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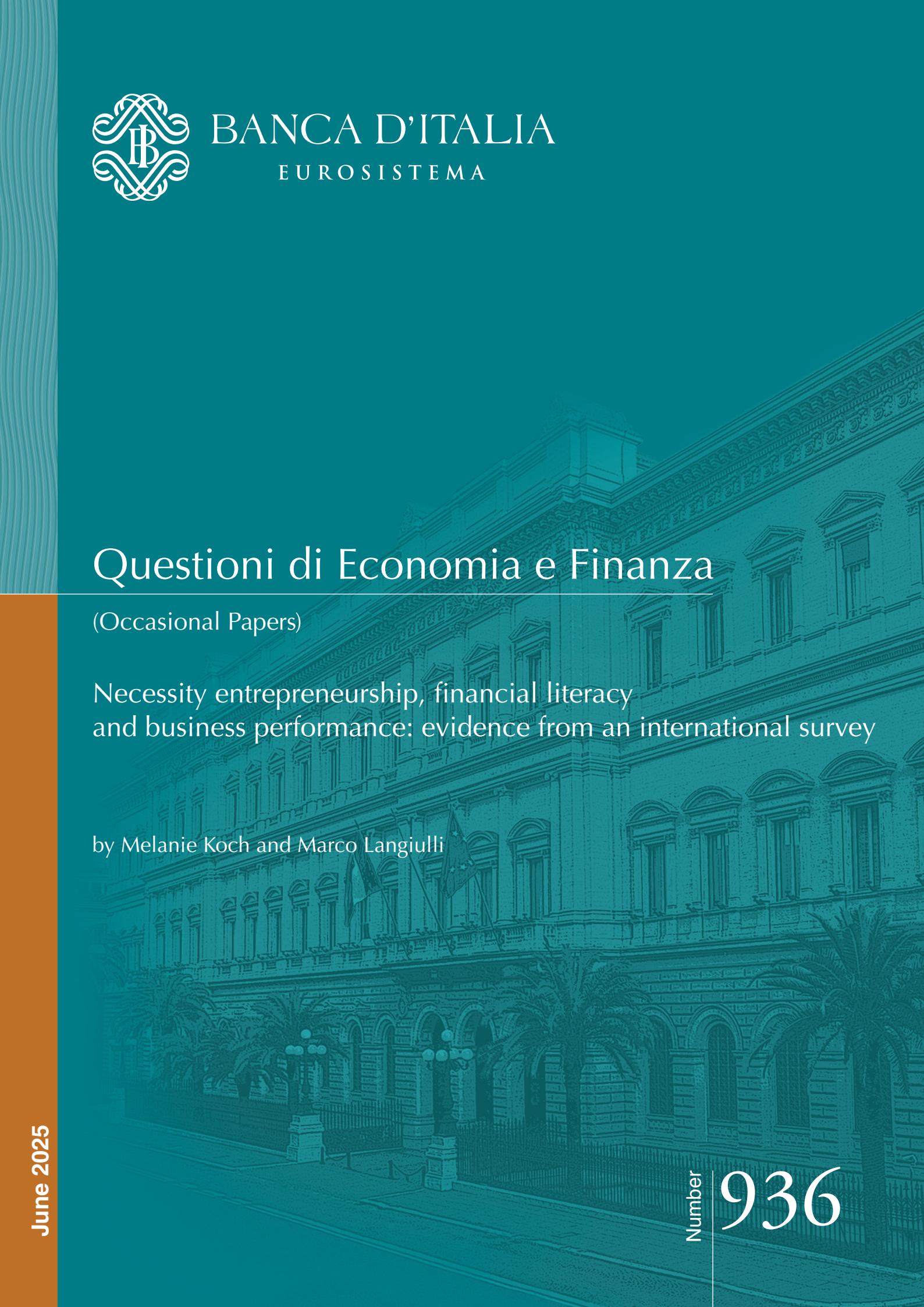
by Melanie Koch and Marco Langiulli



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NECESSITY ENTREPRENEURSHIP, FINANCIAL LITERACY AND BUSINESS PERFORMANCE: EVIDENCE FROM AN INTERNATIONAL SURVEY

by Melanie Koch* and Marco Langiulli**

Abstract

While opportunity entrepreneurs open a business because they see an opportunity, necessity entrepreneurs struggle to find another way to earn (enough) money. Using novel survey data from four different countries, we explore the differences in financial literacy and business performance between necessity and opportunity entrepreneurs. The survey allows us to construct a broad measure of financial literacy relating to the business realm. We find that necessity entrepreneurs have a significantly lower level of financial literacy in all countries. Decomposition techniques show that these differences can hardly be explained by differences in age, gender or education. Necessity businesses also weathered the COVID-19 pandemic worse than opportunity businesses did. In most countries, the financial literacy gap is related to this difference in business performance.

JEL Classification: G53, D22, L26, M21.

Keywords: financial literacy, financial education, entrepreneurship, micro entrepreneurs.

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1 Introduction[1]

There are different reasons why people become self-employed and several studies conclude that it is useful to distinguish between two groups of entrepreneurs. The first group has typical motives: they have a business idea that they want to pursue, or they want to work independently under their own conditions. These persons are commonly referred to as opportunity entrepreneurs. The latter, less studied group, consists of so-called necessity entrepreneurs. These are people who open a business because they perceive their job market perspectives as grim. They believe that they would not find any other kind of employment or would not earn enough money otherwise.[2]

The distinction is meaningful because the two groups differ in more than just their motives for becoming business owners. Relative to opportunity entrepreneurs, the literature has shown that necessity entrepreneurs, on average, have a lower level of education and are more risk averse (e.g., Caliendo et al., 2009; Fossen and Büttner, 2013). On top of that, necessity entrepreneurs' returns to education are lower and their businesses perform worse (e.g., Calderon et al., 2017; Fairlie and Fossen, 2020). The same seems to be true for returns to risk tolerance: thus, even if necessity entrepreneurs have the same level of education or risk tolerance, they do worse than opportunity entrepreneurs. What if this performance gap is caused by differences in a more specific form of education and skills?

So far, there is no evidence whether the two kinds of entrepreneurs differ in terms of financial literacy and, eventually, if differences in financial literacy contribute to differences in business performance. We help fill this gap, using novel, representative data on the financial literacy of micro enterprise (ME) owners in Italy, Brazil, Mexico and the Netherlands. Analysing four countries with very different labour markets and institutions, helps us separate potential country-specific relationships from more general patterns.

In line with the literature, we expect financial literacy to play an important role in explaining business outcomes. Specifically, using the same data from Italy, D'Ignazio et al. (2022) show that financial literacy is associated with an overall lower negative impact of the COVID-19 pandemic on the performance of entrepreneurs' firms. We aim to contribute to this topic by exploring the differences in business performance between

[1] We thank Massimiliano Affinito, Efthymia Antonoudi, Laura Bartiloro, Elisabeth Beckmann, Alessio D'Ignazio, Ginette Eramo, Silvia Fabiani, Sandra Mauser, Lukas Menkhoff, Paolo Finaldi Russo, Massimiliano Stacchini, and seminar participants in Rome and Vienna for very helpful comments. The paper also benefited from discussions with conference participants at the World Finance Conference 2024 and NOeG 2024. We are grateful to Chiara Monticone, María Teresa Borja Chico and Dörthe Kunkel for providing the data on Brazil, the Netherlands and Mexico.
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[2] For recent studies on the difference between necessity and opportunity entrepreneurs, see, for example, the overview given by Fairlie and Fossen (2020).

necessity and opportunity entrepreneurs during the pandemic and how financial literacy might shape these differences.

The data we use come from an international project coordinated by the OECD's International Network on Financial Education (INFE) in 14 countries in 2021 – amid the COVID-19 pandemic (see OECD, 2022). The project interviewed MSME (medium, small and micro-sized enterprise) owners about their financial literacy skills. INFE provides a battery of questions to measure three components of financial literacy: financial knowledge, financial attitude and financial behaviour. The questions normally used for adult populations were adapted to the business realm for the sample of entrepreneurs. Importantly, the survey also includes questions to define necessity and opportunity entrepreneurship. However, not all countries included these questions on entrepreneurial motive and therefore, we restrict the sample to the four countries previously mentioned.

Using stratification by region, sector and/or firm size, between 1,000-2,000 persons who own micro- or small-sized businesses were interviewed in each of the four countries. We will use the term micro businesses as Italy only interviewed micro entrepreneurs and in the other countries we look at, more than 90% of interviewed businesses are micro enterprises. The survey data from Italy are richer than from the other three countries and we have access to more administrative data. Therefore, we can run additional analyses on Italy serving as robustness tests.

In our analysis, we first look at how the two kinds of entrepreneurs differ in terms of socio-demographics, their financial literacy and its major component financial knowledge. Moreover, using Oaxaca-Blinder decomposition, we assess how much of the difference in financial literacy can be explained by socio-demographics.

Indeed, for all four countries, necessity entrepreneurs exhibit a lower level of financial knowledge and financial literacy. We also confirm previous studies finding that, on average, necessity entrepreneurs have a lower level of general education, except in the Netherlands, where the share of necessity entrepreneurs is the lowest. Still, the socio-demographic characteristics explain only about 6% of the gap in the Netherlands and up to 38% in Mexico. This highlights that financial literacy is a skill that goes beyond general education and makes it worth further exploring how the financial literacy gap impacts business performance. The results are very robust to defining necessity and opportunity entrepreneurs in a variety of ways.

We also show that necessity entrepreneurs are not randomly distributed but tend to be more prevalent in certain sectors. Given the highly heterogeneous impact of the COVID-19 crisis across industries, it is thus important to control for the sector of economic activity when assessing the business performance of necessity and opportunity entrepreneurs.

In bivariate comparisons for business performance, we see that necessity entrepreneurs

indeed more often report that the pandemic had a negative impact on their business and that the impact was felt differently by sector. A multivariate analysis then reveals that in three of the four countries, financial literacy is strongly positively correlated with business performance. This is not true for the other socio-demographic variables, which mostly do not show a strong association with overall performance. Importantly, when we control for financial literacy, the relationship between necessity entrepreneurs and business performance becomes smaller and for many performance indicators insignificant. Therefore, financial literacy could be an underlying factor, explaining at least partially why necessity entrepreneurs weathered the COVID-19 pandemic worse than opportunity entrepreneurs. The "mediating" effect of financial literacy is strong in Brazil and Italy. In Mexico, where necessity entrepreneurs did not always performed worse after controlling for the sector, the link is weaker, but still present. Only for the Netherlands, we do not find an association with financial literacy at all but instead a stronger relation with general education.

Overall, this means that the lower financial literacy of necessity entrepreneurs is a consistent finding across all four countries. Moreover, financial literacy seems to act as a mediating factor in experiencing a less severe impact of the pandemic in three out of four countries.

Our work builds on the studies by D'Ignazio et al. (2022) and Finaldi Russo et al. (2022). For Italy, D'Ignazio et al. (2022) describe the financial and digital literacy skills of micro entrepreneurs in general and how these skills have helped them enduring the pandemic. They use the same Italian data as we and we refer to their work for those interested in characteristics of the overall ME-population. Finaldi Russo et al. (2022) also describe the financial literacy of micro entrepreneurs but use a data set on the general population of Italy. They benchmark the level of entrepreneurs' financial literacy to the level of the general population in Italy and to other country samples. They conclude that micro entrepreneurs have a slightly higher level of financial literacy than the rest of the population.[3] Our study indicates that not all micro entrepreneurs are alike in terms of financial literacy.

In general, our paper is related to studies looking at differences between necessity and opportunity entrepreneurs. Caliendo et al. (2009) find that while German opportunity entrepreneurs are more risk seeking than non-entrepreneurs, the same is not true for necessity entrepreneurs, who are actually more risk averse than the other two groups.

[3] Similarly, Oggero et al. (2020) investigate the financial literacy gap between entrepreneurs in general and the non-entrepreneurial population in Italy and find a positive correlation between financial literacy and entrepreneurship but only for men. Outside Italy, except several OECD reports, Alperovych et al. (2023), Dahmen and Rodríguez (2014) and Struckell et al. (2022) are among the very few describing the financial literacy of entrepreneurs in high income countries.

Brock and Koch (2021) find that necessity entrepreneurs in Albania and Kosovo behave differently in uncertain situations and react differently to uninformative signals regarding the resolution of uncertainty. Block and Koellinger (2009) and Kautonen and Palmroos (2010) conclude for Germany and Finland respectively that necessity entrepreneurs are less satisfied with their businesses than opportunity entrepreneurs. The latter study additionally finds that income works as a moderator and that sufficient earnings can lift up the satisfaction of necessity entrepreneurs significantly. Audretsch et al. (2022) use data from 52 countries to show that necessity and opportunity entrepreneurs also respond differently to tax policy and public sector corruption. We add to this literature that the two kinds of entrepreneurs also differ in terms of financial literacy.

Moving to business outcomes, Block and Sandner (2009) find that German necessity businesses are less likely to survive than opportunity business and that this might be related to self-selection into different sectors. In accordance with these findings, our data also reveal a higher prevalence of necessity entrepreneurs in certain sectors, which vary across countries. Fossen and Büttner (2013) show for Germany again that necessity not only have a lower level of education than opportunity entrepreneurs but that their returns to education are also lower. Relatedly, Calderon et al. (2017) conclude that a difference in profitability between female, Mexican necessity and opportunity entrepreneurs cannot be solely explained by differences in education and better business practices. They include a broad set of controls and measures for cognitive individual skills in their model but they do not explicitly include financial literacy. However, their measure of business practices includes concepts like marketing, stock and record keeping, and financial planning; some of these concepts clearly capture financial behaviour but are at best an incomplete measure of financial literacy. Our results suggest that overall financial literacy is another puzzle piece to explain differences in business outcomes.

This is in itself not very surprising. Several studies conclude that financial literacy affects business outcomes, with much of the evidence coming from low and middle income countries (for a recent meta-study, see McKenzie, 2021). For example, Bruhn and Zia (2013) find that a financial education intervention among others increases profits (at least for female business owners) and the likelihood of separate book-keeping and investments in Bosnia and Herzegovina. In a seminal work, Drexler et al. (2014) show that a rule-of-thumb training can improve business reporting, practices and revenues of micro entrepreneurs in the Dominican Republic.

Low financial literacy can be detrimental for many areas of life, including the prospects of the smallest businesses. Such businesses, in which necessity entrepreneurship is common, are a crucial part of most economies. In the four countries we consider, micro businesses employ between 15% and 50% of the labour force. It seems of upmost im-

portance to ensure that micro entrepreneurs have a sufficient level of financial education such that their own business and with this the whole economy can thrive. Our study shows that necessity lack behind opportunity entrepreneurs in terms of financial literacy. We find some evidence that it might be one of the reasons why they also lack behind in business success. Creating financial education initiatives that target those who did not want to become entrepreneurs in the first place could foster fruitful entrepreneurship or, alternatively, increase their employment prospects again (see Quatraro and Vivarelli, 2015).

The paper proceeds as follows: in section 2, we describe the survey and data used, explain how we measure financial literacy and necessity entrepreneurship, and present some descriptive statistics. Section 3 presents the empirical approach and the results on differences in financial literacy between necessity and opportunity entrepreneurs. Analogously, section 4 outlines the empirical approach and the results on differences in business performance during the pandemic between the two kinds of entrepreneurs. Section 5 concludes.

2 Data and descriptives

2.1 The survey

We use a survey designed by OECD's International Network on Financial Education (INFE) together with authorities of several countries to explore the financial and digital literacy of MSME owners. The survey follows INFE's standard approach to measure financial literacy in a holistic way. Thus, three distinct components of financial literacy are elicited: financial knowledge, financial behaviour and financial attitude. Besides literacy skills, the survey focused on how businesses weathered the COVID-19 pandemic, on digitization and access to credit, and further asked about general characteristics of the business and the business owner.

Overall, the survey was conducted in 14 different countries in 2021 (see OECD, 2022, for the overall report). However, in some countries not all questions were asked and for some countries, data are not available. Therefore, only for four countries, it is possible for us to classify entrepreneurs in necessity and opportunity entrepreneurs: Brazil, Italy, Mexico and the Netherlands. The countries constitute an interesting sample, as they, for example, differ in the prevalence of necessity entrepreneurship (see figure 1 in subsection 2.2) and how strongly they were economically affected by the pandemic in 2020. There are some differences across these countries in terms of data availability.

Italy The Italian survey was conducted by Banca d'Italia. In total, about 2,000 micro business owners, who all reported to be responsible for financial decisions of their

firm, were interviewed face-to-face. Micro businesses are defined as businesses with ten or less full-time-equivalent employees. Financial firms, non-profit organizations and branches without own CEO's were deliberately excluded. The sample is stratified by region crossed with the main sector of the business for the whole universe of Italian micro enterprises (see D'Ignazio et al., 2022). Additionally, weights on firm level are provided that account for sample design and unit non-response with respect to regional and sectoral spread. Thus, the Italian sample is meant to be representative for micro businesses in terms of regional distribution and the two-digit NACE sector their main activity can be classified.[4]

Italy is the only country in which all questions provided by INFE were asked and for which we have the exact information in which region the business is located. Moreover, we have more information on the sampling of respondents and additional information on the whole universe of micro businesses. Therefore, we can sometimes run more analyses and tests for Italy than for the other countries.

Brazil In Brazil, the survey was conducted by the Securities and Exchange Commission. Around 1,000 micro and small-sized (up to 50 employees) business owners participated in the telephone survey (CATI). 89% of the respondents own a business with ten or less employees. The random sample was stratified by region and size of the business and is weighted according to region and size. The two main questions to define necessity entrepreneurs were asked, however, not all variables for the robustness checks were elicited. Due to confidentiality, we do not know the exact region a business is located. However, we have placebo ID's for the regions and therefore can at least use regional dummies.

Mexico Banco de México was in charge of collecting the Mexican data. Also there, 1,000 micro and small-sized business owners were interviewed via telephone. In total, more than 92% of these are micro entrepreneurs. Non-profit organizations were excluded and stratification was done across region, size and the main sector (industry, commercial or services). Design weights adjust for the strata. Information on the location of the business is missing completely and no regional dummies can be created.

The Netherlands In the Netherlands, data were collected by the national ministry of finance using an online survey. More than 95% of the 1,151 respondents are micro, the remaining are small business entrepreneurs. Unfortunately, only one question that we use to define necessity entrepreneurship is asked and the control variable whether the parents own a business and some robustness variables are missing. We include the Netherlands nevertheless, as they serve as an interesting benchmark and we can still construct a valid measure for necessity entrepreneurship. The survey was stratified by business size and two-digit NACE sector and weights were created accordingly. As in Mexico, information

[4] Considering that the sample is stratified by region crossed with sector, all estimations are very similar if we do not use these weights. The same holds true for all other countries.

on the location of the business is not available.

In general, for every country, the sample is meant to be representative for the whole universe of businesses considered (i.e. micro and/or small businesses within region or sector).[5]

2.2 Defining necessity and opportunity entrepreneurs

A crucial issue is how necessity and opportunity entrepreneurs can be defined with the data at hand. The survey offers several possibilities: it allows to construct binary and continuous classifications. Since simple, binary categorizations are common in the literature (e.g., Fossen and Büttner, 2013; Calderon et al., 2017), we use such a classification as well.[6] For the main part of our study, we define necessity entrepreneurs with the help of the following questions:

> *Still thinking about your business... would you agree or disagree with the following statements? Please use a scale of 1 to 4, where 1 tells me that you strongly disagree that the statement describes you, and 4 shows that you strongly agree*
>
> *QK2_10: I have a business because I could not find a job as an employee*
> *QK2_13: Starting a business was my only option to earn some income*

We construct a dummy variable that takes the value 1 for those who at least agreed (options 3 and 4 on the scale) to one of these statements and zero if they disagreed or said "don't know" for both statements. This means it suffices to agree to only one of the questions to be classified as necessity entrepreneur. The correlation between the two questions is moderate, ranging between 0.46-0.52 (Pearson correlation) in the three countries. As previously mentioned, in the Netherlands, only one question, *QK2_10*, was asked and thus, every Dutch entrepreneur who at least agreed to that one statement is defined as necessity entrepreneur. For all countries, respondents that gave no answer at all are excluded (these are 12% in IT, 0.2% in BR, none in MX[7] and 1.9% in NL). Thus, we classify anyone as necessity entrepreneur who is sure that lack of other opportunities played a role in becoming an entrepreneur. Given the binary nature, automatically everyone who gave a valid answer and is not a necessity entrepreneur is an opportunity entrepreneur.

[5] However, this does not necessarily mean that the sample is representative for the business owners themselves. In none of the countries, data on individual characteristics of the universe of micro entrepreneurs is available.

[6] However, as robustness check, we look at other definitions of necessity entrepreneurs.

[7] To refuse was a valid answer option also in Mexico and was used in other questions. Thus, we do not have reason to believe that respondents were pressured not to refuse.

Using the classification as described, we see that around 23% in Italy, 27% in Brazil, 53% in Mexico and 14% in the Netherlands are entrepreneurs out of necessity (see figure 1). One valid concern is that the share is the lowest in the Netherlands because we use only one question – whether there were no other job opportunities – for this country. However, the shares seem to be in line with the ones found in other studies for the same[8] or similar countries, and in line with the claim that necessity entrepreneurship is more common the weaker the labour market and the lower the income level is.[9] In all the different data and cross-country comparisons we find for necessity entrepreneurship, the share is always the lowest in the Netherlands out of the four countries.[10]

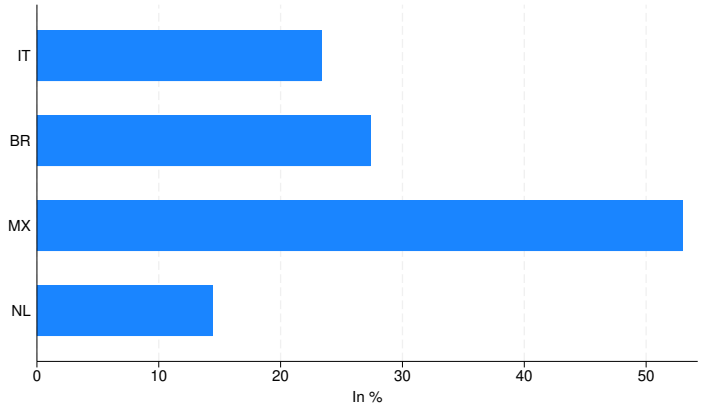


Figure 1: Weighted shares of necessity entrepreneurs

2.3 Measuring financial literacy

We look at financial literacy in two ways. We always start with using only one of the modules that measure financial literacy: financial knowledge, which is broadly based on the measure established by Lusardi and Mitchell (2008). Financial knowledge is the core competency of financial literacy and probably the one that can be most easily addressed

[8] For example, De Vries et al. (2020) estimate the share in the Netherlands to be between 6-26%, depending on the classification used.

[9] Although the share for Mexico seems to be high, it is still much lower than the share identified by Calderon et al. (2017) for female Mexican entrepreneurs in urban centres in 2014. Back then, they found that 79% of these women were necessity entrepreneurs.

[10] An alternative approach would be to use only question QK2_10 for the three other countries as well. However, we believe that this would underestimate the share of necessity entrepreneurs tremendously, especially in Brazil and Mexico. Both countries are characterized by very high shares of informal employment and thus, not finding "any kind" of job is not the main motive to become a necessity entrepreneur. Instead, the crucial point in these countries is that many jobs do not provide enough income. This is also confirmed by our data, in which not earning enough money is much more often chosen in Brazil and Mexico than not finding another job. This might be different in the Netherlands, where the social security net is stronger. Moreover, necessity entrepreneurship is usually defined as either not finding another form of employment or not earning enough money. Therefore, we prefer to use both questions, where possible.

by policy measures. The knowledge questions have a clear correct answer, making them less prone to value judgment than the other two modules. The financial knowledge module consists of five questions. As recommended by INFE, for each individual, we count all correct responses and add them up to assign them a score between zero and five. Like wrong answers, refusing to answer counts as incorrect.

We then include the other two modules as well and create an overall measure of financial literacy in the way suggested by INFE. Here again, "correct" answers are simply added up to create an overall score of financial literacy. In total, the financial literacy score consist of five questions on financial knowledge, nine on financial behaviour and three on financial attitudes. The questions are all listed in appendix table A16.[11]

2.4 Descriptives

In table 1, we depict the summary statistics for our final samples, in which respondents who refused to answer the questions on entrepreneurial motive are excluded. Given the high share of refusals in Italy, table A1 in the appendix shows how the (unweighted) country sample of respondents with valid response differs from those of the refusals.[12]

In Italy and Brazil, around three quarters of the interviewed business owners are male, in Mexico and the Netherlands this share is around two thirds. The average age is around 50, where the average entrepreneur in the Netherlands is substantially older than in the other countries. Average education is the highest in Brazil, however comparability across countries might be limited. While more than 40% have received some kind of education in finance in Italy, Brazil and Mexico, the share is below 30% in the Netherlands. Around every second Italian and Mexican respondent has parents who own or owned a business, in Brazil it is still about 42%. For the Netherlands, this share was not elicited.

Since the survey was conducted amid the COVID-19 pandemic in 2021, sample selection might be of special concern. Many studies on entrepreneurs suffer from survivorship bias as usually only entrepreneurs with still existing businesses are analysed. Those whose businesses have failed already are excluded. The pandemic might have exacerbated market exit because of the exceptional negative shock it had on markets around the world. We partially address this concern in appendix subsection A.2. Unfortunately, we only have access to Italian census data and cannot look at the other three countries. We do not find

[11] There is valid critique that simply adding up correct answers might not be appropriate (see Di Salvatore et al., 2018). However, as common in the literature, we follow the method that is proposed by the official documentation on the survey we use, which is adding up the points without weighting.

[12] Those who refused to answer whether necessity was a reason why they became entrepreneurs, received a training in finance significantly less often and less often have parents that are business owners. Additionally, they are more likely to be located in the Southern part of Italy. There are no significant differences in gender, age and general education between the two groups. For the other countries, the number of refusals is too low to make such comparisons.

strong evidence that the pandemic lead to more market exit, if anything it was the other way around in Italy. Also registered insolvencies in 2021 were below pre-pandemic levels (see Banca d'Italia, May 2022).

Table 1: Descriptive statistics

	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Italy						
Male	1753	0.71	1	0.45	0	1
Age (in years)	1753	49.79	50	11.64	21	95
Education level	1753	2.15	2	0.65	1	3
Finance training	1753	0.43	0	0.50	0	1
Parent owns business	1753	0.50	0	0.50	0	1
Brazil						
Male	1009	0.74	1	0.44	0	1
Age (in years)	1009	47.88	47	12.28	18	82
Education level	1009	2.51	3	0.62	1	3
Finance training	1009	0.50	1	0.50	0	1
Parent owns business	1009	0.42	0	0.49	0	1
Mexico						
Male	1000	0.65	1	0.48	0	1
Age (in years)	1000	47.12	47	12.01	18	85
Education level	1000	2.36	3	0.79	1	3
Finance training	1000	0.41	0	0.49	0	1
Parent owns business	1000	0.47	0	0.50	0	1
The Netherlands						
Male	1129	0.66	1	0.47	0	1
Age (in years)	1129	54.35	55	11.91	19	90
Education level	1129	2.45	3	0.71	1	3
Finance training	1129	0.27	0	0.44	0	1

All results are weighted. *Education level* is measured in three levels: 1-low, 2-medium and 3-high; *Finance training* is a dummy that equals 1 if the respondent has received financial education in school or university; *Parent owns business* is a dummy that equals 1 if any of the respondent's parents owns or owned a business. For more details on the variables, see appendix table A16.

2.5 Differences across socio-demographics, regions and sectors

For each country, we look at the unconditional averages of socio-demographic variables for necessity and opportunity entrepreneurs separately in table 2. Especially in Brazil, Italy and Mexico, we find similar patterns: opportunity entrepreneurs are significantly more educated, more likely to have received financial education in the past and more likely to have parents owning a business than necessity entrepreneurs. Moreover, in Brazil and Mexico, opportunity entrepreneurs are younger. The only characteristic not aligned is

gender, because Mexican necessity entrepreneurs have a higher share of women and those in Brazil (like in the Netherlands) a higher share of men. For Italy, both age and gender do not differ between the two groups. The Netherlands, where only a small fraction of entrepreneurs are necessity entrepreneurs, clearly stands out. Neither general education nor financial education are significantly different and the age effect goes in the opposite direction: opportunity entrepreneurs are on average older than necessity entrepreneurs.

Table 2: Differences in socio-demographics by necessity or opportunity

	Opportunity (1)	Necessity (2)	Difference (3)
Italy			
Male	0.71	0.74	−0.04
Age (in years)	49.82	49.69	0.13
Education level	2.18	2.03	0.16***
Finance training	0.45	0.36	0.09***
Parent owns business	0.51	0.45	0.06**
Brazil			
Male	0.72	0.78	−0.06*
Age (in years)	46.66	51.12	−4.46***
Education level	2.57	2.35	0.22***
Finance training	0.53	0.44	0.09**
Parent owns business	0.44	0.35	0.09***
Mexico			
Male	0.68	0.62	0.06*
Age (in years)	46.01	48.11	−2.10***
Education level	2.63	2.11	0.52***
Finance training	0.55	0.28	0.27***
Parent owns business	0.51	0.43	0.08***
The Netherlands			
Male	0.67	0.60	0.07*
Age (in years)	54.64	52.64	2.00**
Education level	2.44	2.54	−0.10
Finance training	0.28	0.23	0.05

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Positive (negative) numbers in column (3) indicate that the value is larger (smaller) for opportunity entrepreneurs than for necessity entrepreneurs. All results are weighted. *Education level* is measured in three levels: 1-low, 2-medium and 3-high; *Finance training* is a dummy that equals 1 if the respondent has received financial education in school or university; *Parent owns business* is a dummy that equals 1 if any of the respondent's parents owns or owned a business.

Using the geographic information that we have for Italy, we find that the prevalence of necessity entrepreneurs clearly differs across the regions. This can be seen in appendix

figure A1. While the weighted share of necessity entrepreneurs is over one third in the South and on the islands, it is below 20% in the Northern and Central parts. This underlines the different job market opportunities across the regions and lends validity to our necessity entrepreneurship measure.

That our measure is valid is further supported when looking at the distribution of necessity entrepreneurs across sectors, which differs within each country and seems to be related to the specific economy of each country (see figure 2). Therefore, it is also not always the same sector across countries with the most necessity entrepreneurs: in Italy, a country with high tourism, necessity is a more common motive in the hospitality services sector than in the others. In Brazil, the transportation and the information/communication sector, which is characterized by young, small and less export-oriented firms, stand out. In Mexico, most necessity entrepreneurs work in the agricultural sector, which is one of the traditional sectors for necessity entrepreneurship in developing countries, while in the Netherlands, with its traditionally strong role in European trade and logistics, the transportation sector attracts necessity entrepreneurs the most. Still, it should be noted that these shares are mostly not significantly different from each other and that the aim of our study is not to explain how necessity entrepreneurs distribute across sectors.

Figure 2: Weighted share of necessity entrepreneurs in each sector

2.6 Unconditional differences in financial literacy

As previously described, we discuss results on an overall financial literacy score but also look more closely at financial knowledge as one important component of financial literacy. Therefore, the left panel of figure 3 shows the average financial knowledge score in each

country, separately for the two kinds of entrepreneurs. In all four countries, necessity entrepreneurs have a lower financial knowledge score. The difference is statistically significant everywhere except in Brazil. Moreover, as can be seen in appendix figure A5, the whole distribution of their score is shifted to the low performance tail compared to the distribution for opportunity entrepreneurs.

The picture stays similar if we consider the average of the overall financial literacy score in the right panel of figure 3 or its distribution in appendix figure A6. If anything, the differences in mean and distribution are even more pronounced and statistically significant in every country. This is because, in fact, also for financial attitude and behaviour, we always find statistically significant differences. Thus, in all countries, there is a financial literacy gap, driven by gaps in basically all components of financial literacy.

Taking the different sector composition into account here is difficult because the choice of sector can be an outcome of financial literacy but at the same time can impact financial literacy. Thus, reverse causality is of special concern. Moreover, sample sizes can be very low, which results in a lack of power. Therefore, we do not include it in the following multivariate regression analysis on the financial literacy gap.[13] It is, however, noteworthy that the financial literacy gap seems to be present in almost every sector in every country. Out of 40 pairings (four countries and ten sectors), necessity entrepreneurs have a lower level of financial literacy in all but one. Moreover, very often the difference is significant, irrespective of the small sample size.

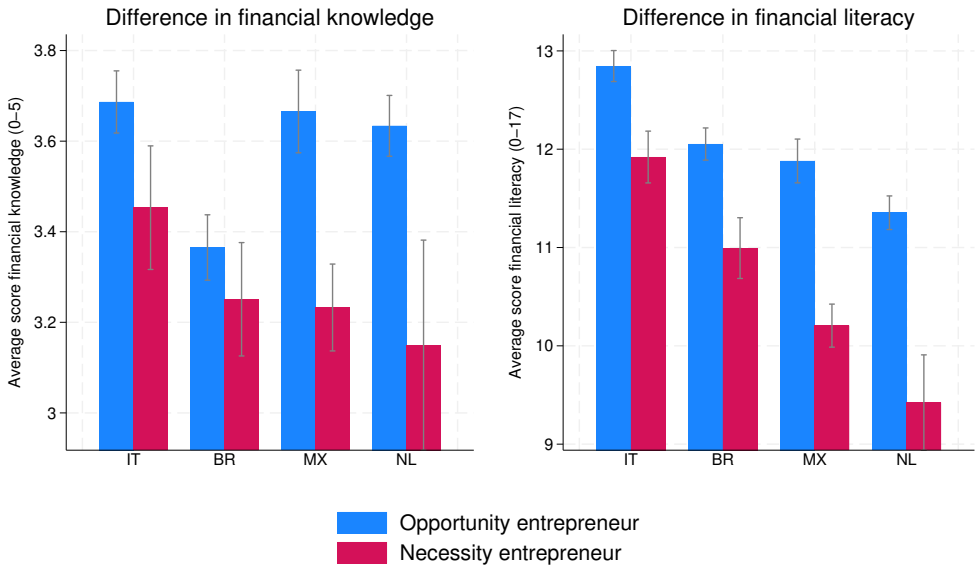


Figure 3: Average difference in financial knowledge and overall literacy

[13] Still, running regressions that simply control for the different sectors, we find that the results remain largely unchanged, both qualitatively and quantitatively.

3 What drives the financial literacy gap?

3.1 Main results

Given that we have seen that the two kinds of entrepreneurs differ in several dimensions in every country, differences in financial literacy might be not surprising as well. Moreover, the level of financial literacy can depend on the region of a country, as in the case of Italy (see Finaldi Russo et al., 2022). To understand if and how much of the difference in financial literacy is explained by differences in socio-demographics, we first estimate multivariate, linear regressions of the following form:

$$Y = \alpha + \beta_0 NEC + \sum_{j=1}^{P} \beta_j X_j + \epsilon \tag{1}$$

where Y is either the overall financial literacy or the financial knowledge score, NEC is the dummy for necessity entrepreneurship, and $\sum_{j=1}^{P} X_j$ are the control variables. Standard errors ϵ are clustered according to sector and region for Italy and Brazil, according to size of the business and sector for the Netherlands, and according to sector for Mexico.

As previously introduced, the control variables are gender, age, educational attainment, whether the respondent has received financial education in school or university, and whether the parents are or were business owners. We include these variables because they are important predictors for financial literacy or necessity entrepreneurship.[14] At the same time, they are not a consequence of being a necessity entrepreneur but predetermined. If possible, we also add dummies for the region the business is located and estimate regressions with and without regional dummies. The region of the business is not necessarily pre-determined and could be a cause of entrepreneurial motive and financial literacy. Still, assuming that most people remain in the region they were born, it can be an important confound in the relationship between necessity entrepreneurship and financial literacy. All variables are explained in appendix table A16 in more detail.

Running these regressions, as shown in appendix tables A2 to A5, we find that the relationship between necessity entrepreneurship and financial literacy is significantly negative in every country. The coefficients remain sizeable and significant even after controlling for general and financial education, which are significantly positively related to financial literacy. Finding that the relationship between financial literacy and necessity

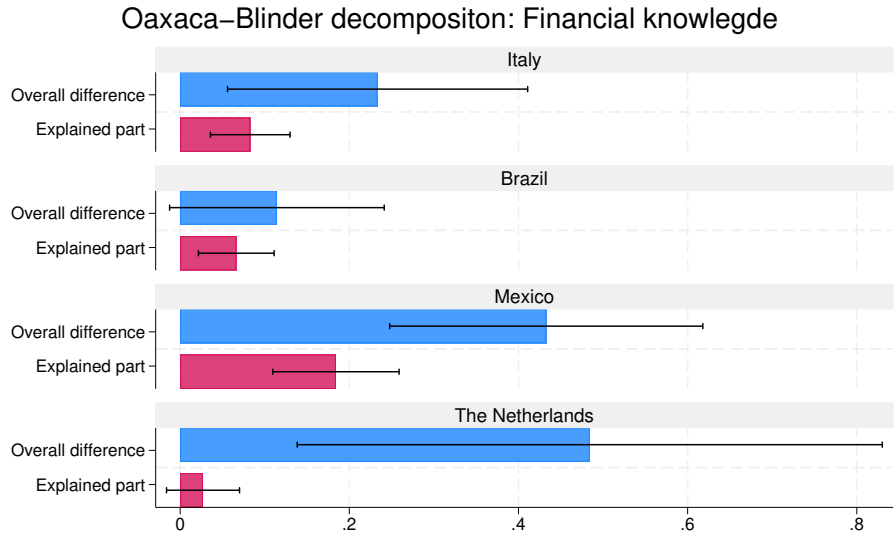
[14] For a recent discussion on the relationship between socio-demographic characteristics and financial literacy see Lusardi and Mitchell (2023). For the relationship between socio-demographics and necessity entrepreneurship see, for example, Stephan et al. (2015) and Van der Zwan et al. (2016). To the best of our knowledge, the relationship between necessity entrepreneurship and having parents who were entrepreneurs themselves is not thoroughly researched yet. However, the intergenerational transmission of entrepreneurship in general is strong (e.g. Giménez-Nadal et al., 2022).

entrepreneurship stays significant after including controls, we take a more thorough look, employing Oaxaca-Blinder decompositions:

$$\overline{Y_o} - \overline{Y_n} = (\alpha_o - \alpha_n) + \sum\sum[(\beta_o - \beta_n)\frac{\overline{X_o} - \overline{X_n}}{2}] + \underbrace{\sum\sum[(\overline{X_o} - \overline{X_n})\frac{\beta_o - \beta_n}{2}]}_{\text{explained part}} \quad (2)$$

The decomposition equations are very similar to those in equation 1, but estimated separately for necessity (index n) and opportunity (index o) entrepreneurs. With the decompositions, it is possible to estimate how much of the variation in financial literacy between necessity and opportunity entrepreneurs is caused by the variation in the control variables for these two groups. We use the twofold decomposition, partitioning regression results in an explained (by control variables) and unexplained difference between necessity and opportunity entrepreneurs.[15] As reference coefficients, which are needed for the decomposition, we use coefficients estimated from the pooled equation 1.

The first impression that socio-demographics do not explain the gap in financial literacy well is confirmed in figures 4 and 5, which show the overall difference in financial knowledge or literacy (the blue bars) and the difference that is explained by the difference in control variables (the red bars). The red bars are substantially smaller than the blue bars: in all countries, socio-demographic characteristics explain less than 50% of the difference in financial knowledge or literacy respectively.

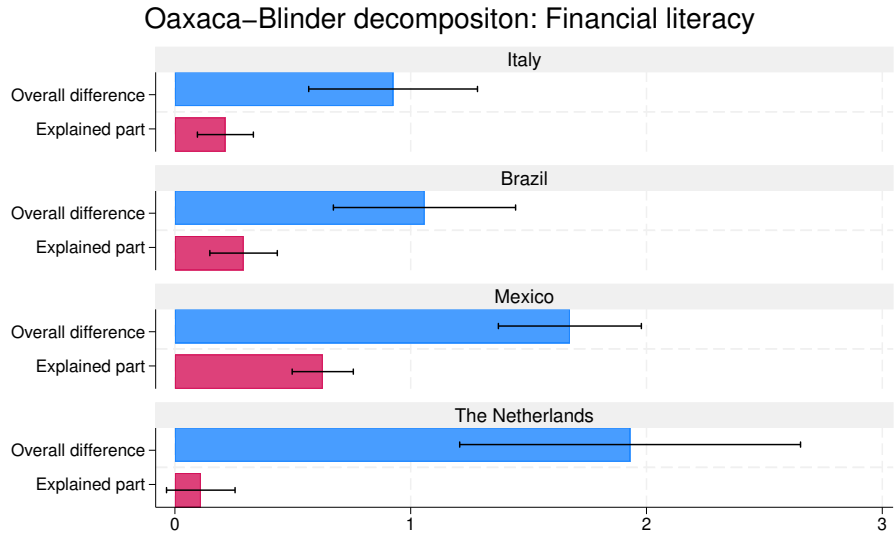


Results from Oaxaca-Blinder decompositions: the upper, blue bar is the total difference of financial knowledge between necessity and opportunity entrepreneurs. The lower, red bar is the difference that can be explained by differences in the control variables between the two kinds of entrepreneurs. Standard errors clustered as specified in section 3. Regressions are weighted with respect to region, size of the business (in MX only) and sector.

Figure 4: Absolute difference in financial knowledge explained by control variables

[15] Estimations are conducted in Stata using the *Oaxaca* command developed by Jann (2008).

The only exception to this is Brazil, where they explain around 64% of the difference in financial knowledge. Moreover, while in Brazil, Italy and Mexico socio-demographic differences at least explain around a third, in the Netherlands, they explain less than 6%. It holds everywhere that the largest bulk of this explained difference is driven by the fact whether entrepreneurs have received education in finance or not. Since there is no significant educational difference in the Netherlands, this is probably the reason why the explanatory power of the control variables is so low. The more striking it is that there is a clear difference in financial literacy also in this country.



Results from Oaxaca-Blinder decompositions: the upper, blue bar is the total difference of financial literacy between necessity and opportunity entrepreneurs. The lower, red bar is the difference that can be explained by differences in the control variables between the two kinds of entrepreneurs. Standard errors clustered as specified in section 3. Regressions are weighted with respect to region, size of the business (in MX only) and sector.

Figure 5: Absolute difference in financial literacy explained by control variables

Summarized, there is a significant financial literacy gap between necessity and opportunity entrepreneurs across all the countries, which can be only insufficiently explained by differences in socio-demographics like gender, age, general and financial education, and whether the parents are business owners. We further show in section 3.2 that this finding is robust to various changes in the specifications like including risk tolerance and self-confidence as further controls. Importantly, it should be kept in mind that we cannot make any causal assessments with these estimations. It is not clear if people have lower financial literacy because they are necessity entrepreneurs or that people become necessity entrepreneurs because they have lower financial literacy. Moreover, there might be an underlying cause to both, but we know that cause is mostly none of the socio-demographic variables tested.

3.2 Robustness for the financial literacy gap

We run additional estimations to see how robust the found gap in financial literacy is to various definitions for necessity and opportunity entrepreneurs, where possible. We use (i) for Italy, another binary measure, in which we define opportunity rather than necessity entrepreneur, (ii) for Italy and Mexico, a continuous measure on necessity entrepreneurship and (iii) for Italy and the Netherlands, include those who refused to answer the questions on necessity entrepreneurship. Moreover, we add (iv) additional control variables which are potentially not pre-determined but might be still important to understand the relationship between necessity entrepreneurship and financial literacy.

(i) Instead of using two questions to classify respondents as being entrepreneurs out of necessity, we use another two questions to classify respondents as being opportunity entrepreneurs. In a mirror image to before, then everyone else is necessity entrepreneur by default except those who refused to answer, who are excluded. The two questions ask respondents again on a Likert-scale if they agree or disagree with the statements that they *like to work for themselves and be their own boss* and that *the business allows them to turn their ideas into practice.* Everyone who at least agreed to one of the statements is defined as opportunity entrepreneur. Unfortunately, these questions were only asked in Italy and Mexico. In Mexico, almost everyone at least agreed to one of the statements, which makes the measure not meaningful there.[16] Thus, we only report results on Italy.

With this approach, we get a very conservative estimate of necessity entrepreneurship because out of 1761 Italian observations (there are less refusals than for the questions used in the main part) not even 8% are now classified as necessity entrepreneurs. The results still hold, as depicted in appendix table A6. Opportunity entrepreneurs have a significantly higher level of financial knowledge and overall literacy, even after controlling for socio-demographic factors and the region. Moreover, socio-demographics explain even a smaller fraction of the difference than in the main specifications.

(ii) After employing two simple, binary measures, we eventually combine the four questions on entrepreneurial motive into an index to have a finer measure. This is possible for Italy and Mexico. Running a polychoric factor analysis over all four questions, we obtain the underlying component of the four variables on which the necessity questions load positive and the opportunity questions negative (the second factor). We use this second factor as continuous measure for necessity entrepreneurship.

[16] We cannot explain why there is not much variation in Mexico. We checked for straight-lining behaviour as most of the questions we used were elicited on Likert-scales within item batteries. We did not find strong evidence for straight-lining in all the countries. Social desirability bias seems rather unlikely too, e.g., on average, Mexican entrepreneurs have worse financial behaviour scores than all other entrepreneurs.

Reassuringly, in both countries, the continuous measure is highly positively correlated with the necessity dummy and highly negatively with the opportunity dummy. After standardizing, the variable broadly ranges between -2 and 3. We interpret lower values as being associated with opportunity and higher values as being associated with necessity entrepreneurship. Appendix table A7 shows that the previous results for Italy and Mexico are also robust to this specification of necessity entrepreneurs.

(iii) Eventually, we recalculate the main regressions but include respondents who refused to answer any of the questions on necessity entrepreneurship. This is only relevant for Italy and the Netherlands, as in the other two countries, non-response is basically zero. In Italy, a small fraction of the 245 non-response cases at least responded to one of the opportunity entrepreneurship questions and we sort these according to the answers in these questions. Still, for the majority, we do not have any valid answer. Given the way these persons differ from those with valid answers, we assume these "non-respondents" to be necessity entrepreneurs. This is because they are less likely to have received financial education, more likely that their parents owns or owned a business and are more often located in the South, which has a higher share of necessity entrepreneurs. Thus, the non-respondents seem to be more similar to necessity entrepreneurs. In the Netherlands, there are only 22 non-response cases but following the reasoning for Italy, we also assume for these that they are necessity entrepreneurs.

For Italy, results for financial knowledge are slightly stronger than before and the coefficients for overall literacy are virtually identical. In case of the Netherlands, both results for financial knowledge and literacy are stronger. For the sake of brevity, we do not report the regression tables. They are available upon request.

(iv) Risk tolerance (we mean the opposite of aversion here) and self-confidence are two traits usually linked to entrepreneurship and necessity and opportunity entrepreneurs seem to differ in both (see Caliendo et al., 2009; Brock and Koch, 2021). At the same time, risk tolerance and self-confidence can be related to how people answer questions like financial literacy questions (e.g. Griselda, 2024). Both traits are measured in the survey as well, except for Brazil, where only risk tolerance but no self-confidence is measured. Risk tolerance is measured by asking respondents whether they agree or disagree (on a scale from 1 to 4 again) to preferring high-risk and high-yield projects rather than low-risk and low-yield projects. We include it as categorical variable because it suffers from high missing values in Italy and the Netherlands (see also the discussion in the following subsection). Self-confidence is measured for the financial literacy domain by letting respondents assess how high their overall knowledge about financial matters is compared with other adults in their country. Since both traits can change over the life-time, we did not want to include them in the main part of our analysis. However,

controlling for the two variables does not change our results. As shown in appendix table A8, necessity entrepreneurs still have a significantly lower level of financial literacy than opportunity entrepreneurs in all countries.
Summarized, the robustness tests show that the financial literacy gap between necessity and opportunity entrepreneurs is a robust finding in all countries. It does not hinge on a specific definition of necessity or opportunity entrepreneurship.

4 What drives the business performance gap?

4.1 Measuring business performance

We eventually look at whether necessity and opportunity businesses weathered the COVID-19 pandemic differently and if financial literacy might play a role in this. In times of crisis – like the pandemic – financial literacy skills might be especially important because they increase resilience to shocks and help people better adjusting to a changing business environment. Indeed, using the same data for Italy, D'Ignazio et al. (2022) conclude that higher financial literacy is associated to an overall lower, negative impact of the pandemic on business activities. The question we try to answer here – using data from four very different countries – is if the impact was lower for opportunity entrepreneurs given that they have higher financial literacy.

In the survey, there are unfortunately no questions asking for a quantitative measure of revenues or profits.[17] Therefore, we rely on a set of qualitative questions about the impact of the COVID-19 pandemic on firms' business outcomes. Specifically, the most suitable questions are the ones concerning the impact on business overall, revenues, profits and number of employees:

How would you describe the impact of the COVID-19 crisis on the following items related to your business? Record responses as: large decrease, decrease, quite unchanged, increase, large increase, don't know and refused.

QX6_1: Overall impact
QX6_2: Turnover/revenues
QX6_3: Profits
QX6_4: Number of employees

[17] There is actually a question asking for the annual turnover but this requires only to choose among predefined amount ranges.

Thus, our measures for business performance are the self-assessed pandemic impacts on the business, rated on a 5-point ordinal scale.[18] Out of these four indicators, our primary measure for performance is the question related to the impact on overall business. We choose this item since it is a comprehensive measure for firm activity and it is strongly associated with the answers on profits and revenues.[19] Moreover, all entrepreneurs provided an answer for this question in Italy and the share of missing values is low in Mexico (0.5 %) and Brazil (about 2 %). The share of missing values is highest in the Netherlands (about 4.5 %); this is true also for the questions on revenues, profits and employees. We drop those missing observations for the following analyses.

4.2 Differences in business performance

As a starting point for our analysis on business performance, we present some aggregate descriptive statistics. The COVID-19 pandemic and lockdown measures implemented to reduce the spread of the virus severely affected all national economies in our sample, but with great heterogeneity. Brazil and the Netherlands experienced a strong decline in real GDP which was, however, mild (3.3% and 3.9% respectively) in comparison to the extreme disruptions in Mexico (8.6%) and Italy (9%). Hence, it might be not surprising that around 60% of the Brazilian and Italian, and 80% of Mexican firms experienced a decrease or a large decrease in their overall business. The impact on firms in the Netherlands, where less than 40% of business owners reported such a negative performance, seems to have been less severe. The relatively low impact is also confirmed by other reports (e.g. Panteia, 2022). Importantly, in all the four countries, necessity entrepreneurs seem to have weathered the pandemic worse (see figure 6). The situation is very similar for the impact on revenues and profits. Most of the firms report a less severe impact on the number of employees, potentially thanks to government measures like paid furlough and other job retention schemes.

A first explanation for the unconditional differences between entrepreneurs is that the share of necessity entrepreneurs varies a lot across sectors and the COVID-19 impact on sectors was extremely heterogeneous (figure 7). Restrictive measures, imposed during the lockdown phases, forced some economic activities to be stopped for a longer period than others. In particular, firms in the hospitality sector were closed for many months and were also affected by the collapse of tourism, so they experienced the most severe impact in

[18] For each variable, we assign a score of one to entrepreneurs reporting a large decrease, while a score of five is given to those who experienced a large increase.

[19] About 70% of the entrepreneurs provided responses on the development of revenues and profits that mirrored the impact they reported for the overall business; the polychoric correlations coefficients are all above 0.80. The association between the impact on business overall and number of employees is milder but still relatively strong, with a correlation above 0.55.

all the countries.[20] In contrast to the first part of the analysis, in which reverse causality between financial literacy and the choice of the sector is a concern, we include sector dummies for the the analysis on business performance. Reverse causality seems highly unlikely in this case and clearly, the sector matters for the performance of the business.

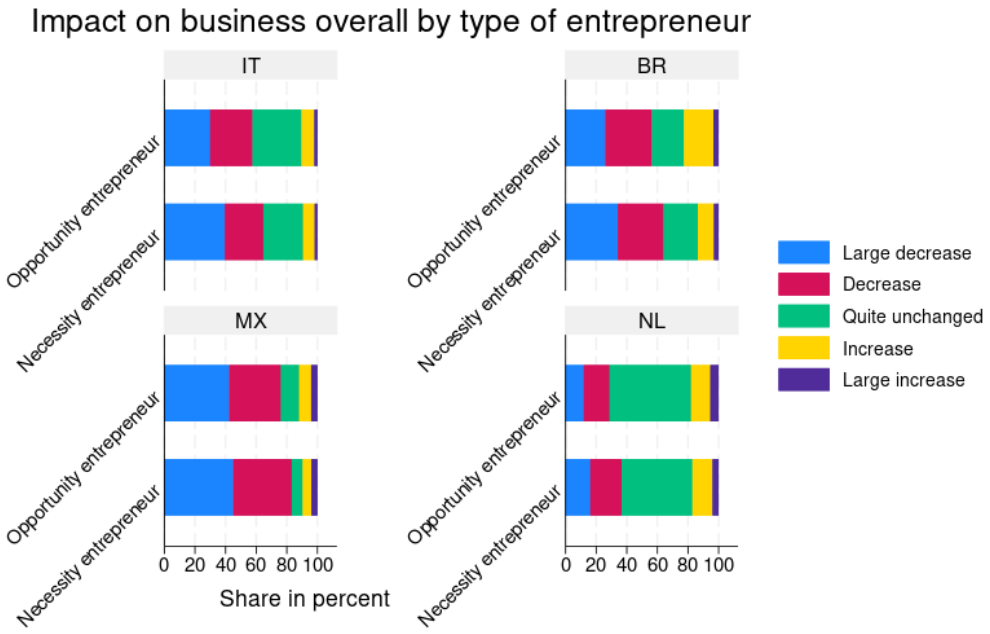


Figure 6: Business performance by necessity entrepreneurship and country

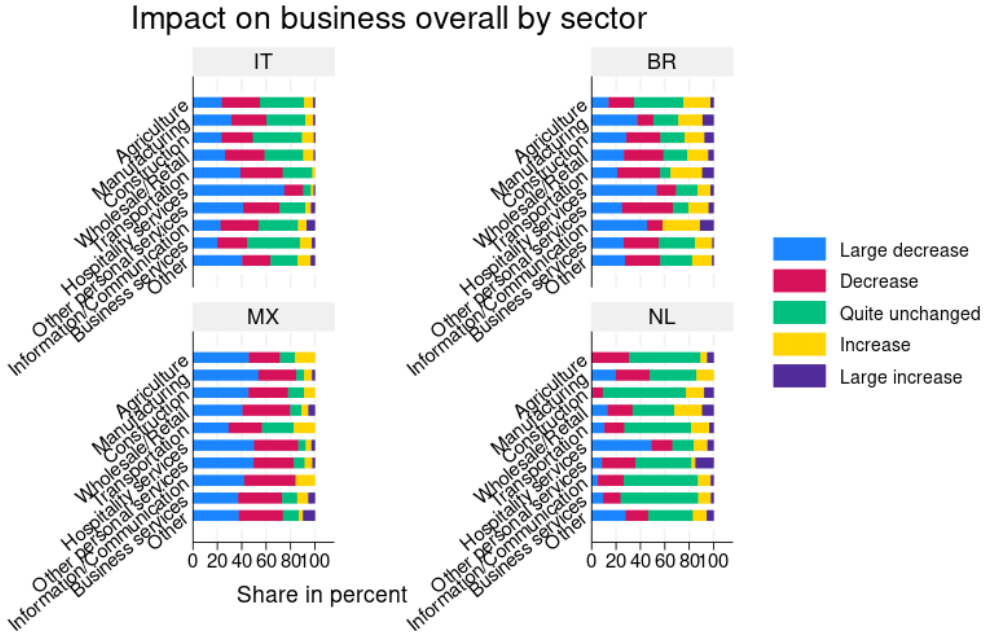


Figure 7: Business performance by sector and country

[20] This is especially relevant in Italy, where the hospitality sector has the highest share of necessity entrepreneurs and almost 90% of the hospitality entrepreneurs reported a decline in their activity.

4.3 Multivariate approach

Similar to before, we conduct a multivariate analysis to examine what factors are related to performance and if in particular the financial literacy gap is related to differences in performance between the two kinds of entrepreneurs. Our main specification is again a linear regression model:[21]

$$Y = \alpha + \beta_0 NEC + \beta_1 FL + \sum_{j=2}^{P} \beta_j X_j + \epsilon \tag{3}$$

where Y is the business performance score, NEC is the dummy for necessity entrepreneurship, FL is the financial literacy score and $\sum_{j=2}^{P} X_j$ are the control variables. Standard errors ϵ are clustered as specified in section 3.

In line with the analysis before, we use as control variables: gender, age, educational attainment, whether the respondent has received financial education in school or university, and whether the parents are or were business owners. These variables are not only relevant to explain financial literacy but are usually found to play a role also for entrepreneurial results. That personal characteristics play a big role for business outcomes is especially the case for micro and small-business entrepreneurs, who are often solely responsible for the strategy of their business. As previously mentioned, we also include regional and sectoral dummies to account for the uneven impact of the pandemic and lockdown measures that affected especially firms operating in "non-essential" sectors.

Moreover, we want to prevent potential bias in our analysis introduced by firms that started their activities just before or during the outbreak of COVID-19. For some of them, it is hard or even impossible to tell how the pandemic impacted their business as the business did not exist before. Luckily, the survey asks respondents when they have founded their business. Therefore, we can restrict our focus on businesses that were established before 2018. We still include those businesses for which the information of the starting year is missing.[22] This is because in all countries the vast majority of the businesses were founded before 2018.[23] Altogether, this leaves us with around 1,500 observations for Italy, 900 for Mexico and Brazil and 1,000 for the Netherlands.

[21] As robustness, we also use other model specifications.

[22] The percentage of businesses for which this information is missing is higher in the Netherlands than in the other countries (above 6% against about 2%).

[23] Results excluding also the businesses with missing starting year are qualitatively and quantitatively almost the same.

4.4 Results on business performance

Irrespective of the financial literacy gap between necessity and opportunity entrepreneurs, financial literacy is worth to be considered on its own when assessing business performance. Starting with a simple univariate analysis, Figure 8 shows the average financial literacy scores for entrepreneurs who reported different levels of impact on their business. On average, entrepreneurs whose firms experienced a large decline in overall activity have a significantly lower financial literacy in all countries, except the Netherlands. Related to this, the average financial literacy varies a lot across sectors, which can be seen in appendix figure A2. Entrepreneurs operating in the information and communication technology (ICT) sector, as well as in the business services sector, have the highest level of financial literacy in Italy and Brazil. At the same time, these two sectors were also the ones where smart working was more feasible.

Thus, lockdown measures also had a smaller impact. The business services sector stands out also in Mexico and in the Netherlands (together with manufacturing). Overall, in order to disentangle the roles played by the different factors, we need to perform a multivariate analysis - without overlooking the economic activity sector - to shed light on the relationship between necessity entrepreneurship, financial literacy and business performance.

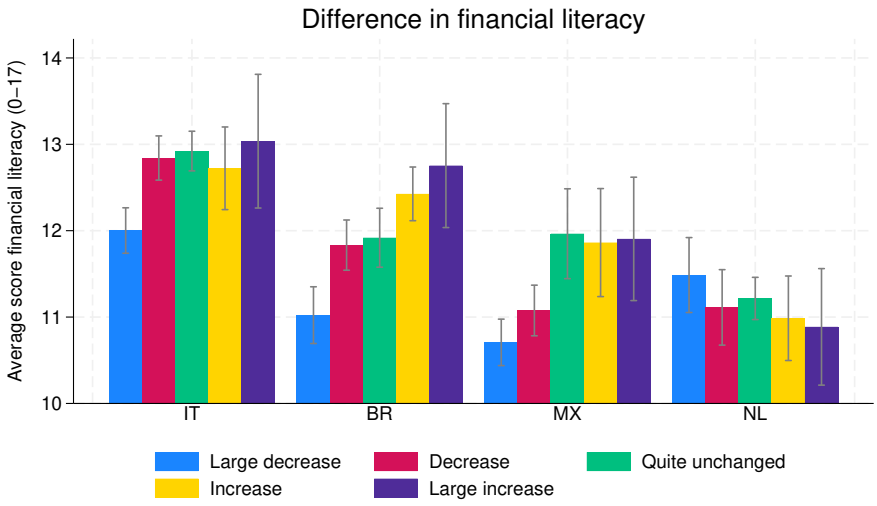


Figure 8: Financial literacy by pandemic-related business outcome

The multivariate regression results in table 3, columns (1), (3), (5) and (7) show that, in all countries except Mexico, the necessity coefficient is sizeable and significant: necessity perform worse than opportunity businesses, even if we account for the sector and the socio-demographic characteristics. This changes if we add financial literacy to the equation. The coefficient for financial literacy itself is positively and statistically significant in all

countries except the Netherlands, which already stood out in the bivariate comparisons between performance and financial literacy. For the other countries, this suggests that entrepreneurs with higher financial skills were able to perform better during the crisis.

Table 3: OLS regression for the impact on overall business performance

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.12*	−0.10	−0.18*	−0.11	−0.02	0.04	−0.17***	−0.21***
	(0.06)	(0.06)	(0.10)	(0.09)	(0.06)	(0.07)	(0.06)	(0.07)
Male	−0.01	−0.02	0.15	0.12	0.23**	0.21**	0.08	0.09
	(0.05)	(0.05)	(0.09)	(0.09)	(0.08)	(0.07)	(0.06)	(0.06)
Age (in years)	−0.00	−0.00	−0.01**	−0.01*	−0.01**	−0.01**	−0.01***	−0.01***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.05	−0.07	0.24	0.21	−0.05	−0.09	0.23***	0.26***
	(0.07)	(0.07)	(0.15)	(0.14)	(0.07)	(0.07)	(0.07)	(0.08)
High education	0.09	0.05	0.20	0.13	0.19**	0.11	0.15**	0.18**
	(0.09)	(0.09)	(0.16)	(0.16)	(0.08)	(0.09)	(0.08)	(0.09)
Finance training	0.01	−0.02	0.13	0.06	−0.03	−0.07	0.07	0.10
	(0.06)	(0.06)	(0.08)	(0.07)	(0.05)	(0.05)	(0.08)	(0.09)
Parent owns business	−0.01	−0.02	−0.06	−0.05	−0.03	−0.04		
	(0.07)	(0.07)	(0.06)	(0.06)	(0.08)	(0.08)		
Fin. literacy		0.03**		0.08***		0.05***		−0.02
		(0.01)		(0.02)		(0.01)		(0.02)
Constant	2.57***	2.30***	3.35***	2.44***	2.29***	1.75***	3.26***	3.50***
	(0.21)	(0.24)	(0.32)	(0.43)	(0.25)	(0.21)	(0.24)	(0.27)
Adj. R-Squared	0.073	0.078	0.044	0.065	0.027	0.040	0.068	0.071
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1537	1537	892	892	876	876	979	979

* p < 0.10, ** p < 0.05, *** p < 0.01

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on business overall on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Importantly, for Italy and Brazil, including financial literacy in the model shrinks the coefficient of the necessity dummy and it loses its significance. This observation might not seem surprising, since we previously showed that necessity and opportunity entrepreneurs are significantly different in terms of financial literacy. However, we also showed that they differ in other socio-demographic characteristics, which, even combined, do not have the same effect on the necessity coefficient. Thus, our results suggest that, in Brazil and Italy, financial literacy might be one of the underlying factors that explain why businesses managed by opportunity entrepreneurs performed better during the pandemic: financial literacy serves as mediator.[24]

[24] As further evidence that financial literacy largely explains the difference in performance between neces-

As seen before, in both Mexico and the Netherlands, entrepreneurs of both kinds were either hit strongly (Mexico) or not much (the Netherlands). So, the variation in the outcome variable is rather limited, which might explain the unexpected results we get for these two countries: despite financial literacy does not seem to play a role in the Netherlands, it increases the negative effect for necessity entrepreneurs, which is not intuitive. In Mexico, being a necessity entrepreneur or not does not make a difference, even before including financial literacy or the sector of economic activity. Therefore, financial literacy cannot serve as the expected mediator. However, there are different performance outcomes in Mexico for which these results are not the same. We run additional estimations to see how the different subcomponents of business performance are related to necessity entrepreneurship and financial literacy. Results are shown in table 4 for revenues, table 5 for profits and table 6 for the number of employees.

The results for Brazil and Italy tell a similar story than before, but interestingly it is a little bit different for Mexico. At least for profits and employees, financial literacy seems to be a mediator between necessity entrepreneurship and performance. The necessity coefficient is negative and significant when not controlling for financial literacy, but loses significance and size as soon as we add financial literacy. The results for revenues point in the same direction too. Overall, it seems that in all our countries, there is a link between necessity entrepreneurs and worse business performance; in three out of four countries, a sizeable part of this link seems to run via the worse financial literacy of necessity entrepreneurs. Although these results for the Netherlands may seem surprising, they are consistent with the results reported for Spain.[25] There, Anghel et al. (2021) find a similar impact of the COVID-19 pandemic on revenues and profits for firms with different levels of financial literacy and just a slightly smaller effect on the number of employees for firms with higher financial literacy.

sity and opportunity entrepreneurs, we also estimated these models with financial literacy but without including the necessity dummy. Comparing these results with the ones reported in Table 3, (columns (2), (4), (6) and (8)), there are almost no quantitative or qualitative differences. This finding is not unexpected since - once financial literacy is taken into account - the necessity coefficient was not significant in the models for the three countries where financial literacy is correlated with business performance. These additional results are not reported in the paper but are available upon request.

[25] Anghel et al. (2021) use the same survey data for Spain where, unfortunately, the questions used to define necessity entrepreneurs were not asked.

Table 4: OLS regression for the impact on revenues

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.10*	−0.08	−0.21*	−0.12	−0.14	−0.09	−0.21**	−0.25**
	(0.05)	(0.05)	(0.11)	(0.10)	(0.08)	(0.09)	(0.09)	(0.10)
Male	0.08	0.07	0.21**	0.18**	0.22**	0.20**	0.04	0.05
	(0.05)	(0.05)	(0.08)	(0.08)	(0.08)	(0.08)	(0.06)	(0.06)
Age (in years)	−0.01***	−0.01***	−0.02***	−0.01***	−0.01***	−0.01***	−0.01**	−0.01**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.09	−0.12*	0.26	0.22	−0.06	−0.09	0.29***	0.31***
	(0.07)	(0.07)	(0.18)	(0.18)	(0.11)	(0.12)	(0.08)	(0.08)
High education	0.07	0.02	0.17	0.09	0.11	0.05	0.12	0.14*
	(0.09)	(0.09)	(0.19)	(0.20)	(0.13)	(0.14)	(0.07)	(0.07)
Finance training	−0.01	−0.04	0.17**	0.09	−0.02	−0.07	0.19**	0.22**
	(0.06)	(0.06)	(0.08)	(0.08)	(0.06)	(0.05)	(0.09)	(0.10)
Parent owns business	−0.03	−0.05	−0.02	−0.01	−0.02	−0.03		
	(0.05)	(0.05)	(0.07)	(0.08)	(0.08)	(0.08)		
Fin. literacy		0.04***		0.09***		0.05***		−0.02
		(0.01)		(0.02)		(0.01)		(0.02)
Constant	2.78***	2.45***	3.49***	2.41***	2.30***	1.81***	3.15***	3.34***
	(0.17)	(0.20)	(0.36)	(0.43)	(0.17)	(0.18)	(0.24)	(0.26)
Adj. R-Squared	0.080	0.088	0.077	0.106	0.032	0.044	0.090	0.092
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1525	1525	889	889	877	877	989	989

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on revenues on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Table 5: OLS regression for the impact on profits

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.09*	−0.06	−0.25**	−0.16*	−0.16**	−0.11	−0.24**	−0.25**
	(0.05)	(0.05)	(0.10)	(0.08)	(0.07)	(0.07)	(0.11)	(0.12)
Male	0.01	0.01	0.21***	0.18***	0.22*	0.20*	−0.01	−0.01
	(0.05)	(0.05)	(0.08)	(0.07)	(0.10)	(0.09)	(0.05)	(0.06)
Age (in years)	−0.01**	−0.01***	−0.01***	−0.01**	−0.01***	−0.01***	−0.01***	−0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.02	−0.05	0.35**	0.31**	−0.11	−0.15	0.29***	0.30***
	(0.08)	(0.08)	(0.15)	(0.15)	(0.10)	(0.11)	(0.08)	(0.08)
High education	0.11	0.05	0.23	0.15	0.06	−0.01	0.14*	0.15*
	(0.09)	(0.08)	(0.15)	(0.15)	(0.10)	(0.11)	(0.09)	(0.09)
Finance training	0.02	−0.01	0.06	−0.02	−0.01	−0.05	0.20*	0.21*
	(0.06)	(0.06)	(0.08)	(0.08)	(0.07)	(0.06)	(0.11)	(0.12)
Parent owns business	0.03	0.01	−0.04	−0.04	−0.05	−0.06		
	(0.05)	(0.05)	(0.07)	(0.07)	(0.07)	(0.07)		
Fin. literacy		0.04***		0.09***		0.05***		−0.01
		(0.01)		(0.02)		(0.01)		(0.01)
Constant	2.46***	2.09***	3.04***	1.97***	2.43***	1.93***	3.08***	3.14***
	(0.16)	(0.20)	(0.40)	(0.48)	(0.21)	(0.21)	(0.24)	(0.26)
Adj. R-Squared	0.067	0.078	0.063	0.093	0.046	0.060	0.083	0.082
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1520	1520	891	891	879	879	991	991

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on profits on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Table 6: OLS regression for the impact on employees

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.12***	−0.11**	−0.01	0.00	−0.12**	−0.09	0.02	0.01
	(0.04)	(0.04)	(0.09)	(0.09)	(0.05)	(0.05)	(0.03)	(0.03)
Male	−0.01	−0.02	0.16***	0.16**	0.08	0.07	−0.01	−0.01
	(0.05)	(0.05)	(0.06)	(0.06)	(0.09)	(0.09)	(0.02)	(0.02)
Age (in years)	−0.00	−0.00	−0.01***	−0.01***	0.00	0.00	−0.00	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.02	−0.05	0.04	0.04	0.04	0.02	−0.04	−0.03
	(0.06)	(0.06)	(0.13)	(0.13)	(0.08)	(0.08)	(0.04)	(0.04)
High education	0.05	0.00	0.21	0.19	0.08	0.04	−0.01	−0.00
	(0.06)	(0.07)	(0.12)	(0.13)	(0.10)	(0.11)	(0.04)	(0.04)
Finance training	−0.00	−0.02	−0.05	−0.07	−0.01	−0.03	0.06*	0.07*
	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.06)	(0.04)	(0.04)
Parent owns business	0.01	−0.01	−0.05	−0.04	−0.11*	−0.11*		
	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.06)		
Fin. literacy		0.03***		0.02		0.03***		−0.00
		(0.01)		(0.02)		(0.01)		(0.01)
Constant	2.87***	2.58***	2.93***	2.69***	2.37***	2.08***	3.10***	3.14***
	(0.11)	(0.14)	(0.29)	(0.30)	(0.19)	(0.15)	(0.12)	(0.11)
Adj. R-Squared	0.090	0.101	0.022	0.025	0.028	0.034	0.064	0.064
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1505	1505	882	882	874	874	943	943

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on employees on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Why is it that the difference in financial literacy might have led to different impacts of the pandemic on necessity and opportunity businesses? In their paper, D'Ignazio et al. (2022) show that Italian firms whose owners had higher financial literacy were better able to manage liquidity shortages. Additionally, their skills allowed them to easier identify and successfully apply for suitable state aids. Overall, about half of the Italian and Brazilian firms experienced a lack of cash during 2020. In Mexico, where the negative impact on firms was stronger, this share is above 60%; on the contrary, less then 20% of Dutch firms reported to have experienced a lack of cash. As displayed in the left panel of figure 9, the share of liquidity-constrained businesses is indeed higher for necessity entrepreneurs (Brazil is the only country where this difference is not significant).

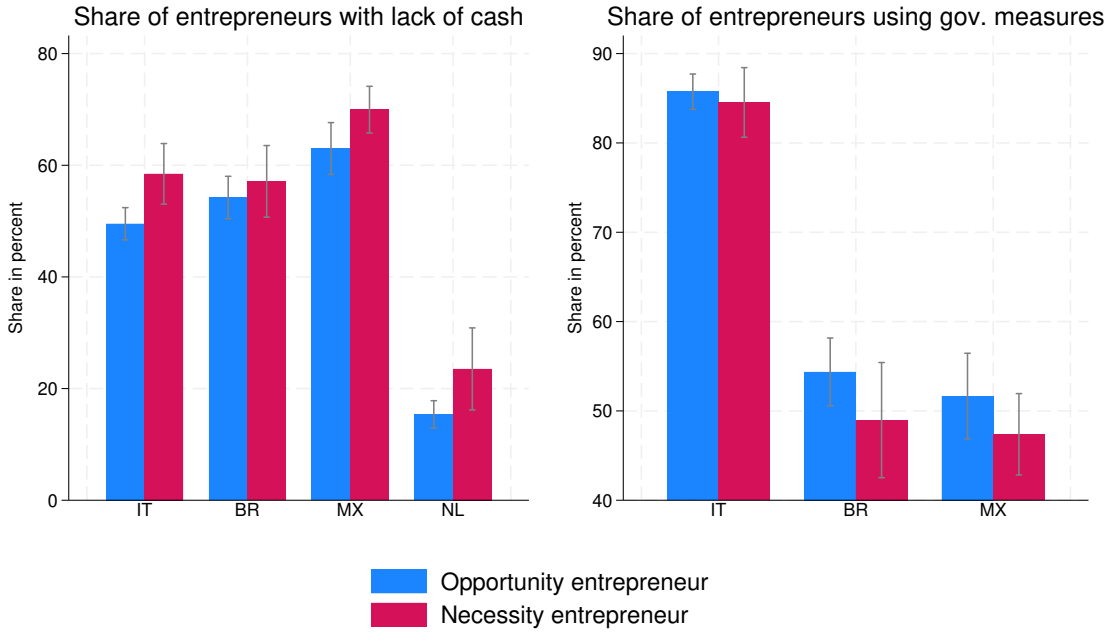


Figure 9: Share of firms experiencing lack of cash and using government measures by type of entrepreneur

At the same time, despite these entrepreneurs reported worse business performances, they seemed to be less successful in receiving state aids to cope with the economic crisis (right panel of figure 9), though not significantly less.[26] Often a large set of competencies is required to understand the conditions and to meet all the requirements to access government measures. Thus, two potential channels how the financial literacy gap might have led to worse business outcomes for necessity entrepreneurs during the pandemic were a lower ability to cope with liquidity shortage and less access to government support. However, a thorough analysis of the exact channels is beyond the scope of this paper.

In a nutshell, our results show that necessity perform worse than opportunity entrepreneurs, even after controlling for the economic activity sector. A part of this gap is associated with the lower level of financial literacy, in three of the four countries we study. In contrast, other socio-demographic characteristics do not seem to play a relevant role in explaining business performance. Additionally, in the following section, we show several tests on the robustness of these findings to various model specifications, as well as to the inclusion of additional control variables and different measures for business performance and financial literacy.

We acknowledge a concern that may arise when estimating the regressions on business performance, related to the potential endogenous nature of the necessity entrepreneurship

[26] Unfortunately, the set of questions about the use of government measures was not asked in the Netherlands.

variable. The decision to start a business out of necessity is correlated with unobserved individual characteristics such as ambition or personal skills. These might also affect business performance. We try to address this issue using regional GDP growth in the year the business was created as an instrument for necessity entrepreneurship, following the approach in Calderon et al. (2017). However, the first stage results for their Mexican sample already indicate that GDP growth might not be a very strong instrument. And indeed, in our case, for Italy, GDP growth performs so poorly in the first-stage regression that it clearly constitutes a weak instrument case and is not suitable for a two-stage least squares model. A possible reason for this difference could be the granularity of the GDP growth data: while Mexico is divided into 32 states, we can only rely on five broader geographical areas.[27] As a result, a significant share of geographical heterogeneity is overlooked in our case, which might explain the poor performance of GDP growth as an instrument. The same holds true if we use lagged values of GDP growth instead of the growth rate from the year the business was founded or the regional unemployment rate of the founding year. These results are available upon request.

4.5 Robustness checks for the business performance gap

We present additional robustness checks also for business performance, offering further evidence that the previous results are not driven by a specific choice of the model specification, and adding analysis in which we use alternative dependent and independent variables: (i) we estimate an ordered logistic model instead of OLS, (ii) include also those businesses that were founded after 2018, (iii) use a continuous measure for business performance, (iv) use the subcomponents of financial literacy – financial attitude, financial behaviour and financial knowledge – separately and (v) include risk tolerance, a measure for business digitalization and the age of the business as additional variables.

(i) To account for the qualitative and ordinal nature of the dependent variable, we estimate an ordered logistic model. Table A9 shows that our results do not change qualitatively when using such a model. In Brazil and Italy, financial literacy is positively associated with the business performance and necessity entrepreneurs seem to cope worse with the pandemic. The necessity coefficient loses in size and in significance if we control for financial literacy. In Mexico, there is no difference in overall performance and, in the Netherlands, necessity entrepreneurs perform worse then opportunity ones but financial literacy does not seem to have a mediating effect there.
(ii) We restrict the sample on businesses that started operations before 2018 because

[27] Italy is composed of 20 regions but, unfortunately, the geographical indicator available in our data provides detail only on the geographical area where the business is located and not on the region.

an assessment on how the business developed in 2020 in comparison to previous years does not seem very meaningful for businesses that are pretty young. For the sake of completeness, we report results including also those younger firms in table A10. The main findings for necessity entrepreneurs do not change, except for Italy: including these businesses reduces the necessity coefficient tremendously, even without controlling for financial literacy. Digging further, it seems that younger businesses in general performed slightly worse than the ones existing before 2018. Younger firms, on the whole, have worse access to finance and inexperienced business owners might have had more difficulties accessing government aid as well. This also holds for opportunity entrepreneurs. The effect of financial literacy stays unchanged in comparison to the main results.
(iii) We combine the questions about the pandemic impact on revenues, profits and number of employees running a polychoric factor analysis on these three variables. We create a continuous measure for overall business performance by extracting the first principal component.[28] Using this continuous measure in table A11, the main findings do not change. Financial literacy is strongly associated with business performance and, once we account for this feature, the difference between necessity and opportunity entrepreneurs loses its significance. Using this comprehensive measure, as expected after the previous results, the necessity coefficient is significant also in Mexico as long as financial literacy is not added.

(iv) So far, we focused on the overall financial literacy score, but we also try to assess if the individual subcomponents of the score are relevant to explain business performance. So we run additional regressions considering: financial attitude (table A12), financial behaviour (table A13) and financial knowledge (table A14). These additional models confirm previous results: opportunity perform better then necessity entrepreneurs. Once we include these subcomponents in the models, the significance of the negative effect of necessity decreases. Both financial attitude and financial behaviour are positively and significantly correlated with the business performance, instead financial knowledge does not play a significant role to explain performance (only in the Netherlands, it seems slightly negative correlated).

(v) We now assess the relevance of further control variables on entrepreneurial performance adding risk tolerance, age of the business and a business digitalization score to the regressions. As we previously mentioned in section 1, necessity and opportunity entrepreneurs differ in many aspects and risk aversion is one of them. Moreover, this factor is not only related to the propensity of starting a business but also to the performance.

[28] The new measure has two main advantages. Firstly, as it is a continuous variable rather than a ordinal one, it is better suited as a dependent variable in a linear regression model. Secondly, it is a good measure for the overall impact of the pandemic on business since it is strongly correlated with all the three different ordinal answers.

Unfortunately, the proportion of missing responses to the risk tolerance question is quite high for the Netherlands and Italy (about 8 % and 11 %, respectively), which is why we did not include it on our main regressions. At the same time, we aim to examine potential advantages or disadvantages of firms that have been operating for different lengths of time[29] and to assess if businesses with a higher level of digitalization[30] were able to cope better with the crisis.

Because of the missing values, we include risk tolerance as categorical variable and all the estimates will be the difference from the "no answer" category.[31] For the business age, we mean impute the missing values and winsorize it at the 98th percentile to account for the skewness, common in business age variables. Table A15 shows that there are no significant links between the age of the firms and the business performance[32] and also the digitalization score does not seem to play a significant role, expect for a small positive effect in Mexico[33]. The main findings about necessity and financial literacy still hold even after including these additional variables.

In these cases as well, before including financial literacy, the necessity coefficient is strongly significant in Italy, Brazil and the Netherlands.[34] After controlling for financial literacy, necessity is no longer significant in Brazil. In general, financial literacy is still positively and significantly correlated with business performance in Mexico and Brazil. In Italy, financial literacy is less significant when controlling for risk tolerance. However, this result is not surprising given that entrepreneurs who refused to answer this question are not a random sample: they exhibit a significantly lower level of financial literacy. As a result, including them as a separate category reduces the significance of financial literacy, as the effect is already captured by the category specific dummy.

In brief, previous robustness tests show that our findings remain consistent and do not much rely on specific choices or can be explained if they differ.

[29] This variable also suffers from a high share of missing values, at least in some countries, and is therefore not included in main part of the analysis.

[30] We define the digitalization score with the same approach used by D'Ignazio et al. (2022).

[31] The advantage of this choice is twofold. Firstly, it allows us to retain all observations. Secondly, it enables us to control for potential non-linear effects of risk tolerance. While assuming the right level of risk may be crucial for successful businesses, hazardous decisions can be extremely harmful (see Koch and Menkhoff, 2024).

[32] This is probably also related to the fact that we have excluded the youngest businesses anyway.

[33] This result about the digitalization score is in line with D'Ignazio et al. (2022) who use the same data for Italy and do not find any significant correlation between the digitalization and the ability to mitigate the impact of the pandemic.

[34] We do not report estimates here but they are available upon request.

5 Conclusion

As the daily life of a business owner revolves around financial decisions, financial literacy is a core competency for every entrepreneur. There is compelling evidence that financial literacy crucially affects the success of a business. However, entrepreneurs are not all alike. There are persons who are entrepreneurs because they want to pursue independent work or their own business idea and there are people who are self-employed because there was no other employment option. These latter necessity entrepreneurs were found to lag behind opportunity entrepreneurs in various aspects. But, to our knowledge, we are the first to analyse if they also lag behind in terms of financial literacy.

Using novel survey data on micro entrepreneurs from Brazil, Italy, Mexico and the Netherlands, we evaluate the financial literacy skills of necessity and opportunity entrepreneurs. We show that in our diverse set of countries, necessity entrepreneurs have less financial knowledge and are overall less financially literate than opportunity entrepreneurs. The gap in financial literacy cannot be well explained with differences in socio-demographic factors like age, gender or education between the two types of entrepreneurs, although there are significant differences in education in most countries. Not even differences in having received financial education or not can explain a large part of the gap. Importantly, these findings are robust to how we classify necessity and opportunity.

Moreover, we find that necessity entrepreneurs more often report that their business was negatively impacted by the COVID-19 pandemic. Multivariate regressions show that this is partially related to their over-proportional presence in sectors that were hit more strongly by the pandemic. Still, in three of the four countries, including financial literacy in the framework suggests that the found literacy gap might serve as mediator in explaining the difference in business performance. This is not true for other socio-demographic characteristics. Throughout the analysis, the Netherlands sticks out, and there, we do not find that financial literacy had any effect on performance during the pandemic. Potential reasons are the low share of necessity entrepreneurs, who differ less from opportunity entrepreneurs than in the other countries, but also the different institutional setup. This includes a better business environment, which is reported by several institutions collecting business indicators, and the less felt impact of the pandemic, which is also confirmed by our survey data. Similarly to De Vries et al. (2020), we also find that necessity entrepreneurs in the Netherlands have a worse business performance and that general education is positively related to performance.

What we cannot address in this study is endogeneity. First, we do not know whether persons with *ex ante* lower financial literacy are more likely to become necessity instead of opportunity entrepreneurs; or if necessity entrepreneurs have *ex post* a lower level of financial literacy because they are less interested in acquiring financial literacy skills in

contrast to opportunity entrepreneurs who want their business to thrive. Future research could tackle this by using panel data and comparing financial literacy levels before the decision to become entrepreneur was taken. Second, we cannot say if better financial literacy has a causal impact on business success, although this was shown in several former studies for entrepreneurs in general. A future avenue for research would be to distinguish between necessity and opportunity entrepreneurs and test whether they and their businesses respond differently to financial education programs.

Overall, our results suggest that it could be worthwhile tailoring financial education programs especially to necessity entrepreneurs. Their needs in business training and financial education are stronger. However, the valid question remains if, instead of investing resources into necessity entrepreneurs' businesses, such entrepreneurs should be rather supported to find a job in salaried employment. It should be noted, however, that our representative data suggest that between 13% to 42% of all people employed in micro firms are employed in necessity businesses. In any case, it is of utmost importance to understand the hurdles to business success.

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Appendix

A.1 Additional figures and tables

Table A1: Mean comparison control variables by response status, only for Italy

	Valid response (1)	Nonresponse (2)	Difference (3)
Male	0.72	0.70	0.02
Age (in years)	50.13	49.36	0.76
Education level	2.17	2.12	0.05
Finance training	0.44	0.30	0.14***
Parent owns business	0.49	0.34	0.14***
Region: central	0.22	0.22	0.00
Region: islands	0.10	0.09	0.01
Region: north-east	0.21	0.17	0.04
Region: north-west	0.27	0.27	−0.00
Region: south	0.20	0.24	−0.05*
Observations	1753	245	1998

* p < 0.10, ** p < 0.05, *** p < 0.01

Positive (negative) numbers in column (3) indicate that the value is larger (smaller) for those persons who gave a valid answer than for those who refused to answer. All results are unweighted. *Education level* is measured in three levels: 1-low, 2-medium and 3-high; *Finance training* is a dummy that equals 1 if the respondent has received financial education; *Parent owns business* is a dummy that equals 1 if any of the respondent's parents owns a business.

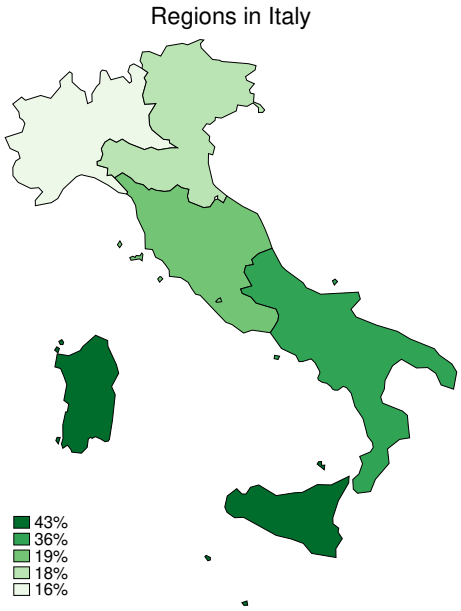

Figure A1: Weighted share of necessity entrepreneurs in each region in Italy

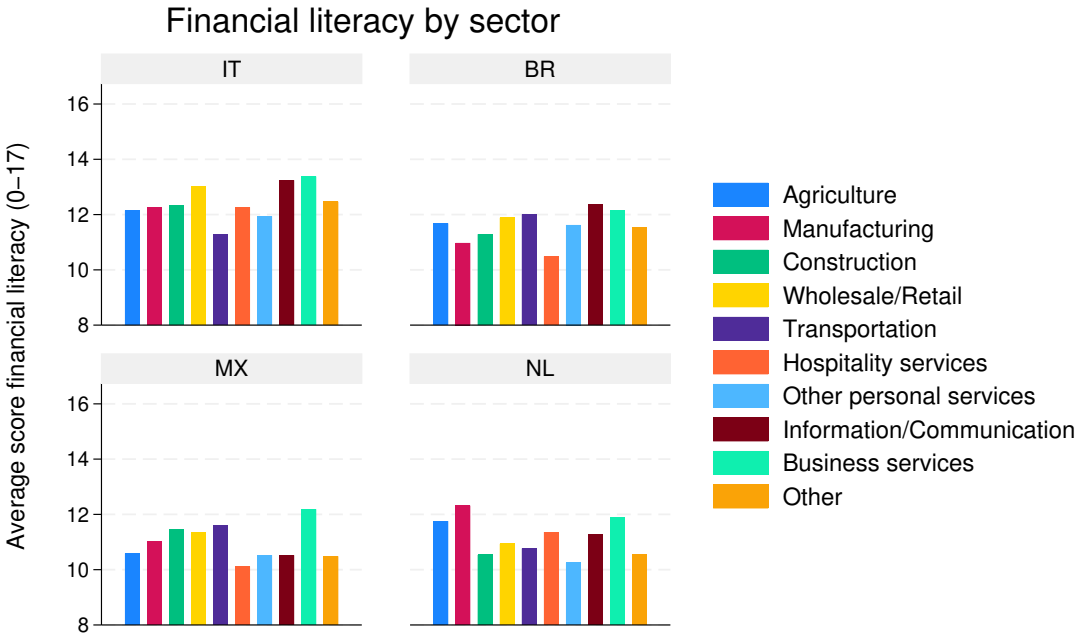

Figure A2: Financial literacy by sector and by country

A.2 Selection effects due to COVID-19 in Italy

As businesses from necessity entrepreneurs were found to be less profitable and less innovative in the past, sample selection effects because of the pandemic might be especially strong for them. To see how the survey sample might be biased, we compare the survey data to official register data on all micro enterprises in Italy, obtained from the Italian National Institute of Statistics (Istat). Moreover, we look at how the universe of micro firms has changed over the course of the pandemic.

Figure A3 shows how the (unweighted) regional distribution of firms in the survey sample compares to the universe of all Italian firms in 2021 and the three previous years. Surprisingly, the relative distribution of firms with less than 10 employees barely changes between 2018 and 2021. However, if we consider absolute numbers, in every region, the number of firms actually increased between previous years and 2021. This is indicated by the orange triangles in the figure which depict growth rates in the number of businesses between 2020 and 2021. In general, the sampling strategy of the survey seems to reflect the regional distribution very well as even its unweighted distribution is very close to the distribution of the whole universe.

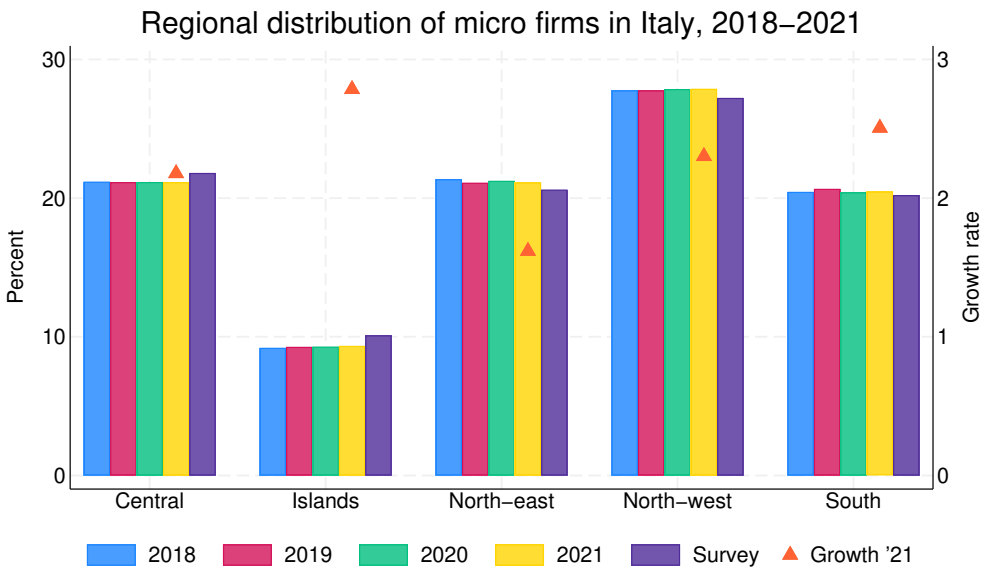

Figure A3: Comparison survey sample and universe of micro firms (no. employees < 10)

Regarding the distribution over sectors, we get a similar picture. As can be seen in figure A4, the share across sectors stays relatively stable over the course of the pandemic. The Italian survey sample in general also represents the sectoral spread well. However, there is a strong oversampling of firms from the business services sector, which includes legal, accounting, advertising and cleaning activities.

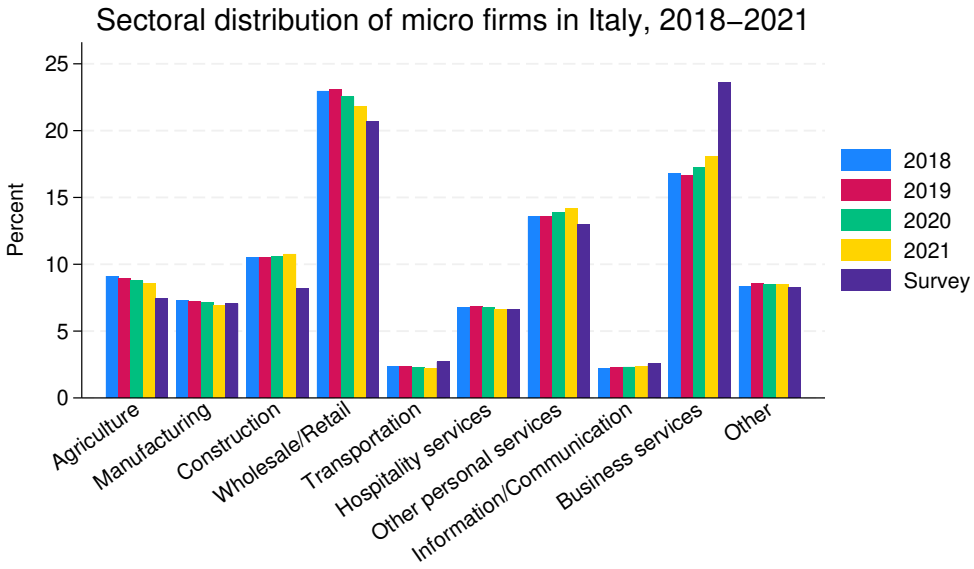

Figure A4: Sectoral spread of survey sample vs universe of micro firms

Overall, it seems that in Italy, the pandemic rather facilitated market entry or standstill, not exit. Insolvencies in 2021 were below pre-pandemic levels (Banca d'Italia, May

2022). In that sense, the timing of the survey might lead to less survivorship bias in Italy. At least the distribution across regions and sectors remained stable over the first two years of the pandemic.

A.3 Additional figures and tables on the financial literacy gap

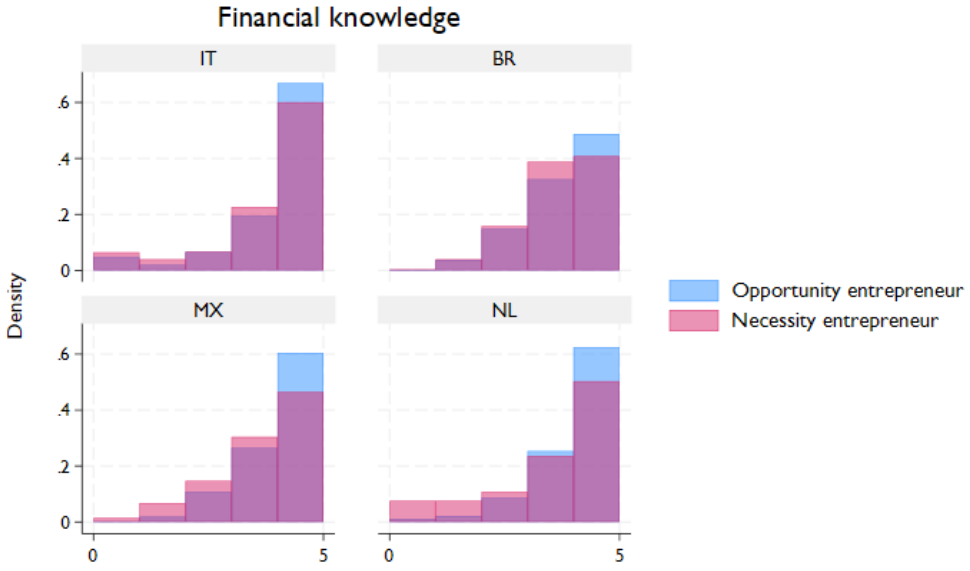

Figure A5: Distribution of the financial knowledge score

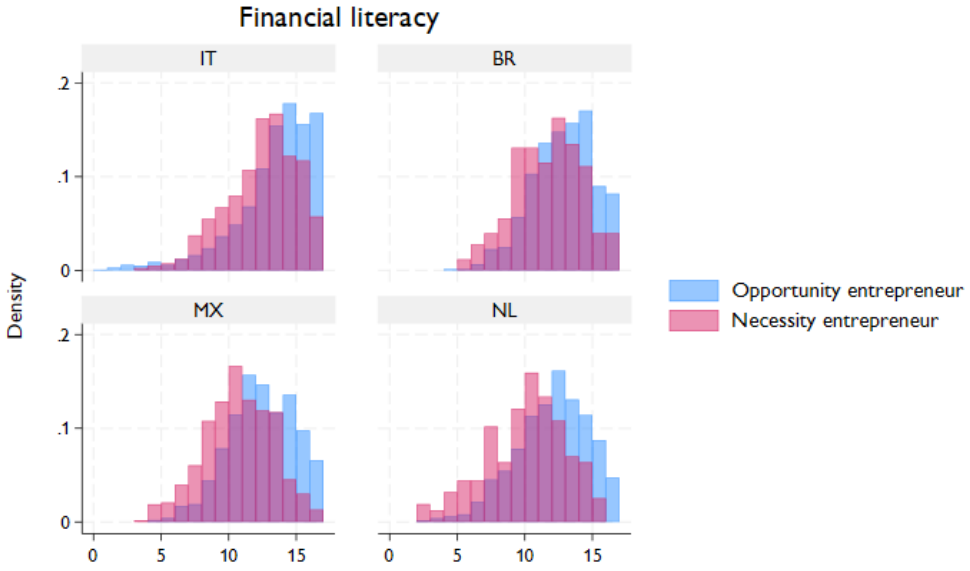

Figure A6: Distribution of the financial literacy score

Table A2: Regression on differences in financial literacy, Italy

	Financial knowledge			Financial literacy		
	(1)	(2)	(3)	(4)	(5)	(6)
Necessity (dummy)	−0.23***	−0.15*	−0.16*	−0.93***	−0.71***	−0.61***
	(0.08)	(0.08)	(0.09)	(0.17)	(0.18)	(0.18)
Male		0.07	0.07		0.28*	0.30*
		(0.07)	(0.07)		(0.16)	(0.16)
Age (in years)		0.02***	0.02***		0.03***	0.02***
		(0.00)	(0.00)		(0.01)	(0.01)
Medium education		0.39***	0.39***		0.83**	0.86**
		(0.13)	(0.13)		(0.33)	(0.33)
High education		0.59***	0.59***		1.61***	1.64***
		(0.13)	(0.13)		(0.34)	(0.34)
Finance training		0.31***	0.32***		0.82***	0.82***
		(0.06)	(0.06)		(0.15)	(0.14)
Parent owns business		0.18***	0.18***		0.39***	0.37***
		(0.05)	(0.05)		(0.13)	(0.13)
Constant	3.69***	2.23***	2.22***	12.85***	9.83***	9.73***
	(0.06)	(0.20)	(0.21)	(0.15)	(0.49)	(0.48)
Adj. R-Squared	0.005	0.063	0.062	0.017	0.092	0.095
Controls (region)	No	No	Yes	No	No	Yes
Share necessity	23.3	23.3	23.3	23.3	23.3	23.3
Observations	1753	1753	1753	1753	1753	1753

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered on region crossed with sector (in parentheses). Regressions are weighted with respect to region and sector. Dependent variables: financial knowledge score on a scale from 0-5 and overall financial literacy on a scale from 0-17. *Controls (region)* indicates whether regional dummies are included and *share necessity* indicates the weighted fraction of respondents who are defined as necessity entrepreneurs.

Table A3: Regression on differences in financial literacy, Brazil

	Financial knowledge			Financial literacy		
	(1)	(2)	(3)	(4)	(5)	(6)
Necessity (dummy)	−0.11*	−0.05	−0.04	−1.06***	−0.77***	−0.75***
	(0.06)	(0.06)	(0.06)	(0.17)	(0.20)	(0.20)
Male		0.20*	0.20*		0.37*	0.36
		(0.11)	(0.11)		(0.22)	(0.22)
Age (in years)		−0.01***	−0.01***		−0.03***	−0.03***
		(0.00)	(0.00)		(0.01)	(0.01)
Medium education		0.12	0.10		0.48	0.46
		(0.17)	(0.17)		(0.30)	(0.31)
High education		0.16	0.15		0.97***	0.96***
		(0.16)	(0.17)		(0.34)	(0.35)
Finance training		0.32***	0.32***		0.96***	0.96***
		(0.09)	(0.09)		(0.19)	(0.19)
Parent owns business		−0.12*	−0.12**		−0.04	−0.04
		(0.06)	(0.06)		(0.13)	(0.14)
Constant	3.37***	3.44***	3.29***	12.05***	11.82***	11.65***
	(0.03)	(0.19)	(0.20)	(0.12)	(0.48)	(0.50)
Adj. R-Squared	0.002	0.048	0.051	0.038	0.134	0.133
Controls (region)	No	No	Yes	No	No	Yes
Share necessity	27.4	27.4	27.4	27.4	27.4	27.4
Observations	1009	1009	1009	1009	1009	1009

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered on region crossed with sector (in parentheses). Regressions are weighted with respect to region and size of the business. Dependent variables: financial knowledge score on a scale from 0-5 and overall financial literacy on a scale from 0-17. *Controls (region)* indicates whether regional dummies are included and *share necessity* indicates the weighted fraction of respondents who are defined as necessity entrepreneurs.

Table A4: Regression on differences in financial literacy, Mexico

	Financial knowledge		Financial literacy	
	(1)	(2)	(3)	(4)
Necessity (dummy)	−0.43***	−0.25**	−1.68***	−1.05***
	(0.11)	(0.08)	(0.19)	(0.17)
Male		0.21**		0.47*
		(0.08)		(0.21)
Age (in years)		0.01***		0.01
		(0.00)		(0.01)
Medium education		0.27		0.55**
		(0.15)		(0.20)
High education		0.48**		1.19***
		(0.18)		(0.34)
Finance training		0.21**		1.04***
		(0.07)		(0.26)
Parent owns business		0.06*		0.29**
		(0.03)		(0.11)
Constant	3.67***	2.68***	11.88***	9.59***
	(0.06)	(0.13)	(0.13)	(0.31)
Adj. R-Squared	0.038	0.098	0.098	0.202
Controls (region)	No	No	No	No
Share necessity	53.0	53.0	53.0	53.0
Observations	1000	1000	1000	1000

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered on sector (in parentheses). Regressions are weighted with respect to region, sector and size of the business. Dependent variables: financial knowledge score on a scale from 0-5 and overall financial literacy on a scale from 0-17. *Controls (region)* indicates whether regional dummies are included and *share necessity* indicates the weighted fraction of respondents who are defined as necessity entrepreneurs.

Table A5: Regression on differences in financial literacy, the Netherlands

	Financial knowledge		Financial literacy	
	(1)	(2)	(3)	(4)
Necessity (dummy)	−0.48***	−0.46***	−1.93***	−1.82***
	(0.17)	(0.17)	(0.37)	(0.34)
Male		0.22***		0.66***
		(0.05)		(0.17)
Age (in years)		0.01*		0.02*
		(0.00)		(0.01)
Medium education		0.38**		1.15**
		(0.14)		(0.49)
High education		0.42***		1.08***
		(0.11)		(0.32)
Finance training		0.32***		1.48***
		(0.09)		(0.22)
Constant	3.63***	2.60***	11.35***	8.42***
	(0.07)	(0.31)	(0.25)	(0.80)
Adj. R-Squared	0.021	0.075	0.056	0.160
Controls (region)	No	No	No	No
Share necessity	14.4	14.4	14.4	14.4
Observations	1129	1129	1129	1129

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered on size of the business crossed with sector (in parentheses). Regressions are weighted with respect to sector and size of the business. Dependent variables: financial knowledge score on a scale from 0-5 and overall financial literacy on a scale from 0-17. *Controls (region)* indicates whether regional dummies are included and *share necessity* indicates the weighted fraction of respondents who are defined as necessity entrepreneurs.

A.4 Tables for the robustness on the financial literacy gap

Table A6: Regressions on financial literacy and opportunity, Italy

	Financial knowledge			Financial literacy		
	(1)	(2)	(3)	(4)	(5)	(6)
Opportunity (dummy)	0.95***	0.92***	0.92***	3.57***	3.46***	3.45***
	(0.17)	(0.17)	(0.17)	(0.51)	(0.49)	(0.48)
Male		0.08	0.08		0.29*	0.32**
		(0.07)	(0.07)		(0.16)	(0.16)
Age (in years)		0.02***	0.02***		0.03***	0.03***
		(0.00)	(0.00)		(0.01)	(0.01)
Medium education		0.36***	0.36***		0.78**	0.81**
		(0.13)	(0.13)		(0.33)	(0.33)
High education		0.56***	0.56***		1.50***	1.54***
		(0.14)	(0.13)		(0.35)	(0.35)
Finance training		0.31***	0.32***		0.87***	0.87***
		(0.05)	(0.05)		(0.14)	(0.14)
Parent owns business		0.18***	0.18***		0.34***	0.32**
		(0.05)	(0.05)		(0.12)	(0.12)
Constant	2.75***	1.35***	1.37***	9.34***	6.46***	6.49***
	(0.18)	(0.26)	(0.26)	(0.51)	(0.63)	(0.61)
Adj. R-Squared	0.037	0.094	0.093	0.107	0.181	0.188
Controls (region)	No	No	Yes	No	No	Yes
Share necessity	7.8	7.8	7.8	7.8	7.8	7.8
Observations	1761	1761	1761	1761	1761	1761

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered on region crossed with sector (in parentheses). Regressions are weighted with respect to region and sector. Dependent variables: financial knowledge score on a scale from 0-5 and overall financial literacy on a scale from 0-17. *Controls (region)* indicates whether regional dummies are included and *share necessity* indicates the weighted fraction of respondents who are defined as necessity entrepreneurs.

Table A7: Continuous measure for entrepreneurial motive, Italy and Mexico

	Financial knowledge		Financial literacy	
	IT	MX	IT	MX
Necessity (continuous)	−0.26***	−0.10**	−0.93***	−0.61***
	(0.03)	(0.04)	(0.08)	(0.04)
Male	0.06	0.21**	0.23	0.43*
	(0.07)	(0.08)	(0.16)	(0.19)
Age (in years)	0.02***	0.01***	0.03***	0.01
	(0.00)	(0.00)	(0.01)	(0.01)
Medium education	0.37***	0.27	0.77**	0.53***
	(0.12)	(0.16)	(0.32)	(0.16)
High education	0.52***	0.49**	1.37***	1.09***
	(0.13)	(0.21)	(0.33)	(0.30)
Finance training	0.31***	0.23***	0.82***	1.10***
	(0.06)	(0.06)	(0.15)	(0.26)
Parent owns business	0.15***	0.05	0.28**	0.22
	(0.05)	(0.04)	(0.12)	(0.12)
Constant	2.25***	2.55***	9.88***	9.11***
	(0.19)	(0.18)	(0.50)	(0.43)
Adj. R-Squared	0.101	0.094	0.181	0.214
Controls (region)	No	No	No	No
Observations	1709	1000	1709	1000

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered on region (in IT only) crossed with sector (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: financial knowledge score on a scale from 0-5 and overall financial literacy on a scale from 0-17. *Controls (region)* indicates whether regional dummies are included.

Table A8: Controlling for risk tolerance and self-confidence

	Financial knowledge				Financial literacy			
	IT	BR	MX	NL	IT	BR	MX	NL
Necessity (dummy)	−0.14*	−0.03	−0.21**	−0.36**	−0.58***	−0.74***	−0.89***	−1.40***
	(0.07)	(0.06)	(0.08)	(0.17)	(0.14)	(0.19)	(0.16)	(0.35)
Male	−0.00	0.20*	0.21**	0.18***	−0.01	0.31	0.40*	0.38***
	(0.06)	(0.11)	(0.08)	(0.06)	(0.15)	(0.24)	(0.18)	(0.14)
Age (in years)	0.01***	−0.01***	0.01***	0.01	0.02***	−0.03***	0.01	0.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Medium education	0.30***	0.09	0.24	0.31**	0.56**	0.42	0.60**	0.82*
	(0.11)	(0.17)	(0.18)	(0.14)	(0.25)	(0.33)	(0.20)	(0.45)
High education	0.38***	0.13	0.42*	0.41***	0.89***	0.92**	1.10***	0.87***
	(0.12)	(0.18)	(0.19)	(0.11)	(0.25)	(0.38)	(0.26)	(0.30)
Finance training	0.20***	0.32***	0.13*	0.16**	0.39***	0.95***	0.55***	0.85***
	(0.05)	(0.09)	(0.06)	(0.07)	(0.13)	(0.20)	(0.15)	(0.19)
Parent owns business	0.13**	−0.13**	0.04		0.21**	−0.04	0.17	
	(0.05)	(0.06)	(0.03)		(0.09)	(0.14)	(0.12)	
Very low risk tol.	1.20***	−0.00	0.69*	0.06	3.56***	−0.16	1.57**	0.09
	(0.16)	(0.23)	(0.32)	(0.21)	(0.38)	(0.58)	(0.52)	(0.26)
Low risk tol.	1.10***	0.18	0.53	−0.01	3.74***	0.39	1.27**	0.83***
	(0.17)	(0.20)	(0.30)	(0.15)	(0.36)	(0.54)	(0.47)	(0.26)
High risk tol.	0.90***	0.10	0.43	−0.01	3.45***	0.47	1.68***	1.01***
	(0.18)	(0.20)	(0.30)	(0.19)	(0.43)	(0.56)	(0.50)	(0.34)
Very high risk tol.	1.32***	−0.04	0.47	−0.62	3.76***	0.10	1.86***	0.50
	(0.33)	(0.24)	(0.32)	(0.38)	(0.56)	(0.53)	(0.50)	(0.69)
Self-confidence	0.23***		0.17***	0.27***	0.84***		0.92***	1.07***
	(0.04)		(0.05)	(0.04)	(0.09)		(0.07)	(0.09)
Adj. R-Squared	0.154	0.053	0.117	0.110	0.309	0.142	0.301	0.260
Controls (region)	Yes	Yes	No	No	Yes	Yes	No	No
Observations	1753	1009	1000	1123	1753	1009	1000	1123

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: financial knowledge score on a scale from 0-5 and overall financial literacy on a scale from 0-17. *Controls (region)* indicates whether regional dummies are included.

A.5 Additional robustness tables for business performance

Table A9: Ordered logit regression for the impact on overall business performance

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.24*	−0.21*	−0.31*	−0.22	−0.03	0.08	−0.33**	−0.42***
	(0.12)	(0.12)	(0.17)	(0.16)	(0.13)	(0.14)	(0.13)	(0.14)
Male	−0.04	−0.05	0.27*	0.25*	0.42**	0.39**	0.17	0.19*
	(0.09)	(0.09)	(0.16)	(0.15)	(0.16)	(0.15)	(0.11)	(0.11)
Age (in years)	−0.01	−0.01	−0.02**	−0.02*	−0.02**	−0.02**	−0.02***	−0.02***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Medium education	−0.00	−0.05	0.34	0.28	−0.22*	−0.28**	0.51***	0.57***
	(0.15)	(0.16)	(0.25)	(0.25)	(0.13)	(0.14)	(0.14)	(0.15)
High education	0.24	0.17	0.29	0.16	0.21	0.08	0.38**	0.44***
	(0.18)	(0.19)	(0.25)	(0.26)	(0.15)	(0.18)	(0.15)	(0.16)
Finance training	0.02	−0.02	0.22	0.10	−0.03	−0.12	0.18	0.25
	(0.11)	(0.10)	(0.13)	(0.12)	(0.09)	(0.09)	(0.17)	(0.18)
Parent owns business	−0.01	−0.03	−0.13	−0.11	−0.09	−0.12		
	(0.12)	(0.12)	(0.10)	(0.11)	(0.14)	(0.15)		
Fin. literacy		0.05**		0.13***		0.10***		−0.05
		(0.02)		(0.03)		(0.02)		(0.03)
Pseudo R-Squared	0.046	0.048	0.014	0.022	0.018	0.024	0.034	0.035
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1537	1537	892	892	876	876	979	979

* p < 0.10, ** p < 0.05, *** p < 0.01

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on business overall on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Table A10: OLS regression for the impact on overall business performance - all starting years

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.06	−0.04	−0.22**	−0.16**	−0.02	0.04	−0.13*	−0.18**
	(0.05)	(0.05)	(0.09)	(0.07)	(0.06)	(0.07)	(0.07)	(0.08)
Male	0.01	0.00	0.13	0.11	0.27***	0.25***	0.11***	0.13***
	(0.05)	(0.05)	(0.10)	(0.09)	(0.07)	(0.07)	(0.04)	(0.04)
Age (in years)	−0.00	−0.00	−0.01**	−0.01**	−0.01**	−0.01**	−0.01***	−0.01***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.02	−0.04	0.20	0.17	−0.06	−0.09	0.21***	0.24***
	(0.07)	(0.07)	(0.13)	(0.13)	(0.06)	(0.06)	(0.07)	(0.07)
High education	0.11	0.06	0.15	0.07	0.15	0.09	0.17**	0.20***
	(0.08)	(0.09)	(0.14)	(0.14)	(0.09)	(0.10)	(0.07)	(0.07)
Finance training	0.05	0.02	0.14*	0.07	0.01	−0.04	0.03	0.07
	(0.06)	(0.06)	(0.08)	(0.07)	(0.05)	(0.05)	(0.08)	(0.09)
Parent owns business	0.01	−0.01	−0.06	−0.06	−0.01	−0.02		
	(0.06)	(0.06)	(0.07)	(0.07)	(0.06)	(0.06)		
Fin. literacy		0.03***		0.08***		0.05***		−0.03
		(0.01)		(0.02)		(0.01)		(0.02)
Constant	2.32***	1.99***	3.18***	2.20***	2.23***	1.74***	3.22***	3.51***
	(0.18)	(0.20)	(0.32)	(0.44)	(0.24)	(0.22)	(0.22)	(0.27)
Adj. R-Squared	0.072	0.080	0.051	0.074	0.031	0.044	0.061	0.065
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1753	1753	987	987	995	995	1084	1084

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of the COVID-19 pandemic on business overall on a scale from 1-5 (large decrease, decrease, quite unchanged, increase, large increase). *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Table A11: OLS regression for the impact on business performance - continuous performance measure

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.09*	−0.07	−0.20*	−0.12	−0.15*	−0.10	−0.19**	−0.22**
	(0.05)	(0.05)	(0.11)	(0.09)	(0.08)	(0.08)	(0.09)	(0.10)
Male	0.05	0.05	0.18**	0.16**	0.20**	0.19*	−0.01	−0.00
	(0.05)	(0.05)	(0.08)	(0.07)	(0.09)	(0.08)	(0.06)	(0.06)
Age (in years)	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01**	−0.01*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.07	−0.10	0.28*	0.25	−0.08	−0.12	0.26***	0.28***
	(0.07)	(0.07)	(0.16)	(0.16)	(0.10)	(0.11)	(0.08)	(0.08)
High education	0.07	0.02	0.17	0.10	0.10	0.03	0.08	0.10
	(0.08)	(0.08)	(0.16)	(0.16)	(0.11)	(0.13)	(0.07)	(0.07)
Finance training	0.00	−0.02	0.12*	0.04	−0.02	−0.07	0.23***	0.26***
	(0.06)	(0.06)	(0.07)	(0.07)	(0.06)	(0.05)	(0.08)	(0.09)
Parent owns business	−0.01	−0.03	−0.03	−0.02	−0.04	−0.05		
	(0.05)	(0.05)	(0.07)	(0.07)	(0.07)	(0.07)		
Fin. literacy		0.04***		0.08***		0.05***		−0.02
		(0.01)		(0.02)		(0.01)		(0.01)
Constant	2.69***	2.34***	3.34***	2.36***	2.39***	1.90***	3.06***	3.26***
	(0.15)	(0.19)	(0.34)	(0.41)	(0.19)	(0.19)	(0.22)	(0.23)
Adj. R-Squared	0.082	0.092	0.070	0.100	0.044	0.059	0.095	0.097
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1497	1497	877	877	869	869	933	933

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: continuous measure for business performance (first principal component of questions about the pandemic impact on revenues, profits and number of employees). Businesses that were founded after 2018 are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Table A12: OLS regression for the impact on overall business performance - financial attitude

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.12*	−0.11*	−0.18*	−0.17*	−0.02	−0.00	−0.17***	−0.16**
	(0.06)	(0.06)	(0.10)	(0.10)	(0.06)	(0.06)	(0.06)	(0.07)
Male	−0.01	−0.02	0.15	0.15	0.23**	0.23**	0.08	0.08
	(0.05)	(0.05)	(0.09)	(0.09)	(0.08)	(0.07)	(0.06)	(0.06)
Age (in years)	−0.00	−0.00	−0.01**	−0.01**	−0.01**	−0.01**	−0.01***	−0.01***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.05	−0.06	0.24	0.24*	−0.05	−0.05	0.23***	0.22***
	(0.07)	(0.07)	(0.15)	(0.14)	(0.07)	(0.07)	(0.07)	(0.07)
High education	0.09	0.07	0.20	0.19	0.19**	0.18*	0.15**	0.15*
	(0.09)	(0.09)	(0.16)	(0.15)	(0.08)	(0.08)	(0.08)	(0.07)
Finance training	0.01	−0.00	0.13	0.12	−0.03	−0.05	0.07	0.06
	(0.06)	(0.06)	(0.08)	(0.08)	(0.05)	(0.06)	(0.08)	(0.09)
Parent owns business	−0.01	−0.01	−0.06	−0.06	−0.03	−0.03		
	(0.07)	(0.07)	(0.06)	(0.06)	(0.08)	(0.08)		
Fin. attitude		0.07**		0.07**		0.08**		0.02
		(0.03)		(0.04)		(0.04)		(0.04)
Constant	2.57***	2.46***	3.35***	3.17***	2.29***	2.12***	3.26***	3.24***
	(0.21)	(0.22)	(0.32)	(0.32)	(0.25)	(0.27)	(0.24)	(0.25)
Adj. R-Squared	0.073	0.076	0.044	0.046	0.027	0.030	0.068	0.068
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1537	1537	892	892	876	876	979	979

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on business overall on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Table A13: OLS regression for the impact on overall business performance - financial behaviour

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.12*	−0.10	−0.18*	−0.11	−0.02	0.03	−0.17***	−0.20***
	(0.06)	(0.06)	(0.10)	(0.09)	(0.06)	(0.07)	(0.06)	(0.07)
Male	−0.01	−0.02	0.15	0.14	0.23**	0.22**	0.08	0.09
	(0.05)	(0.05)	(0.09)	(0.09)	(0.08)	(0.07)	(0.06)	(0.06)
Age (in years)	−0.00	−0.00	−0.01**	−0.01**	−0.01**	−0.01**	−0.01***	−0.01***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.05	−0.06	0.24	0.20	−0.05	−0.07	0.23***	0.25***
	(0.07)	(0.07)	(0.15)	(0.15)	(0.07)	(0.07)	(0.07)	(0.08)
High education	0.09	0.06	0.20	0.12	0.19**	0.13	0.15**	0.17**
	(0.09)	(0.09)	(0.16)	(0.16)	(0.08)	(0.09)	(0.08)	(0.08)
Finance training	0.01	−0.01	0.13	0.07	−0.03	−0.06	0.07	0.09
	(0.06)	(0.06)	(0.08)	(0.08)	(0.05)	(0.05)	(0.08)	(0.09)
Parent owns business	−0.01	−0.02	−0.06	−0.06	−0.03	−0.04		
	(0.07)	(0.07)	(0.06)	(0.06)	(0.08)	(0.08)		
Fin. behaviour		0.05**		0.13***		0.08***		−0.04
		(0.02)		(0.03)		(0.02)		(0.02)
Constant	2.57***	2.29***	3.35***	2.59***	2.29***	1.93***	3.26***	3.46***
	(0.21)	(0.24)	(0.32)	(0.40)	(0.25)	(0.24)	(0.24)	(0.28)
Adj. R-Squared	0.073	0.078	0.044	0.070	0.027	0.038	0.068	0.071
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1537	1537	892	892	876	876	979	979

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on business overall on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Table A14: OLS regression for the impact on overall business performance - financial knowledge

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.12*	−0.11*	−0.18*	−0.18*	−0.02	−0.01	−0.17***	−0.19***
	(0.06)	(0.06)	(0.10)	(0.10)	(0.06)	(0.06)	(0.06)	(0.06)
Male	−0.01	−0.01	0.15	0.14	0.23**	0.22**	0.08	0.10
	(0.05)	(0.05)	(0.09)	(0.09)	(0.08)	(0.08)	(0.06)	(0.06)
Age (in years)	−0.00	−0.00	−0.01**	−0.01**	−0.01**	−0.01**	−0.01***	−0.01***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.05	−0.06	0.24	0.23	−0.05	−0.06	0.23***	0.25***
	(0.07)	(0.07)	(0.15)	(0.15)	(0.07)	(0.07)	(0.07)	(0.08)
High education	0.09	0.08	0.20	0.19	0.19**	0.16*	0.15**	0.17**
	(0.09)	(0.09)	(0.16)	(0.16)	(0.08)	(0.08)	(0.08)	(0.08)
Finance training	0.01	0.00	0.13	0.11	−0.03	−0.04	0.07	0.09
	(0.06)	(0.06)	(0.08)	(0.07)	(0.05)	(0.05)	(0.08)	(0.09)
Parent owns business	−0.01	−0.01	−0.06	−0.05	−0.03	−0.03		
	(0.07)	(0.07)	(0.06)	(0.06)	(0.08)	(0.08)		
Fin. knowledge (short)		0.02		0.05		0.06		−0.07*
		(0.02)		(0.05)		(0.04)		(0.04)
Constant	2.57***	2.53***	3.35***	3.17***	2.29***	2.12***	3.26***	3.48***
	(0.21)	(0.21)	(0.32)	(0.39)	(0.25)	(0.20)	(0.24)	(0.19)
Adj. R-Squared	0.073	0.073	0.044	0.045	0.027	0.028	0.068	0.073
Controls (region)	Yes	Yes	Yes	Yes	No	No	No	No
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1537	1537	892	892	876	876	979	979

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on business overall on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

Table A15: OLS regression for the impact on overall business performance - additional controls

	IT		BR		MX		NL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Necessity (dummy)	−0.10	−0.12*	−0.11	−0.13	0.04	0.04	−0.21***	−0.18***
	(0.06)	(0.07)	(0.09)	(0.09)	(0.07)	(0.07)	(0.07)	(0.06)
Male	−0.02	−0.03	0.12	0.10	0.21**	0.23**	0.09	0.10
	(0.05)	(0.05)	(0.09)	(0.08)	(0.07)	(0.07)	(0.06)	(0.06)
Age (in years)	−0.00	−0.00	−0.01*	−0.01**	−0.01**	−0.01**	−0.01***	−0.01***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Medium education	−0.07	−0.07	0.21	0.20	−0.09	−0.08	0.26***	0.26***
	(0.07)	(0.07)	(0.14)	(0.14)	(0.07)	(0.07)	(0.08)	(0.09)
High education	0.05	0.04	0.13	0.13	0.11	0.10	0.18**	0.19**
	(0.09)	(0.09)	(0.16)	(0.15)	(0.09)	(0.08)	(0.09)	(0.09)
Finance training	−0.02	−0.02	0.06	0.05	−0.07	−0.10*	0.10	0.10
	(0.06)	(0.06)	(0.07)	(0.07)	(0.05)	(0.05)	(0.09)	(0.09)
Parent owns business	−0.02	−0.02	−0.05	−0.07	−0.04	−0.04		
	(0.07)	(0.07)	(0.06)	(0.07)	(0.08)	(0.08)		
Fin. literacy	0.03**	0.02*	0.08***	0.07***	0.05***	0.05***	−0.02	−0.02
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)
Very low risk tol.		0.18		0.53**		−0.70**		−0.10
		(0.11)		(0.26)		(0.23)		(0.21)
Low risk tol.		0.24**		0.53**		−0.48**		−0.10
		(0.11)		(0.24)		(0.19)		(0.13)
High risk tol.		0.36**		0.67***		−0.50**		−0.20
		(0.15)		(0.24)		(0.19)		(0.17)
Very high risk tol.		−0.18		0.60**		−0.69**		−0.22
		(0.36)		(0.27)		(0.26)		(0.25)
Age of business		0.00		0.01		0.00		0.00
		(0.00)		(0.00)		(0.00)		(0.00)
Digitalization score		−0.01		0.03		0.05**		−0.04
		(0.03)		(0.05)		(0.02)		(0.03)
Constant	2.30***	2.19***	2.44***	1.88***	1.75***	2.27***	3.50***	3.58***
	(0.24)	(0.24)	(0.43)	(0.61)	(0.21)	(0.36)	(0.27)	(0.24)
Adj. R-Squared	0.078	0.082	0.065	0.070	0.040	0.045	0.071	0.071
Controls (region)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls (sector)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1537	1537	892	892	876	876	979	979

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors clustered as specified in section 3 (in parentheses). Regressions are weighted with respect to region, size of the business (in MX only) and sector. Dependent variables: impact of COVID-19 pandemic on business overall on a scale from 1 to 5 (large decrease, decrease, quite unchanged, increase, large increase). Businesses that were founded from 2018 onwards are excluded, those with unknown starting year are included. *Controls (region)* and *Controls (sector)* indicate whether regional and sectoral dummies are included.

A.6 Codebook

Table A16: Description of questions and variables

Financial literacy questions	
Financial knowledge 1	Dividends are part of what a business pays to a bank to repay a loan. -True -False -Don't know -Refused
Financial knowledge 2	When a company obtains equity from an investor it gives the investor part of the ownership of the company. -True -False -Don't know -Refused
Financial knowledge 3	If a financial investment offers the chance to make a lot of money it is likely that there is also a chance to lose a lot of money. -True -False -Don't know -Refused
Financial knowledge 4	High inflation means that the cost of living is increasing rapidly. -True -False -Don't know -Refused
Financial knowledge 5	A 15-year loan typically requires higher monthly payments than a 30-year loan, but the total interest paid over the life of the loan will be less. -True -False -Don't know -Refused
Financial knowledge	The sum of correct answers on all financial knowledge questions; the score ranges from 0 to 5.

Financial behaviour 1	You mentioned that you have a current or savings account for your business. Can you tell me which of these statements best represents your situation? -I use the same account for both my household and business finances -I have separate accounts for my household and for my business, but I find it quite difficult to manage household and business finances separately -I manage strictly separate accounts for my household and for my business -Don't know -Not applicable (does not have an account) -Refused
Financial behaviour 2	Which of the following statements best describes how you made your most recent choice about a financial product or service for the business (e.g. current account, business loan, insurance policy, etc.)? -I considered several options from different financial providers before making my decision -I considered the various options from one financial provider -I didn't consider any other options at all -I looked around but there were no other options to consider -Don't know -Not applicable (no product indicated before) -Refused
Financial behaviour 3	How do you keep track of the financial records of the business? -In electronic format (e.g. MS Excel or dedicated software) -In paper form (e.g. noting them in a notebook; keeping receipts and invoices) -I keep track of financial records in my head -Someone else does it for me (e.g. an accountant) -In another way -I do not usually keep track -Don't know -Refused
Financial behaviour 4	Have you thought about how you will fund your own retirement or maintain yourself when you will no longer work due to old age? -Yes -No / Not yet -Don't know -Refused

Financial behaviour 5	Imagine that tomorrow you discover that most of the equipment that you need to operate the business has been stolen (it could be computers, vehicles or other equipment). Which one of these statements best represents what you would do? -I would use money that my business has set aside for emergencies -I would claim insurance on all or part of the equipment -I would take a loan to buy new equipment -I would use some personal or household funds -I would ask family members or friends to lend me money or equipment -I would stop my business temporarily or for good -I don't know, I have never thought about how I would cope -Other: specify -Don't know -Refused
Financial behaviour 6	I keep secure data and information about the business. -Strongly disagree -Disagree -Agree -Strongly agree -Don't know -Refused
Financial behaviour 7	I compare the cost of different sources of finance for the business. -Strongly disagree -Disagree -Agree -Strongly agree -Don't know -Refused
Financial behaviour 8	I forecast the profitability of the business regularly. -Strongly disagree -Disagree -Agree -Strongly agree -Don't know -Refused

Financial behaviour 9	I adjust my planning according to the changes in economic factors. -Strongly disagree -Disagree -Agree -Strongly agree -Don't know -Refused
Financial behaviour	The sum of correct answers on all financial behaviour questions; the score ranges from 0 to 9.
Financial attitude 1	I set long financial goals for the business and strive to achieve them. -Strongly disagree -Disagree -Agree -Strongly agree -Don't know -Refused
Financial attitude 2	I am confident to approach banks and external investors to obtain business finance. -Strongly disagree -Disagree -Agree -Strongly agree -Don't know -Refused
Financial attitude 3	I prefer to follow my instinct rather than make detailed financial plans for my business. -Strongly disagree -Disagree -Agree -Strongly agree -Don't know -Refused
Financial attitude	The sum of correct answers on all financial attitude questions; the score ranges from 0 to 3.

Financial literacy	The sum of correct answers on all financial knowledge, all financial behaviour and all financial attitude questions; the score ranges from 0 to 17.

Entrepreneur classifications

Necessity (dummy)	Dummy that takes the value 1 if the respondent agreed or strongly agreed to any of the following two statements: -I have a business because I could not find a job as an employee -Starting a business was my only option to earn some income For everyone who (strongly) disagreed or answered don't know (which is treated as mid-point on the Likert-scale) the value is 0.
Opportunity (dummy)	Dummy that takes the value 1 if the respondent agreed or strongly agreed to any of the following two statements: -I like to work for myself and be my own boss -The business allows me to turn my ideas into practice For everyone who (strongly) disagreed or answered don't know (which is treated as mid-point on the Likert-scale) the value is 0.
Necessity (continuous)	Combination of the four questions above using the standardized, second component of a polychoric factor analysis. Don't know again treated as mid-point and refused excluded.

Business performance measures

Business overall	Ordinal variable describing the self-assessed COVID-19 pandemic impact on the overall business: 1-Large decrease; 2-Decrease; 3-Quite unchanged; 4-Increase; 5-Large increase. Everyone who refused to answer or answered don't know is excluded.
Revenues	Ordinal variable describing the self-assessed COVID-19 pandemic impact on the revenues: 1-Large decrease; 2-Decrease; 3-Quite unchanged; 4-Increase; 5-Large increase. Everyone who refused to answer or answered don't know is excluded.
Profits	Ordinal variable describing the self-assessed COVID-19 pandemic impact on the profits: 1-Large decrease; 2-Decrease; 3-Quite unchanged; 4-Increase; 5-Large increase. Everyone who refused to answer or answered don't know is excluded.

Employees	Ordinal variable describing the self-assessed COVID-19 pandemic impact on the number of employees: 1-Large decrease; 2-Decrease; 3-Quite unchanged; 4-Increase; 5-Large increase. Everyone who refused to answer or answered don't know is excluded.
Business performance (continuous)	Combination of the questions of COVID-19 pandemic impact on revenues, profits and number of employees using first component of a polychoric factor analysis. Don't know and refused are excluded.
Control variables	
Male	Dummy that takes the value 1 if the respondent is male and 0 otherwise.
Age	Age of the respondent in years.
Education level	Educational attainment of the respondent: 1-low education: lower secondary education or below; 2-medium education: upper secondary education; 3-high education: at least tertiary education.
Finance training	Dummy that takes the value 1 if the respondent has received education in subjects related to business, economics or finance in school or at university.
Parent owns business	Dummy that takes the value 1 if any of the respondent's parents has owned or owns a business.
Region (dummies)	Five dummies indicating in which region at NUTS-1 level the business is located: in central, north-east, north-west or south Italy or on one of the islands (Sardinia and Sicily).
Sector	Self-reported main activity of the business: 1-Agriculture, forestry and fishing; 2-Manufacturing; 3-Construction and real estate; 4-Wholesale and retail trade; 5-Transportation, shipping, storage; 6-Accommodation, food and beverage services; 7-Other personal services such as education, beauty, repairs, laundry; 8-Information and communication; 9-Business services such as legal, accounting, advertising, cleaning; 10-Other.
Risk tolerance	Scale from one to four, where four means that respondents strongly agree and one that they strongly disagree with the following statement: "I prefer high-risk and high-yield projects rather than low-risk and low-yield projects".

Self-confidence	Scale from one to five, where one means the self-assessed financial knowledge is *very low* and five the knowledge is *very high* in comparison to other adults in the country.
Age of the business	Age of the business in years, calculated as the difference between 2021, when the survey was conducted, and the starting business year. Missing values are mean-imputed and data are winsorized at the 98th percentile.
Digitalization score	The digitalization score ranges from 0 to 5 and measures the level of digital competencies based on the use of ICT tools and services prior to COVID-19. This score is computed as the sum of five dummy variables, each indicating whether the firm has ever undertaken the following actions: -Have a dedicated website to showcase the products or services of the business -Have a dedicated website to sell the products or services of the business -Have opened a bank account completely online -Have signed an insurance contract completely online -Use open banking services or applications to manage business finances and payments