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# The gender gap in access to finance: Evidence from the COVID-19 pandemic

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## ABSTRACT

Using gender as a theoretical framework, we analyse the dynamics of debt and equity financing during the COVID-19 pandemic for a cross-country sample of 8,921 private firms. We provide evidence of a slight gender bias in debt financing, with creditors favouring female entrepreneurs when dealing with cash flow problems during the COVID-19 pandemic. We find no evidence of gender bias in equity financing. 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 debt market, speculating that in the context of high uncertainty, prototypical forms of femininity may be advantageous as financial institutions seek to hedge their risk by favouring more conservative borrowers.

## 1. Introduction

Across the world, the COVID-19 pandemic highlighted the financial fragility of many businesses (Liu et al., 2021; Brown and Rocha, 2020). The sharp decline in cash inflow resulting from the temporary lockdowns during the COVID-19 pandemic has driving many firms, especially smaller ones, close to bankruptcy, unable to meet their current and ongoing financial obligation. Drawing on a survey of over 5,800 small businesses in the United States, Bartik et al. (2020) show three-quarters of respondents had just two months or less in cash in reserve during the early stages of the COVID-19 pandemic. Humphries and Ulyssea, 2020 report similar impacts. This is further exacerbated by the fact that smaller firms tend to be disproportionately disadvantaged in securing finance in periods of high uncertainty (Gompers et al., 2010; Lee et al., 2015). Evidence of 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 entrepreneurial finance deals dropped by 30% during the pandemic.

In this paper, we examine whether female entrepreneurs faced barriers attributed to their gender in accessing debt financing—from banks and micro-finance institutions (MFIs)—and equity financing during the pandemic. Our paper is motivated by the fact that a significant portion of smaller businesses globally are female-owned/led (Bruhn et al., 2017), the importance of these firms in driving

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**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

female participation in the economy, and female entrepreneurs being particularly hit hard by the pandemic (Liu et al., 2021), putting much of the progress made towards women's empowerment at risk.

The literature on gender differences in access to finance suggests that under "normal" economic conditions, female entrepreneurs are more prone to financial constraint (Cavalluzzo et al., 2002; Chaudhuri et al., 2020). Discrimination theory, widely cited in finance, helps to explain gender differences in 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 of Becker (1957), taste-based discrimination highlights adverse and unjustified attitudes towards a specific individual 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 entrepreneurs being offered restricted access to finance and on less favourable terms (Alesina et al., 2013; Andrés de 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 other 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 from family members, which leads to less demand for external finance, including start-up loans (Andrés de et al., 2020).

A lack of information about a borrower's ability to pay leads to statistical discrimination in the debt and equity markets. 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 expectation of borrowers' ability should place weight on both the signal and the mean. In such situations, group stereotypes are applied to individual borrowers (Wellalage and Locke, 2017). For example, unobservable factors of borrower's credit situation encourage lenders to use gender as a proxy for ability to pay (Andrés de et al., 2020). Gender discrimination in access to finance may worsen during uncertain 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 terms of accessing debt and equity financing during the COVID-19 pandemic. For a sample of 8,921 private firms from 19 (mostly developing) countries, we find no evidence suggesting that female entrepreneurs were disadvantaged, attributed to their gender, in terms of accessing finance during the pandemic. Propensity score matching and Blinder-Oaxaca decomposition tests confirm the baseline regression results. In particular, we find slight female favouritism, with female entrepreneurs up to 2 percentage points more likely to access debt financing than their male entrepreneurs during the pandemic based on their gender alone. We find no evidence of gender bias in access to equity financing. 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 become advantageous as creditor providers seek to hedge their risks by favouring more conservative lenders.

The rest of our paper is organised as follows. Section 2 presents the data 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

**Table 2**  
Descriptive statistics.

Variable	Mean	Median	Stdev.	Min.	Max.	First quartile	Third quartile
Bank	0.088	0	0.284	0	1	0	0
MFI	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 gender differences in access to finance.

Variable	N	Mean	Median	Stdev.	Mean Diff.	Median Diff.
<i>Female_Own = 1</i>						
Bank	2,914	0.081	0	0.273	0.010 (0.104)	2.647 (0.104)
MFI	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)
<i>Female_Own = 0</i>						
Banks	5,950	0.091	0	0.288		
MFI	5,950	0.01	0	0.099		
Equity	5,950	0.135	0	0.341		
<i>Panel B: Female-led firms</i>						
<i>Female_Led = 1</i>						
Bank	1,441	0.092	0	0.289	-0.005 (-0.563)	0.337 (0.561)
MFI	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)
<i>Female_Led = 0</i>						
Bank	7,423	0.087	0	0.282		
MFI	7,423	0.010	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 and male-owned/led firms. Student's t-ratios are in parentheses.

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.

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

Variable	Bank (I)		MFI (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** (0.00002)	-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** (2.2110)	-0.1637** (0.0736)	2.961 (2.1720)	0.3566 (0.2475)
GRSI	0.0004 (0.0026)	0.00005 (0.0003)	-0.0032 (0.0054)	-0.00011 (0.0001)	0.0020 (0.0020)	0.0002 (0.0002)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-2.324* (0.1371)		2.188 (1.7050)		-3.184** (1.6060)	
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.

We merged the two datasets (WBES and the COVID-19 follow up surveys) using unique firm identifiers (ID) provided, providing information for 8,921 private firms from 19 (mostly developing) economies ([Table 1](#)). About 32% of sample firms are female-owned, whilst 16% are female-led. Greece has the highest proportion of female-owned firms (51%) whilst Mongolia has the highest proportion of female-led firms (51%). For completeness, also shows is the Global Gender Gap Index (GGGI), provided by the World Economic Forum, and the Government Response Stringency Index (GRSI), which embodies nine government response initiatives<sup>1</sup> to address the spreading of the coronavirus.

[Table 2](#) shows that to deal with cash flow shortages during the pandemic, about 14% of firms accessed equity financing, 10% accessed bank finance, and 1% accessed MFI 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%). Firms were started, on average, 22 years ago; over 36% of firms' shares are family-owned; whilst one-quarter of firms operate as sole proprietors.

<sup>1</sup> 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 contract tracing.

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

	Bank (I)		MFI (II)		Equity (III)	
Variable	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)	-0.0006 (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* (0.0001)	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 (0.0001)	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** (2.1820)	-0.1636** (0.0712)	2.790 (2.0800)	0.3368 (0.2378)
GRSI	0.0001 (0.0016)	0.0003 (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 3](#) shows that female entrepreneurs accessed debt financing 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%).

## 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 debt financing—from banks and MFIs, and equity financing during the pandemic<sup>2</sup>. The main equation is as follows:

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

where  $Financing_{ic}$  takes the value of one if the firm accessed financing—from bank, MFIs, or equity.  $Female$  takes the value of one if the

<sup>2</sup> Although the heckprobit model is widely used in literature, this method is not without its drawbacks. [Freedman and Sekhon, 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

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:

$$\text{Probit}(\text{Cashflow\_Down}_{ic} = 1) = \alpha_c + \alpha + \beta \text{Female}_{ic} + \gamma X_{ic} + \partial_1 \text{Temp\_Closed}_{ic} + \partial_2 \text{Delay\_Pay}_{ic} + \varepsilon_{ic} \quad (2)$$

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*.<sup>3</sup> 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 cash flow, 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

Tables 4 and 5 report the two-stage heckprobit regression results for female-owned and managed businesses, respectively.<sup>4</sup> Reported are the marginal effects estimated around the mean point. Column I and II show that female entrepreneurs accessed debt financing (from banks and MFIs) on average by up to 2 percentage points more during the pandemic than their male counterparts, controlling for a larger number of other firm-specific variables. Although the differences attributed to gender are economically small, they nevertheless align with Cowling et al. (2020) who argue that during periods of high financial uncertainty, when financial intermediaries become self-protective and more cautious in their allocation of risk capital (Caballero and Krishnamurthy, 2008), 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 financing during the pandemic (Column III).

Compared to micro firms (base case), larger firms (*Large*, *Median* and/or *Small*) accessed debt and/or equity financing less during the pandemic. Family-owned firms and sole proprietors accessed debt financing more during the pandemic, consistent with Crespi-Cladera and Martin-Oliver (2014). We find no evidence that the severity of government initiatives to address the spreading of the coronavirus impacts firms’ access to debt or equity financing. Perhaps this could be explained by substantial government subsidies provided to businesses during mandatory lockdowns.

### 4. Robustness

We apply two robustness checks: propensity score matching (PSM) and Blinder–Oaxaca decomposition technique. We perform PSM 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 that have non-systematic differences in response to the treatment, so they provide valid counterfactual evidence. Table 6 panels A and B provide the results for three PSM techniques: nearest neighbour matching, stratification matching, and kernel matching method. Across the three methods, the average treatment effect on the treated (ATT) is positive for debt financing. In particular, female entrepreneurs accessed debt financing from banks and MFIs by up to 1.0 and 1.9 percentage points more, respectively, during the pandemic. We find no evidence for gender differences in equity financing.

The Blinder–Oaxaca decomposition technique is widely in gender studies to identify and quantify the separate contributions of differences in measurable characteristics to group differences in the outcome of interest. Table 7 Panel A and B show that the bank financing accessibility gender gap is between 0.5 to 1.7 percentage points, favouring female entrepreneurs. Panel A shows slight evidence of a gender gap in access to debt financing from MFIs for female-owned-firms but not from female-led firms. Again, we find no evidence of an equity financing accessibility gender gap. Overall, the results of these additional tests are consistent with the results provided by the heckprobit model.

### 5. Summary and conclusions

We analysed the dynamics of debt and equity financing in female-owned/led businesses for a cross-country sample of private firms during the COVID-19 pandemic. While the impact of the pandemic has been particularly severe for females, our study provides slight female favouritism, with female entrepreneurs up to 2 percentage points more likely to access debt financing than their male entrepreneurs during the pandemic based on their gender alone. This result is perhaps somewhat surprising given the prevalence of findings that female entrepreneurs face certain barriers related to their gender when requesting financing.

<sup>3</sup> We identified *Sales\_Increase* as an alternative IV variable. *Sales\_Increase* indicates high-income generation, thus reducing the need for external credit. The heckprobit results are robust to this alternative specification.

<sup>4</sup> The first stage results are unreported for brevity but is available from the authors upon request.

**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
<b>Bank</b>					
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
<b>MFI</b>					
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
<b>Equity</b>					
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
<i>Panel B: Female-led firms</i>					
<b>Bank</b>					
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
<b>MFI</b>					
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
<b>Equity</b>					
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>	Bank	Std. Error	MFI	Std. Error	Equity	Std. Error
<i>Differential</i>						
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>						
$\pi$ Endowment	0.011	(0.010)	0.005	(0.003)	-0.001	(0.013)
$\Gamma$ Coefficients	0.008	(0.012)	-0.001	(0.004)	0.018	(0.015)
$\infty$ 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>						
<i>Differential</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>						
$\pi$ Endowment	-0.010**	(0.004)	0.001	(0.001)	0.002	(0.005)
$\Gamma$ Coefficients	0.015	(0.010)	-0.003	(0.003)	0.009	(0.012)
$\infty$ 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.

Nevertheless, our results are not entirely inconsistent with the literature. Using European Central Bank data, Stefani and Vacca (2013) find female firms structurally different from those led by men, without leaving room for a significant gender effect. Cowling et al. (2020) applying a formal Oaxaca–Blinder decomposition, find that women who did apply for bank loans were more likely to be successful. They suggest that during financial recessions, prototypical forms of femininity 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. Combined these results suggest that gender patterns in access to bank finance move with the cycles of the economy. Since this requires a longitudinal approach, we leave this for future exploration. Lastly, our research is not free 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 mitigated because of data limitations.



## CRedit authorship contribution statement

**Nirosha Hewa-Wellalage:** Conceptualization, Writing – original draft, Formal analysis, Methodology. **Sabri Boubaker:** Conceptualization, Methodology, Writing – review & editing. **Ahmed Imran Hunjra:** Data curation, Conceptualization, Project administration, Writing – original draft. **Peter Verhoeven:** Conceptualization, Methodology, Writing – review & editing.

## 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
MFI	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 finance 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 coronavirus. 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.

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