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MICRO-ENTREPRENEURS AND THE TWIN GREEN AND DIGITAL TRANSITIONS. DOES FINANCIAL LITERACY PLAY A ROLE?

by Alessio D'Ignazio*, Daniela Marconi* and Massimiliano Stacchini*

Abstract

The digital and sustainable transitions are two strategic drivers of growth and innovation for micro, small and medium-sized enterprises. This is especially relevant for micro-firms, which lag significantly behind larger firms in these areas. Financial literacy can play a key role in guiding small entrepreneurs to make sound financial choices and make the twin transition successful. We exploit a survey conducted by the Bank of Italy in 2021 – involving about 2,000 non-financial firms with fewer than 10 employees – to investigate whether financial literacy acts as a driver for the twin transition. Through instrumental variable estimation, we find evidence of a causal link between financial literacy and both digitalization and engagement in sustainable activities.

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1   Introduction[1]

In 2020 the European Commission presented the "SME Strategy for a sustainable and digital Europe". The first pillar of the Strategy aims at increasing the number of SMEs engaging in sustainable business practices as well as the number of SMEs employing digital technologies (so-called twin transition). Micro SMEs – i.e. firms with less than 10 employees, MSMEs – will play a crucial role within the twin transition process. MSMEs are indeed very relevant in many European countries, accounting on average in the EU27 for about 20 per cent of value added and 30 per cent of employment. Italy, in particular, is one of the European countries where firms with less than 10 employees account for the largest share of value added and employment (25 per cent and 42 per cent, respectively, in 2019; Figure 1).

In the areas of digitalisation and sustainability, MSMEs are significantly lagging behind with respect to larger firms. According to European Investment Bank (2021), only 40 per cent of European micro-firms had implemented at least one digital technology in 2020, about half of the share for large firms. The shares remained similar in 2021, with the probability of micro-firms investing in digital technologies being significantly lower than that of SMEs (European Investment Bank, 2022). The European Commission (European Commission and Executive Agency for Small and Medium-sized Enterprises et al., 2021) shows that in the pre-Covid-19 pandemic period, about 20 per cent of MSMEs believed that there was no need to introduce any digital technologies at all (16 per cent of MSMEs and 10 per cent of medium-sized SME). The study also finds a positive association between the digital profile of firms and climate-related investment. Concerning the latter, according to European Commission and Executive Agency for Small and Medium-sized Enterprises et al. (2021) one third of European SMEs have a sustainability strategy, while about one fifth said that they do not have it and will not have one in the future. The share of firms concerned with sustainability issues is even lower among micro-firms, as the interest in sustainability projects is inversely related to firm size (Yook et al., 2018). Indeed, according to Istat (2020), Italian micro-firms

invest significantly less in sustainability projects with respect to larger firms.

Despite the relevance of MSMEs within an economy moving towards an increase in both digitalisation and sustainability, little is known about the drivers of their choices on such areas. Investigating these drivers is indeed relevant, as such analysis can provide useful insights to support the twin transition. In this paper we investigate whether firms' financial literacy affects MSMEs strategies on both digitalisation and sustainability. On a theoretical ground, the role of financial literacy in fostering digitalisation is largely associated to the expansion of digital financial services and products (DFS). Lo Prete (2022) investigates country-level data and shows that financial literacy is positively correlated to a higher use of digital payments. On a similar ground, Yang et al. (2023) use household-level data in China and find, by means of an IV approach, that financial literacy positively affects the use of DFS. Indeed, greater financial competencies could allow entrepreneurs to evaluate better (and take advantage of) the opportunities offered by DFS.

While the relationship between financial literacy and sustainability has been investigated at the individual level (see, for instance, Gutsche et al., 2023), it is still unexplored at the firm-level. All in all, greater financial literacy arguably encourages entrepreneurs' thinking about the drivers of their firm's growth, including sustainability issues. For instance, a short-sighted approach by MSMEs on climate change related issues could be very penalizing both in terms of participation to global value chains and access to finance in the near future (Angelini, 2022). Along this line, Aristei and Gallo (2024) focus on the post-Covid 19 pandemics firm-level data and find that businesses adopting high-quality green management practices are less likely to face a decline in liquidity shortages.

Overall, whether financial literacy determines greater entrepreneurs' involvement in digital and sustainable activities or not is an empirical question, but there is no evidence available so far. We investigate whether such causal relationships exist by exploiting a survey conducted by the Bank of Italy in spring 2021, involving about 2,000 non-financial firms with less than 10 employees. The survey was part of a larger initiative, promoted by the G20 Italy Presidency 2021 using the OECD/INFE 2020 survey instrument to measure the financial literacy of MSMEs and involved fourteen countries (see G20/OECD-INFE, 2021).

The identification of any causal relationship between financial literacy and both

digitalisation and engagement in sustainable activities is challenging, with several potential sources of endogeneity being at work. We obtain a consistent estimate of that causal relationship by means of instrumental variable estimation, where the exogenous source of variation is derived from a reform of the banking system that took place in Italy in 1936. We find that financial literacy positively affects both the extent of digitalisation and the engagement in sustainable activities. Our results, which survive a battery of robustness checks, are coherent with the assumption that the role of financial literacy in fostering digitalisation is associated to the expansion of DFS.

The remainder of the paper is organized as follows. Section 2 describes the data and how the key indicators of financial literacy, digitalisation and engagement in sustainable activities were devised. Section 3 outlines the empirical strategy, while the results are discussed in Section 4. Section 5 provides a discussion and investigates the possible channels through which financial literacy affects digitalisation. Section 6 concludes.

2 Data

The empirical analysis benefits from a new survey promoted by the G20 Italy Presidency 2021 and conducted by the Bank of Italy in 2021. The surveyed sample consists of about 2,000 non-financial Italian firms with less than 10 employees,[2] representative of the population of Italian MSMEs (consisting of 4.4 million of businesses).[3]

Figure 2 displays some characteristics of the Italian MSMEs sample. About 20 per cent of the surveyed firms have a turnover below 100,000 euro, while about 50 per cent are characterized by sales between 100,000 and 500,000 euro; one third have a turnover greater than 500,000 euro. About 30 per cent of entrepreneurs achieved university-level education, while about half of them reached a secondary school or upper school diploma at most; the share of entrepreneurs that completed primary school only or did not get any formal education at all is negligible. About 60 per cent of people were aged between 40 and 59 years and slightly less than 30 per cent of interviewed entrepreneurs are female. Finally, and with regard to geographical localization, about 70 per cent of

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[2]More specifically, the questionnaire asks to indicate the number of (full-time equivalent) people working in the firm including the owner. With this approximation in mind, the entrepreneurs who claim to work in one-person businesses are referred as self-employed throughout the paper.

[3]For a more detailed description of the survey see D'Ignazio et al. (2022).

micro-enterprises are located in the Center and North, with only 30 per cent in the South and Islands. The questionnaire used for the survey was developed by OECD/INFE, with the main aim to measure the financial literacy of small firms (OECD-INFE, 2018). In 2021 the questionnaire was revised to take into account the consequences of the COVID-19 crisis on businesses and to investigate both small businesses' digitalisation and involvement into sustainable activities as well.

MSMEs' financial literacy. – In line with the existing OECD/INFE (2018) definition, financial literacy is measured as a combination of financial knowledge, behaviors and attitudes. Each of these three components is assessed by means of a score built drawing from five, nine and three questions, respectively (see Table A2). In particular, the knowledge score is computed as the number of correct answers to the financial knowledge questions, while the financial behavior score and the financial attitude score are computed as the number of "financially savvy" behaviors and attitudes, respectively. In order to devise a financial literacy score we aggregate the scores of the three components. Following D'Ignazio et al. (2022), we employ a weighted financial literacy score, where each of the three components (knowledge, behavior, attitudes) is given an equal importance. In particular, we normalize each financial component's score between 0 and 1 (dividing the raw score by the number of questions) and then we sum them up. In this way, we obtain an overall financial literacy score ranging from 0 to 3. The average score of micro-entrepreneurs is equal to 2.12 and it corresponds to about the 70 per cent of the maximum level (see Table 1). As pointed out by D'Ignazio et al. (2022), the share of small-business owners with an 'adequate' level of financial literacy, is low in Italy: less than 4 in 10 business owners according to the metric developed by OECD/INFE.

MSMEs' digitalisation. – The micro-entrepreneurs' involvement in digital activities is measured in the survey both before and after the pandemic. Since the breakthrough of the pandemic, as a response to the crisis, several firms increased their digital activities. Such phenomenon was heterogeneous across several firm characteristics, such as size and sectors (see D'Ignazio et al., 2022); arguably, the greater digitalisation was transitory in some cases. In order to estimate the causal relationship between financial literacy and digitalisation more accurately, in our analysis we investigate the extent of MSMEs pre-pandemic digitalisation. In particular, we exploit ten questions pertaining to engagement in digital activities, reported in Table A3. Five of them require a "yes/no" answer; for them, we assign a score equal to 1 in the case of "yes" (i.e., the

firm engage in the specific digital activity) and 0 otherwise. Five questions require instead the entrepreneur to claim whether the relevance of specific digital activity for the business is "very small, small, quite large, very large"; for them, we assign a score ranging from 0 ("very small") to 3 ("very large"). We sum up such scores and obtain a normalized digitalisation score, ranging from 0 to 1 (see Table A3 for more details about the construction of the score). The average digitalisation score is equal to 0.43 (Table 1).

MSMEs' engagement in sustainable activities. – The entrepreneurs' engagement in sustainable activities is measured in the survey by means of three questions only, involving the following topics: taking into account the environmental impact of investments; taking into account the social impact of investments; encouraging actions with low environmental impact. For each of them the entrepreneur reports whether she strongly disagrees, disagrees, agrees or strongly agrees. The questions are reported in Table A4. In order to devise a measure of sustainability engagement, we assign to each question a score ranging from 0 ("strongly disagree") to 3 ("strongly agree). We sum up such scores and obtain a normalized score of engagement in sustainable activities, ranging from 0 to 1. At a glance, the average score level of engagement in sustainable activities is equal to 0.59.

MSMEs characteristics. – The survey provides a large set of firm and entrepreneur characteristics, such as size, education, sector of economic activity, gender, age, geographical area and entrepreneurial experience. The descriptive statistics are reported in Table 1, while the full set of variables is described in Table A1. Not surprisingly, MSMEs that are larger in size (in terms of turnover) display a larger average score for both digitalisation and engagement in sustainable activities (Figure 3). Both digitalisation and engagement in sustainable activities require indeed some sunk costs, which can be more easily borne by larger firms. Along with firm size, the level of education of the entrepreneurs plays also a relevant role in shaping the involvement of the firm in both digital and sustainability activities (Figure 4). When firms are grouped according to their level of financial literacy, however, differences in the mean scores of both digitalisation and sustainability are even larger (Figure 5).

MSMEs' exposure to climate change risks. – The analysis of entrepreneurial engagement in sustainability transition considers the exposure of individual firms to climate change risks. The physical proximity to these risks might act as a catalyst of

the individual sensitivity toward sustainability. Such exposure is measured by means of a composite indicator that takes into account five indicators of landslide and flooding risks, available at municipality level: the percentage of local units at risk; the percentage of area at risk; the percentage of buildings at risks; the percentage of population at risk and the percentage of households at risks (see Table A1). The basic indicators are retrieved from the Environmental Data Yearbook compiled by the Italian Institute for Environmental Protection and Research (ISPRA). Figure 6 illustrates the geographical distribution of floods and landslides risks over the Italian territory, at the municipality level. As expected, the extent of these risks is widely heterogeneous across the country. Figure 7 shows the distribution of our sampled micro-enterprises by level of exposure to climate change risks. In particular, about one fifth of sampled firms are located in the quartile of Italian municipalities with high climate change risks areas; a similar share characterizes firms headquartered in low-risk municipalities, while about 50 per cent of firms operate in medium climate risk areas.

3 Empirical strategy and identification

The aim of the paper is to assess the impact of entrepreneur financial literacy on both digital and sustainable transition. Formally, we estimate such causal relationships by means of the following linear regression model

$$y_i = \alpha + \beta FL_i + X_i\gamma + P_i\delta + \theta r_{mi} + \mu e_{mi} + \epsilon_i \tag{1}$$

where y_i is a measure of digitalisation or of the extent of involvement into sustainability for firm i; FL_i is a measure of financial literacy of firm i; X_i is a set of firm-specific controls, including sector, area and size (measured by the turnover); P_i is a set of entrepreneur-specific controls, including level of education, gender, age, working experience and acquaintance with finance and economics (measured by both the participation to financial courses and being parented by an entrepreneur); r_{mi} is an indicator capturing wealth conditions of population in firm i's municipality m, given by the share of individuals with an annual income lower than € 26,000 in year 2019 (the latest available); e_{mi} is the exposure to climate change related physical risks. Standard errors are clustered at the municipality level.

OLS estimates of equation (1) arguably suffer from three sources of bias and

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hence cannot be intended in a causal fashion. Firstly, although a large set of firm- and entrepreneur- level controls are employed in the regression, there still could be unobserved firm characteristics, such as firm productivity, affecting both the dependent variables and the financial literacy. In this case, OLS estimates would be upward biased, since productivity is arguably positively correlated with both financial literacy and the two dependent variables. A similar bias could arise if unobservable components that are specific for the entrepreneur, such as her innate abilities, correlate with both entrepreneur's literacy and digitalisation skills or sustainability involvement. A second source of bias could stem from potential reverse causality issues, when greater digitalisation or sustainable investments might call for greater investments in financial knowledge, leading to inflated OLS coefficients. Finally, measurement error of the independent variable of interest (i.e., financial literacy) would lead to biased OLS estimates.[4]

We tackle these challenges and reach causal identification by means of instrumental variable (IV) estimation. To devise our IV we exploit a source of exogeneity operating at the municipality level, stemming from an exogenous shock on the offer of banking services. In particular, the source of exogeneity comes from the 1936 banking law, which introduced a reform to protect the banking system from instability:[5] it significantly constrained the growth of banks in Italy over the following 50 years (Guiso et al., 2004) and led to a segmented banking system until the 1980s (Angelini and Cetorelli, 2003; De Bonis et al., 2023). Even though the reform reduced competition in the Italian banking system for many years, what we are exploring here is the effect of the shock on the availability of banking services. This may have influenced the development of different abilities across the Italian territory to handle financial issues and become familiar with various financial services.

More in detail, our IV is grounded on three streams of research, showing: (i) that individuals' financial literacy is influenced by that of peers or that of reference groups (Bucher-Koenen and Lusardi, 2011; Fornero and Monticone, 2011; Klapper et al., 2013); (ii) the causal effect of financial experience on financial literacy (Frijns et al., 2014);

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[4]Specifically, a downward (upward) bias would arise if financial literacy was measured with a positive (negative) additive error.

[5]The 1936 banking law, passed to address the crisis following the Great Depression, separated between short- and long-term credit and between banking and industry. Credit institutions were grouped into four categories, facing different constraints on the territory where they could open branches (city, province or region, depending on the type of bank) accordingly.

(iii) the existence of a relationship between exposure to banks and customers' financial literacy (Brown et al., 2019; Fort et al., 2016). Building on the above research, we claim the (exogenous) offer of banking services across municipalities in 1951 affected financial literacy of individuals living in such territories who, in turn, passed these competences to their peers. Hence, as instrumental variable we use the number of bank branches per square km in 1951 (the earliest available year), at the municipality level.

The exclusion restriction assumption requires that, conditional on the controls used in the regressions (including area and firm sector dummies), the instrumental variable affects our two independent variables only indirectly, by means of the entrepreneur's financial literacy. A possible threat to the exclusion restriction assumptions would arise in the case that the density of bank branches in 1951 at the municipality level reflects pre-existing (historical) local differences in the economic and financial landscape, thereby shaping current entrepreneurial engagement as well as levels of financial knowledge.

While the exclusion restriction assumption is not testable, we run some estimates to assess a number of potential threats to identification. In particular, we exploit 1951 municipality data available from Istat census and estimate the correlation between our instrumental variable and some relevant economic activity indicators (labour market participation and the unemployment rate, the only ones available for that year) and the illiteracy rate. As reported in Table A5, columns 1, 2 and 3, the estimated coefficient of interest is not statistically significant, suggesting that our instrument is not correlated with local economic performance in 1951. To take into account the possibility that the density of bank branches of municipality m in 1951 might have shaped the economic growth of that municipality in the following decades – affecting its current wealth and, in this way, fostering access to digital technologies and sustainable activities in that area – in our estimates of model (1) we control for current wealth at the municipality level. We use the share of municipality population with an annual income below € 26,000, a threshold largely used in Italy to identify low income earners, who have access to fiscal bonuses.[6]

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[6] For instance, the tax credit introduced in Italy in 2014 was targeted to employees with gross annual income between euro 8,145 and 26,000. Such measure was maintained in the following years, with the income threshold slightly increased to euro 28,000.

4 Results

The baseline results of the econometric analysis about the effect of financial literacy on digitalisation are displayed in Table 2. The OLS estimates show that financial literacy positively correlates with the extent of digitalisation. As expected, entrepreneurs holding at least a secondary school diploma display a greater use of digital activities; on the other hand, smaller firms are charaterised by a lower degree of digitalisation; age seems to matter, with early career entrepreneurs (less than 50 years old) being more engaged in digital tasks.[7]

IV estimates (in column 5) provide evidence for a causal relationship between financial literacy and entrepreneurs' engagement in digitalisation. As far as the first stage regression is concerned, the estimates document the significance of our instrument in shaping entrepreneurs' financial skills; they also show that financial literacy is higher among owners with a secondary school diploma and those who have an entrepreneur as a parent; it is lower among young owners who are likely to have accumulated lower level of experience in the conduct of the business. The second stage shows that the coefficient of the financial literacy is positive, statistically significant and sizeable: a one standard deviation increase in the financial literacy score leads to an improvement of the engagement in digitalisation equal to about 44 per cent of the average digitalisation level. Moreover, the IV estimates confirm the important role played by age when exploring the digital transition, as early-career entrepreneurs engage in digital activities more than late-career ones. The first stage F-statistic is well above the conventional threshold for weak instruments. The downward bias observed in OLS results aligns with findings from Lusardi and Mitchell (2014), who show that the impact of financial literacy on financial decision-making estimated through IV models tend to be larger compared to those estimated through OLS in many cases, pointing to a possible underestimation of the true effect by OLS estimates.

Table 3 investigates the relationship between financial literacy and entrepreneurs' engagement in sustainable activities. OLS results show that financial literacy positively correlates with efforts towards sustainability. On the other hand, the level of education, which is significantly linked to entrepreneur's financial skills, does not show any

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[7]Heterogeneities at the economic sector level are also highlighted by (unreported and available upon request) economic sector level dummies.

correlation with engagement in sustainability. OLS findings are strengthened by IV regression results (in column 5), showing a causal relationship between financial literacy and entrepreneurs' interest into sustainability issues: in particular, a one standard deviation increase in the financial literacy score leads to an increase of the engagement into sustainable activities by about 40 per cent of the average level.

Interestingly, women entrepreneur appear more willing to engage in sustainable activities than men, while age does not play a role in this case. Finally, firms located in municipalities characterized by higher climate-related physical risks are more likely to engage in sustainable activities. This result suggests that the proximity of the businesses to these risks might enhance awareness and sensitivity to sustainability issues. As in the previous set of results, the first stage confirms the significance of the link between financial skills and our instrument and the value of the F test statistics is reassuring with regard to the strength of our IV strategy.

4.1 Robustness checks

In this section we perform a battery of robustness exercises to assess the relationship between financial literacy and engagement in digitalisation or sustainabile activities (Table 4, panel *a* and panel *b*, respectively).

As a first robustness check (in column 1), we estimate model (1) by including additional firm-level controls. In particular, we introduce more granular regional dummies (moving from two macro-regions – Centre & North vs South and Islands – to four regions – North West, North East, Centre, South & Islands –), more granular age dummies (moving from one dummy to four dummies – below 30 years, between 30 and 49, between 50 and 70, more than 70 –), more granular education level dummies (moving from one dummy to three dummies) and firms legal entity type. Second (column 2), we measure in an alternative way the wealth of individuals living in the province where the firm is headquartered. Namely, we use the per capita added value - available however at NUTS3-level only - instead of the share of municipality population with income below 26,000 euro. Third (column 3), we include a set of regional dummies rather than area dummies, accounting in a more precise way for unobserved heterogeneity that does not vary within each Italian region. Fourth, (column 4) we employ as dependent variable a dummy taking value one if the digitalisation or sustainability score is above the mean level and 0 otherwise. Finally, (column 5), we consider a dichotomous measure

of financial literacy rather than a continuous one. To this aim, we devise a binary variable taking value 1 for micro-entrepreneurs with a FL score above the median and 0 otherwise.

Results strengthen our findings on baseline estimates, with the estimated coefficient of interest - i.e. that associated to the Financial literacy score - being always statistically significant and similar in size with that of our previous findings across all alternative specifications of model (1) (see columns 1, 2 and 3).

4.2 Further robustness checks: alternative IV

As a further robustness check, we devise a second instrumental variable, exploiting as source of exogeneity the number of universities that offered a degree in economics near the entrepreneurs' area, similarly to Klapper et al. (2013). Differently from Klapper et al. (2013), who focus on the total number of universities in each region, we consider only those universities offering degrees in economics; moreover, we use more granular municipality-level data to identify universities that are close enough the entrepreneur. To this aim, we exploited 2015 data provided by Istat.

The presence of courses in economics offered by nearby universities is arguably correlated to the financial literacy of both the entrepreneurs and their peers, who were exogenously exposed to a different amount of information and economic knowledge according to their closeness to such universities. To devise our instrumental variable, we firstly computed, for each firm, the driving time distances between the municipality where firm is headquartered and any other Italian municipality. Then, we selected those municipalities reachable with a driving time of at most 30 minutes. Finally, we summed up the number of faculties offering economics degrees in those municipalities, including the one where the firm is headquartered.

To frame our preferred instrumental variable we exploit three streams of research, showing: (i) that individuals' financial literacy is influenced by that of peers or that of reference groups (Bucher-Koenen and Lusardi, 2011; Fornero and Monticone, 2011; Klapper et al., 2013); (ii) the causal effect of financial experience on financial literacy (Frijns et al., 2014); (iii) the existence of a relationship between exposure to banks and customers' financial literacy (Brown et al., 2019; Fort et al., 2016). Building on the above research, we claim that an exogenous shock on the financial services offered within a certain territory would shape, in future, the average level of financial literacy

in that area.

The IV estimates obtained with the alternative instrument described above, reported in Table 4 (column 6) confirm our baseline findings about the causal relationship between financial literacy and both digitalisation and sustainability. However, in this case it should be noted that the instrument is weaker, as shown by the first stage statistic.

5 Discussion

Financial literacy might positively affect digitalisation through several possible mechanisms. We argued before that a first mechanism involves the role of financial literacy in enhancing the access to digital financial activities, and, in this way, fostering further digitalisation. A second possible mechanism involves the role of financial literacy in making the entrepreneur aware of the potential benefits stemming from more digital commercial activities.

With respect to this second mechanism, at least two channels are at work. Firstly, higher financial literacy might lead to a greater awareness of the importance of technological upgrade to improve the productivity through, for instance, online selling platforms and a more digitalised business organization. Secondly, higher financial literacy might lead to higher propensity of small firms to digitize their businesses because this could allow them to improve their access to finance. In fact, in the current fast expanding digital financial landscape, innovative financial service providers make an intensive use of data analytics stemming from financial and commercial digital activities to assess small businesses creditworthiness (International Financial Corporation and SME Finance Forum, 2023).

In order to investigate whether some of the above outlined mechanisms are at work, we run some additional estimates of our baseline model considering, in turn, different outcome variables. First, in order to investigate whether the link going through the access to digital finance plays a role, we employ as dependent variable a dummy equal to one if the entrepreneurs has opened a current account completely online and zero otherwise, and a dummy equal to one if the entrepreneur has signed a financial or insurance contract completely online and zero otherwise. Second, in order to investigate whether financial literacy plays a role for the business via purely non-financial channels, we employ as dependent variable a dummy equal to one if the firm has a website to

advertise her products or services, and zero otherwise, or whether it uses social media to promote the business.

Finally, as falsification test, we study the relationship between entrepreneurs' FL and the share of online payments received from their customers. In particular, since entrepreneurs have limited capability to influence access to digital instruments of their customers, we do not expect any statistical significant relationship between entrepreneurs' FL and their customers payment habits.

Results are displayed in Table 5. Concerning the relationship between financial literacy and access to digital financial instruments, columns 1 and 2 support our claim hinting at a direct relationship, as FL positively affects both the access to online current account and to digital financial services. The estimates also provide support to the claim that higher financial literacy might lead to a greater awareness of the importance of technology to improve the productivity, for instance by means of digital platforms to showcase their products or services. We do not find, however, a relationship between FL and usage of social network for advertising purposes. This result suggests that the use of social media even in a business environment is mostly related to personal attitudes, not-FL mediated, and experience with such instruments. Finally, concerning the falsification exercise, we do not detect any relationship between the entrepreneurs' FL and the share of online payments received from her customers.

6   Concluding remarks

Despite the relevance of MSMEs to the European economy, in terms of both value added and employment, the drivers of their strategies about digitalisation and sustainability – that are now key in Europe – are largely unknown. Investigating such drivers can provide useful insights to support the twin transition.

In this paper we investigate – for the first time, to the best of our knowledge – whether financial literacy affects MSMEs strategies about digitalisation and sustainability. On a theoretical ground, financial literacy could encourage digitalisation through the availability of digital financial services and products (DFS). In particular, financially competent entrepreneurs could decide to invest in digitalisation to exploit the opportunities offered by DFS. More generally, financial skills can stimulate economic awareness and a proper assessment of the benefits of digitalisation, for instance in terms of efficiency, competitiveness and ability to preserve business continuity during crises.

Concerning the relationship between financial literacy and sustainability, greater financial literacy might lead to larger efforts by small firms to adopt sustainable-friendly practices to mitigate the transition risks and to improve their access to sustainable finance as well.

By using an instrumental variable estimation strategy, we find evidence of a causal link between financial literacy and both digitalisation and engagement in sustainable activities for entrepreneurs. With respect to the impact of financial literacy on digitalisation, our findings suggest that financial literacy fosters digitalisation through at least two mechanisms: (i) the usage of digital financial services and products and (ii) a greater awareness of the importance of a digitalised business organization, which might eventually improve both productivity and access to finance.

These findings suggest that policy-makers should keep promoting financial education initiatives devoted at MSMEs, as they will both lead to an improvement of their financial decisions and favor greater digitalisation and involvement into environmental and social sustainabile activities.

References

P. Angelini. The financial risks posed by climate change: information gaps and transition plans, 11 2022. URL https://www.bancaditalia.it/pubblicazioni/interventi-direttorio/int-dir-2022/en-ANGELINI-15-novembre-2022.pdf?language_id=1. Remarks at the "Associazione nazionale per lo studio dei problemi del credito".

P. Angelini and N. Cetorelli. The effects of regulatory reform on competition in the banking industry. *Journal of Money, Credit and Banking*, 35(5):663–684, 2003.

D. Aristei and M. Gallo. Green management, access to credit, and firms' vulnerability to the covid-19 crisis. *Small Business Economics*, 62:179–211, 2024.

J. R. Brown, J. A. Cookson, and R. Z. Heimer. Growing up without finance. *Journal of Financial Economics*, 134(3):591–616, 2019.

T. Bucher-Koenen and A. Lusardi. Financial literacy and retirement planning in germany. *Journal of Pension Economics and Finance*, 10(4):565–584, 2011.

R. De Bonis, G. Marinelli, and F. Vercelli. Bank lending in the great recession and in the great depression. *Empirical Economics*, 64:567–602, 2023.

A. D'Ignazio, P. Finaldi Russo, and M. Stacchini. Micro-entrepreneurs' financial and digital competences during the pandemic in italy. *Bank of Italy Occasional Papers*, 724, 2022.

European Commission and Executive Agency for Small and Medium-sized Enterprises, P. Muller, S. Devnani, R. Ladher, J. Cannings, E. Murphy, N. Robin, S. Ramos Illán, F. Aranda, S. Gorgels, M. Priem, S. Smid, N. Unlu Bohn, V. Lefebvre, I. Frizis, and K. Hope. *Annual report on European SMEs 2020/2021 – Digitalisation of SMEs – Background document.* Publications Office, 2021.

European Investment Bank. *Digitalisation in Europe 2020-2021 – Evidence from the EIB investment survey.* European Investment Bank, July 2021.

European Investment Bank. *Digitalisation in Europe 2021-2022 – Evidence from the EIB investment survey.* European Investment Bank, May 2022.

E. Fornero and C. Monticone. Financial literacy and pension plan participation in italy. *Journal of Pension Economics and Finance*, 10(4):547–564, 2011.

M. Fort, F. Manaresi, and S. Trucchi. Adult financial literacy and households' financial assets: the role of bank information policies. *Economic Policy*, 31(88):743–782, 09 2016.

B. Frijns, A. Gilbert, and A. Tourani-Rad. Learning by doing: the role of financial experience in financial literacy. *Journal of Public Policy*, 34(1):123–154, 2014.

G20/OECD-INFE. *Navigating the Storm: MSMEs' financial and digital competencies in COVID-19 times.* Organisation for Economic Co-operation and Development, October 2021.

L. Guiso, P. Sapienza, and L. Zingales. Does local financial development matter? *The Quarterly Journal of Economics*, 119(3):929–969, 2004.

G. Gutsche, H. Wetzel, and A. Ziegler. Determinants of individual sustainable investment behavior - a framed field experiment. *Journal of Economic Behavior & Organization*, 209:491–508, 2023.

International Financial Corporation and SME Finance Forum. *Innovations in SME Financial Services.* International Finance Corporation, 2023.

Istat. *Sostenibilità nelle imprese: aspetti ambientali e sociali.* Istat, June 2020.

L. Klapper, A. Lusardi, and G. A. Panos. Financial literacy and its consequences: Evidence from russia during the financial crisis. *Journal of Banking & Finance*, 37 (10):3904–3923, 2013.

A. Lo Prete. Digital and financial literacy as determinants of digital payments and personal finance. *Economics Letters*, 213:110378, 2022.

A. Lusardi and O. S. Mitchell. The economic importance of financial literacy: theory and evidence. *Journal of Economic Literature*, 52(1):5–44, 2014.

OECD-INFE. *Toolkit for measuring financial literacy and financial inclusion.* Organisation for Economic Co-operation and Development, May 2018.

J. Yang, Y. Wu, and B. Huang. Digital finance and financial literacy: Evidence from chinese households. *Journal of Banking & Finance*, 156:107005, 2023.

K. H. Yook, J. H. Choi, and N. C. Suresh. Linking green purchasing capabilities to environmental and economic performance: The moderating role of firm size. *Journal of Purchasing and Supply Management*, 24(4):326–337, 2018.
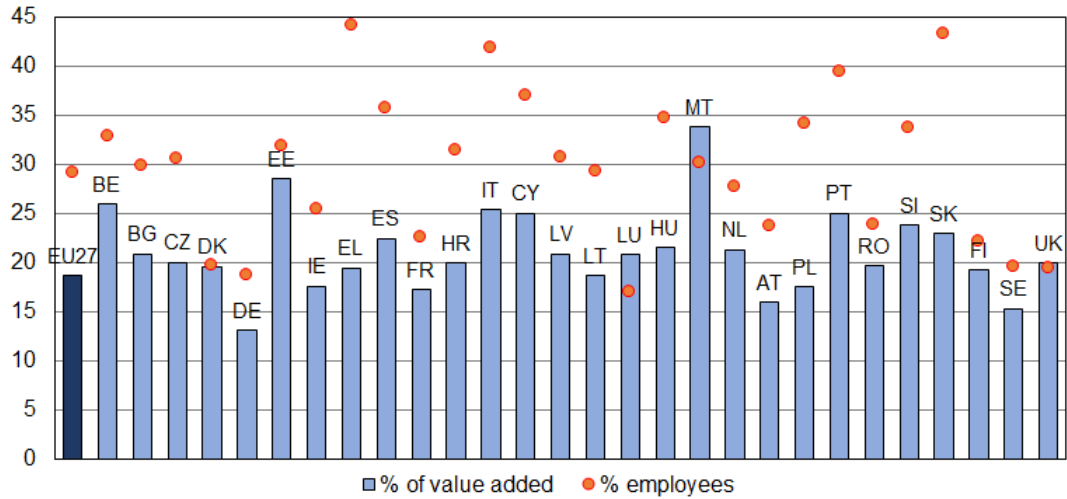
Figures

Figure 1: Share of value added and employment of MSMEs in Europe
Notes: Source: Eurostat. Data refer to year 2019, with the exception of EU27 and UK (2018).
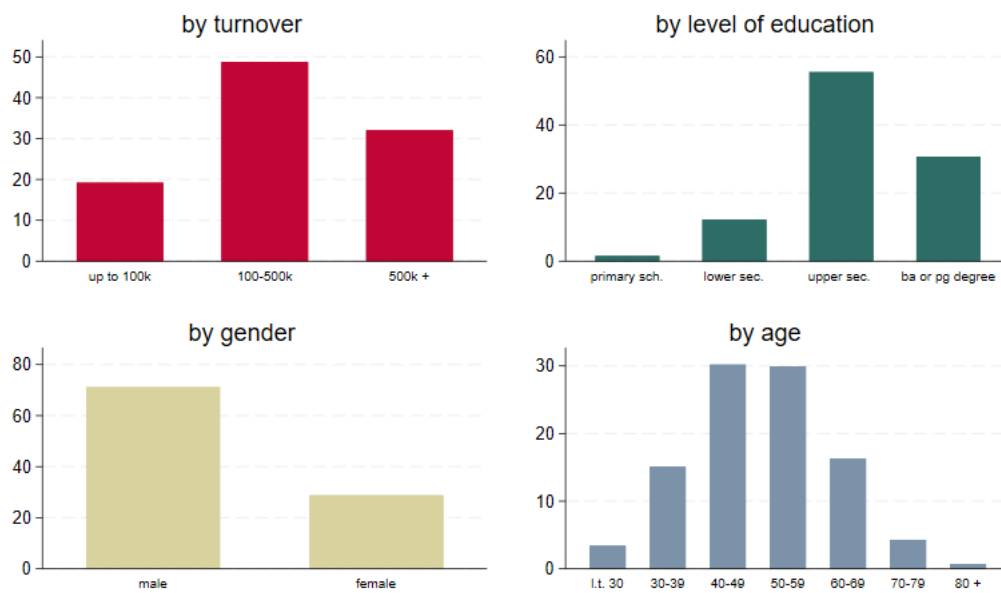
Figure 2: Sampled firms distribution (percentage values)
Notes. Sample of non-financial Italian firms with less than 10 employees. See Table A1 for the description of variables.
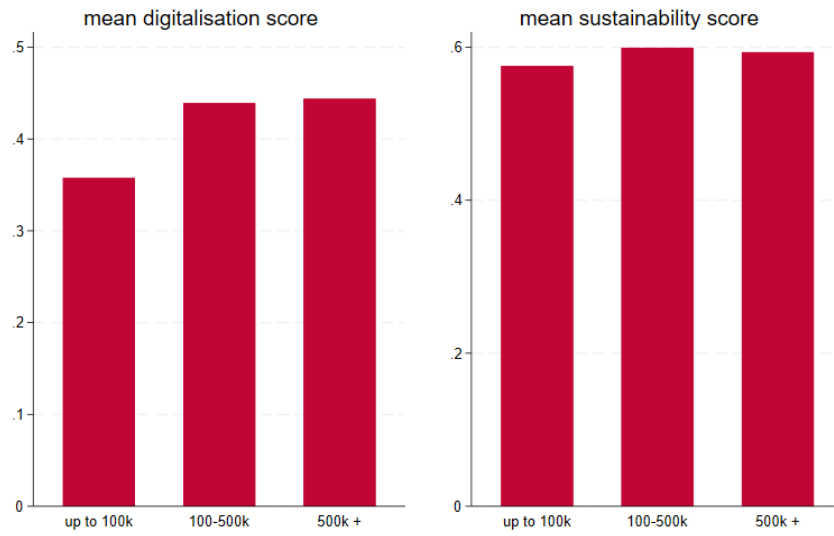
Figure 3: Digitalisation and sustainability score by class of turnover
Notes. Sample of non-financial Italian firms with less than 10 employees. Mean digitalisation score and mean sustainability score by class of turnover (up to 100,000 euro; between 100,000 and 500,000 euro; more than 500,000 euro). See Table A1 for the description of variables.
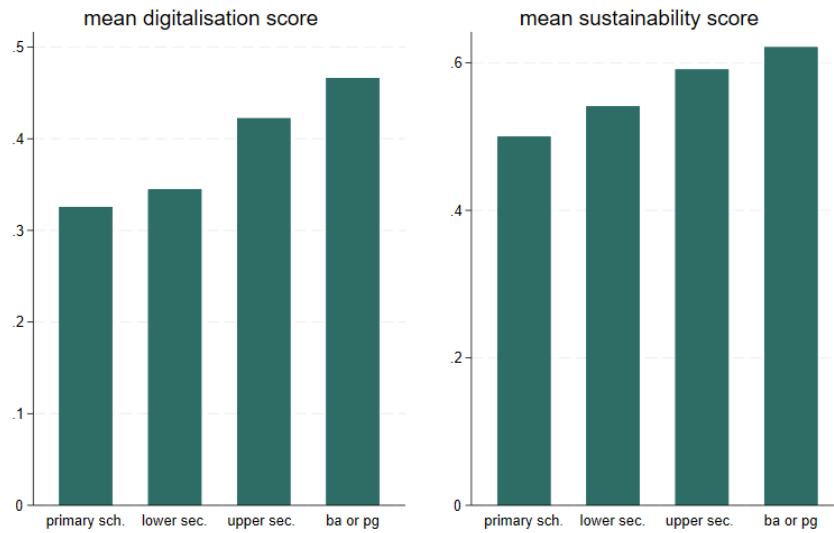
Figure 4: Digitalisation and sustainability score by entrepreneur's level of education
Notes. Sample of non-financial Italian firms with less than 10 employees. Mean digitalisation score and mean sustainability score by entrepreneurs' level of education (primary school or no formal education at all; lower secondary school; upper secondary school; bachelor or post-graduate degree). See Table A1 for the description of variables.
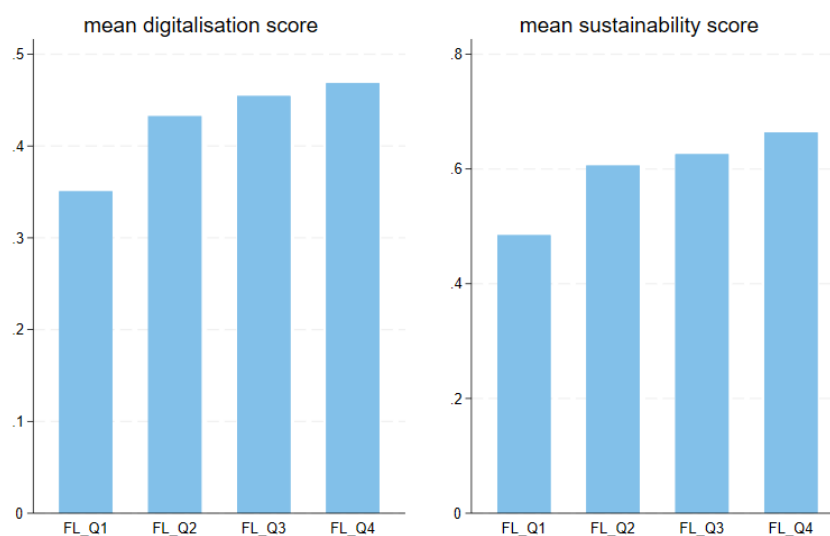
Figure 5: Digitalisation and sustainability score by entrepreneur's financial literacy
Notes. Sample of non-financial Italian firms with less than 10 employees. Mean digitalisation score and mean sustainability score by entrepreneurs' financial literacy (quartiles). See Table A1 for the description of variables.
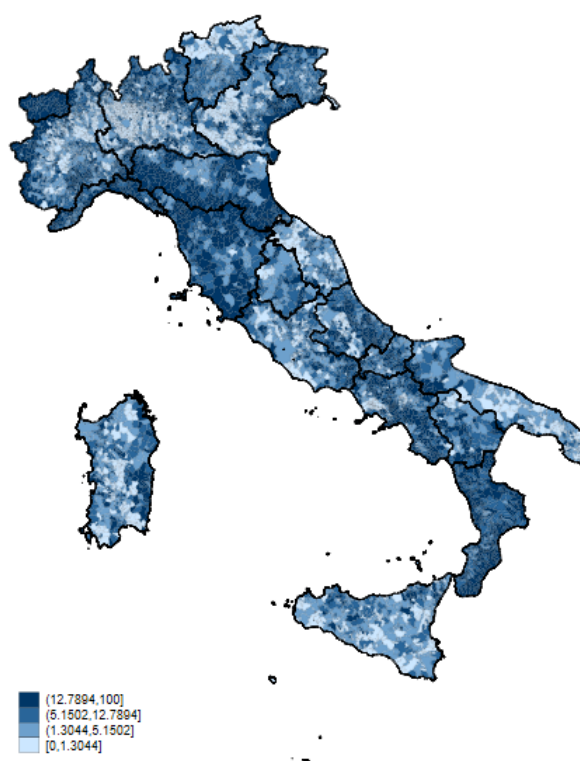
Figure 6: Flooding and landslides risk in Italian municipalities
Notes. Floods and landslides risks of Italian municipalities. Composite risk indicator that takes into account five indicators of landslide and flooding risks, available at municipality level: percentage of local units at risk; percentage of area at risk; percentage of buildings at risks; percentage of population at risk and percentage of households at risks. The basic indicators are retrieved from the Environmental Data Yearbook compiled by the Italian Institute for Environmental Protection and Research (ISPRA). See Table A1 for the description of this variable.
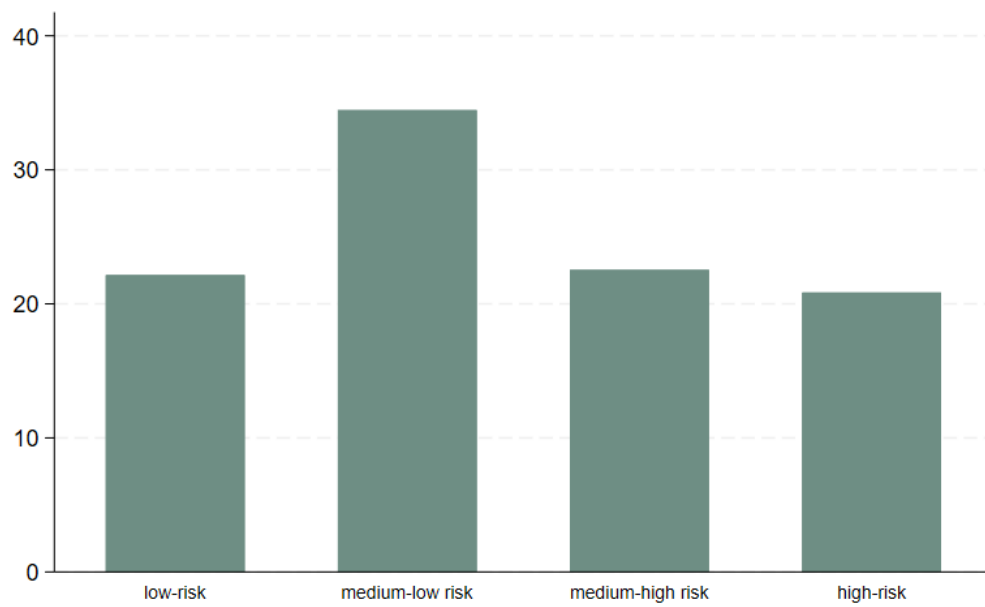
Figure 7: Sample firms' distribution by quartile of flooding and landslide risks
Notes. Sample of non-financial Italian firms with less than 10 employees. See Table A1 for the description of this variable.

Tables

Table 1: Descriptive statistics

	mean	sd
FL, digitalisation & sustainability		
FL score	2.12	0.61
digitalisation score	0.43	0.25
fin. sustainability score	0.59	0.26
economic sector		
agricolture	0.075	0.26
hospitality and food	0.068	0.25
other services	0.469	0.50
trade	0.204	0.40
construction	0.090	0.29
manufacturing	0.067	0.25
transportation and storage	0.027	0.16
area		
Centre & North	0.698	0.46
South & Islands	0.302	0.46
additional ctrls		
turnover below 50k	0.118	0.32
diploma	0.863	0.34
woman	0.288	0.45
early career	0.487	0.50
parents are entrepreneurs	0.466	0.50
entrepreneurial experience	0.577	0.49
municipality income distr.	0.281	0.07
climate change risk	1.415	1.48
NUTS3 per capita added value	25207	7613

Notes. For the description of the variables, see Table A1.

Table 2: Financial literacy and digitalisation

VARIABLES	OLS			IV	
	baseline	sector	full ctrls	first-stage	second-stage
FL score	0.0951***	0.0946***	0.0812***		0.307**
	(0.0101)	(0.00998)	(0.0103)		(0.123)
South & Islands		-0.00510	0.00935	-0.0388	0.0156
		(0.0121)	(0.0140)	(0.0369)	(0.0155)
turnover below 50k			-0.0543***	-0.435***	0.0441
			(0.0188)	(0.0478)	(0.0544)
diploma			0.0474***	0.281***	-0.0159
			(0.0177)	(0.0457)	(0.0424)
woman			0.00750	-0.0418	0.0173
			(0.0114)	(0.0276)	(0.0141)
early-career			0.0522***	-0.0877***	0.0720***
			(0.0117)	(0.0318)	(0.0182)
parents entrepr.			0.0199*	0.117***	-0.00571
			(0.0115)	(0.0257)	(0.0188)
entrepr. experience			0.0157	0.0354	0.00783
			(0.0123)	(0.0319)	(0.0138)
munic. income distr.			0.185*	0.0727	0.101
			(0.0957)	(0.253)	(0.121)
instr. variable				0.219***	
				(0.0518)	
firm sector	no	yes	yes	yes	yes
constant	0.223***	0.148***	0.0428	1.849***	-0.359
	(0.0229)	(0.0284)	(0.0402)	(0.0988)	(0.219)
observations	1,957	1,957	1,957	1,957	1,957
R-squared	0.052	0.075	0.100		
First-stage F					17.92

Notes. OLS and IV estimates on firm-level data. Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the digitalization score (see Table A1 for the definition of both the dependent variables and the covariates). The instrumental variable is the density of bank branches at the municipal level in 1951.

Table 3: Financial literacy and sustainability

VARIABLES	OLS			IV	
	baseline	sector	full ctrls	first-stage	second-stage
FL score	0.153***	0.158***	0.159***		0.389***
	(0.0101)	(0.00993)	(0.0101)		(0.0939)
South & Islands		0.0434***	0.0343**	-0.0350	0.0410**
		(0.0126)	(0.0153)	(0.0373)	(0.0164)
turnover below 50k			0.0194	-0.433***	0.120**
			(0.0187)	(0.0477)	(0.0483)
diploma			0.0158	0.282***	-0.0489
			(0.0173)	(0.0459)	(0.0306)
woman			0.0135	-0.0412	0.0234*
			(0.0117)	(0.0278)	(0.0134)
early-career			-0.0107	-0.0884***	0.00954
			(0.0122)	(0.0320)	(0.0153)
parents entrepr.			0.00706	0.117***	-0.0191
			(0.0116)	(0.0257)	(0.0170)
entrepr. experience			0.00509	0.0357	-0.00284
			(0.0125)	(0.0319)	(0.0141)
munic. income distr.			-0.124	0.171	-0.208*
			(0.0850)	(0.247)	(0.115)
geo risk			0.00642	-0.00303	0.00757*
			(0.00391)	(0.00799)	(0.00436)
instr. variable				0.220***	
				(0.0650)	
firm sector	no	yes	yes	yes	yes
constant	0.267***	0.307***	0.308***	1.831***	-0.104
	(0.0242)	(0.0295)	(0.0423)	(0.0993)	(0.163)
observations	1,957	1,957	1,957	1,957	1,957
R-squared	0.127	0.141	0.145		
First-stage F					11.49

Notes. OLS and IV estimates on firm-level data. Clustered standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The dependent variable is the digitalization score (see Table A1 for the definition of both the dependent variables and the covariates). The instrumental variable is the density of bank branches at the municipal level in 1951.

VARIABLES	add ctrls (1)	NUTS 3 added value	regional dummies	binary depvar (2)	binary FL (3)	alter. IV (4)
panel a: Financial literacy and digitalisation						
FL score	0.309*	0.260**	0.232*	0.471**		0.642**
	(0.173)	(0.103)	(0.136)	(0.215)		(0.295)
binary FL score					0.405**	
					(0.182)	
sector	yes	yes	yes		yes	yes
firm level crtls	yes	yes	yes		yes	yes
additional ctrls	yes	no	no		no	no
NUTS3 added value	no	yes	no		no	no
regional dummies	no	no	yes		no	no
First-stage F	12.20	17.68	7.755	17.92	10.25	5.102
panel a: Financial literacy and sustainability						
FL score	0.455***	0.300**	0.274*	0.876***		0.463**
	(0.160)	(0.122)	(0.150)	(0.232)		(0.220)
binary FL score					0.457**	
					(0.213)	
sector	yes	yes	yes		yes	yes
firm level crtls	yes	yes	yes		yes	yes
additional ctrls	yes	no	no		no	no
NUTS3 added value	no	yes	no		no	no
regional dummies	no	no	yes		no	no
Observations	1,957	1,957	1,957	1,957	1,957	1,957
First-stage F	11.61	17.21	8.764	21.37	10.45	4.252
Observations	1,957	1,957	1,957	1,957	1,957	1,957

Notes. IV estimates on firm-level data. Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Instrumental variable estimates. The dependent variable is the digitalization score (see Table A1 for the definition of both the dependent variables and the covariates). - (1) Additional controls include: legal entity type, age-group dummies, level of education dummies. The instrumental variable is the density of bank branches at the municipal level in 1951. - (2) The dependent variable is a dummy taking value 1 if the sustainability score is above the median and 0 otherwise. - (3) FL dummy is a binary variable taking value 1 if the FL score of the entrepreneur is above the median, and 0 otherwise. - (4) The instrumental variable is given by the number of universities offering economics degrees within 30 minutes of driving time from the municipality centroid.

Table 5: Financial literacy and digitalisation: channels

VARIABLES	online current acc.	digital finan. serv.	website advert.	social network	online payments from customers
FL score	0.434**	0.315**	0.684**	0.151	0.308
	(0.213)	(0.158)	(0.271)	(0.251)	(0.256)
South & Islands	0.0192	0.00993	0.0219	0.0214	0.0278
	(0.0297)	(0.0201)	(0.0348)	(0.0208)	(0.0224)
turnover below 50k	0.0946	0.0806	0.119	0.000880	-0.0174
	(0.101)	(0.0728)	(0.124)	(0.108)	(0.117)
diploma	-0.0399	-0.0668	-0.0610	-0.00239	-0.0121
	(0.0720)	(0.0534)	(0.0893)	(0.0725)	(0.0742)
woman	-0.00269	0.00236	0.0503	0.0378*	0.0559***
	(0.0266)	(0.0187)	(0.0310)	(0.0211)	(0.0200)
early-career	0.0704**	0.0437*	0.117***	0.131***	0.0355
	(0.0321)	(0.0231)	(0.0379)	(0.0261)	(0.0303)
parents entrepr.	0.00154	-0.0117	-0.0224	-0.00260	-0.000647
	(0.0340)	(0.0238)	(0.0393)	(0.0332)	(0.0336)
entrepr. experience	0.00282	0.0194	0.0422	0.00193	0.0238
	(0.0278)	(0.0183)	(0.0306)	(0.0198)	(0.0227)
munic. income distr.	-0.0986	-0.0178	0.237	-0.0950	0.0144
	(0.221)	(0.147)	(0.253)	(0.167)	(0.170)
firm sector	yes	yes	yes	yes	yes
Constant	-0.370	-0.492*	-1.229**	-0.0753	-0.296
	(0.379)	(0.284)	(0.492)	(0.452)	(0.461)
observations	1,957	1,957	1,957	1,957	1,957
First-stage F	17.92 *(for all models)*				

Notes. IV estimates on firm-level data. Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The instrumental variable is the density of bank branches at the municipal level in 1951. See Table A1 for the definition of the covariates. - (1) The dependent variable is a dummy equal to 1 if the entrepreneur has opened a bank account completely online and 0 otherwise see Table A3). - (2) The dependent variable is a dummy equal to 1 if the entrepreneur has signed a financing or insurance contract completely online and 0 otherwise (see Table A3). - (3) The dependent variable is a dummy equal to 1 if the entrepreneur has a dedicated website to showcase her products or services and 0 otherwise (see Table A3). - (4) The dependent variable is a dummy equal to 1 if the entrepreneur uses social networks for advertising or networking (see Table A3). - (5) The dependent variable is a dummy equal to 1 if the entrepreneur receives a large or very large share of payments from customers online and 0 otherwise.

Appendix

Table A1: Variables description

name	description	source
FL_score	Financial literacy score (see Table A2)	MSMEs 2021 survey
digitalisation score	Digitalisation score (see Table A3)	MSMEs 2021 survey
sustainability score	Sustainability score (see Table A4)	MSMEs 2021 survey
early-career	Dummy equal to 1 if the microentrepreneur is less than 50 y.o., and 0 otherwise	MSMEs 2021 survey
diploma	Dummy equal to 1 if the microentrepreneur holds at least a secondary school diploma and 0 otherwise	MSMEs 2021 survey
woman	Dummy equal to 1 if the microentrepreneur is a woman	MSMEs 2021 survey
parents are entrepreneurs	Dummy equal to 1 if one or both microentrepreneur parents are or were entrepreneurs and 0 otherwise	MSMEs 2021 survey
entrepreneurial experience	Dummy equal to 1 if the microentrepreneur has at least 10 years of experience and 0 otherwise	MSMEs 2021 survey
municipality income distr.	Share of municipality population whose declared income tax (IRPEF) falls below 26,000 euro	Istat - MEF, 2019
South & Islands	Dummy equal to 1 if the firm is headquartered in Southern regions or Islands	MSMEs 2021 survey
turnover below 50k	Dummy equal to 1 if the microentrepreneur's firm turnover is below 50,000 euro; microentrepreneur's who do not know their turnover are included in this category	MSMEs 2021 survey
sector	sector of economic activities (agricolture, manufacturing, construction, trade, transportation and storage, hospitality and food, other services)	MSMEs 2021 survey
climate change risk	municipality risk of flooding or landslides, computed as the average share of areas/firms/population/households/buildings subject to high or very high risk or flooding or landslides	ISPRA
NUTS3 p.c. added value	per capita added value at NUTS3-level	Istat, 2020
iv	Preferred Instrumental variable - Number of bank branches per squared km at the municipality level in 1951	Bank of Italy
alter. iv	Alternative Instrumental variable - Number of universities offering economics degrees within 30 minutes of driving time from the municipality centroid	Istat, 2015

Table A2: Financial literacy questions

Financial knowledge questions

- Dividends are part of what a business pays to a bank to repay a loan.

- When a company obtains equity from an investor it gives the investor part of the ownership of the company.

- 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.

- High inflation means that the cost of living is increasing rapidly.

- 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.

1=True
0=False
-97=Don't know
-99=Refused

Financial behaviour questions

- 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? *(1) I use the same account for both my household and business finances; (2) I have separate accounts for my household and for my business, but I find it quite difficult to manage household and business finances separately; (3) I manage strictly separate accounts for my household and for my business; (-97) Don't know; (-98) Not applicable (does not have an account); (-99) Refused.*

- 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.)? *(1) I considered several options from different financial providers before making my decision; (2) I considered the various options from one financial provider; (3) I didn't consider any other options at all; (4) I looked around but there were no other options to consider; (-97) Don't know; (-98) Not applicable (no product indicated in QP5); (-99) Refused.*

- How do you keep track of the financial records of the business? *(1) In electronic format (e.g. MS Excel or dedicated software) ; (2) In paper form (e.g. noting them in a notebook; keeping receipts and invoices); (3) I keep track of financial records in my head; (4) Someone else does it for me (e.g. an accountant); (5) In another way; (6) I do not usually keep track; (-97) Don't know; (-99) Refused.*

- Have you thought about how you will fund your own retirement or maintain yourself when you will no longer work due to old age? *(1) Yes; (0) No / Not yet; (-97) Don't know; (-99) Refused.*

- 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? *(1) I would use money that my business has set aside for emergencies; (2) I would claim insurance on all or part of the equipment; (3) I would take a loan to buy new equipment; (4) I would use some personal or household funds; (5) I would ask family members or friends to lend me money or equipment; (6) I would stop my business temporarily or for good; (7) I don't know, I have never thought about how I would cope; (8) Other: specify [register what]; (-97) Don't know; (-99) Refused.*

- I adjust my planning according to the changes in economic factors.

- I keep secure data and information about the business.

- I compare the cost of different sources of finance for the business.

- I forecast the profitability of the business regularly.

- I adjust my planning according to the changes in economic factors.

1=Strongly disagree;
2=Disagree;
3=Agree;
4=Strongly agree;
-97=Don't know;
-99=Refused.

Financial attitudes questions

- I set long financial goals for the business and strive to achieve them.

- I am confident to approach banks and external investors to obtain business finance.

- I prefer to follow my instinct rather than make detailed financial plans for my business.

1=Strongly disagree;
2=Disagree;
3=Agree;
4=Strongly agree;
-97=Don't know;
-99=Refused.

Notes. The financial literacy score (FL_score) is computed as the sum of the financial knowledge score, financial behaviour score and financial attitudes score. The knowledge score is computed as the number of correct responses to the financial knowledge questions, while the financial behavior score and the financial attitude score are computed as the number of "financially savvy" behaviors and attitudes, respectively. In order to devise a financial literacy score we aggregate the scores of the three components (knowledge, behavior, attitudes), where each of the three components is given an equal importance. To do so we normalize each financial component's score between 0 and 1 (dividing the raw score by the number of questions) and then sum them up. In this way, we obtain an overall financial literacy score ranging from 0 to 3

Table A3: Digitalisation activities questions

(a) do you have, or have recently done, any of the following things?

• 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.	*yes;* *no*
• Have signed a financing contract (e.g. a bank loan) completely online.	
• Have signed an insurance contract completely online.	

(b) how large the following digital activities were for your business?

• Sales of products or services through your business' website as a percentage of total sales.	
• Sales of products or services through a shared online platform (e.g. \<Amazon\>) as a percentage of total sales.	*very small;* *quite small;* *quite large;* *very large*
• Online payments to suppliers as a percentage of total payments to suppliers.	
• Use of social media (e.g. \<facebook\>, \<other national example\>, etc.) for business activity such as advertising or networking.	
• Number of operations on current account conducted online, as a percentage of total operations on the current account.	

Notes. Both groups of questions (i.e. type (a) and type (b) questions) refer to the period before the Covid-19 pandemic. The digitalization score is computed as the sum of the normalized digitalization scores derived from type (a) and type (b) questions. The digitalization score of type (a) questions is computed as the sum of "yes" replies divided by the maximum score, i.e. 5. The digitalization score of type (b) is computed as follows: "very small", "quite small", "quite large", "very large" replies are given 0, 1, 2 and 3 points respectively. Such scores are then summed up and divided by the maximum possible score, i.e. 15.

Table A4: Engagement in sustainable activities questions

• When I make an investment for the business, I take into account its environmental impact.	*strongly disagree;* *disagree;*
• When I make an investment for the business, I take into account its social impact.	*agree;* *strongly agree*
• I involve my providers in implementing actions with low environmental impact.	

Notes. The sustainability score is computed as follows: "strongly disagree", "disagree", "agree", "strongly agree" replies are given 0, 1, 2 and 3 points respectively. Such scores are then summed up and divided by the maximum possible score, i.e. 9.

Table A5: Instrumental variable and municipality-level indicators in 1951

VARIABLES	Labour market participation		Employment rate		Illiteracy rate	
instr. variable	-4.608	-8.622	-8.357	-6.729	-8.662	-7.579
	(9.139)	(10.35)	(13.57)	(13.05)	(5.905)	(5.234)
area dummies	yes	no	yes	no	yes	no
regional dummies	no	yes	no	yes	no	yes
constant	54.00***	51.11***	51.57***	49.47***	13.46***	17.37***
	(1.634)	(3.885)	(1.833)	(4.115)	(0.683)	(0.301)
observations	1,027	1,027	1,027	1,027	1,027	1,027
R-squared	0.183	0.253	0.124	0.195	0.762	0.807

Notes. OLS estimates on municipality-level data. Municipalities where surveyed MSMEs are headquartered only. Robust standard errors in parentheses. Labour market participation, employment rate and illiteracy rate refer to 1951. The instrumental variable is the density of bank branches at the municipal level in 1951. *** p<0.01, ** p<0.05, * p<0.1.