Received: 14 July 2022 | Revised: 3 January 2023 | Accepted: 15 January 2023

DOI: 10.1111/jors.12636

RESEARCH ARTICLE

JOURNAL OF REGIONAL SCIENCE WILEY

Firm-level productivity growth returns of social capital: Evidence from Western Europe

Roberto Ganau[1,2] | Andrés Rodríguez-Pose[3]

[1]Department of Economics and Management "Marco Fanno", University of Padova, Padova, Italy

[2]Department of Geography and Environment, London School of Economics and Political Science, London, United Kingdom

[3]Cañada Blanch Centre and Department of Geography and Environment, London School of Economics and Political Science, London, United Kingdom

Correspondence

Andrés Rodríguez-Pose, Cañada Blanch Centre and Department of Geography and Environment, London School of Economics and Political Science, Houghton Street, London WC2A 2AE, United Kingdom.
Email: a.rodriguez-pose@lse.ac.uk

Abstract

We analyze the firm-level labor productivity growth returns of social capital—defined as a synthetic measure of "generalized trust," "active participation," and "social norms"—using a large sample of manufacturing firms in France, Germany, Italy, Portugal, and Spain. We find that firms' labor productivity growth is higher in areas with a better social capital endowment. The positive returns of social capital are, nevertheless, unevenly distributed across firms, with smaller, less productive, less capital-endowed, and low-tech firms benefitting the most from operating in strong social capital ecosystems.

KEYWORDS

firm labor productivity growth, manufacturing industry, social capital, Western Europe

1 | INTRODUCTION

The economic effects of social capital have attracted considerable attention since, at least, the seminal works by Putnam (1993) and Knack and Keefer (1997). Building on Banfield's (1958), Coleman's (1988), and Gambetta's (1988) early contributions, Putnam (1993, p. 167) defines social capital as "those features of social organizations, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions." According to this definition, social capital emerges as a multifaced and complex concept capturing a community-specific set of productive intangible assets that make the bulk of a society's informal institutional framework (Durlauf & Fafchamps, 2005; Storper, 1995). As such, social capital impacts on the quantity and quality of social and economic interactions (Andini & Andini, 2019), influencing overall economic performance by reducing transaction costs and facilitating interactions, information flows, and coordination (Forte et al., 2015).

Despite the diversity in the definitions of social capital and in its operationalization—from individual variables (Forte et al., 2015) to synthetic indices (Akçomak & ter Weel, 2012)—empirical research generally supports the idea that differences in social capital help explain territorial variations in entrepreneurship, innovation, trade, productivity, and economic growth, both among countries (Algan & Cahuc, 2010; Bjørnskov & Méon, 2015; Guiso et al., 2006, 2009; Knack & Keefer, 1997) and regions within and across countries (Akçomak & ter Weel, 2009; Andini & Andini, 2019; Beugelsdijk & van Schaik, 2005; Forte et al., 2015; Muringani et al., 2021; Peiró-Palomino, 2016, 2019; Percoco, 2012; Tabellini, 2010).

However, the way social capital influences economic performance at the aggregate (country, regional, or urban) level depends on how it affects the behavior and performance of individual economic actors (de Blasio & Nuzzo, 2010; Guiso et al., 2004). It is thus crucial to understand the microlevel relationship between social capital and economic performance, especially through the lens of the firm. Aggregate economic performance depends on the performance of individual firms, with each firm interacting heterogeneously—both through its workers and as an organizational structure as a whole—with other actors (mainly other firms, banks, and public authorities) located within the same socioeconomic ecosystem.

The firm-level literature, despite its scarcity, emphasizes how social capital is related to a firm's organizational structure, innovativeness, and output. However, many of the existing studies present limitations that curb the potential for generalization of their findings. Most works adopt a single-country perspective (Bürker et al., 2013; Bürker & Minerva, 2014; Cooke, 2007; Cooke et al., 2005; Sabatini, 2008; Wang & Steiner, 2020). Di Guilmi et al. (2008) and Bloom et al. (2012) are the exceptions, as they examine cross-country differences in social capital at the national level. Other works focus, rather than on the territory-specific endowment of social capital, on how the entrepreneur's or managers' personal ties and embeddedness in social networks affect firm performance (Kemeny et al., 2016). Finally, most of the abovementioned contributions lack a causal interpretation of the relationship between social capital and firm performance. Bloom et al. (2012), Bürker et al. (2013), and Bürker and Minerva (2014) are exceptions to this rule.

Hence, considerable gaps remain in our knowledge as to how and to which extent social capital plays a role—if at all—in firm-level performance. Are firms located in areas with weaker social capital disadvantaged in terms of their capacity to increase their productivity and to progress? Are certain types of firms, such as the most vulnerable in terms of age, size, technological component, and access to capital, rendered even more vulnerable in the absence of a strong local social capital? These are questions that have considerable policy relevance but that, to date, remain mostly unanswered. Our intention is to fill these gaps in the literature by analyzing the causal effects of social capital on firm-level economic performance from a cross-country perspective, under the hypothesis of firm heterogeneity. Specifically, we provide novel evidence on how social capital at the regional level—captured by a synthetic measure encompassing Putnam's (1993) three dimensions of trust, networking, and social norms—shapes manufacturing firms' labor productivity growth over the period 2010–2017 in five Western European countries: France, Germany, Italy, Portugal, and Spain. We explicitly account for firm-level differences in structural conditions, including productive efficiency, physical capital endowment, size, age, and technological level. In doing this, we go beyond previous firm-level analyses considering local differences in social capital within a single country, as well as region-level studies, as we investigate the microlevel processes driving aggregate regional economic performance. We also complement cross-country firm-level studies by lowering the geographical scale at which social capital emerges. We posit that informal institutions are locally embedded and, therefore, highly heterogeneous not only across countries, but also within them (Putnam, 1993; Rodríguez-Pose, 2013).[1]

[1]Our analysis differs significantly from previous studies reporting a causal effect of social capital on firm-level behavior and performance. We assess whether and to what extent a region's social capital explains labor productivity growth differentials at firm level. To do that, we explicitly evaluate the type of firm that benefits the most from being located in a "good" informal institutional environment. Other scholarly contributions focus on different aspects. Bloom et al. (2012), for example, study the effects of social capital on the size, internal organization, and reallocation decision of firms across countries; Bürker et al. (2013) analyze the extent to which social capital in Italy influences productivity differentials related to foreign ownership; and Bürker and Minerva (2014) estimate the effects of social capital on the size distribution of plants in Italy. In this respect, we complement existing empirical analyses by providing novel evidence on the productivity growth effects of social capital.

We assess the productivity growth returns of local social capital by exploiting cross-regional heterogeneity in terms of precipitation variability between 1500 and 1750, which is used as a proxy for economic risk. The rationale for this choice is that a high weather risk in a period where individuals' subsistence was based on agricultural production may have favored the early emergence of shared norms and altruistic/cooperative behaviors to cope with weather-related economic risks (Buggle & Durante, 2021). We find a general positive effect of social capital on labor productivity growth, but also that growth returns of social capital are unevenly distributed across firms of different types.

Our analysis is also relevant for policy, as improvements in social capital are increasingly seen by supranational institutions, such as the World Bank, the Organization for Economic Cooperation and Development (OECD), and the European Union (EU), as a means for promoting economic development and growth (Malecki, 2012; Muringani et al., 2021). This is particularly relevant in the European context, where nation–states are characterized by strong economic and political integration, while remaining highly internally heterogeneous in terms of economic potential and development.

The remainder of the paper is structured as follows. Section 2 briefly discusses the mechanisms underlying the relationship between social capital and firm performance. Section 3 presents the data, the empirical model, and the econometric strategy. This is followed by a presentation and discussion of the empirical results. Section 5 concludes and draws some policy implications.

2 | THEORETICAL FRAMEWORK

Economic research has identified several mechanisms through which a strong social capital in a community can spur economic dynamism, in general, and firm-level performance, in particular. This multiplicity of mechanisms rests on the complexity of the definition of the concept of social capital.

Following Putnam (1993), the endowment of social capital in a society is shaped by at least three interrelated and mutually reinforcing dimensions. The first dimension is generalized trust, that is, the trust that individuals have in the other members of a collective. This translates into the expectation that the behavior of others will be fair, predictably honest, and reliable (Fukuyama, 1995; Gambetta, 1988). The second dimension is networking. It captures social connections and interactions among individuals (within and across organizations) and their attitude towards associationism and collective behavior (Putnam, 1993). The third dimension is the sharing of social norms, that is, the collective adoption of the system of socially accepted, unwritten rules and codes of conduct defining "good citizenship" and attitude towards the public interest (Coleman, 1990; Knack & Keefer, 1997). Generalized trust is a prerequisite for social interactions (Putnam, 1993), but, at the same time, strong ties reinforce trust among individuals and society (Beugelsdijk & van Schaik, 2005). In a trusting environment, characterized by high-density social networks, individuals are more inclined to respect community-specific social norms due to both "[i]nternal (e.g., guilt) and external (e.g., shame and ostracism) sanctions" (Knack & Keefer, 1997, p. 1254). As long as norms and behavioral codes are largely shared and observed, individuals will trust others more and increase social interactions (Beugelsdijk & van Schaik, 2005).

Theory suggests that the combination of these three dimensions conforms the bulk of the informal institutional settings in a society. They contribute to define and shape the socioeconomic and business environments where individuals and organizations operate (Durlauf & Fafchamps, 2005; Rodríguez-Pose, 2013; Storper, 1995).

But how can social capital shape the economic performance of a firm? The main idea is that generalized trust and repeated interactions trigger greater economic activity and better performance by reducing transaction costs and increasing transparency and reciprocity among economic actors (Fukuyama, 1995; Putnam, 1993). In trusting environments, where people follow shared norms, individuals are more prone to adopt cooperative behaviors, and less reluctant to diffuse information and knowledge, both within and across firms (Granovetter, 2005; Kaasa, 2009). This favors the cross-fertilization of ideas across economic and social agents leading to more (radical) innovations and technological progress (Akçomak & ter Weel, 2009; Peiró-Palomino, 2019). The result is higher firm-level productivity and growth (Di Guilmi et al., 2008; Sabatini, 2008).

Moreover, trustworthiness and shared values reduce free-riding and opportunistic behaviors, lowering monitoring costs (Guiso et al., 2011; Knack & Keefer, 1997; Tabellini, 2010). This translates into less effort for entrepreneurs and managers in controlling working tasks within the firm. Hence, more time and resources can be devoted to high-value and productivity-enhancing activities (Bjørnskov & Méon, 2015; Kaasa, 2016). Social capital also facilitates task delegation, which promotes an optimal division of labor within the firm and, consequently, increases organizational efficiency (Bloom et al., 2012; Cingano & Pinotti, 2016), as well as cooperation among employees, leading to collective problem solving (Peiró-Palomino, 2016), higher productivity among workers sharing the firm's goals (Sabatini, 2008), and information and knowledge exchange fostering innovation (Di Guilmi et al., 2008; Kemeny et al., 2016). Less monitoring costs and greater reciprocity derived from repeated interfirm interactions also reduce the costs of negotiating complex transactions, contract enforcement, and surveillance of third parties, such as suppliers (Beugelsdijk & van Schaik, 2005; Fukuyama, 1995; Knack & Keefer, 1997). The outcome is a maximization of the gains from transactions and trade, with positive effects on efficiency and productivity growth (Tabellini, 2010).

Social capital also helps solve agency problems of asymmetric information and moral hazard (Bloom et al., 2012; Bürker et al., 2013; Forte et al., 2015), with positive effects on both firm–bank and interfirm trade credit relationships (Cruz-García & Peiró-Palomino, 2019; Guiso et al., 2004; Knack & Keefer, 1997). Trust, reputation, and embeddedness in local networks facilitate banks' access to soft information on firms, leading to reduced uncertainty and, consequently, lower credit denial rates. Interfirm transactions based on trust and reciprocity may also translate into financial relationships through trade credit, based on better contracts or delayed payments (Dei Ottati, 1994). Trade credit represents a key alternative source of financing for firms to alleviate problems of limited resources and credit rationing. It increases productivity by promoting investment in physical capital and technology (Rodríguez-Pose et al., 2021).

Finally, social capital favors long-term investment choices. This practice leads to capital accumulation and advanced technology adoption that spur efficiency and productivity growth (Forte et al., 2015). Investors are more likely to venture into potentially risky projects in the presence of trust-based ties (Knack & Keefer, 1997), with entrepreneurs benefitting from easier access to the tangible and intangible assets needed for firm performance (Nahapiet & Ghoshal, 1998).

Overall, we expect that a strong social capital—through its components of trust, networking, and shared norms—will improve firms' performance and deliver greater growth. This can be achieved by creating a favorable socioeconomic and business environment, where reduced transaction costs, nonselfish and nonopportunistic behaviors, shared values, and interaction and cooperation among workers, entrepreneurs, and firms promote the availability and accumulation of productivity-enhancing factors: from information and knowledge flows spurring technological diffusion and innovation (Akçomak & ter Weel, 2009), physical capital investments (Knack & Keefer, 1997), or human capital (Bjørnskov & Méon, 2015), to financial resources through both formal and informal credit markets (Guiso et al., 2004; Knack & Keefer, 1997) and trade and production linkages (Guiso et al., 2009).[2]

However, although social capital represents a key ingredient explaining productivity at firm level and cross-firm productivity differentials (Di Guilmi et al., 2008), it may be the case that not all firms benefit in the same way from the local endowment of social capital. As shown by Ganau and Rodríguez-Pose

[2]On top of the "more traditional" definition of social capital à la Putnam (1993), based on trust, networking, and social norms, the literature has proposed alternative conceptualizations of social capital. Some of these distinguish between bonding and bridging social capital (Patulny, 2009; Putnam, 2000): bonding social capital refers to closed networks linking homogeneous groups, and, thus, captures the within-group dimension of social capital. Bridging social capital refers to open networks linking heterogeneous groups, encompassing the intergroup dimension of social capital. Our choice of following Putnam's (1993) definition—without distinguishing between bonding and bridging social capital—is based on two factors. First, Putnam's original definition captures a relatively broader spectrum of social capital-related mechanisms that explain the reasons why firms located in high-social capital regions can perform better than their counterparts in low-social capital regions. Second, data availability constraints prevent us from disentangling empirically the bonding (i.e., internal to the firm) and bridging (i.e., external to the firm, but internal to the region) dimensions of social capital. We lack information to quantify the social capital of individual firms. Our measure of social capital relies on the *European Values Study* (EVS). This source provides information on the general population, and not on firms. Accordingly, we can only proxy for a region's social capital endowment. However, our goal is not to compare a firm's social capital endowment (i.e., the bonding dimension) with that external to the firm but internal to its region of location (i.e., the bridging dimension). Rather, we analyze whether social capital—as the informal institution characterizing the socioeconomic environment where a firm operates—drives labor productivity growth.

(2019), heterogeneous firms may interact differently with, and gain unevenly from, their local environment: larger firms, firms already endowed with a high stock of internal resources (physical and human capital), and firms close to the efficiency frontier may have less need for leveraging resources through social capital to grow.

Drawing on the abovementioned theoretical arguments, we explore explicitly whether and to which extent local differences in social capital endowment contribute to explain productivity growth differentials across heterogeneous firms. In doing so, we add new knowledge of the economic returns of social capital by adopting a cross-country and territorial perspective under the hypothesis of firm heterogeneity, thus contributing to understand the microlevel relationship between social capital and economic performance.

3 | EMPIRICAL FRAMEWORK

3.1 | The dataset

We use two main data sources to analyze the firm-level labor productivity growth returns of regional social capital. The *Amadeus* database (Bureau van Dijk) contains information and balance sheet figures for European firms. The *EVS* provides regional data on different dimensions of social capital.

First, we cleaned the *Amadeus* database to only include active manufacturing firms reporting unconsolidated balance sheet data. Second, we excluded firms with missing information for year of incorporation and location at the regional level—defined according to the EU *Nomenclature des Unités Territoriales Statistiques* (NUTS). Third, we excluded firms incorporated after the reference year (2010), as well as firms with missing or unreliable figures for value-added, employment, and tangible fixed assets.

The cleaning procedure left us with a final sample of 27,299 manufacturing firms observed in the year 2010, 17,396 of which were still observed in 2017. This means that 63.72% of firms in the sample survived during the entire period of analysis. The final sample covers firms in five EU countries: France, Germany, Italy, Portugal, and Spain.[3] We focus the empirical analysis on these five countries for two main reasons. First, the cleaning procedure performed on the *Amadeus* database left us with usable information on representative samples of firms only in the abovementioned countries. Cleaning the database left only a few dozen firms in many of the excluded countries, taking also into account available local data on social capital and other socioeconomic dimensions. Hence, representative subsamples of firms with respect to the true population of manufacturing firms (according to official figures) can only be constructed for the selected five countries. The country-level representativeness of the sample is good, as only sample firms in France and Italy appear to be slightly underrepresented and overrepresented, respectively (Supporting Information Table A1). The sample covers 91.57% of the geography of the countries analyzed (Supporting Information Table A2), as well as all two-digit NACE Rev. 2 manufacturing sectors, except for sectors "12—Tobacco products" and "19—Coke and refined petroleum products," for which no firms remained after the cleaning procedure (Supporting Information Table A3).[4] Second, the five countries in the sample are all developed Western EU nation–states characterized by a sufficiently high degree of similarity in terms of their more recent historical, political, and institutional paths. These similarities facilitate isolating regional variations in social capital and estimating its causal effect on firm-level labor productivity growth (Ganau & Rodríguez-Pose, 2019).

[3]We identified the location of firms using the regional aggregation level available in the 2008 wave of the EVS: this corresponds to NUTS-1 (*Länder*) for Germany, and NUTS-2 for France (*Régions*), Italy (*Regioni*), Portugal (*Grupos de Entidades Intermunicipais* and *Regiões Autónomas*), and Spain (*Comunidades Autónomas*).

[4]The sample includes firms operating in both low- and high-technology manufacturing sectors (Supporting Information Table A4).

We then enriched the firm-level dataset by adding regional data on social capital drawn from the 2008 wave of the EVS and regional data for 2010 on Gross Domestic Product (GDP), population, surface, and human capital provided by Eurostat (*Regio* database). In addition, we included regional 2010 data on government quality drawn from the *European Quality of Government Index* dataset, compiled by the Quality of Government Institute at the University of Gothenburg, and historical regional data for 1900 on GDP and population, drawn from Rosés and Wolf (2019).

3.2 | Empirical model and variables

Let us consider a representative firm i, which operates in industry s in region r in country c. We assume that this firm is characterized by a standard Cobb–Douglas production function. We also assume that, at time t, it produces a certain output level (Y_{isrct}), using the existing stock of physical capital (K_{isrct}) and the available labor force (L_{isrct}), according to a Hicks-neutral technology parameter (A_{isrct}). We can express the production function in units of labor as follows:

$$y_{isrct} = A_{isrct} k_{isrct}^{\alpha}, \tag{1}$$

where y_{isrct} denotes the labor productivity, and k_{isrct} denotes the capital-to-labor ratio.

Having observed its current labor productivity level (y_{isrct}), the firm sets the target of reaching a certain variation in labor productivity between periods t and T ($\dot{y}_{isrct}$), with $T > t$. Inspired by Romer (1990), we express the variation in labor productivity as follows:

$$\dot{y}_{isrct} = y_{isrct}^{\beta} (a_k k_{isrct})^{\gamma} \Phi_{isrct} \tag{2}$$

such that $\dot{y}_{isrct}$ is defined as a function of the current labor productivity level y_{isrct}^{β}, capturing a firm's accumulated production capacity; the fraction of the capital-to-labor ratio still available from the realization of y_{isrct}, and needed to increase labor productivity between t and T ($a_k k_{isrct}$); and the technology parameter Φ_{isrct} influencing the overall labor productivity dynamics.

We define Φ_{isrct} as a function of firm-specific capabilities (F_{isrct})—for example, new managerial competences—industry-specific technology (I_{st}), the region-specific socioeconomic and institutional environment (R_{rct}), and country-specific macroeconomic and institutional conditions (C_{ct}). We further express the regional dimension in two main categories for social capital and structural conditions, respectively, such that $R_{rct} = Z_{rct}^{\mu} Z_{rct}^{\nu}$. First, the social capital dimension (Z_{rct}^{μ}) captures the informal institutional setting where firms operate. This setting, as discussed earlier, can influence a firm's labor productivity dynamics by reducing transaction costs, stoking interactions among workers and firms leading to information flows (e.g., knowledge exchange for innovation), facilitating access to credit via formal markets and trade credit (e.g., allowing a firm to invest in new technologies or enlarge the business), and reducing coordination problems and free-riding. Specifically, we model $Z_{rct}^{\mu} = e^{\lambda Social\ Capital_{rct}}$, where λ denotes the relative position of a region in the cross-regional distribution of social capital. This means that location in a region characterized by a relatively stronger social capital will result in a higher variation in a firm's labor productivity. Second, the structural conditions of a region (Z_{rct}^{ν}) capture the economic and formal institutional ecosystem influencing the production process through, for example, labor market specificities, agglomeration forces, and government efficiency.

By dividing both sides of Equation (2) by y_{isrct}, and taking logarithms, we obtain the following expression for firm-level labor productivity growth:

$$\begin{aligned} \Delta y_{isrct} = {} & \omega \log(y_{isrct}) + \gamma \log(a_k k_{isrct}) + \log(F_{isrct}) + \log(I_{st}) + \log(C_{ct}) \\ & + \nu \log(Z_{rct}) + \lambda Social\ \ Capital_{rct}, \end{aligned} \tag{3}$$

where $\Delta y_{isrct} = [\log(y_{iscrT}) - \log(y_{isrct})]$ denotes labor productivity growth between periods t and T, and all the terms on the right-hand side of Equation (3) are defined at period t. We set $\omega = -(1 - \beta)$, where $\beta \in [0, 1)$ captures the effects

of a firm's existing production capacity on labor productivity growth. A higher β indicates a higher growth potential in a firm. Simultaneously, and in line with the standard macroeconomic convergence model à la Solow (1956), more productive firms are also expected to grow less than firms far away from the labor productivity frontier.

We further restrict the term for firm-specific capabilities as a linear combination of a constant term (τ_0), firm fixed effects (η_i), time fixed effects (θ_t), and an error component (ε_{isrct})—such that $\log(F_{isrct}) = \tau_0 + \eta_i + \theta_t + \varepsilon_{isrct}$. We model the industry- and country-level terms as industry (ϑ_s) and country (ξ_c) fixed effects, respectively. This allows us to rewrite Equation (3) as the following empirical firm-level labor productivity growth equation:

$$\begin{aligned}\Delta y_{isrct} = {} & \tau_0 + \omega \log(y_{isrct}) + \gamma \log(a_k k_{isrct}) + \eta_i + \theta_t + \vartheta_s + \xi_c + \nu \log(Z_{rct}) \\ & + \lambda Social\ \ Capital_{rct} + \varepsilon_{isrct}.\end{aligned} \tag{4}$$

Given the cross-sectional nature of our analysis and considering data availability restrictions, we derive the following equation that we use to estimate the firm-level labor productivity growth returns of regional social capital over the period 2010–2017:

$$\begin{aligned}\Delta Productivity_{isrc} = {} & \alpha_0 + \alpha_1 Social\ Capital_{rc}^{2008} + \alpha_2 \log\left(Productivity_{isrc}^{2010}\right) \\ & + \alpha_3 \log\left(Capital\ Endowment_{isrc}^{2010}\right) + \alpha_4 \log\left(Age_{isrc}^{2010}\right) \\ & + \alpha_5 Size\ Class_{isrc}^{2010} + \alpha_6 \log\left(GDP\ Per\ Capita_{rc}^{2010}\right) \\ & + \alpha_7 \log\left(Population\ Density_{rc}^{2010}\right) + \alpha_8 \log\left(Human\ Capital_{rc}^{2010}\right) \\ & + \alpha_9 Institutional\ Quality_{rc}^{2010} + \alpha_{10} \log\left(GDP\ Per\ Capita_{rc}^{1900}\right) \\ & + \vartheta_s + \xi_c + \varepsilon_{isrc},\end{aligned} \tag{5}$$

where the dependent variable captures labor productivity growth defined as the log-difference in labor productivity between the years 2010 and 2017, with labor productivity defined as deflated value added over employment.[5]

The key explanatory variable represents regional social capital, defined using information drawn from the 2008 wave of the EVS. The proxy measure for social capital is calculated using the principal component of three key dimensions usually employed to measure social capital (Akçomak & ter Weel, 2009; Forte et al., 2015; Tabellini, 2010), namely, "generalized trust," "active participation," and "social norms."

The first dimension of social capital is "generalized trust." It is defined as the percentage of individuals who replied "most people can be trusted" to the survey question "Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people?" (Tabellini, 2010).

The second dimension of social capital is "active participation," measured by voluntary unpaid work. It is used as a proxy for the network component of social capital (Forte et al., 2015; Peiró-Palomino, 2019). Specifically, the EVS asks the individuals not only whether they are members of a voluntary organization, but also whether they do unpaid work for it. Therefore, the second dimension of social capital is defined as the percentage of individuals who "mentioned" that they do voluntary unpaid work, and proxies for association life.

The third dimension is "social norms." We define it, following Forte et al. (2015), considering responses about the extent to which a variety of actions is viewed as justifiable. Specifically, the EVS asks "Which of the following behaviors you think can always be justified, never be justified, or something in between." The selected actions are: (i) claiming state benefits which you are not entitled to; (ii) cheating on tax if you have the chance; (iii) someone accepting a bribe in the course of their duties; (iv) paying cash for services to avoid taxes; (v) avoiding a fare on public transport. Those interviewed are asked to reply in the range from 1 ("never justified") to 10 ("always justified"). Answers to the five questions were averaged to construct the indicator for "social norms" in the interval

[5]The deflator for value added is defined at the sector-country level. Data are drawn from Eurostat.

[1, 10]. A linear transformation is then applied for ease of interpretation, such that the higher the value of the indicator, the better the score in terms of "social norms."[6]

The three dimensions of social capital have been standardized with zero mean and unitary standard deviation to construct a synthetic index through a principal component analysis (Akçomak & ter Weel, 2012).[7] Finally, the resulting score has been normalized in the interval [0, 1] to obtain the variable for social capital ($Social\ Capital_{rc}^{2008}$) used in the empirical analysis. A higher value of the index represents a higher regional endowment of social capital.[8]

The right-hand side of Equation (5) includes also the initial, log-transformed firm-level variables for: labor productivity, defined as the deflated value added over employment ($Productivity_{isrc}^{2010}$); capital endowment, defined as tangible fixed assets over employment ($Capital\ Endowment_{isrc}^{2010}$); age, or the difference between 2010 and the year of a firm's incorporation (Age_{isrc}^{2010}). It also includes a four-level categorical variable capturing the size class of a firm ($Size\ Class_{isrc}^{2010}$), with firms classified into micro (1–9 employees), small (10–49), medium (50–249), and large (250 and more).[9]

Equation (5) also includes a series of region-level controls. These are (i) GDP per capita in 2010, defined as GDP over population, representing a region's development level ($GDP\ Per\ Capita_{rc}^{2010}$); (ii) population density in 2010, measured as population over surface, to proxy for agglomeration-related forces ($Population\ Density_{rc}^{2010}$); (iii) human capital endowment in 2010, calculated as the percentage of the population aged 15–64 years with tertiary education, as a measure of the availability of educated labor force in a region ($Human\ Capital_{rc}^{2010}$); (iv) government quality in 2010 ($Institutional\ Quality_{rc}^{2010}$), to account for any potential confounding effects related to a region's formal institutional framework (Bjørnskov & Méon, 2015; Cruz-García & Peiró-Palomino, 2019);[10] and (v) GDP per capita in 1900, to control for historical differentials in economic development across regions, which may have affected subsequent development, urbanization, and education levels ($GDP\ Per\ Capita_{rc}^{1900}$).

Finally, Equation (5) includes the terms $\boldsymbol{\vartheta}_s$ and $\boldsymbol{\xi}_c$ denoting sets of two-digit industry dummies and country dummies, respectively, and the error term (ε_{isrc}). Supporting Information Tables C1 and C2 report some descriptive statistics of the dependent and explanatory variables, and the correlation matrix of the explanatory variables, respectively.

[6]The answers to the survey questions used to construct the three dimensions of social capital have been weighted using the EVS original weights to avoid biases due to the oversampling of certain categories of individuals interviewed (Di Guilmi et al., 2008).

[7]The choice of capturing social capital through a synthetic index relies on the fact that "[s]ocial capital is different from other forms of capital in the sense that it is not directly observable … is hard to measure and should best be treated as a latent construct" (Akçomak & ter Weel, 2012, p. 328). Survey data—such as the EVS data used in this paper—may only provide a poor proxy for such a complex and multifaced phenomenon. In particular, social capital emerges as a combination of different factors—in Putnam's (1993) words, as a combination of trust, networking, and social norms—that, as previously discussed, are highly interrelated and mutually reinforce one another. Therefore, we expect that the mechanisms and channels through which social capital stimulates economic performance result from the combined—rather than the isolated—effect of the different dimensions defining the concept of social capital. We also test the three dimensions of social capital separately.

[8]Supporting Information Appendix B reports details on the survey questions considered to construct the synthetic measure of social capital. It also discusses the geographical dimension of social capital. We also test our operationalization choice of social capital by considering two alternatives. The first alternative variable simply avoids any further normalization in the interval [0, 1] of the principal component. The second alternative variable, instead, defines social capital as the logarithm of the arithmetic average value of the three dimensions for "generalized trust," "active participation," and "social norms."

[9]Size classes are defined according to the European Commission Recommendation 2003/361/EC.

[10]This control variable proxies for the "quality" rather than the "quantity" of regional institutions. It captures the capacity of regional governments to provide and administer public services impartially, effectively, and in a noncorrupt manner (Charron et al., 2014; Rodríguez-Pose & Ganau, 2022; Rothstein & Teorell, 2008). The institutional quality variable is constructed using survey information collected in 2010 on a sample of 34,000 citizens. The information refers to individuals' perception and experience with corruption, quality, and impartiality with respect to education, public health care, and law enforcement in their own region—see Charron et al. (2013) and Charron et al. (2014) for details. Following Charron et al. (2014), we have aggregated individual survey questions into four main region-specific institutional pillars capturing the dimensions of rule of law, government effectiveness, voice and accountability, and fight against corruption. The four indices are standardized, with a zero mean and unitary standard deviation. We, subsequently, use principal components to obtain the region-specific synthetic measure for institutional quality. Finally, we normalize the resulting variable in the interval [0, 1].

3.3 | Estimation and identification strategy

Equation (5) is estimated via Ordinary Least Squares (OLS). However, two key econometric issues arise: sample selection and endogeneity of the social capital variable. Sample selection can bias the OLS estimation of Equation (5) because labor productivity growth is observed only for the subsample of firms surviving over the growth period 2010–2017 (Cainelli & Ganau, 2019; Ganau & Rodríguez-Pose, 2018). Endogeneity can arise for three main reasons. First, measurement errors, as the social capital variable is only a proxy for what is a multifaceted and complex phenomenon hard to capture through any composite index. Second, spatial sorting, if better-performing firms locate in (or relocate towards) regions already characterized by a high level of social capital. Third, an omitted variable bias, as there are perhaps unobservable factors and exogenous shocks that influence regional social capital and firm-level labor productivity growth simultaneously.

We deal with sample selection by means of a Heckman (1979)-style estimation approach and by specifying as exclusion restriction for firms' survival a third-order polynomial expansion $\varphi(\cdot)$ in firm age and capital endowment (Ganau & Rodríguez-Pose, 2018; Griffith et al., 2009; Olley & Pakes, 1996).[11]

With regard to the potential endogeneity of regional social capital, we follow the usual approach of relying on historical and geographical instrumental variables (IV) under the rationale that the current stock of social capital of a community is the result of historical events (Akçomak & ter Weel, 2009; Buggle & Durante, 2021; Guiso et al., 2016; Tabellini, 2010).[12] Specifically, we follow Buggle and Durante (2021), who analyze the historical and long-lasting relationship between economic risk and social cooperation and find a positive association between climate variability in historical times and current levels of social trust in European regions.

Drawing on this evidence, we identify current regional social capital by exploiting the cross-regional exogenous variation in precipitation during the growing season in the period between 1500 and 1750, before the industrial revolution took off. The rationale for using this identification strategy relies on the idea that high weather risk—captured by precipitation variability during the growing season in a period where individuals' subsistence was based on agricultural production—may have favored the emergence of "good" informal institutions, characterized by shared norms and altruistic/cooperative behaviors to cope with weather-related economic risks. Following North (1990) and Putnam (1993), informal institutional settings are featured by strong path dependency: they are the result and keep traces of past local ecosystems. For this reason, current regional social capital is expected to reflect past regional informal institutional settings. Moreover, we can reasonably consider our identification strategy valid for two reasons: first, climate variability in the period before the Industrial Revolution is a weather phenomenon hardly affected by human activity; second, climate variability in the agriculture-dominated, preindustrial period is an exogenous force with respect to firm-level labor productivity growth in the present, when economic development and growth are driven by technological progress, innovation, and automation, among other factors (Rodríguez-Pose & Ganau, 2022).[13]

The region-specific variable capturing precipitation variability between 1500 and 1750 is defined using reconstructed paleoclimatic data. Paleoclimatic data are drawn from the *European Seasonal Temperature and*

[11]We also consider an alternative version of the exclusion restriction by replacing capital endowment with total assets.
[12]Examples of historical and geographical IVs used in the literature to identify the causal effect of regional social capital include historical literacy rate (Akçomak & ter Weel, 2009), early establishment or presence of universities (Akçomak & ter Weel, 2009; Peiró-Palomino, 2016), historical institutional regimes (Akçomak & ter Weel, 2009; Bürker et al., 2013; Bürker & Minerva, 2014), cultural and religious traits (Akçomak & ter Weel, 2012; Ketterer & Rodríguez-Pose, 2018), linguistic rules such as the pronoun-drop feature of the spoken language (Bjørnskov & Méon, 2015; Peiró-Palomino, 2016, 2019), latitude (Peiró-Palomino, 2016, 2019), and the minimum temperature of the coldest month of the year (Bjørnskov & Méon, 2015; Cruz-García & Peiró-Palomino, 2019).
[13]We are conscious that exogeneity can be violated if cross-regional differentials in historical weather-related economic risk left long-lasting effects, thus affecting subsequent development paths in economic potential and output. In other words, if early development of social capital as a means to manage environment-related economic risk led to high levels of economic development and industrialization in the past that, in turn, resulted in variations in economic performance at the firm level. We, however, partially address this concern by controlling for current (i.e., 2010) levels of GDP per capita, urbanization, and human capital, and, especially, for historical (i.e., 1900) levels of GDP per capita.

Precipitation Reconstruction database. This dataset provides grid cells of 0.5° width, each containing annual seasonal observations for the period 1500–2000—see Luterbacher et al. (2004) and Pauling et al. (2006) for details. Formally, let p denote precipitations, let g denote seasons (winter, spring, summer, and autumn), f the grid cell, with $f \in r$ and r representing the region, and let t indicate the year, with t = 1500, –, 1750. First, a season-specific interannual standard deviation measure is calculated at the cell level for p_{fgt} over all years t, before averaging the cell-level standard deviation measures over all cells within a region r to obtain region- and season-specific measures of precipitation variability. Then, the region- and season-specific interannual standard deviation measures defined over the period 1500–1750 are averaged with respect to the growing seasons identified with spring and summer for Europe. Therefore, the IV captures the mean variability during the growing season averaged over the years from 1500 to 1750, that is, from the first available year of information to what can be considered as the starting year for the Industrial Revolution.

We therefore account for the endogeneity of regional social capital by relying on a Two-Stage Least Squares (TSLS) approach. We tackle sample selection and endogeneity issues simultaneously through the Maximum Likelihood estimation of a three-equation system for firm-level survival, endogenous regional social capital, and firm-level labor productivity growth.[14]

4 | EMPIRICAL RESULTS

4.1 | Main results

Table 1 reports the results of the estimation of Equation (5) on the whole sample of firms. It is worth noting, first, that the exclusion restriction of the first-step selection equation is relevant and that the correlation between the error terms of the survival and labor productivity growth equations is statistically significant. This justifies the use of a Heckman (1979)-type selection model—see bottom part of Table 1, Specifications (2) and (4). Second, the first-stage estimated coefficient of the IV capturing precipitation variability in the preindustrial period shows the expected positive sign and is statistically significant, while the associated first-stage F statistic is greater than the conservative cut-off value of 10—see the bottom part of Table 1, Specifications (3) and (4). The first-stage estimates suggest that current differences in social capital are historically rooted and geographically bounded (Buggle & Durante, 2021; Guiso et al., 2016).

The results hint at a positive and statistically significant effect of regional social capital on firms' labor productivity growth. We find that a 1% increase in social capital leads to an increase in firm-level labor productivity growth between 0.19 and 0.35 percentage points, depending on the estimation approach adopted.

The coefficients of the firm-level control variables go along with expectations. They indicate that firms have experienced convergence in labor productivity, as denoted by the negative coefficient of the labor productivity variable. Moreover, labor productivity growth is positively and statistically significantly connected with a firm's capital endowment. The association with a firm's age is, in contrast, negative but negligible. Larger firms also grow faster than medium- and small-sized ones, relative to microfirms. The results of the region-specific control variables indicate that firms' labor productivity growth is positively associated with high-quality formal institutions (Rodríguez-Pose & Ketterer, 2019) and

[14]Some recent contributions have relied on multilevel estimation approaches to analyze the firm- or individual-level effects of region-level phenomena. They account for the hierarchical structure of the data at the expense of a causal interpretation of the results—see, for example, Neira et al. (2018) in the context of regional social capital and individual subjective well-being, Agostino et al. (2020) for regional institutional quality and firm productivity, and Bykova and Coates (2020) for regional economic freedom and firm performance. Although our estimation strategy—based on a combination of Heckman (1979)-style and IV approaches—does not account for the hierarchical structure of the data—that is, firms "nested" within regions—it adequately deals with sample selection and endogeneity issues that existing firm-level studies have highlighted as key for identifying the causal effect of a regional phenomenon on firm-level performance (e.g., Cainelli & Ganau, 2019; Ganau & Rodríguez-Pose, 2018). As we will discuss later in the paper, our main results are robust when relying on a multilevel estimation approach.

TABLE 1 Social capital and firm labor productivity growth.

Dependent variable	$\Delta Productivity_{isrc}$			
	OLS	Heckman	TSLS	IV-Heckman
Estimation approach	(1)	(2)	(3)	(4)
$Social\ Capital_{rc}^{2008}$	0.198***	0.210***	0.328**	0.353**
	(0.074)	(0.074)	(0.150)	(0.149)
$\log\left(Productivity_{isrc}^{2010}\right)$	−0.487****	−0.482****	−0.489****	−0.486****
	(0.020)	(0.021)	(0.020)	(0.022)
$\log\left(Capital\ Endowment_{isrc}^{2010}\right)$	0.038****	0.038****	0.039****	0.039****
	(0.005)	(0.005)	(0.006)	(0.006)
$\log\left(Age_{isrc}^{2010}\right)$	−0.006	−0.005	−0.008	−0.006
	(0.005)	(0.005)	(0.005)	(0.005)
$Micro\ Firm_{isrc}^{2010}(d)$	Ref.	Ref.	Ref.	Ref.
$Small\ Firm_{isrc}^{2010}(d)$	0.155****	0.163****	0.155****	0.163****
	(0.011)	(0.011)	(0.011)	(0.011)
$Medium\ Firm_{isrc}^{2010}(d)$	0.206****	0.226****	0.206****	0.225****
	(0.018)	(0.016)	(0.018)	(0.016)
$Large\ Firm_{isrc}^{2010}(d)$	0.252****	0.272****	0.251****	0.268****
	(0.022)	(0.022)	(0.022)	(0.021)
$\log\left(GDP\ Per\ Capita_{rc}^{2010}\right)$	−0.019	−0.020	−0.015	−0.014
	(0.012)	(0.012)	(0.014)	(0.016)
$\log\left(Population\ Density_{rc}^{2010}\right)$	−0.011	−0.011	−0.011	−0.013
	(0.012)	(0.013)	(0.012)	(0.012)
$\log\left(Human\ Capital_{rc}^{2010}\right)$	0.053	0.052	0.065	0.064
	(0.044)	(0.046)	(0.043)	(0.043)
$Institutional\ Quality_{rc}^{2010}$	0.158***	0.172***	0.154***	0.164***
	(0.055)	(0.058)	(0.057)	(0.060)
$\log\left(GDP\ Per\ Capita_{rc}^{1900}\right)$	0.116****	0.113****	0.107***	0.105***
	(0.032)	(0.034)	(0.039)	(0.040)
Two-digit sector dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Number of firms	17,396	17,396	17,396	17,396
Model F statistic [p value]	149.96 [0.000]	137.27 [0.000]	146.87 [0.000]	122.62 [0.000]
Selection equation				
Number of firms	–	27,299	–	27,299

(Continues)

TABLE 1 (Continued)

	$\Delta Productivity_{isrc}$			
Dependent variable	**OLS**	**Heckman**	**TSLS**	**IV-Heckman**
Estimation approach	**(1)**	**(2)**	**(3)**	**(4)**
H_0: $\varphi(\cdot) = 0$ (χ^2 [p value])	–	62.34 [0.000]	–	65.42 [0.000]
$\rho(Survival_{isrc}, \Delta Productivity_{isrc})$	–	0.167***	–	0.162***
		(0.054)		(0.052)
First-stage equation (IV)				
$Precipitation\ \ Variability_{rc}^{1500-1750}$	–	–	0.013****	0.013****
			(0.003)	(0.004)
First-stage F statistic on excluded IV [p value]	–	–	15.41 [0.000]	12.47 [0.000]

Notes: Standard errors are clustered at the regional level, and are shown in parentheses. All specifications include a constant term. (*d*) denotes a dummy variable. $\varphi(\cdot)$ denotes the third-order polynomial in age and capital endowment used as exclusion restriction in the selection equation.

Abbreviations: GDP, Gross Domestic Product; IV, instrumental variable; OLS, Ordinary Least Square; TSLS, Two-Stage Least Squares.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

historical economic development. By contrast, the regional controls for current GDP per capita, population density, and human capital show negligible estimated coefficients. Overall, looking at Specification (4), social capital emerges as the most relevant factor explaining firm-level labor productivity growth differentials, taking into account the magnitude of the estimated coefficients.

4.2 | Robustness analysis

We present here a series of exercises testing the robustness of the results of Table 1. The outcomes of these exercises are reported in Tables D1–D10 in Supporting Information Appendix D. They fully confirm the main evidence of Table 1.

First, we test the validity of our estimation strategy against correlation bias among regressors by excluding from the empirical model region-level controls only, and both region- and firm-level controls (Supporting Information Table D1).

Second, we test the sensitivity of our analysis against potential biases related to the selection of countries included in the sample, and estimate Equation (5) excluding the countries in the sample one by one (Supporting Information Table D2). We also test for country-specific effects by augmenting Equation (5) with the interaction term between the regional social capital variable and the vector of country dummies (Supporting Information Table D3). The comparison of the estimated marginal effects suggests a cross-country positive effect of social capital on firms' labor productivity growth (Supporting Information Table D4).

Third, we replace the set of firm size dummies with a log-employment variable to check for model specification (Supporting Information Table D5).

Fourth, following some recent contributions analyzing the relationship between regional phenomena and firm- (or individual-) level outcomes (Agostino et al., 2020; Bykova & Coates, 2020; Neira et al., 2018), we rely on a multilevel (random slope) estimation approach to account for the hierarchical structure of the data (Supporting Information Table D6).

Fifth, we consider two alternative identification strategies to assess the robustness of our IV estimates (Supporting Information Table D7). We exploit cross-regional historical variations in institutional regimes, and construct an IV capturing whether a region belonged to, or was a tributary territory of, the Carolingian Empire at the time of Charlemagne's death. The logic behind the choice of this alternative instrument is that an early exposure to what could be regarded as a "modern" system of governance may have influenced positively social capital through civic behavior, shared norms, and a strength in trust and embeddedness in the local community (Ketterer & Rodríguez-Pose, 2018). Then, following Bjørnskov and Méon (2015) and Cruz-García and Peiró-Palomino (2019), we exploit cross-regional variations in the coldest temperature recorded during the winter season. The rationale of this IV rests on the idea that communities living in cold areas developed a higher sense of trust and deeper cooperation mechanisms to survive harsher winter conditions compared to those living in relatively warmer areas.

Sixth, we consider an alternative exclusion restriction for the first-step selection equation of firms' survival by specifying a third-order polynomial expansion using total assets rather than capital endowment in the year 2010 (Supporting Information Table D8).

Seventh, we examine two alternative operationalization approaches for defining social capital (Supporting Information Table D9): (i) a variant for social capital, defined by avoiding any further normalization in the interval [0, 1] of the principal component; (ii) a variable defined as the logarithm of the arithmetic average value of the three dimensions for "generalized trust," "active participation," and "social norms."[15]

Finally, we test for the returns of social capital on labor productivity at the firm level (in 2010 and 2017) rather than growth (Supporting Information Table D10).

4.3 | Assessing the individual dimensions of social capital

We now disentangle the social capital variable by assessing the productivity growth returns of its individual dimensions of "generalized trust," "active participation," and "social norms." We estimate Equation (5) via an IV-Heckman approach, and consider the three social capital dimensions—normalized in [0, 1]—separately. Two main insights emerge from the results of Table 2.[16] First, firms' labor productivity growth is positively affected by all the three dimensions of social capital. Second, "active participation"—a proxy for networking—emerges as the most relevant social capital dimension for firms' productivity growth. Its estimated coefficient is 3.03 times larger in magnitude than that of "social norms," and 3.76 times larger in magnitude than that of "generalized trust."

These results reinforce the idea that social capital is a complex construct encompassing a multiplicity of dimensions. Hence, no individual variable can single-handedly capture it. They also indicate that the networking component of social capital plays the greatest role as a transmission channel for firms' productivity growth. It favors interaction and cooperation among workers both within the firm—by improving organizational efficiency (Bloom et al., 2012)—and across organizations. It simultaneously facilitates knowledge and information flows that both spur technological diffusion and innovation (Akçomak & ter Weel, 2009), and enables the acquisition

[15]When we consider the principal component of regional social capital without any further normalization in the interval [0, 1], we estimate that a one unit increase in social capital leads to an increase in firm-level labor productivity growth between 3.4% and 6.1%—see Specifications (1)–(4) in Table D9 in Supporting Information Appendix D. When we consider regional social capital as the logarithm of the arithmetic mean of the three dimensions of "generalized trust," "active participation," and "social norms," we estimate that a 1% increase in social capital leads to an increase in firm-level labor productivity growth between 0.11% and 0.22%—see Specifications (5) and (8) in Table D9 in Supporting Information Appendix D.

[16]We report here only the main results on the three dimensions of social capital. Table E1 in Supporting Information Appendix E includes the full set of results.

TABLE 2 Individual components of social capital and firm labor productivity growth.

Dependent variable	$\Delta Productivity_{isrc}$		
Estimation approach	IV-Heckman		
	(1)	(2)	(3)
Genralised Trust$_{rc}^{2008}$	0.128*	–	–
	(0.073)		
Active Participation$_{rc}^{2008}$	–	0.481**	–
		(0.229)	
Social Norms$_{rc}^{2008}$	–	–	0.159**
			(0.072)
Firm-level controls	Yes	Yes	Yes
Region-level controls	Yes	Yes	Yes
Two-digit sector dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Number of firms	17,396	17,396	17,396
Model *F* statistic [*p* value]	193.02 [0.000]	259.35 [0.000]	186.08 [0.000]
Selection equation			
Number of firms	27,299	27,299	27,299
H_0: $\varphi(\cdot) = 0$ (χ^2 [*p* value])	61.88 [0.000]	62.90 [0.000]	61.13 [0.000]
$\rho\left[Survival_{isrc}, \log\left(Productivity_{isrc}^{2017}\right)\right]$	0.160***	0.161***	0.155***
	(0.051)	(0.051)	(0.051)
First-stage equation (IV)			
Precipitation Variability$_{rc}^{1500-1750}$	0.039****	0.009***	0.027****
	(0.005)	(0.003)	(0.004)
First-stage *F* statistic on excluded IV [*p* value]	67.11 [0.000]	18.95 [0.000]	46.75 [0.000]

Notes: Standard errors are clustered at the regional level, and are shown in parentheses. All specifications include a constant term. $\varphi(\cdot)$ denotes the third-order polynomial in age and capital endowment used as exclusion restriction in the selection equation.

Abbreviation: IV, instrumental variable.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

of productivity-enhancing resources through production and credit markets (Guiso et al., 2004, 2009; Knack & Keefer, 1997).

4.4 | Accounting for firm-level heterogeneity

In this section we present the estimates obtained by accounting for firm-level heterogeneity considering variations in initial labor productivity, capital endowment, size, age, and technological level. As suggested by Rutten and Gelissen

(2010), social capital is heterogeneously distributed across subgroups within a population of economic agents, replicating what happens with formal institutions (Ganau & Rodríguez-Pose, 2019). More specifically, we report the results of estimating Equation (5) through TSLS, as well as by accounting simultaneously for the endogeneity of regional social capital and sample selection bias (IV-Heckman). Overall, the results reveal that the positive returns of social capital on labor productivity growth are unevenly distributed across different types of firms.[17]

When splitting the sample around the mean value of the log-transformed variable for labor productivity in 2010, the results in Table 3 suggest that only low-productivity firms benefit from regional social capital. The comparison between Specifications (2) and (4) shows that the labor productivity growth returns of social capital are about 2.6 times larger for low-productivity than for high-productivity firms. The difference in the estimated coefficients for the two groups of firms is statistically significant (p value equal to 0.000).[18]

When we split the sample around the mean value of the log-transformed variable for capital endowment in 2010—evaluating firm-level heterogeneity in terms of available tangible resources for the production process—we find that only low-capital-endowed firms increase their productivity as a result of stronger regional social capital (Table 4). Moreover, the difference in labor productivity growth returns of regional social capital is highly statistically significant (p value is equal to 0.000).

When the sample is split into two size classes, i.e., micro and small (up to 49 employees) and medium and large (50 or more employees) firms, we find that smaller firms reap more productivity benefits from regional social capital than larger firms. The benefits of regional social capital are significantly larger for the former than for the latter (Table 5). The comparison between Specifications (2) and (4) highlights how the labor productivity growth returns of regional social capital are 1.9 times larger for micro and small than for medium and large firms. As in the previous cases, the difference in the estimated coefficient of regional social capital is highly statistically significant (p value is equal to 0.000).

We also account for heterogeneity in terms of age by splitting the sample into two groups reflecting a firm's age in the year 2010. The first group, "young" firms, includes firms in the first 5 years of their existence. "Older" firms are those with more than 5 years of existence. The results obtained by accounting for either social capital endogeneity or both social capital endogeneity and sample selection bias are reported in Table 6. Looking at Specifications (2) and (4), we estimate that the labor productivity growth returns of social capital are about 1.1 times larger for younger than for the established firms, despite the fact that the difference in the estimated social capital coefficient is statistically negligible (p value is equal to 0.295).

Finally, we account for heterogeneity in technological level by comparing low- and mid-low-technology firms versus high- and mid-high-technology firms, with a firm's technological level defined according to Eurostat taxonomy based on the NACE Rev. 2 three-digit level classification of manufacturing sectors. We find that social capital matters for the labor productivity growth of only low-technology firms (Table 7). Looking at Specifications (2) and (4), we estimate that the labor productivity growth returns of social capital are about 2.2 times larger for low- than for high-tech firms, and the difference in the estimated coefficient of regional social capital is highly statistically significant (p value is equal to 0.000).

Overall, our heterogeneity analysis corroborates the previous finding that regional social capital has positive effects on firm-level labor productivity growth, even though its positive returns are unevenly distributed across different types of firms. Indeed, we find that less productive, less capital-endowed, smaller, and low-technology firms stand to benefit the most from a high level of regional social capital. By contrast, there is limited evidence of a statistically significant difference in social capital returns on the labor productivity growth of young versus more established firms. In this respect, we complement previous firm-level evidence of a positive but heterogeneous role

[17]We report here only the main results on social capital. Tables E2–E6 in Supporting Information Appendix E include the full set of results concerning the estimates accounting for firm-level heterogeneity.

[18]Inference on the difference in the estimated coefficient of regional social capital is obtained through permutation (Cleary, 1999). The same statistical level of significance is reached when comparing the estimated regional social capital coefficients in Specifications (1) and (3). See also Table E7 in Supporting Information Appendix E, which reports the difference in the estimated coefficient of regional social capital for the five different subsamples considered in this section.

TABLE 3 Social capital and firm labor productivity growth, accounting for heterogeneity in firm-level labor productivity.

Dependent variable	$\Delta Productivity_{isrc}$			
Initial labor productivity level	Low (≤sample mean)		High (>sample mean)	
Estimation approach	TSLS	IV-Heckman	TSLS	IV-Heckman
	(1)	(2)	(3)	(4)
$Social\ Capital_{rc}^{2008}$	0.539**	0.538**	0.191	0.211
	(0.243)	(0.239)	(0.170)	(0.175)
Firm-level controls	Yes	Yes	Yes	Yes
Region-level controls	Yes	Yes	Yes	Yes
Two-digit sector dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Number of firms	7949	7949	9447	9447
Model *F* statistic [*p* value]	191.10 [0.000]	187.73 [0.000]	50.71 [0.000]	54.21 [0.000]
Selection equation				
Number of firms	–	13,003	–	14,296
H_0: $\varphi(\cdot) = 0$ (χ^2 [*p* value])	–	35.87 [0.000]	–	41.67 [0.000]
$\rho(Survival_{isrc}, \Delta Productivity_{isrc})$	–	0.068*	–	0.139***
		(0.039)		(0.051)
First-stage equation (IV)				
$Precipitation\ Variability_{rc}^{1500-1750}$	0.012****	0.013****	0.014****	0.014****
	(0.003)	(0.004)	(0.004)	(0.004)
First-stage *F* statistic on excluded IV [*p* value]	15.85 [0.000]	12.23 [0.000]	14.46 [0.000]	12.31 [0.001]

Notes: Standard errors are clustered at the regional level, and are shown in parentheses. All specifications include a constant term. $\varphi(\cdot)$ denotes the third-order polynomial in age and capital endowment used as exclusion restriction in the selection equation.

Abbreviations: IV, instrumental variable; TSLS, Two-Stage Least Squares.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

played by formal institutions (Ganau & Rodríguez-Pose, 2019) by highlighting how social capital has different effects on the performance of heterogeneous firms. We also complement previous region-level analysis for the EU showing a positive aggregate regional effect of social capital on economic growth (Beugelsdijk & van Schaik, 2005; Forte et al., 2015; Peiró-Palomino, 2016) by identifying at the microlevel those actors who benefit the most from being located in places with a favorable social capital. Overall, our contribution to existing knowledge stresses the microlevel effects of regional social capital and identifies sources of firm-level heterogeneity for social capital as a driver of productivity growth.[19]

[19]We also evaluate the aggregate effect of regional social capital by considering the region-specific average value of firm-level labor productivity growth. Supporting Information Appendix F discusses this exercise, and presents OLS and TSLS estimates. The region-level analysis corroborates our microlevel evidence of an aggregate positive effect of social capital on labor productivity growth.

TABLE 4 Social capital and firm labor productivity growth, accounting for heterogeneity in firm-level capital endowment.

Dependent variable	$\Delta Productivity_{isrc}$			
Initial capital endowment level	Low (≤sample mean)		High (>sample mean)	
Estimation approach	TSLS	IV-Heckman	TSLS	IV-Heckman
	(1)	(2)	(3)	(4)
$Social\ Capital_{rc}^{2008}$	0.547**	0.635**	0.206	0.218
	(0.270)	(0.320)	(0.171)	(0.164)
Firm-level controls	Yes	Yes	Yes	Yes
Region-level controls	Yes	Yes	Yes	Yes
Two-digit sector dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Number of firms	7643	7643	9753	9753
Model *F* statistic [*p* value]	166.44 [0.000]	129.63 [0.000]	104.69 [0.000]	104.50 [0.000]
Selection equation				
Number of firms	–	13,067	–	14,232
H_0: $\varphi(\cdot) = 0$ (χ^2 [*p* value])	–	37.49 [0.000]	–	33.14 [0.000]
$\rho(Survival_{isrc}, \Delta Productivity_{isrc})$	–	0.486***	–	0.052**
		(0.169)		(0.022)
First-stage equation (IV)				
$Precipitation\ Variability_{rc}^{1500-1750}$	0.011****	0.011****	0.015****	0.015****
	(0.003)	(0.003)	(0.004)	(0.004)
First-stage *F* statistic on excluded IV [*p* value]	18.07 [0.000]	13.08 [0.000]	14.49 [0.000]	12.62 [0.000]

Notes: Standard errors are clustered at the regional level, and are shown in parentheses. All specifications include a constant term. $\varphi(\cdot)$ denotes the third-order polynomial in age and capital endowment used as exclusion restriction in the selection equation.

Abbreviations: IV, instrumental variable; TSLS, Two-Stage Least Squares.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

5 | CONCLUSIONS

Social capital—as the bulk of the informal institutional setting of a society—has long been regarded as a fundamental factor for economic growth and development. However, despite the growing number of studies analyzing this relationship at country and regional levels, limited attention has been paid to how a community's social capital endowment affects the performance of local firms. In this paper we have covered this gap in existing knowledge by investigating the firm-level economic effects of social capital. Specifically, we have analyzed the extent to which social capital at the regional level across Western European countries over the period 2010–2017 impinges on labor productivity growth at a firm level.

Our results, based on sample selection and IV estimation approaches, suggest that social capital—and, especially, its networking dimension—is pivotal for the labor productivity growth of firms. However, we also find that not all firms benefit from a high-social capital endowment in the same way. Local social capital benefits far more those firms that lack the conditions to prosper on their own. Firms with size constraints, a

TABLE 5 Social capital and firm labor productivity growth, accounting for heterogeneity in firm-level size.

Dependent variable	$\Delta Productivity_{isrc}$			
	Micro and small firms		Medium and large firms	
Initial size class	TSLS	IV-Heckman	TSLS	IV-Heckman
Estimation approach	(1)	(2)	(3)	(4)
$Social\ Capital_{rc}^{2008}$	0.430**	0.451**	0.217**	0.243***
	(0.187)	(0.191)	(0.095)	(0.087)
Firm-level controls	Yes	Yes	Yes	Yes
Region-level controls	Yes	Yes	Yes	Yes
Two-digit sector dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Number of firms	12,276	12,276	5120	5120
Model F statistic [p value]	159.89 [0.000]	157.37 [0.000]	74.99 [0.000]	75.01 [0.000]
Selection equation				
Number of firms	–	19,462	–	7,837
H_0: $\varphi(\cdot) = 0$ (χ^2 [p value])	–	109.86 [0.000]	–	27.86 [0.001]
$\rho(Survival_{isrc}, \Delta Productivity_{isrc})$	–	0.100***	–	0.175
		(0.037)		(0.217)
First-stage equation (IV)				
$Precipitation\ Variability_{rc}^{1500-1750}$	0.008****	0.008****	0.023****	0.025****
	(0.002)	(0.002)	(0.006)	(0.007)
First-stage F statistic on excluded IV [p value]	16.38 [0.000]	16.35 [0.000]	13.76 [0.000]	13.43 [0.000]

Notes: Standard errors are clustered at the regional level, and are shown in parentheses. All specifications include a constant term. $\varphi(\cdot)$ denotes the third-order polynomial in age and capital endowment used as exclusion restriction in the selection equation.

Abbreviations: IV, instrumental variable; TSLS, Two-Stage Least Squares.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

reduced availability of internal resources, limited levels of productivity, and operating in low-technology sectors stand to benefit the most from being located in regions with a good endowment of social capital. Why is this the case? A plausible explanation is that social capital contributes to the emergence of a local socioeconomic and business ecosystem where interactions across workers, firms, banks, investors, and public authorities are maximized. Relatively "weak" firms in these dense social capital ecosystems can exploit external resources, compensating for their internal limitations to improve efficiency and, consequently, grow more.

Our analysis corroborates previous studies and adds some important novel insights to existing knowledge with relevant policy implications. As the productivity and viability of smaller firms with a lower access to capital is highly dependent on the characteristics of the social capital of the places where they are located, measures aimed at enhancing their productivity should not be just restricted to direct interventions at the firm level, but should take into account the conditions of the ecosystem in which these firms operate. Policies targeting productivity should, therefore, consider not just what can be done for the firm itself, but, as importantly, what can be done to improve the social capital conditions that often constrain firm-level

TABLE 6 Social capital and firm labor productivity growth, accounting for heterogeneity in firm-level age.

Dependent variable	$\Delta Productivity_{isrc}$			
Initial age group (in years)	1 ≤ Age ≤ 5		Age>6	
Estimation approach	TSLS	IV-Heckman	TSLS	IV-Heckman
	(1)	(2)	(3)	(4)
$Social\ Capital_{rc}^{2008}$	0.390*	0.385*	0.318*	0.345*
	(0.207)	(0.205)	(0.176)	(0.181)
Firm-level controls	Yes	Yes	Yes	Yes
Region-level controls	Yes	Yes	Yes	Yes
Two-digit sector dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Number of firms	1,978	1,978	15,418	15,418
Model *F* statistic [*p* value]	146.29 [0.000]	137.96 [0.000]	137.57 [0.000]	101.32 [0.000]
Selection equation				
Number of firms	–	3308	–	23,991
H_0: $\varphi(\cdot) = 0$ (χ^2 [*p* value])	–	14.96 [0.092]	–	51.13 [0.000]
$\rho(Survival_{isrc}, \Delta Productivity_{isrc})$	–	0.171*	–	0.160***
		(0.092)		(0.059)
First-stage equation (IV)				
$Precipitation\ Variability_{rc}^{1500-1750}$	0.011****	0.012****	0.013****	0.014****
	(0.003)	(0.003)	(0.003)	(0.004)
First-stage *F* statistic on excluded IV [*p* value]	17.73 [0.000]	13.50 [0.000]	15.34 [0.000]	12.58 [0.000]

Notes: Standard errors are clustered at the regional level, and are shown in parentheses. All specifications include a constant term. $\varphi(\cdot)$ denotes the third-order polynomial in age and capital endowment used as exclusion restriction in the selection equation.

Abbreviations: IV, instrumental variable; TSLS, Two-Stage Least Squares.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

progress. This does not just apply to the southernmost countries in our sample (Italy, Portugal, and Spain), which have long suffered from a productivity slowdown (Rodríguez-Pose & Ganau, 2022). Rather, policy measures aimed at strengthening the social capital endowment of local communities will also benefit firms in economically and institutionally stronger countries (Germany and France). In other words, improving social capital emerges as a cross-country productivity-enhancing strategy. This is particularly important given the increasing attention devoted by supranational institutions—such as the Social Capital Initiative of the World Bank (1998), or the analyses carried out by the OECD and the EU (European Commission, 2005; OECD, 2001; Stiglitz et al., 2018)—to informal institutions as a means for compensating government inefficiency and "weak" formal institutions (Malecki, 2012; Muringani et al., 2021; Rodríguez-Pose, 2013). If policies aimed at enhancing productivity and, as a consequence, promoting a more territorially inclusive growth and stimulating convergence are to be successful, more attention towards the social capital in which firms operate may be crucial to guarantee that especially the most vulnerable firms can thrive and lift their competitiveness to a new level. Such a social capital improvement strategy is, of course, not straightforward

TABLE 7 Social capital and firm labor productivity growth, accounting for heterogeneity in firm-level technological level.

Dependent variable	$\Delta Productivity_{isrc}$			
	Low- and mid-low technology		High- and mid-high technology	
Technological level	TSLS	IV-Heckman	TSLS	IV-Heckman
Estimation approach	(1)	(2)	(3)	(4)
$Social\ Capital_{rc}^{2008}$	0.415**	0.443**	0.152	0.203
	(0.203)	(0.211)	(0.228)	(0.219)
Firm-level controls	Yes	Yes	Yes	Yes
Region-level controls	Yes	Yes	Yes	Yes
Two-digit sector dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Number of firms	12,509	12,509	4887	4887
Model F statistic [p value]	92.12 [0.000]	120.45 [0.000]	77.64 [0.000]	85.72 [0.000]
Selection equation				
Number of firms	–	19,952	–	7347
H_0: $\varphi(\cdot) = 0$ (χ^2 [p value])	–	33.19 [0.000]	–	70.26 [0.000]
$\rho(Survival_{isrc}, \Delta Productivity_{isrc})$	–	0.135***	–	0.355
		(0.042)		(0.259)
First-stage equation (IV)				
$Precipitation\ Variability_{rc}^{1500-1750}$	0.012****	0.013****	0.014****	0.015***
	(0.003)	(0.003)	(0.004)	(0.005)
First-stage F statistic on excluded IV [p value]	16.48 [0.000]	13.64 [0.000]	12.91 [0.001]	10.15 [0.001]

Notes: Standard errors are clustered at the regional level, and are shown in parentheses. All specifications include a constant term. $\varphi(\cdot)$ denotes the third-order polynomial in age and capital endowment used as exclusion restriction in the selection equation.

Abbreviations: IV, instrumental variable; TSLS, Two-Stage Least Squares.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

or easy to implement, as informal institutions are "remarkably time-invariant" (Cruz-García & Peiró-Palomino, 2019, p. 664).

Our paper, of course, comes with limitations. First, we have focused on a small number of countries all belonging to the "nucleus" of the EU, and this could cap the generalization of our results to other parts of the world. It would thus be interesting to extend our analysis to other countries, in Europe and beyond, and particularly to those that are relatively less developed and structurally different in comparison to Western European ones. Second, our dataset does not allow us to investigate properly the transmission mechanisms of social capital by disentangling the within-firm and the cross-firm dimensions. Indeed, although the focus of the paper has been to assess whether and to which extent regional social capital is a labor productivity growth-enhancing factor, it would be interesting to treat the firm as an organization to evaluate the relative effects of a firm's internal social capital endowment versus its community's social capital endowment. Despite these caveats, our research pushes existing boundaries by bringing to the fore the strong role social capital plays in increasing the productivity of particularly those firms less capable of doing so on their own.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from Bureau van Dijk. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the authors upon request and with the permission of Bureau van Dijk.

ORCID

Andrés Rodríguez-Pose http://orcid.org/0000-0002-8041-0856

REFERENCES

Agostino, M., Di Tommaso, M. R., Nifo, A., Rubini, L., & Trivieri, F. (2020). Institutional quality and firms' productivity in European regions. *Regional Studies*, *54*(9), 1275–1288.

Akçomak, İ. S., & ter Weel, B. (2009). Social capital, innovation and growth: Evidence from Europe. *European Economic Review*, *53*(5), 544–567.

Akçomak, İ. S., & ter Weel, B. (2012). The impact of social capital on crime: Evidence from the Netherlands. *Regional Science and Urban Economics*, *42*(1–2), 323–340.

Algan, Y., & Cahuc, P. (2010). Inherited trust and growth. *American Economic Review*, *100*(5), 2060–2092.

Andini, C., & Andini, M. (2019). Social capital and growth: Causal evidence from Italian municipalities. *Journal of Economic Geography*, *19*(3), 619–653.

Banfield, E. C. (1958). *The moral basis of a backward society*. The Free Press.

Beugelsdijk, S., & van Schaik, T. (2005). Social capital and growth in European regions: An empirical test. *European Journal of Political Economy*, *21*(2), 301–324.

Bjørnskov, C., & Méon, P.-G. (2015). The productivity of trust. *World Development*, *70*, 317–331.

Bloom, N., Sadun, R., & Van Reenen, J. (2012). The organization of firms across countries. *The Quarterly Journal of Economics*, *127*(4), 1663–1705.

Buggle, J. C., & Durante, R. (2021). Climate risk, cooperation, and the co-evolution of culture and institutions. *The Economic Journal*, *131*(637), 1947–1987.

Bürker, M., Franco, C., & Minerva, G. A. (2013). Foreign ownership, firm performance, and the geography of civic capital. *Regional Science and Urban Economics*, *43*(6), 964–984.

Bürker, M., & Minerva, G. A. (2014). Civic capital and the size distribution of plants: Short-run dynamics and long-run equilibrium. *Journal of Economic Geography*, *14*(4), 797–847.

Bykova, A., & Coates, D. (2020). Firm performance and regional economic freedom: The case of Russia. *Post-Soviet Affairs*, *36*(5–6), 395–415.

Cainelli, G., & Ganau, R. (2019). Related variety and firm heterogeneity. What really matters for short-run firm growth? *Entrepreneurship & Regional Development*, *31*(9–10), 768–784.

Charron, N., Dijkstra, L., & Lapuente, V. (2014). Regional governance matters: Quality of government within European Union member states. *Regional Studies*, *48*(1), 68–90.

Charron, N., Lapuente, V., & Rothstein, B. (2013). *Quality of government and corruption from a European perspective: A comparative study of good governance in EU regions*. Edward Elgar Publishing.

Cingano, F., & Pinotti, P. (2016). Trust, firm organization, and the pattern of comparative advantage. *Journal of International Economics*, *100*, 1–13.

Cleary, S. (1999). The relationship between firm investment and financial status. *The Journal of Finance*, *54*(2), 673–692.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94*, S95–S120.

Coleman, J. S. (1990). *Foundations of social theory*. Harvard University Press.

Cooke, P. (2007). Social capital, embeddedness, and market interactions: An analysis of firm performance in UK regions. *Review of Social Economy*, *65*(1), 79–106.

Cooke, P., Clifton, N., & Oleaga, M. (2005). Social capital, firm embeddedness and regional development. *Regional Studies*, *39*(8), 1065–1077.

Cruz-García, P., & Peiró-Palomino, J. (2019). Informal, formal institutions and credit: Complements or substitutes? *Journal of Institutional Economics*, *15*(4), 649–671.

de Blasio, G., & Nuzzo, G. (2010). Historical traditions of civicness and local economic development. *Journal of Regional Science*, *50*(4), 833–857.

Di Guilmi, C., Clementi, F., Di Matteo, T., & Gallegati, M. (2008). Social networks and labour productivity in Europe: An empirical investigation. *Journal of Economic Interaction and Coordination*, *3*(1), 43–57.

Durlauf, S. N., & Fafchamps, M. (2005). Social capital. In P. Aghion & S. N. Durlauf (Eds.), *Handbook of economic growth* (Vol. 1B, pp. 1639–1699). North-Holland.

European Commission. (2005) *Social capital*. Special Eurobarometer (Vol. 223).
Forte, A., Peiró-Palomino, J., & Tortosa-Ausina, E. (2015). Does social capital matter for European regional growth? *European Economic Review*, *77*, 47–64.
Fukuyama, F. (1995). *Trust: The social virtues and the creation of prosperity*. The Free Press.
Gambetta, D. (1988). *Trust: Making and breaking cooperative relations*. Blackwell Publishers.
Ganau, R., & Rodríguez-Pose, A. (2018). Industrial clusters, organized crime, and productivity growth in Italian SMEs. *Journal of Regional Science*, *58*(2), 363–385.
Ganau, R., & Rodríguez-Pose, A. (2019). Do high-quality local institutions shape labour productivity in Western European manufacturing firms? *Papers in Regional Science*, *98*(4), 1633–1666.
Granovetter, M. (2005). The impact of social structure on economic outcomes. *Journal of Economic Perspectives*, *19*(1), 33–50.
Griffith, R., Redding, S., & Simpson, H. (2009). Technological catch-up and geographic proximity. *Journal of Regional Science*, *49*(4), 689–720.
Guiso, L., Sapienza, P., & Zingales, L. (2004). The role of social capital in financial development. *American Economic Review*, *94*(3), 526–556.
Guiso, L., Sapienza, P., & Zingales, L. (2006). Does culture affect economic outcomes? *Journal of Economic Perspectives*, *20*(2), 23–48.
Guiso, L., Sapienza, P., & Zingales, L. (2009). Cultural biases in economic exchange? *Quarterly Journal of Economics*, *124*(3), 1095–1131.
Guiso, L., Sapienza, P., & Zingales, L. (2011). Civic capital as the missing link. In J. Benhabib, A. Bisin, & M. O. Jackson (Eds.), *Handbook of social economics* (Vol. 1A, pp. 417–480). North-Holland.
Guiso, L., Sapienza, P., & Zingales, L. (2016). Long-term persistence. *Journal of the European Economic Association*, *14*(6), 1401–1436.
Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*(1), 153–161.
Kaasa, A. (2009). Effects of different dimensions of social capital on innovative activity: Evidence from Europe at the regional level. *Technovation*, *29*(3), 218–233.
Kaasa, A. (2016). Social capital, institutional quality and productivity: Evidence from European regions. *Economics & Sociology*, *9*(4), 11–26.
Kemeny, T., Feldman, M., Ethridge, F., & Zoller, T. (2016). The economic value of local social networks. *Journal of Economic Geography*, *16*(5), 1101–1122.
Ketterer, T. D., & Rodríguez-Pose, A. (2018). Institutions vs. 'first-nature' geography: What drives economic growth in Europe's regions?: Institutions vs. 'first-nature' geography. *Papers in Regional Science*, *97*, S25–S62.
Knack, S., & Keefer, P. (1997). Does social capital have an economic payoff? A cross-country investigation. *The Quarterly Journal of Economics*, *112*(4), 1251–1288.
Luterbacher, J., Dietrich, D., Xoplaki, E., Grosjean, M., & Wanner, H. (2004). European seasonal and annual temperature variability, trends, and extremes since 1500. *Science*, *303*(5663), 1499–1503.
Malecki, E. J. (2012). Regional social capital: Why it matters. *Regional Studies*, *46*(8), 1023–1039.
Muringani, J., Fitjar, R. D., & Rodríguez-Pose, A. (2021). Social capital and economic growth in the regions of Europe. *Environment and Planning A: Economy and Space*, *53*(6), 1412–1434.
Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *The Academy of Management Review*, *23*(2), 242–266.
Neira, I., Bruna, F., Portela, M., & García-Aracil, A. (2018). Individual well-being, geographical heterogeneity and social capital. *Journal of Happiness Studies*, *19*, 1067–1090.
North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
OECD. (2001). *The well-being of nations: The role of human and social capital*. OECD Publishing.
Olley, G. S., & Pakes, A. (1996). The dynamics of productivity in the telecommunications equipment industry. *Econometrica*, *64*(6), 1263–1297.
Ottati, G. (1994). Trust, interlinking transactions and credit in the industrial district. *Cambridge Journal of Economics*, *18*(6), 529–546.
Patulny, R. (2009). The sociability of nations: International comparisons in bonding, bridging and linking social capital. In G. T. Svendsen & G. L. H. Svendsen (Eds.), *Handbook of social capital* (pp. 402–427). Edward Elgar Publishing.
Pauling, A., Luterbacher, J., Casty, C., & Wanner, H. (2006). Five hundred years of gridded high-resolution precipitation reconstructions over Europe and the connection to large-scale circulation. *Climate Dynamics*, *26*, 387–405.
Peiró-Palomino, J. (2016). Social capital and economic growth in Europe: Nonlinear trends and heterogeneous regional effects. *Oxford Bulletin of Economics and Statistics*, *78*(5), 717–751.
Peiró-Palomino, J. (2019). The geography of social capital and innovation in the European Union. *Papers in Regional Science*, *98*(1), 53–73.

Percoco, M. (2012). Entrepreneurship, social capital and institutions: Evidence from Italy. *Spatial Economic Analysis*, *7*(3), 339–355.
Putnam, R. D. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton University Press.
Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Simon & Schuster.
Rodríguez-Pose, A. (2013). Do institutions matter for regional development? *Regional Studies*, *47*(7), 1034–1047.
Rodríguez-Pose, A., & Ganau, R. (2022). Institutions and the productivity challenge for European regions. *Journal of Economic Geography*, *22*(1), 1–25.
Rodríguez-Pose, A., & Ketterer, T. (2019). Institutional change and the development of lagging regions in Europe. *Regional Studies*, *54*(7), 974–986. https://doi.org/10.1080/00343404.2019.1608356
Rodríguez-Pose, A., Ganau, R., Maslauskaite, K., & Brezzi, M. (2021). Credit constraints, labor productivity, and the role of regional institutions: Evidence from manufacturing firms in Europe. *Journal of Regional Science*, *61*(2), 299–328.
Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, *98*(5, Part 2), S71–S102. https://doi.org/10.1086/261725
Rosés, J. R., & Wolf, N. (2019). *The economic development of Europe's regions. A quantitative history since 1900*. Routledge.
Rothstein, B., & Teorell, J. (2008). What is quality of government? A theory of impartial government institutions. *Governance*, *21*(2), 165–190.
Rutten, R., & Gelissen, J. (2010). Social values and the economic development of regions. *European Planning Studies*, *18*(6), 921–939.
Sabatini, F. (2008). Does social capital improve labour productivity in small and medium enterprises? *International Journal of Management and Decision Making*, *9*(5), 454–480.
Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, *70*(1), 65–94.
Stiglitz, J., Fitoussi, J., & Durand, M. (2018). *For good measure: Advancing research on well-being metrics beyond GDP*. OECD Publishing.
Storper, M. (1995). The resurgence of regional economies, ten years later: The region as a nexus of untraded interdependencies. *European Urban and Regional Studies*, *2*(3), 191–221.
Tabellini, G. (2010). Culture and institutions: Economic development in the regions of Europe. *Journal of the European Economic Association*, *8*(4), 677–716.
Wang, C., & Steiner, B. (2020). Can social capital explain business performance in Denmark? *Empirical Economics*, *59*, 1699–1722.
World Bank. (1998). *The initiative on defining, monitoring and measuring social capital*. World Bank.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Ganau, R., & Rodríguez-Pose, A. (2023). Firm-level productivity growth returns of social capital: Evidence from Western Europe. *Journal of Regional Science*, 1–23. https://doi.org/10.1111/jors.12636