corp. Gov. Int. Rev.* 23, 249-265. doi:<https://doi.org/10.1111/corg.12100>
- Galli, E., Mascia, D.V., Rossi, S.P.S., 2019. Bank credit constraints for women-led SMEs: Self-restraint or lender bias? *Europ. Fin. Manag.* 26, 1147-1188. doi:<https://doi.org/10.1111/eufm.12255>
- Gompers, P.A., Ishii, J., Metrick, A., 2010. Extreme governance: An analysis of dual-class firms in the United States, *Rev. Financ. Stud.* 23, 1051–1088. <https://doi.org/10.1093/rfs/hhp024>
- Han, S., 2004. Discrimination in lending: Theory and evidence. *J. of Real Estate Finance and Econ.* 29, 5-46. doi:<https://doi.org/10.1023/B:REAL.0000027199.22889.65>
- Kende-Robb, C., 2019. To improve women's access to finance, stop asking them for collateral. <https://www.weforum.org/agenda/2019/06/women-finance-least-developed-countries-collateral/> (accessed on 12 May2021).
- Koenig, A.M., 2018. Comparing prescriptive and descriptive gender stereotypes about children, adults, and the elderly. *Frontiers in Psychology* 9, 1086. doi:<https://doi.org/10.3389/fpsyg.2018.01086>
- Humphries, J.C.N., Ulyssea, G., 2020. The evolving impacts of COVID-19 on small businesses since the CARES Act, Cowles Foundation Discussion Paper No. 2230. Cowles Foundation. <http://dx.doi.org/10.2139/ssrn.3584745>
- Lee, N., Sameen, H., Cowling, M., 2015. Access to finance for innovative SMEs since the financial crisis. *Res. Policy*, 44, 370-380.
- Liu, Y., Wei, S., Xu, J., 2021. COVID-19 and women-led businesses around the world. *Financ. Res. Lett.* In Press (April). doi:<https://doi.org/10.1016/j.frl.2021.102012>
- Moro, A., Wisniewski, T.P., & Mantovani, G.M., 2017. Does a manager's gender matter when accessing credit? Evidence from European data. *J. Bank. & Financ.* 80, 119-134. doi:<https://doi.org/10.1016/j.jbankfin.2017.04.009>
- Ongena, S., Popov, A., 2016. Gender Bias and Credit Access, *J. Money, Credit and Bank.* 48(8), 1691-1724. doi:<https://doi.org/10.1111/jmcb.12361>
- Pham, T., Talavera, O., 2018. Discrimination, social capital, and financial constraints: The case of Vietnam. *World Dev.* 102, 228-242. doi:<https://doi.org/10.1016/j.worlddev.2017.10.005>
- Qi, S., Ongena, S. 2020. Fuel the engine: Bank credit and firm innovation. *J. Financ. Serv. Res.* 57, 115–147.

- Ramiah, A.A., Hewstone, M., Dovidio, J.F., Penner, L.A., 2010. The Social psychology of discrimination: Theory, measurement and consequences. In: Bond, L., Russell, H. (Eds.). *Making Equality Count: Irish and International Research Measuring Equality and Discrimination*. Liffey Pr., Dublin, Ireland, pp. 84-112. https://www.researchgate.net/publication/292811039_The_social_psychology_of_discrimination_theory_measurement_and_consequences (accessed on 6 June 2021).
- Robb, A., Marin Consulting, Rafael, L. S., 2013. Access to capital among young firms, minority-owned firms, women-owned firms, and high-tech firms. (SBAHQ-11-M-0203), 41. [https://www.sba.gov/sites/default/files/files/rs403tot\(2\).pdf](https://www.sba.gov/sites/default/files/files/rs403tot(2).pdf) (accessed on 6 June 2021).
- Shaw, E., Carter, S.L., Brierton, J., 2001. Unequal entrepreneurs: Why female enterprise is an uphill business. The Work Foundation. <https://pureportal.strath.ac.uk/en/publications/unequal-entrepreneurs-why-female-enterprise-is-an-uphill-business> (accessed on 6 June 2021).
- Stefani, M.L., Vacca, V., 2013. Credit access for female firms: Evidence from a survey on European SMEs. Bank of Italy Occasional Paper No. 176. doi: <http://dx.doi.org/10.2139/ssrn.2297789>
- Wellalage, N.H., Locke, S., 2017. Access to credit by SMEs in South Asia: Do women entrepreneurs face discrimination. *Res. Int. Bus. Financ.* 41, 336-346. doi:<https://doi.org/10.1016/j.ribaf.2017.04.053>
- [dataset] The World Bank, 2020. Enterprise Surveys. COVID-19: Impact on firms. <https://www.enterprisesurveys.org/en/covid-19> (accessed on 6 June 2021).
- Xu, X., Li, Y., Chang, M., 2016. Female CFOs and loan contracting: Financial conservatism or gender discrimination? An empirical test based on collateral clauses. *China J. Account. Res.* 9, 153-173. doi:<https://doi.org/10.1002/app5.286>

Appendix A: Variable definitions

Variable	Description
Bank	Takes the value of “1” if the firm accessed finance from commercial banks as the main mechanism of dealing with cash flow shortages during the pandemic, “0” otherwise
Micro Finance	Takes the value of “1” if the firm accessed finance from non-bank financial institutions (micro finance institutions, credit cooperatives, credit unions, or finance companies) as the main mechanism of dealing with cash flow shortages during the pandemic, “0” otherwise.
Equity	Takes a value of “1” if the firm accessed financ from equity (increase contributions or capital from existing owners/shareholders or issuing new shares) as the main mechanism of dealing with cash flow shortages during the pandemic.
Female_Own	Takes the value of “1” if the firm has at least one female owner amongst the owners of the firm, “0” otherwise.
Female_Led	Takes the value of “1” if the firm has a female top manager, “0” otherwise.
Firm size	<i>Large</i> - Takes the value of “1” if the firm has more than 100 employees, 0” otherwise. <i>Medium</i> - Takes the value of “1” if the firm has between 20 and 99 employees, “0” otherwise. <i>Small</i> - Takes the value of “1” if the firm has between 6 and 20 employees, “0” otherwise. <i>Micro</i> - Takes the value of “1” if the firm has less than 6 employees, “0” otherwise.
Firm_Age	The number of years from the date of establishment.
Family_Own	The percentage of shares held by family members (range from 0 to 100).
Sole_Prop	Takes the value of “1” if the current legal status of the firm is a sole proprietorship, “0” otherwise.
Exporter	Takes the value of “1” if the firm sells directly or indirectly abroad, “0” otherwise.
Innovation	Takes the value of one if either product innovations and/or process innovations occurred in the firm during the last three years, “0” otherwise.
Mgr_Time	The percentage of total senior management's time spent in dealing with requirements imposed by government regulations.
GGGI	The Global Gender Gap Index (World Economic Forum), capturing the magnitude of gender-based disparities. The index score ranges from 0 to 1 (zero gender gap).

GRSI	The Government Response Stringency Index, embodying nine government response initiatives to address the spreading of the COVID-19 virus. The index score ranges from 1 to 100 (very strict).
Cashflow_Down	Takes the value of “1” if the firm reports a decrease in cash flow during the pandemic, and “0” otherwise.
Delay_Pay	Takes the value of “1” if the firm reports a delay in payment to suppliers, landlords or tax authorities during the pandemic, and “0” otherwise.
Temp_Closed	Takes the value of “1” if the firm reports a temporary shutdown of business during the pandemic, and “0” otherwise.

Table 1: Sample selection

Country	N	Female-owned firms (%)	Female-led firms (%)	Gender Gap Index 2020±	Government Response Stringency Index*
Greece	600	51.00	16.17	0.701	56.02
Mongolia	360	46.11	42.22	0.706	49.07
Cyprus	240	45.42	7.50	0.692	50.00
Moldova	360	43.06	20.56	0.757	53.70
Zambia	601	42.10	14.64	0.731	50.93
Zimbabwe	600	41.33	0.00	0.730	80.56
Slovenia	397	40.30	19.40	0.743	43.52
El-Salvador	719	36.72	24.20	0.706	80.56
Nicaragua	333	32.73	21.92	0.804	16.67
Russia	1323	29.71	22.07	0.706	38.89
Togo	150	27.33	11.33	0.615	49.07
Guatemala	345	26.38	13.62	0.666	87.04
Georgia	701	21.68	15.69	0.708	59.26
Italy	760	21.32	10.53	0.707	54.63
Jordan	601	20.97	4.66	0.623	63.89
Albania	377	20.42	18.30	0.769	43.52
Chad	153	13.73	7.84	0.596	64.81
Niger	151	12.58	8.61	0.635	13.89
Guinea	150	12.00	6.00	0.642	58.80
All	8921	32.10	16.00	0.697	53.41

Table 2: Descriptive statistics

Variable	Mean	Median	Stdev.	Min.	Max.	First quartile	Third quartile
Bank	0.088	0	0.284	0	1	0	0
Micro Finance	0.010	0	0.100	0	1	0	0
Equity	0.138	0	0.345	0	1	0	0
Large	0.176	0	0.398	0	1	0	0
Medium	0.317	0	0.466	0	1	0	1
Small	0.472	0	0.499	0	1	0	1
Micro	0.035	0	0.034	0	1	0	1
Family_Own	36.11	0	45.55	0	100	0	100
Sole_Prop	0.238	0	0.426	0	1	0	0
Exporter	0.122	0	0.269	0	1	0	1
Innovation	0.381	0	0.486	0	1	0	1
Firm Age	22.60	18	17.55	1	197	11	28
Cashflow_Down	0.697	1	0.460	0	1	0	1
Mgr-Time	0.092	0.020	0.170	0	1	0	0.10
Delay_Pay	0.102	0	0.303	0	1	0	0
Temp_Closed	0.531	1	0.499	0	1	0	1
Manufacturing	0.467	0	0.499	0	1	0	1
Retail	0.193	0	0.395	0	1	0	0
Other services	0.340	0	0.474	0	1	0	1

Notes: Variable definitions are provided in Appendix A.

Table 3: Univariate test of differences for gender differences in access to finance

Variable	Obs.	Mean	Median	Stdev.	Mean Diff.	Median Diff.
Female_Own = 1						
Bank	2,914	0.081	0	0.273	0.010 (0.104)	2.647 (0.104)
Micro Finance	2,914	0.01	0	0.102	-0.001 (0.808)	0.048 (0.827)
Equity	2,914	0.145	0	0.352	-0.011 (0.177)	1.822 (0.172)
Female_Own = 0						
Banks	5,950	0.091	0	0.288		
Micro Finance	5,950	0.01	0	0.099		
Equity	5,950	0.135	0	0.341		
Panel B: Female led firms						
Female_Led = 1						
Bank	1,441	0.092	0	0.289	-0.005 (-0.563)	0.337 (0.561)
Micro Finance	1,441	0.008	0	0.087	0.003 (0.279)	1.115 (0.291)
Equity	1,441	0.139	0	0.346	-0.001 (0.899)	0.011 (0.916)
Female_Led = 0						
Bank	7,423	0.087	0	0.282		
Micro Finance	7,423	0.01	0	0.103		
Equity	7,423	0.138	0	0.345		

Notes: Variable definitions are provided in Appendix A. Mean/Median differences are between female vs. male-owned/led firms. Student's t-ratios are in parentheses.

Table 4: Heckprobit results for access to finance in female-owned firms

Variable	Bank (I)		Micro Finance (II)		Equity (III)	
	Heckprobit	Marginal	Heckprobit	Marginal	Heckprobit	Marginal
Female_Own	0.1552* (0.0875)	0.0189** (0.0095)	0.2890** (0.1038)	0.0100** (0.0033)	0.0481 (0.0774)	0.0057 (0.0090)
Large	-0.4150* (0.2352)	-0.0506* (0.0294)	-0.5867** (0.2945)	-0.0203** (0.0107)	-0.4883** (0.2382)	-0.0588* (0.0303)
Medium	-0.6277** (0.2023)	-0.0766** (0.0256)	-0.7501*** (0.1988)	-0.0260*** (0.0077)	-0.6486*** (0.1962)	-0.0781*** (0.0250)
Small	-0.4593** (0.2338)	-0.0560** (0.0300)	-0.7779** (0.3006)	-0.0269** (0.0112)	-0.4883** (0.2355)	-0.0588* (0.0298)
Firm_Age	-0.0071 (0.0044)	-0.0008 (0.0006)	-0.0129** (0.0064)	-0.0004** (0.0002)	-0.0056 (0.0041)	-0.0006 (0.0005)
Family_Own	-0.0001 (0.0011)	-0.00002 (0.0001)	0.0018** (0.0006)	0.0006** (0.0002)	-0.0003 (0.0010)	-0.00004 (0.00012)
Exporter	0.00009 (0.0024)	0.00001 (0.0003)	-0.0007 (0.0031)	-0.00002 (0.0001)	0.0006 (0.0023)	0.00008 (0.0002)
Innovation	0.0325 (0.0626)	0.0039 (0.0076)	0.1772* (0.0970)	0.0061* (0.0037)	0.0402 (0.0605)	0.0048 (0.0073)
Sole_Prop	0.1803* (0.1088)	0.0220* (0.0127)	-0.2248 (0.2347)	-0.0077 (0.0081)	0.1532 (0.1310)	0.0184 (0.0155)
Mgr_Time	0.0005 (0.0021)	0.00007 (0.0002)	-0.0094* (0.0037)	-0.0003** (0.0001)	0.0014 (0.0021)	0.0001 (0.0002)
GGGI	1.829 (1.920)	0.2233 (0.2251)	-4.721** (2.211)	-0.1637** (0.0736)	2.961 (2.172)	0.3566 (0.2475)
GRSI	0.0004 (0.0026)	0.00005 (0.0003)	-0.0032 (0.0054)	-0.00011 (0.00019)	0.0020 (0.0020)	0.0002 (0.0002)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-2.324* (0.1.371)		2.188 (1.705)		-3.184** (1.606)	
Selection equation: <i>Cashflow_Down</i>						
Temp_closed	-5.648*** (0.3275)		-5.724*** (0.3640)		-5.650*** (0.1052)	
Delay_Pay	-0.1189 (0.0961)		-0.0696 (0.0959)		-0.1334 (0.0975)	
Control variables	Yes		Yes		Yes	
Constant	6.566*** (0.4746)		6.751*** (0.5619)		6.557*** (0.2765)	
Wald test	31.780		0.050		47.200	
Prob>Chi2	(0.0000)		(0.8291)		(0.0000)	
Observations	2,623	2,558	2,623	2,558	2,623	2,558

Notes: Reported are the heckprobit results and marginal effects estimated around mean points. Robust standards errors are reported in parentheses. Due to lack of space, we do not report the first stage regression results. Variable definitions are provided in Appendix A. [The Wald tests test the null hypothesis that the equations are independent.](#) Standard errors are in parentheses. *, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Table 5: Heckprobit results for access to finance in female-led firms

Variable	Bank (I)		Micro Finance (II)		Equity (III)	
	Heckprobit	Marginal	Heckprobit	Marginal	Heckprobit	Marginal
Female-Led	0.1175** (0.0377)	0.0220** (0.0072)	0.4557*** (0.1087)	0.0157*** (0.0025)	-0.0856 (0.0846)	-0.0103 (0.0104)
Large	0.3124 (0.2836)	0.0586 (0.0535)	-0.5128* (0.2745)	-0.0176* (0.0098)	-0.5056** (0.2399)	-0.0610** (0.0305)
Medium	0.1892 (0.2780)	0.0355 (0.0523)	-0.7052*** (0.1929)	-0.0242*** (0.0075)	-0.6605*** (0.1942)	-0.0797*** (0.0248)
Small	0.2501 (0.2760)	0.0469 (0.0520)	0.7380** (0.2772)	-0.0254** (0.0101)	-0.4916** (0.2359)	-0.0593** (0.0299)
Firm_Age	-0.0003 (0.0017)	-0.00006 (0.0003)	-0.0123** (0.0059)	-0.0004** (0.0002)	-0.0055 (0.0043)	-0.0006 (0.0005)
Family_Own	0.0008* (0.0004)	0.0001* (0.00009)	0.0023*** (0.0006)	0.00007*** (0.00002)	-0.0002 (0.0010)	-0.00003 (0.0001)
Exporter	-0.0035** (0.0013)	-0.0006** (0.0002)	0-.0007 (0.0031)	-0.00002 (0.00010)	0.0007 (0.0024)	0.00008 (0.0002)
Innovation	-0-.0076 (0.0553)	-0.0014 (0.0103)	0.1572 (0.0982)	0.0054 (0.0038)	0.0429 (0.0601)	0.0051 (0.0073)
Sole_Prop	-0.2028* (0.1165)	-0.0380* (0.0221)	-0.2703 (0.2387)	-0.0093 (0.0082)	0.1462 (0.1283)	0.0176 (0.0153)
Mgr_Time	-0.0022 (0.0047)	-0.0004 (0.0008)	-0.0582*** (0.0110)	-0.0003** (0.0001)	0.0015 (0.0021)	0.0001 (0.0002)
GGGI	-0.0090 (0.5223)	-0.0016 (0.0980)	-4.750** (2.182)	-0.1636** (0.0712)	2.790 (2.080)	0.3368 (0.2378)
GRSI	0.0001 (0.0016)	0.00003 (0.0003)	0.0015 (0.0056)	0.00005 (0.0001)	0.0018 (0.0017)	0.0002 (0.0002)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.382** (0.5702)		2.049*** (1.758)		-3.025* (1.588)	
Selection equation:						
<i>Cashflow_Down</i>						
Temp_closed	-5.519*** (0.2555)		5.589*** (0.2678)		-5.639*** (0.1665)	
Delay_pay	-0.0245 (0.1162)		-0.0816 (0.0985)		-0.1383 (0.0964)	
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.181*** (0.3714)		6.297*** (0.3972)		6.248*** (0.1043)	
Wald test	0.780		0.060		50.470	
Prob>Chi2	(0.3773)		(0.8018)		(0.0000)	
Observations	2,623	2,558	2,623	2,558	2,623	2,558

Notes: Reported are the heckprobit results and marginal effects estimated around mean points. Robust standards errors are reported in parentheses. Due to lack of space, we do not report the first stage regression results. Variable definitions are provided in Appendix A. [The Wald tests test the null hypothesis that the equations are independent.](#) Standard errors are in parentheses. *, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Table 6: Propensity score matching (PSM) results for gender differences in access to finance

<i>Panel A: Female-owned firms</i>	No. treated	No. control	ATT	Std. Err	t-value
Bank					
Nearest neighbour matching	2,732	3,398	0.001	(0.008)	-0.008
Stratification matching	2,731	5,446	0.007*	(0.004)	1.740
Kernel Matching method	2,732	5,445	0.008	(0.006)	1.281
Microfinance					
Nearest neighbour matching	2,732	3,398	0.009***	(0.004)	2.558
Stratification matching	2,731	5,446	0.009***	(0.003)	2.747
Kernel Matching method	2,732	5,442	0.010	(0.004)	2.779
Equity					
Nearest neighbour matching	2,732	3,398	0.007	(0.005)	0.335
Stratification matching	2,731	5,446	0.014	(0.008)	0.670
Kernel Matching method	2,732	5,445	0.012***	(0.006)	2.175
Panel B: Female-led firms					
Bank					
Nearest neighbour matching	1,348	2,956	0.007	(0.011)	0.603
Stratification matching	1,348	6,818	0.011*	(0.006)	1.805
Kernel Matching method	1,348	6,818	0.011*	(0.006)	1.787
Microfinance					
Nearest neighbour matching	1,348	2,956	0.019***	(0.005)	3.704
Stratification matching	1,348	6,818	0.016***	(0.005)	3.207
Kernel Matching method	1,348	6,818	0.017***	(0.002)	8.771
Equity					
Nearest neighbour matching	1,348	2,956	0.002	(0.013)	0.176
Stratification matching	1,348	6,818	0.009	(0.010)	0.836
Kernel Matching method	1,348	6,818	0.008	(0.018)	0.476

Notes: ATT is the average treatment effect on the treated. Firm level covariates are included in all models. The standard errors (in parentheses) used to compute the t-statistics is the standard deviation of the ATT after 100 bootstrap replications. *, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Table 7: Blinder-Oaxaca decomposition for gender differences in access to finance

<i>Panel A: Female-owned firms</i>						
<i>Differential</i>	Bank	Std. Error	Micro Finance	Std. Error	Equity	Std. Error
Prediction (female)	0.087***	(1.003)	0.010***	(1.001)	0.135***	(1.004)
Prediction (male)	0.087***	(0.003)	0.010***	(0.001)	0.135***	(0.004)
Difference	0.005***	(0.012)	0.001**	(0.004)	0.019	(0.015)
<i>Decomposition</i>						
π Endowment	0.011	(0.010)	0.005	(0.003)	-0.001	(0.013)
Γ Coefficients	0.008	(0.012)	-0.001	(0.004)	0.018	(0.015)
∞ Interaction	-0.013	(0.011)	-0.005	(0.004)	0.013	(0.014)
Observations	5,824		5,824		5,824	
<i>Panel B: Female-led firms</i>						
Prediction (female)	0.102***	(0.009)	0.008***	(0.003)	0.144***	(0.011)
Prediction (male)	0.085***	(0.003)	0.011***	(0.001)	0.135***	(0.004)
Difference	0.017***	(0.010)	-0.002	(0.003)	0.009	(0.012)
<i>Decomposition</i>						
π Endowment	-0.010**	(0.004)	0.001	(0.001)	0.002	(0.005)
Γ Coefficients	0.015	(0.010)	-0.003	(0.003)	0.009	(0.012)
∞ Interaction	0.011**	(0.005)	0.000	(0.001)	-0.003	(0.006)
Observations	5,824		5,824		5,824	

Notes: In all specifications we included the same control variables as in the heckprobit regressions reported in Tables 4 and 5. Standard errors are in parentheses. *, **, and *** denote significant at the 10%, 5% and 1% level respectively.