Title

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EuroMesCo/IEMed Annual Conference 2022, Tunis, Tunisia, September 22-23
Towards More Social Justice and Inclusiveness in the Mediterranean
Addressing vulnerabilities, mainstreaming inclusiveness in public policy reforms in Tunisia

Financial Inclusion and Hurdles to Funding Female Entrepreneurs in Tunisia

Philippe Adair[1] and Imène Berguiga[2]

Abstract

A literature review and stylised facts address financial inclusion regarding (small) businesses and female entrepreneurs. Factors detrimental to financial inclusion come both from the demand side of customers, such as absence of funding need versus self-selection, and from the supply side of financial institutions, such as deficient financial infrastructure and discrimination towards loan applicants.

An inventory of distinct data sources, with respect to coverage and gender, tackles the supply side of financial institutions as well as the demand side of businesses from both enterprises and households. A sequential model is designed, which includes descriptive statistics before and during the COVID-19 shock.

Marginal effects of probit regressions analyse financial inclusion from the demand side, using two different samples of comparative size devoted to Tunisia: the 2020 WBES and the ERF COVID-19 Monitor in 2021. Outcomes are that female entrepreneurs are prone to self-selection before the pandemic but not during the pandemic, whereas discrimination that was only computed during the pandemic does not occur.

Main conclusion is that financial inclusion does not preclude gender self-selection, which remains an obstacle to business growth of female entrepreneurs. Hence, policies should emphasize funding enhancement by financial institutions and the government, such as extending the guarantee scheme for borrowers, regulating crowdfunding and promoting positive discrimination towards female entrepreneurs, whereby the microfinance industry is key.

Keywords: Discrimination; Entrepreneurs; Financial inclusion; Gender; Loans; Probit regressions; Self-selection; Small businesses; Tunisia.

JEL Classification: D1; D8; D22; G2; G4.

Acknowledgements

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Introduction.

A key factor in socio-economic development through the alleviation of poverty and inequality together with rising sustainable economic growth (Chehade et al, 2015; Ayadi et al, 2021), financial inclusion targets vulnerable economic groups such as small businesses and female entrepreneurs, with a focus on account holding, loan granting and savings.

Financial inclusion is both a potential and real endowment. First, as regards access, female entrepreneurs holding a bank account can be denied a loan application and face credit rationing because they lack sufficient collateral. Hence, potential endowment does not transform into real access. In addition, if female entrepreneurs are denied access to a loan application, although they have the same characteristics than males whose loan application is granted, this is discrimination. Second, with respect to use, whenever loan application is not presented despite the need for it from the entrepreneur, there is self-selection.

As for the pre-COVID-19, period, small businesses applying for a loan did face credit rationing and lack of sufficient collateral requested by the banks (Adair & Fhima, 2014). As of 2015, financial issues were the second main reason for exiting the business, affecting almost a quarter of businesses. Within a 1-9 scale (from insufficient to sufficient) entrepreneurial finance in Tunisia ranked a low 4.2 (Kelley et al. 2016). Access to finance was the major obstacle as for seven out of ten businesses in a sample of 201 Tunisian female entrepreneurs (OIT/ILO, 2016). Chehade et al (2015) estimated that over half the enterprises remained unserved or underserved by the official financial sector. Among Tunisians borrowers as of 2017 (Global Findex Survey, 2017; Ayadi et al, 2021), almost half (45%) borrowed in the previous year, yet only one out of five (8.5%) from a financial institution, suggesting that money was borrowed from informal finance (family and friends, 32%) and trade credit (11.2%).

According to Global Findex, figures for financial inclusion improved in 2017, but slightly declined in 2021, presumably due to the impact of the pandemic (Global Findex, 2021, See Table A1 in the Appendix).

Delechat et al (2018) use OLS and probit regressions upon a worldwide sample from Findex database and a single index for financial inclusion. They find that legal discrimination against women and gender norms explain part of the cross-country variation in access to finance for women. Evidence of gender bias in financial inclusion could help explain the relationship between gender inequality and macroeconomic outcomes.

Inequality does not necessarily mean discrimination. Hence, microdata are requested to highlight the financial behaviour of small businesses and female entrepreneurs.

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COVID-19 pandemic burst in 2020 stand as a as a test of the financial behaviour of these two categories, with respect to government support programs in Tunisia. Krafft et al (2021) provide an overview of such support programs. Over half of firms reported not applying for nor receiving any government assistance, although less than a tenth declared no government support was needed. Business loans were the most common categories of support received and needed. Reduced and delayed taxes were the next most needed support, and wage subsidies were commonly received and mentioned as needed. Noteworthy is that received and needed support are not disentangled.

The research issue is twofold and unfolds before and during the COVID-19 pandemic. First, the gender issue: Are female entrepreneurs prone to self-selection? Do they face discrimination when they apply for a loan and/or financial support? Second, the size issue: Are micro and small businesses prone to self-selection? Do they face discrimination when they apply for a loan and/or financial support?

The paper is structured as follows.

Section 1 tackles the literature review and stylised facts upon financial inclusion, especially gender inclusion for female entrepreneurs. Various causes may explain financial exclusion regarding use on the demand side of borrowers (insufficient income, absence of funding need *versus* self-selection and available substitutes to bank loans) and with respect to access on the supply side of financial institutions (poor financial infrastructure, credit rationing and discrimination towards loan applicants).

Section 2 provides an inventory of data sources from both the demand-side addressing businesses from the World Bank Enterprise Survey (WBES 2020) as well as entrepreneurs from households ERF-COVID-19 Monitor (OAMDI 2021) and from the supply side of financial providers, which encapsulate loopholes regarding coverage and gender. Model design includes descriptive statistics before and in the wake of the COVID-19 shock in Tunisia.

Section 3 is devoted to the analytics of financial inclusion, namely two investigations based on probit regressions (marginal effects). Regressions apply to two distinct samples: the WBES sample of 587 businesses collected in 2019 and the ERF-COVID-19 sample of 491 entrepreneurs, a subset of the household survey in 2020. The research issues are the following: are small businesses and female entrepreneurs confronting self-selection and/or discrimination from lenders before and during the COVID-19 disruption.

Section 4 addresses conclusions and policy recommendations. The focus is on harmonised data collection and funding enhancement from financial institutions, such as extending guarantee scheme for borrowers, regulating crowdfunding and promoting positive discrimination towards

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female entrepreneurs. In this respect, microfinance institutions are a key vector for financial inclusion, fostering female entrepreneurship in a sustainable way.

1. Literature review

1.1. Financial inclusion

A literature review and stylised facts from indicators address financial inclusion regarding (small) businesses and female entrepreneurs. Financial inclusion (account holding) remains only a potential endowment, if use does not occur on the demand-side, due to the absence of funding need or self-selection, despite the need for a loan.

Factors transforming financial inclusion (account holding) into real financial exclusion (loan application denial) come from the supply side of financial institutions if available financial infrastructure is deficient and there is discrimination towards loan applicants.

Villaseca et al (2021) observe that funding requests from female entrepreneurs on business angels (*AngelList* platform) amount only to 16% of total requests. There is also lower female access to venture capital. These two observations do not necessarily imply gender discrimination. Gafni et al (2021) point out a larger participation of women entrepreneurs to the *Kickstarter* crowdfunding platform (35%) and no evidence of discrimination.

At the macroeconomic level, financial inclusion (i.e. financial intermediation), has a positive correlation with growth, employment, poverty and a reduction in inequality. At the microeconomic level, financial inclusion (access to financial services) has a positive effect on employment and on household consumption, and stimulates the local economy. This is a major issue in Tunisia, wherein the unemployment rate is high especially among youth and the number of informal businesses is large (World Bank, 2015). Among formal enterprises registered with the National Enterprise Registry (RNE) in 2013, it was estimated that over one third did (37%) report their sales. Hence, most businesses may be informal, especially micro and small businesses. Over half the enterprises (58%), mostly micro and small businesses, expressed the need for financing fixed assets or/and working capital, whereas only one out of seven (15%) accessed bank loans.

1.2. Self-Selection from the Demand-Side

According to the Global Entrepreneurship Monitor (GEM 2017), women have a lower propensity for borrowing than their male counterparts have and rely more on informal sources such as family and friends. The pecking order theory (Myers 1984) would suggest that female entrepreneurs opt first for their own financing rather than borrow. Watson (2012) states that female entrepreneurs are more prone to risk aversion than men are, driving self-selection, a

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controversial hypothesis that may depend on job position datasets and countries, which proves plausible among MENA countries.

GEM provides a household survey upon Entrepreneurial Attitudes and Perceptions. We checked GEM reports up to 2021. Unfortunately, no data is available because Tunisia was not surveyed since 2012 (GEM 2013). Deng et al (2021), found no paper addressing female entrepreneurship in the MENA countries among the top 20 countries over 1975-2018. Aljuwaiber (2021) selected a data set of articles on entrepreneurship in MENA countries over 2009-2019, among which five papers are devoted to female entrepreneurship in Tunisia, whereas only one tackles the funding issue (Soltane & Imen, 2013)

Morsy et al. (2019) analyse North Africa (Egypt, Mauritania, Morocco and Tunisia), using a sample of 6,097 registered firms with at least five employees from several World Bank Enterprise Surveys (WBES). A multinomial logistic regression rules out self-selection and finds no evidence of gender discrimination. However, an instrumented probit model highlights self-selection, combining low perceived creditworthiness and female risk aversion.

Berguiga & Adair (2021) draw a pooled sample of 3,896 businesses in Egypt, Morocco and Tunisia from the 2013 WBES, including microenterprises and making a distinction between managers and owners that Morsy et al (2019) overlooked. Main results of two logistic regressions show there is neither self-selection nor discrimination for female owners, whereas self-selection affects female managers.

1.3. Discrimination from the Supply Side

Two theories address discrimination. According to Becker (1957), taste-based discrimination is due to a prejudice towards one group of applicants based on gender and other personal characteristics. Phelps (1972) grounds statistical discrimination upon information asymmetry. Applying these theories to the credit market, lenders reject some loan applicants based on some observed characteristics such as gender, which are supposed to predict their creditworthiness.

Evidence proves controversial. Hereafter, we contend that there is no gender discrimination if banks require women to have a bank account and provide a collateral exactly as they require these lending conditions from men. Discrimination occurs if female entrepreneurs with the same characteristics as their male counterparts are denied a loan when they apply for it.

On the one hand, no discrimination affects female business owners/managers as for developing countries

Bardasi et al (2011) analyse a sample of over 20,000 firms from 61 developing countries, based on World Bank Enterprise Surveys (WBES) from 2005 to 2007, wherein the MENA region is

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not included. A multinomial logit model addresses the following categories: a) businesses that do not need a loan, b) that need a loan but do not apply for it, c) that need a loan and apply for it; in the latter case, either the loan application is approved, or it is dismissed. There is no gender discrimination in access to formal funding.

Hewa-Wellalage et al (2022) use a cross-section sample of 8,921 businesses from WBES and World Bank COVID-19 follow-up surveys upon 19 mostly developing countries, wherein Tunisia is not included. Applying an Heckprobit and marginal effects as well as propensity score matching and Blinder-Oaxaca decomposition, authors find no evidence of discrimination. In contrast, micro firms and female entrepreneurs are slightly favoured over larger firms and their male counterparts, suggesting that financial institutions prefer less risky female borrowers. On the other hand, discrimination occurs for female business owners/managers.

Carco et al (2017) depict a non-representative sample of 583 female entrepreneurs collected in six MENA countries including Tunisia. Female entrepreneurs, mostly university graduates, enjoy 10 years of experience are aged 40 on average. Their family-based businesses operate in the services, trade and craft industries. The share of non-registered businesses amounts 10% in Tunisia. Access to funding for female entrepreneurs *versus* male entrepreneurs amounts to a 25.70% gap in Tunisia.

Amara et al (2018) applying logistic regression and propensity score matching upon a cross-section sample of 9,382 individuals, find that female entrepreneurs experience significant gender discrimination in Tunisia.

Berguiga & Adair (2022) use a pooled sample of 6,253 enterprises from the 2019 WBES upon six MENA countries including Tunisia. Two logistic regression models (marginal effects) address loan demand and loan supply with respect to self-selection vs. discrimination of both owners and managers according to gender. There is no self-selection for female owners and managers but discrimination occurs for female owners.

2. Data sources and model design

It is worth mentioning that the updated RNE has not been completed since 2018. In addition, the Tunisian classification of businesses does not always comply with standards coined by the ILO and the UN System of National Accounts as follows: *Micro* (1-9 employees), *Small* (10-49 employees), *Medium-size* (50-249 employees) and *Large* (over 250 employees). However, thresholds used by the National Statistical Office (INS 2021) as of 2020 do match with broad categories, according to which almost nine out of ten enterprises have no employee, whereas *Micro* account for 86.6% of the sub-total number of enterprises, *Small* amount to 0.98% and

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Medium-size together with *Large* businesses (over 200 employees) account for only 0.36%. Regarding the distribution by industry, manufacturing has a share of 11.4%, while that of trade and services is 87.8%.

2.1. Data sources

Five data sources address business funding behaviour in Tunisia from both the demand side and the supply side in the recent pre-COVID 19 period and during the pandemic. However, only the first and the last data source documenting the demand side prove relevant, although not always representative.

First, the World Bank Enterprise Survey (WBES 2020) conducted in 2019 provides a sample of 587 businesses, among which over one third are female entrepreneurs. WBES is biased by predominant manufacturing industry and the absence of unregistered businesses, which account for the majority of enterprises (Berguiga & Adair, 2019), alongside *Micro* and *Small* categories (Ayadi et al 2017). Hence, WBES figures displaying access to (97% own a bank account) and use of financial services (almost half have a bank loan) by SMEs in Tunisia are obviously non-representative (WBES 2020).

Second, the Business Pulse Survey (IFC & INS 2021) checked the effectiveness of government support cushioning the impact of COVID-19 pandemic in 2020. It covers a large sample of 2,500 formal and informal businesses, whereby sectoral distribution is plausible: trade and services being prominent (72.4%), while manufacturing accounts for 27.6%. The distribution of categories complies with critical knowledge: over four out of five businesses are microenterprises (81.0%), whereas small and medium size (14.2%) and large (4.8%) enterprises amount to a minor share. Unfortunately, microdata proved unavailable and aggregates are inappropriate for investigating financial behaviour from borrowers.

Third, Financial Access Survey (FAS) collected by the International Monetary Fund records macroeconomic aggregates on the supply side, which provides little help for investigating financial behaviour from lenders. Noteworthy is that the number of SMEs borrowing from commercial banks has receded between 2017 and 2020 whereas the number of branches increased alongside the number of borrowers and outstanding deposits (See Table A2 in the Appendix).

Fourth, three waves conducted by the ERF in 2021 (OAMDI 2021a) upon a stratified sample of enterprises, included unfortunately lacking variables (e.g. gender ownership), which precluded tackling gender differentials.

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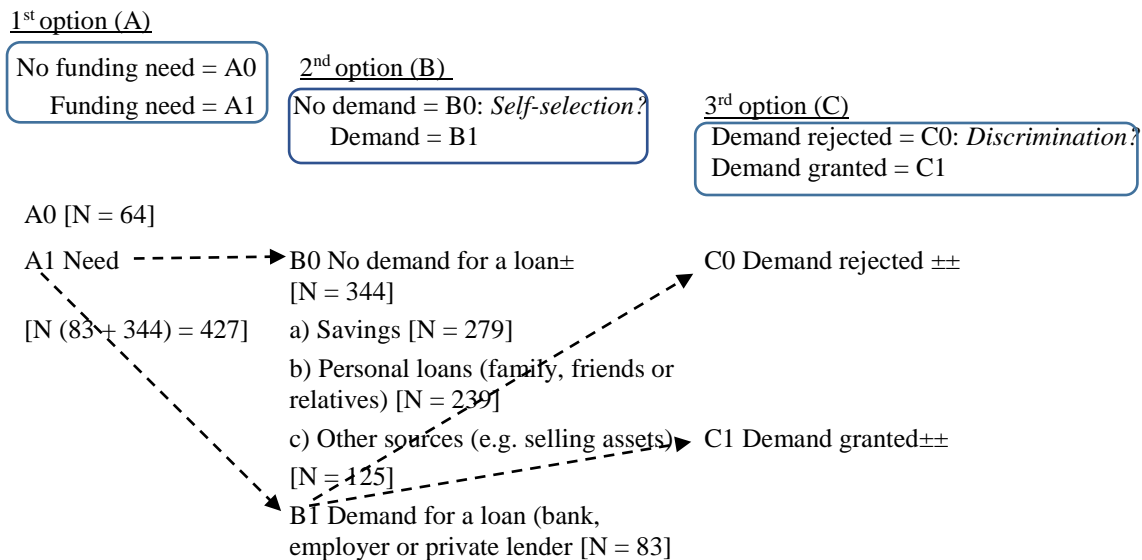
Last, four waves surveyed by the ERF in 2021 (OAMDI 2021b) upon a stratified sample of households, encapsulated a sub sample of 491 non-farming business owners whose financial behaviour before and during the COVID-19 pandemic, including the impact of government support, was assessed. Female entrepreneurs own one out of five businesses.

2.2. Model design

We design a sequential choice model best represented with a decision tree, which includes three binary options: (A) no funding need vs. funding need prior to (B) no funding application (self-selection) vs. funding application and (C) funding denied (potential discrimination) vs. funding granted (See Figure 1, Figure 2 and Box 1 hereafter). It is noteworthy that the final choice in the last option does not belong to the companies on the demand side, but to the banks or government support programs on the supply side.

Figure 1. Decision tree: the sequential model for funding before COVID-19 (ERF sample)

1st option (A)

| No funding need = A0 |
| Funding need = A1 |

2nd option (B)

| No demand = B0: *Self-selection?* |
| Demand = B1 |

3rd option (C)

| Demand rejected = C0: *Discrimination?* |
| Demand granted = C1 |

A0 [N = 64]

A1 Need - - - - - -> B0 No demand for a loan± [N = 344]

[N (83 + 344) = 427]

a) Savings [N = 279]

b) Personal loans (family, friends or relatives) [N = 239]

c) Other sources (e.g. selling assets) [N = 125]

B1 Demand for a loan (bank, employer or private lender [N = 83]

C0 Demand rejected ±±

C1 Demand granted±±

Note: Sample (N= 491) ± Preferences for alternate funding sources suggest self-selection towards borrowing. Several funding sources can combine. ±± Not available.
Source: Authors' calculations from OAMDI (2021b) for Tunisia.

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Figure 2. Decision tree: the sequential model for funding/support during COVID-19 (ERF sample)

1st option (A)

No funding need = A0
    Funding need = A1

2nd option (B)

No demand = B0: *Self-selection?*
    Demand = B1

3rd option (C)

Demand rejected = C0: *Discrimination?*
Demand granted = C1

A0 [N = 28]

A1 Need - - - - - - → B0 No demand for support [N = 334] → C0 Demand rejected ±±± [N = 45]

[N (129 + 334) = 463] a) Not aware of programs [N = 67]

b) Self-selection± [N = 267]

B1 Demand for support±± [N = 129]   C1 Demand granted ±±± [N = 84]

a) Business loans [N = 76]   a) Business loans [N = 44]

b) Payment deferrals [N = 43]   b) Payment deferrals [N = 13]

c) Subsidies [N = 50]   c) Subsidies [N = 27]

Notes: Sample (N= 491) ± Requires internet/smart phone (have none) + Don't think will get support + Need to pay bribe to get support + Others. ±± Several supports can combine. ±±± Not available. We compile C0 and C1 from cross sorting with the answers to the question regarding the best policy required to support business activity, whether a), b) or c). If the answer is positive, we assume that the application was accepted (C1), otherwise rejected (C0).
Source: Authors' calculations from OAMDI (2021b) for Tunisia.

Probit regressions (marginal effects) apply to both samples including micro data (WBES and

ERF) and address the research issues before and during the COVID-19 pandemic.

Box 1. Probit models (marginal effects)

The funding/support demand model is binary and self-selection comes from the absence of application (=0) as follows:

$Self-selection_{ik}$

$$= \begin{bmatrix} 0 \text{ if funding/support was needed and not applied for in 2019/2020 and 2021} \\ 1 \text{ if funding/support was needed and applied for in 2019/2020 and 2021} \end{bmatrix}$$

The funding/support supply model is binary and discrimination comes from the denial of application (=0) as follows:

$Discrimination_{ik}$

$$= \begin{bmatrix} 0 \text{ if funding/support was applied for and was denied } * \text{ in 2019/2020 and 2021} \\ 1 \text{ if funding/support was applied for and was granted in 2019/2020 and 2021} \end{bmatrix}$$

* Discrimination is conditional to the comparison between female and male entrepreneurs.

Both models are estimated according to the general equation for the explained variable *Y*:

$$E(Y = 1/X_{ikj}) = P_{ikj} = \sum_j \alpha_j X_{ikj} + \sum_j б_j W_{ikj} + \sum_j \varphi_j Z_{ikj} + \sum_j \beta_j V_{ikj} + \varepsilon_j$$

Wherein explanatory variables are the following: X_j= characteristics of the business; W_j = characteristics of the owner or manager; Z_j= characteristics of the funding; V_i= activity of the business, and $\varepsilon_j$is the error term.

Source: Authors.

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3. Outcomes from econometric analysis

3.1. Self-selection *vis-à-vis* banking loans before the COVID-19 pandemic

We estimate the probability of self-selection affecting entrepreneurs before the COVID-19 pandemic upon a subset of businesses that did not apply for a bank loan belonging to two samples: the first accounts for 587 businesses (WBES 2020) and the second consists of 491 enterprises surveyed in any of the four waves of the ERF COVID-19 Monitor (OAMDI, 2021b).

3.1.1. The WBES sample

The WBES consists mainly of medium and large enterprises (60.89%). (See Table A4 in the Appendix).

Table 1 reports the results of the estimation of self-selection according to the characteristics of enterprises, their owner and the financing of their activity. Female entrepreneurship is measured by the ownership of the company (*Gender ownership*) and its management (*Gender of the manager*). These two indicators were first used as separate explanatory variables (Model 1 and 2) and then simultaneously (Model 3).

Table 1. Estimation of the self-selection model (marginal effects): the WBES sample

Variables	(1) Gender ownership±	(2) Gender manager±	(3) Gender ownership + Gender manager±	(4) Gender ownership±
Personal loan	0.1551*	0.1491*	0.1530*	0.1513*
(ref.: *No personal loan*)	(1.8245)	(1.7867)	(1.8298)	(1.7856)
Size: *Micro*	0.0209	0.0357	0.0169	0.0198
(ref. *Medium and Large*)	(0.2941)	(0.5156)	(0.2398)	(0.2800)
Size: *Small*	0.0432	0.0361	0.0258	0.0499
(ref.: *Medium and Large*)	(0.7000)	(0.6001)	(0.4197)	(0.8053)
Industry: *Manufacturing*	-0.0528	-0.0666	-0.0589	-0.0795
(ref.: *Retail and services*)	(-0.9428)	(-1.2070)	(-1.0562)	(-1.4505)
Age: *Mature*	-0.0569	-0.0422	-0.0416	
(ref.: *Start-up + Young*)	(-0.5981)	(-0.4480)	(-0.4449)	
Ownership: *Sole proprietorship*	-0.0862	-0.0956*	-0.1127*	
(ref.: *Shareholding*)	(-1.4874)	(-1.7263)	(-1.9258)	
Ownership: *Partnership*	-0.2274***	-0.2459***	-0.2478***	
(ref.: *Shareholding*)	(-2.7262)	(-3.0267)	(-2.9993)	
Financial inclusion	-0.3056	-0.3250	-0.2809	-0.3310
(ref.: *Excluded*)	(-1.3783)	(-1.5205)	(-1.2700)	(-1.4850)
Gender ownership: *Female*(ref.: *Male*)	0.0080		-0.0405	0.0126
	(0.1457)		(-0.6965)	(0.2336)
Gender of manager: *Female* (ref.: *Male*)		0.2178**	0.2348**	
		(2.4795)	(2.5375)	
Sales Turnover	-0.0004	-0.0007	-0.0022	0.0017
	(-0.0305)	(-0.0514)	(-0.1578)	(0.1164)
Observations	355	366	355	359
Log Likelihood	-232.839	-236.348	-229.455	-239.66
LR statistic	17.04	24.64	23.46	9.26
Mc Fadden R2	0.0394	0.0556	0.0534	0.0214
Predicted cases	60%	60.66%	59.15%	57.10%

Note: Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1., ± N= 420 No demand out of 587 firms
Source: Authors from WBES (2020)

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Personal loan (Model 1, 2 and 3) and *Gender of the manager* (Model 2 and 3) are significant and positive, whereas *Sole proprietorship* (Model 2 and 3) and *Partnership* (Model 1, 2 and 3) are significant and negative.

Being a female manager increases the likelihood of self-selection compared to male managers. However, there is no significant relationship between female owners and self-selection.

Financial Inclusion is negative but not significant: holding a bank account has no impact on the likelihood of self-selection *vis-à-vis* loan application.

3.1.2. The ERF sample

In Table 2, female entrepreneurship is measured only by the *Gender ownership* exerting a positive and significant influence upon self-selection (Model 2), alongside *Manufacturing Industry* (Model 1 and 2).

Table 2. Estimation of the self-selection model before COVID-19 (marginal effects): the ERF sample

Models	(1) Self-selection	(2) Self-selection
Variables	±	±
Personal loan	-0.0705	-0.0730
(ref.: *No personal loan)*	(-1.0043)	(-1.0821)
Size: *Micro*	0.3140	0.2642
(ref.: *Medium and Large)*	(1.3443)	(1.1743)
Size: *Small*	0.3814	0.3078
(ref.: *Medium and Large)*	(1.3864)	(1.1641)
Industry: *Manufacturing*	0.1288**	0.1422**
(ref.: *Retail and services)*	(1.9798)	(2.2096)
Financial inclusion	-0.0332	-0.0583
(ref.: *Excluded)*	(-0.4738)	(-0.8617)
Gender ownership: *Female*	0.1290	0.1473*
(ref.: *Male)*	(1.4437)	(1.6521)
Sales Turnover	0.0020	-0.0022
	(0.2104)	(-0.2319)
Education level : *Primary*		-0.2150**
school (ref.: *Tertiary)*		(-2.1907)
Education level : *Secondary*		-0.1089
school (ref.: *Tertiary)*		(-1.0947)
Location of residence :		-0.0274
Rural (ref.: *Urban)l*		(-0.3776)
Observations	156	156
Log Likelihood	-75.298	-72.430
LR statistic	8.56	15.23
Mc Fadden R2	0.0488	0.085
Predicted cases	80.13%	80.13%

Notes: Robust z-statistics in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. ±N= 344 No demand out of 491 firms. *Source*: Authors from ERF (OAMDI 2021b).

A significant and negative *Primary level of education* of the owner (Model 2) runs opposite to self-selection, meaning that these businesses are prone to apply for a loan, compared with a higher *Education level*, suggesting that better educated owners may be aware of the strong requirements of a loan application such as collateral.

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Size is positive but not significant and plays no role in explaining self-selection behaviour.

Financial inclusion is negative and not significant (Model 1 and 2).

3.1.3. Comparing the WBES and the ERF sample before the COVID-19 pandemic

A comparison of Model 4 in Table 1 with Model 1 in Table 2 shows that the determinants of self-selection behaviour are different according to samples. In the WBES sample, the availability of *Personal loans* drives the self-selection decision, while in the ERF sample it depends on *Manufacturing Industry*.

Financial inclusion exerts no effect on the probability of self-selection behaviour.

Regardless of *Size,* women running small, medium and large businesses (WBES) and women owning micro enterprises are prone to self-selection.

The WBES sample has a far smaller share of microenterprises (20.10%) than the ERF (94.09%). This may stand as a robustness check regarding size.

The WBES sample is larger than the ERF and includes more women (36.12%) than in the ERF (20.37%). Almost all firms (98.28%) are financially included in WBES, whereas financial inclusion benefit two out of three companies (67.21%) in the ERF sample. One out of four (25%) WBES companies applied for a loan, while almost one out of six (16.9%) ERF companies did apply. Conversely, one out of six (15.9%) WBES companies use personal loans, whereas almost half ERF companies (48.67%) did. See Table A4 in the Appendix.

3.2. Self-selection during the COVID-19 pandemic

In as much as the WBES sample was collected in 2019/2020, it does not cover government support programs implemented during the pandemic. Therefore, we only use the ERF database to estimate the probability of businesses to self-select *vis-à-vis* government programs. In addition, we use a larger sample of data stacked in four waves.

In Table 3, estimation results from Model 1 show that the factors influencing self-selection towards government support programs are different from those affecting loan demand in the pre-COVID-19 period (See Model 1 in Table 2), using the same explanatory variables except *Personal loan*. Especially, *Financial inclusion* explains why businesses do not apply for government support programs during COVID-19.

According to Models 1 and 2, *Primary school Education level* and *Revenue change* (*Decrease, increase*) are significant and negative, while *Financial inclusion* is positive and significant. *Gender ownership* is not significant: being a female or male owner has no impact on the likelihood of self-selection during COVID-19, unlike the pre-COVID-19 period (See Table 2).

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Table 3. Estimation of the self-selection model during COVID-19 (marginal effects): the ERF sample

Models	(1a) Self-selection	(2a) Self-selection	(1b) Self-selection	(2b) Self-selection
Variables	±	±	±±	±±
Size: *Micro*	0.2999	0.2724	0.2999	0.2724
(ref.: *Medium and Large*)	(1.0900)	(0.9312)	(1.0900)	(0.9312)
Size: *Small*	0.2368	0.2159	0.2368	0.2159
(ref.: *Medium and Large*)	(0.8245)	(0.7115)	(0.8245)	(0.7115)
Industry: *Manufacturing*	0.0091	-0.0029	0.0091	-0.0029
(ref.: *Retail and services*)	(0.2255)	(-0.0706)	(0.2255)	(-0.0706)
Financial inclusion	0.0703*	0.0680*	0.0703*	0.0680*
(ref.: *Excluded*)	(1.8489)	(1.7889)	(1.8489)	(1.7889)
Gender ownership: *Female*	0.0018	0.0180	0.0018	0.0180
(ref.: *Male*)	(0.0379)	(0.3738)	(0.0379)	(0.3738)
Education level: *Primary*		-0.1631***		-0.1631***
school (ref.: *Tertiary*)		(-2.7082)		(-2.7082)
Education level: *Secondary*		-0.0682		-0.0682
school (ref.: *Tertiary*)		(-1.1414)		(-1.1414)
Location of residence: *Rural*		0.0456		0.0456
(ref.: *Urban*)		(0.9709)		(0.9709)
Business model adjustment		0.0082		0.0082
(ref.: *No adjustment*)		(0.2059)		(0.2059)
Revenue change: *Decrease*		-0.1752**		-0.1752**
(ref.: *Constant*)		(-2.5527)		(-2.5527)
Revenue change: *Increase*		-0.2086**		-0.2086**
(ref.: *Constant*)		(-2.1276)		(-2.1276)
Current status: *Temporarily*		-0.0028		-0.0028
Closed (ref.: *Open*)		(-0.0583)		(-0.0583)
Current status: *Permanently*		-0.0100		-0.0100
Closed (ref.: *Open*)		(-0.0963)		(-0.0963)
Observations	633	623	633	623
Log Likelihood	-395.979	-382.022	-395.979	-382.022
LR statistic	5.09	21.28	5.09	21.28
Mc Fadden R2	0.0066	0.0285	0.0066	0.0285
Predicted cases	67.77%	67.42%	67.77%	67.42%

Notes: Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. ± N= 334 No demand out of 491firms. ±± N= 640 No demand out of 1,168 observations.

Source: Authors from ERF (OAMDI 2021b).

Consistent with the result previously found before COVID-19, business owners with a primary education level apply not only for credit from financial institutions but also for assistance from government programs (loans, repayments and tax rescheduling, wage subsidies, grants, etc.).

A change in income, whether declining or rising since 2019, reduces the likelihood of self-selection, relative to businesses with constant revenues.

Noteworthy is that revenue declines especially for female entrepreneurs. Female businesses are more often closed permanently, whereas male businesses are more often open or temporarily closed. Women adjusted their business model more than men did (See table A4 in the Appendix).

3.3. Discrimination regarding government support programs during COVID-19.

Discrimination is designed to capture the determinants of the likelihood of rejection by government support programs during the pandemic.

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Noteworthy is that estimating the probability of credit rejection by financial institutions prior to the pandemic proved impossible, because the subsample size of credit applicants is too small in WBES (140 businesses) and ERF (83 businesses) (See table A4 in the appendix).

In Table 4, we use stacked data from ERF businesses across the four waves (1,168 observations).

According to Model 2, only *Secondary Education level* and *Business model adjustment* are significant. No relationship shows that female-owned businesses have a higher probability of rejection than their male counterparts do. There is no discrimination against female owners in Tunisia. This result is consistent with results regarding the absence of discrimination on the credit market in North Africa (Morsy et al 2019; Berguiga & Adair 2021) and the Middle East and North Africa countries including Tunisia (Berguiga & Adair 2022).

Table 4. Estimation of the discrimination model during COVID-19 (marginal effects): the ERF sample

Models Variables	(1) Discrimination ±	(2) Discrimination ±
Size: *Micro*	-0.0608	-0.0793
(ref.: *Medium and Large*)	(-0.1708)	(-0.2497)
Size: *Small*	-0.1462	-0.1350
(ref.: *Medium and Large*)	(-0.3811)	(-0.3914)
Industry: *Manufacturing*	0.0907	0.1022
(ref.: *Retail and services*)	(1.2308)	(1.3673)
Financial inclusion	0.0630	0.0784
(ref.: *Excluded*)	(0.9105)	(1.1451)
Gender ownership: *Female*	0.0825	0.0985
(ref.: *Male*)	(0.9303)	(1.1271)
Education level: *Primary school*		0.0964
(ref.: *Tertiary*)		(0.7856)
Education level: *Secondary school*		0.2048*
(ref.: *Tertiary*)		(1.6871)
Location of residence: *Rural*		-0.1011
(ref.: *Urban*)		(-1.1426)
Business model adjustment		-0.1498**
(ref.: *No adjustment*)		(-2.1666)
Revenue change: *Decrease*		0.0924
(ref*.: Constant*)		(0.5494)
Revenue change: *Increase*		0.1079
(ref*.: Constant*)		(0.5452)
Current status: *Temporarily closed*		-0.0618
(ref*.: Open*)		(-0.7257)
Current status: *Permanently closed*		-0.0183
(ref*.: Open*)		(-0.0948)
Observations	205	203
Log Likelihood	-136.065	-129.647
LR statistic	2.92	12.57
Mc Fadden R2	0.0108	0.0476
Predicted cases	60%	66.01%

Notes: Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. ± N= 216 demand out of 1,168 observations
Source: Authors from ERF (OAMDI 2021b).

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There is no significant relationship between the likelihood of rejection and financial inclusion; the decision to assist businesses with government programs is not conditional to bank account holding.

Conversely, being a business owner with a secondary education level increases the probability of credit rejection compared with his academic counterpart, suggesting the latter would be considered a better manager.

Rejection rates for government program applicants decline when they adjust their business model and when they use financial technology (fintech): use of the smartphone for marketing and placing orders, the Internet, online social media, specialised applications or digital platforms, etc. Companies are encouraged to digitalise to ensure ongoing business activity and receive support (Ayadi et al, 2021).

4. Conclusion and policy recommendations

4.1. Conclusions

Our findings are consistent with previous results from MENA countries, including Tunisia, long before COVID-19 disruption (Morsy et al 2019; Berguiga & Adair 2021). Self-selection occurs but there is no evidence of gender discrimination.

Prior the COVID-19 era, women entrepreneurs are prone to self-selection *vis-à-vis* loan application, regardless of *Size*. Being a female manager (according to WBES) or a female owner (according to ERF) increases the likelihood of self-selection compared to their male counterparts.

Financial inclusion does not preclude self-selection, which is an impediment to empowerment and business development of female entrepreneurs.

During COVID-19, unlike the pre-COVID-19 period, gender ownership is not significant: being a female or male owner exerts no impact on the likelihood of self-selection. *Financial inclusion* explains why businesses do not apply for government support programs.

During COVID-19, there is no discrimination against female owners as regards applications for government support. No relationship shows that female-owned businesses have a higher probability of rejection than their male counterparts do.

This does not imply that small entrepreneurs, including females, do access the loan or benefit the support they should expect. Hence, policies must bring in conducive conditions and foster stakeholders to overcome gender self-selection. Herein lies the role of the microfinance industry.

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4.2. Policy implications and recommendations

4.2.1. Policy implications: spreading the use of *fintech* and collecting robust data

In the wake of COVID-19, Central Bank of Tunisia has adapted access to and use of banking services, implementing mechanisms to foster remote transactions and payments, providing new opportunities for the use of financial technologies (*fintech*), including mobile phones and the internet (Ayadi et al, 2021). Although spreading means of payment is one of the levers for alleviating inequalities and the digital divide, it will not be enough to closing the gender gap and boosting lagging micro and small businesses. Hence, funding from financial institutions needs enhancement.

In this respect Sustainable Development Goal 5 — "achieve gender equality and empower all women and girls" — requires financial services that are affordable, accessible, and easy to use and tailored to meet women's needs. Many service offerings do not comply with aforementioned conditions and needs, although a wide range of e-banking services are available: free issuance of bankcards, digital payment of social assistance, removing fees on ATM withdrawals and electronic payments, etc. Such services require to enhancing financial, business, and digital literacy by leveraging technology.

Empirical work dedicated to financial inclusion differentials is rather scarce in Tunisia.

G20 GPFI (2020) points out that financial inclusion strategies and policies fail to consider women's perspectives and needs, and this is due in the first place to a lack of gender-disaggregated data necessary to inform policy. According to SME Finance Forum (2020), little if any data is available at country level on financing for female entrepreneurs, young entrepreneurs or other key actors targeted for promoting financial inclusion. Data collected by international financial institutions and specialised development banks supporting the private sector remain uncoordinated, inconsistent and usually incompatible with national SME definitions and reporting requirements to financial sector regulators. Harmonised robust data collection is an important issue.

4.2.2. Fostering the role of the microfinance industry

Microfinance institutions (MFIs), non-banking financial institution (NBFI), are major stakeholders providing loans to female entrepreneurs and micro and small businesses and promoting positive discrimination towards female entrepreneurs. There is a rising number of borrowers from MFIs, alongside that of loan accounts with MFIs and branches over 2017-2020 (See Table A2 and Table A5 in the Appendix). Ayadi et al (2021) report 423,834 customers, below half the figure (one million) of financially excluded poor people.

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Barguelli & Bettayeb (2020) focussing upon the Enda Tamweel MFI over the period 1995-2017, conclude that its social performance contributes to economic development, whereas its financial performance drives its sustainable growth.

The main MFI, Enda Tamweel, serves 370,000 micro-entrepreneurs, almost 65% of which are women and its market share amounts to 72% of outstanding loans as of 2021. Often the only source of finance available to micro-entrepreneurs, loans range from US$200 to $6,500, with an average overall loan size of US$565 (TND 1,569 in 2021), funding short-term working capital (Fitch Ratings 2021).

In addition, crowdfunding is a rising source that includes loans and donations, wherein MFIs act as brokers for loans. The Lebanese Zoomaal is one of the leading crowdfunding platforms that operate in the MENA region (Adair 2022). French platforms operating in Tunisia, such as Afrikwity (loans) and CoFundy (donations) are worth mentioning.

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Appendix

Table A1. Financial Inclusion: Key Data

Series, percentage	2014	2017	2021
Account in any financial institution or mobile money service (population aged 15+)	27.43	36.91	36.85
Account in any financial institution or mobile money service, female (aged 15+)	*20.7*	*28.36*	*28.75*
Account in any financial institution or mobile money service, male (aged 15+)	34.25	45.73	45.14
Borrowed from a formal financial institution (population aged 15+)	12	11.73	9.89
Borrowed from a formal financial institution, female (aged 15+)	*8.71*	*7.45*	*9.22*
Borrowed from a formal financial institution, male (aged 15+)	15.34	16.16	10.57
Borrowed from family or friends (population aged 15+)	16.12	31.74	41.04
Borrowed from family or friends, female (% aged 15+)	*14.41*	*26.09*	*38.61*
Borrowed from family or friends, male (% aged 15+)	17.86	37.58	43.53
Borrowed to start, operate, or expand a business (population aged 15+)	4.6	6.21	..
Borrowed to start, operate, or expand a (farm or) business, female (aged 15+)	*3.3*	*3.06*	*..*
Borrowed to start, operate, or expand a (farm or) business, male (aged 15+)	5.92	9.46	..
Experience or continue to experience severe financial hardship as a result of the disruption caused by COVID-19: very worried, female (aged 15+)	*..*	*..*	*32.67*
Experience or continue to experience severe financial hardship as a result of the disruption caused by COVID-19: very worried, male (% age 15+)			35.62
Financial institution account, female (aged 15+)	*20.52*	*28.19*	*28.54*
Financial institution account, male (aged 15+)	34.09	45.73	43.04
Mobile money account. female (% age 15+)	*0.38*	*2.39*	*2.02*
Mobile money account, male (% age 15+)	0.86	1.67	5.44
Has an inactive account, female (aged 15+)	*3.48*	*2.06*	*3.92*
Has an inactive account, male (aged 15+)	4.55	1.65	3.54
Made or received a digital payment (population aged 15+)	17.4	29.41	27.69
Made or received a digital payment, female (aged 15+)	*13.54*	*21.31*	*21.04*
Made or received a digital payment, male (% age 15+)	21.32	37.78	34.5

Source: Global Findex Database (2021), Tunisia

Table A2. Financial Access Survey –FAS Country Survey Data: Tunisia

	2014	2017	2020
Number of borrowers from all microfinance institutions per 1,000 adults		40,27	49,98
Number of borrowers from commercial banks per 1,000 adults	213,57	234,18	245,98
Number of SME borrowers from commercial banks (% of non-financial corporation borrowers)	12,37	17,82	17,36
Number of all microfinance institution branches per 100,000 adults	1,02	1,51	2,13
Number of commercial bank branches per 100,000 adults	19,24	21,70	22,32
Number of loan accounts with all microfinance institutions per 1,000 adults	30,19	43,23	51,85
Outstanding deposits with commercial banks (% of GDP)	58,46	61,50	68,79
Outstanding loans from commercial banks to household sector (% of GDP)	20,57	22,27	21,29
Outstanding small and medium enterprise (SME) loans from commercial banks (% of GDP)	21,61	21,86	19,68

Source: IMF https://data.imf.org/regular.aspx?key=61063966

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Table A3. Dictionary of variables: WBES and ERF samples

	Name	Type	Definition	Units	Source 1	Source 2
Characteristics of the owner or manager	*Gender ownership*	Discrete	*Female = 1* *Male = 2*	Binary (1, 2)	WBES *Calculated*	ERF
	Gender manager	Discrete	*Female = 1* *Male = 2*	Binary (1, 2)	WBES	
	Education level	Discrete	*Primary school = 1* *Secondary school=2* *Tertiary (University)=3*	Ordinal (1, 2, 3)		ERF *Calculated*
Characteristics of the firm	*Industry*	Discrete	*Manufacturing = 1* *Retail and services = 2*	Binary (1, 2)	WBES *Calculated*	ERF *Calculated*
	Size	Discrete	Full-time permanent staff *Micro: 1-9 employees = 1* *Small:10-49employees= 2* *Medium: 50-99 employees = 3* *Large: 100 + employees = 4*	Ordinal (1, 2, 3 and 4)	*WBES Calculated*	ERF *Calculated*
	Age	Discrete	Number of years *Start-up + young <8 years = 1* *Mature >=8 years = 2*	Binary (1, 2)	WBES *Calculated*	
	Ownership	Discrete	*Sole proprietorship = 1* *Partnership = 2* *Shareholding = 3*	Ordinal (1, 2, 3)	WBES *Calculated*	
	Financial inclusion	Discrete	*Excluded* (no bank account) = 0 *Included* (bank account) = 1	Dummy (0,1)	WBES	ERF *Calculated*
	Local of residence	Discrete	*Rural= 1* *Urban = 2*	Binary (1, 2)		ERF
Funding of the firm	*Personal loans*	Discrete	*No personal loans =0* *Personal loans funding business activities =1*	Dummy (0, 1)	WBES	ERF *Calculated*
	Self-selection before COVID-19	Discrete	*Need and no loan demand before COVID-19=0* *Need and loan demand before COVID-19=1*	Dummy (0, 1)	WBES *Calculated*	ERF *Calculated*
	Self-selection during COVID-19	Discrete	*Need and no demand for support during COVID-19=0* *Need and demand for support during COVID-19=1*	Dummy (0, 1)	WBES *Calculated*	ERF *Calculated*
	Discrimination during COVID-19	Discrete	*Rejected =0* *Granted =1*	Dummy (0, 1)	WBES *Calculated*	ERF *Calculated*
Activity of the firm	*Sales Turnover*	Continuous	*Ln(Sales turnover)* as of 2019	Currency unit	WBES *Calculated*	ERF *Calculated*
	Revenue change (compared to 2019)	Discrete	*Decrease=1* *Increase=2* *Constant=3*	Ordinal (1, 2, 3)		ERF *Calculated*
	Current status	Discrete	*Temporarily closed=1* *Permanently closed =2* *Open=3*	Ordinal (1, 2, 3)		ERF *Calculated*
	Business model adjustment	Discrete	*No=0* *Yes=1*	Dummy (0, 1)		ERF *Calculated*

Source: Authors from World Bank Enterprises Survey (WBES 2020) and OADMI (ERF 2021)

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Table A4. Descriptive statistics according to gender: WBES and ERF samples

		Gender ownership (WBES)±					Gender ownership (ERF)±±				
		Female	%	Male	%	Total	Female	%	Male	%	Total
Industry	*Manufacturing.*	132	38.37	212	61.63	344	27	17.76	125	82.24	152
	Retail & services	80	32.92	163	67.08	243	72	22.78	244	77.22	316
	Total	212	36.12	375	63.88	587	99	21.15	369	78.85	468
Size	*Micro*	32	27.12	86	72.88	118	96	20.78	366	79.22	462
	Small	85	35.42	155	64.58	240	2	8.00	23	92.00	25
	Medium-sized	37	35.92	66	64.08	103	0	0.00	2	100.00	2
	Large	58	46.03	68	53.97	126	2	100.00	0	0.00	2
	Total	212	36.12	375	63.88	587	100	20.37	391	79.63	491
	Excluded	3	30.00	7	70.00	10	36	22.36	125	77.64	161
Financial inclusion	*Included*	208	36.30	365	63.70	573	65	19.70	265	80.30	330
	Total	211	36.19	372	63.81	583	101	20.57	390	79.43	491
Loan demand (before COVID-19)	*No Demand*	146	34.76	274	65.24	420	62	18.02	282	81.97	344
	Demand	59	42.14	81	57.86	140	21	25.30	62	74.97	83
	Total	205	36.61	355	63.39	560	83	19.43	344	80.56	427
Loan application* (before COVID-19)	Rejected	7	43.75	9	56.25	16					
	Granted	51	41.46	72	58.54	123					
	Total	58	41.72	81	58.27	139					
Personal loan	*No personal loan*	160	36.45	279	63.55	439	49	19.44	203	80.56	252
	Personal loan	36	43.37	47	56.63	83	51	21.34	188	78.66	239
	Total	196	37.55	326	62.45	522	100	20.37	391	79.63	491
Self-selection (before COVID-19)	*No*	59	42.14	81	57.86	140	21	25.30	62	74.69	83
	Yes	82	35.65	148	64.35	230**	62	18.02	282	81.97	344
	Total	141	38.11	229	61.89	370	83	19.43	344	80.56	427
Revenue change***	*Decrease*						82	19.95	329	80.05	411
	Increase						7	24.14	22	75.86	29
	Constant						10	20.00	40	80.00	50
	Total						99	20.20	391	79.80	490
Current Status***	*Temporarily closed*						27	25.47	79	74.53	106
	Permanently closed						10	38.46	16	61.54	26
	Open						62	17.82	286	82.18	348
	Total						99	20.63	381	79.38	480
Business model adjustement***	*No*						30	18.29	134	81.71	164
	Yes						69	21.17	257	78.83	326
	Total						99	20.20	391	79.80	490
Total		212	36.12	375	63.88	587	100	20.37	391	79.63	491

Note: ± N= 587. ±± N = 491. **The outcome of loan application before COVID-19 is available only for the WBES sample and n.a=1. ** For WBES, n.a = 190 missing observations. Among 420 companies not applying for a loan, information is available only for 230 self-selecting companies. ***Data are available only for the ERF sample and during the pandemic.*
Source: WBES (2020) and ERF (OAMDI 2021b)

Table A5. Characteristics of the Tunisian *Enda Tamweel* MFI

Year	NAB±	Average loan balance	Rural borrowers (%)	Female borrowers (%) ±±	Outstanding loans: Number of customers (%)			Lending rate ±±±	PAR> 30 (%) ±±±±	Risk Coverage
					MSMEs	Micro	SMEs			
2017	312,973	TND 2,091	40.90	201,404 (64.35)	266,646	266,646 (100.00)	0	26.16	0.77	176.28
2018	346,104	TND 2,339	45.16	215,099 (62.14)	290,078	290,078 (100.00)	0	26.42	0.97	53.17
2021	426,000	TND 3,184	44.00	243,000 (57.04)	344,390 (interim)	344,390 (100.00)	0	27.7	2.93	176

Note: ± Number of active borrowers. ±± 44% are rural and 29% are farming borrowers. ±±± proxied by Yield on gross portfolio (nominal). ±±±± Portfolio At Risk>30 days.
Source: Micro Exchange Market (MIX, 2019), and Enda Tamweel (2022).