# Fast Tracks to Boardrooms: Director Supply and Board Appointments

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March 2024

**Abstract**

We examine how the size of the labor market for corporate directors impacts board appointments in Italian private firms. Using the high-speed railway expansion as an exogenous shock to costs of serving on boards, we find that an increase in the supply of non-local directors leads to a higher degree of positive assortative matching between firms and directors. High-quality firms improve their board quality at the expense of low-quality firms. The director-firm matching effects are muted among companies with owners acting as board directors. This finding highlights the importance of director entrenchment in the corporate governance of private firms.

JEL classification: G32, G34.

[*]The views and opinions expressed in this paper pertain to the author only and do not represent in any way those of the Bank of Italy.

# 1 Introduction

Choosing good directors is critical for the firm's performance (Adams and Ferreira, 2007). Although companies have traditionally been thought to determine board appointments through their demand for directors (e.g., Becher et al., 2019; Boone et al., 2007), recent research suggests that supply-side factors may also be influential (e.g., Cai et al., 2022; Knyazeva et al. 2013). As Knyazeva et al. (2013, p.1562) posit, "ability of most firms to recruit qualified independent directors is significantly affected by the local supply of prospective directors". While Knyazeva et al. (2013) focus exclusively on large listed companies, it is also important to examine how the supply of directors affects private firms, which form the backbone of the economy. Being major job providers, the private sector companies impact the labor market dynamics, consumption and savings' patterns and resource allocation.[1] Shedding light on their governance structures is, therefore, essential also from a macroeconomic perspective.

Our paper studies the effects of expanding the available talent pool on director appointments in private firms. On the one hand, private firms have more primitive governance structures. They may dedicate fewer resources - time, money, or managerial effort - than stock-listed companies to recruit board members. In turn, one may expect their reaction to the available talent pool to be muted. On the other hand, board turnover may be smoother in these smaller firms, which arguably have a more horizontal organizational structure (e.g., shareholders may have more flexibility in appointing directors due to lower public scrutiny), making changes in the supply of directors consequential. Since it is not clear *ex ante* whether

[1] For example, non-farm private sector workers represent more than 80% of nationwide employment in Italy (Citino et al., 2023).

private firms would be affected, our study investigates this question empirically.

Serving on boards has both benefits (e.g., income, reputation, labor market effects) and costs (e.g., time, effort), but the latter should particularly matter for private firms which are the focus of our study. To address concerns of endogenous board selection, we evaluate how the change in costs of serving on board - and thus effective size of labor market for board of directors - affects matching between firms and directors. To this end, we exploit the gradual introduction of high-speed and high-comfort train service in Italy. We posit that – due to lower personal travel costs, such as time or discomfort – the supply of potential directors willing to accept a distant board appointment *ceteris paribus* is expanded.[2] This expansion in turn facilitates matching between firms and directors. Such approach is consistent with the notion that the personal costs of performing a task at a distant location decrease with the ease of traveling between two areas, as demonstrated in previous research by Bernile et al. (2018), Bernard et al. (2019), and Giroud (2013).

Our empirical analysis builds on a rich novel dataset on the universe of Italian limited liability companies for the period 2005-2017. It combines administrative data on board members' identities and demographics with firm-level information on its age, location, industry, and balance sheet indicators. Our sample of non-micro firms comprises over 295 thousand

[2]As firms tend to prefer in-person to online board meetings, the duration and the quality of the journey are important criteria for the potential candidates' decision to accept a board appointment. For example, online gatherings forced by the COVID-19 pandemic are perceived as less effective since only "in a room full of people you can take the pulse of the crowd" and "allow for a proper grilling of bosses" (The Economist, 2020). Board meetings can be relatively frequent. Although there is no systematic evidence on the actual meeting frequency in Italy, in the U.S., boards of private firms meet from once per month in young companies to four to six times per year in more established ones (Hadzima, 2005). Moreover, these meetings may be intense and lengthy (Hadzima, 2005), inducing the directors to consider comfort costs and to prefer a possibility of within-a-day travels.

firm-year observations, information on over 31 thousand firms, and over 162 thousand unique individuals who have held positions on their boards.[3]

We propose a novel measure of board appointments' quality based on how well board quality fits firm quality. To that aim, we use firm and director fixed effects estimated in a two-way fixed effects model (Bertrand and Schoar, 2003; Baltrunaite et al., 2023a) in total factor productivity regressions. We define director quality and firm quality as their relative positions in the corresponding fixed effects distributions each year.[4] Under the assumption that director and firm quality are complements in the production process, the optimal allocation implies the positive assortative matching, under which best (worst) directors lead best (worst) firms (similarly to Dauth et al., 2022).[5] The improvement in firm-director matching would be consistent with high-quality (low-quality) firms attracting more (less) talented leaders. We thus examine how the firm's access to potential non-local directors in the destinations connected to the firm's headquarters by a high-speed train affects the directors' quality, depending on the firm quality.

We demonstrate that a shock in the supply of potential non-local directors increases assortative director-firm matching. For example, to approximate the relative size of the

[3]Following European Commission, we define micro firms as firms that do not reach a 2-million EUR revenue and a 10-employee threshold over our sample period (`https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en`).

[4]Director fixed effects may be interpreted as an individual contribution in boosting the firm's productivity. It comprises, among other factors, unobservable time-invariant and portable personal characteristics, such as ability, charisma, or skills.

[5]Our definition of the quality of the match takes a stance of the overall economic efficiency and considers not only the firm utility, but also the talent allocation within the economy and, in particular, within a highly qualified labor force segment comprising the corporate directors' labor market. We acknowledge, however, that there exist alternative interpretation of the "matching" concept, for example, in terms of fitting firm's needs. However, due to a complex nature of such concept and a difficulty of measuring it, we leave its exploration for the future research.

director talent pool, we observe that around 157,000 directors serve on boards in Milan and 31,000 – in Bologna. These numbers are arguably a good proxy for the overall number of individuals companies consider for their board appointments. We show that after cities like Milan and Bologna are connected via a high-speed train line, in high-quality firms close to the high-speed train station in a city like Bologna, the board percentile rank increases by 1.3 percentage points. We find that non-local director supply instead is less relevant for the board quality in low-quality firms. Such firms, nevertheless, experience director outflows and difficulties in their replacement. Overall, the shock in the potential directors' supply improves the director-firm fit – higher talent directors sit on boards of higher quality firms.

By construction, our director supply shock is exogenous and not mechanically correlated with the mere presence of a high-speed train to the headquarters from other cities in Italy, as it exploits i) the timing of the high-speed line opening and ii) the intensive margin in terms of the pool size of non-local directors in the destination city. Therefore, our results have a causal interpretation under the assumption that there are no relevant omitted variables that *jointly* determine board selection, the time-varying existence of high-speed trains between firm headquarters and other cities in Italy, as well as the size of the director pool at these locations. The paper provides numerous robustness checks to support this claim.

We show that the director supply effect on board selection depends not only on firm's quality but also on its corporate ownership and governance characteristics. While differences in ownership concentration *per se* do not affect firm's reaction to the expanded set of available directors, we find evidence that the new director appointment opportunities are used mostly

by firms with a higher fraction of non-owner directors. They manage to move to the new state, in which higher quality directors serve on boards of higher quality firms. Put it differently, strong intertwine between firm's ownership and governance may block companies from exploiting the expanded pool of potential candidates for board appointments. These analyses highlight the joint importance of ownership and governance on board selection.

Next, we investigate how an increase in the supply of potential directors affects board characteristics. Specifically, it encourages changes in corporate board generations; on average, younger individuals have higher education levels and, possibly, more modern views of business. We further demonstrate that an increased director supply lowers the share of the family members on boards. Reassuringly, this result confirms the intuition that the presence of relatives in the top ranks of the company is indicative of a limited firms' access to a broader pool of talent (Burkart et al., 2003; Perez-Gonzalez, 2006; Bennedsen et al., 2007).

Finally, consistent with the improved mobility across locations, we show that firms with access to non-local director pool raise the fraction of directors that were born or worked in the train destination at the expense of directors in other non-train-destination locations. The result suggests that firms respond to an increase in director supply by hiring directors located close to the fast-train-destination stations.

Firm's organizational features, such as managerial styles or structures, affect its performance (e.g., Bandiera et al., 2020, Caliendo et al., 2020). We provide evidence that the supply-driven director quality is associated with higher revenues and a lower probability of default. This finding aligns with the notion that higher-quality directors render firm in-

put utilization more effective and that the scarce supply of suitable directors hinders firm growth and performance. Although these findings hinge on an exclusion restriction assumption that the effects on firm performance are only channeled through director appointments, we present evidence that allows us to exclude several of the most plausible competing explanations. Overall, the heterogeneous effect on board quality yields that the increase in high-quality firms' performance comes with a reduction in low-quality ones.

This paper contributes to several strands of research in economics and finance. First, it adds to the literature analyzing boards of directors in private firms. Studies in this area show that the presence of the board of directors (Bennedsen, 2002), board size (e.g., Yermack, 1996; Eisenberg et al., 1998; Bennedsen et al., 2008) or its composition (e.g., Amore et al., 2014; Bauweraerts et al., 2022; Peng et al., 2003) affect the firm's performance and risk (Sattar et al., 2022). We contribute more closely to the literature that focuses on the board selection *per se*. For example, Gao and He (2019) show that, compared to public firms, private ones appoint outside directors more frequently. In a similar vein, Amore (2018) documents positive peer effects of neighbouring companies on private firms' external governance, measured by the presence of non-family directors. Clarysse et al. (2007), instead, focus on firm-level determinants of the appointment of outside board members in a sample of private high-tech companies. Our paper contributes to the literature on private firms by showing that not only the firm's demand but also the directors' supply determines the choice of board members and that such effect varies with firms' relative quality and with their ownership and governance characteristics.

Second, our paper speaks closely to studies on the labor market for corporate directors more in general (e.g., Becher et al., 2019; Cai et al., 2022; Ferreira et al., 2017). While many papers in this area focus on listed companies, we establish that board selection in private firms – which are typically smaller – is significantly affected by access to non-local directors' pool, in line with Knyazeva et al. (2013) findings on listed firms. Yet, we differ from Knyazeva et al. (2013) in several ways. To start with, we extend the analysis to a large sample of privately-held firms that represent a major share of the economic system as opposed to the particular sample of fewer listed companies in their paper. Next, we focus on different outcome variables as we study how patterns of director-to-firm allocation – based on measures of their respective quality – and board characteristics, such as their age or family ties, change in response to the expansion of potential directors' market.[6] Our paper offers a new comprehensive measure of board selection quality based on the closeness of the director-firm fit. Most importantly, we show that the effects of expanding the local supply are heterogeneous, not only in terms of firm-quality, but also based on their corporate ownership and governance characteristics.

Third, this paper is related to a rich literature on agglomeration economies. Building on the notion that the search quality is better in a large labor market (e.g., Wheeler, 2001; Dauth et al., 2022; Rossitti, 2019), it increases the extent of the assortative director-firm matching. Interestingly, better director-firm matches may be one of the channels behind the observed higher manager compensation in large cities (Francis et al., 2016).

[6]Our paper speaks to Sauvagnat and Schivardi (2023), who show how a thinner market of possible candidates for a CEO position in Italy reduces the chances of successfully replacing lost managers, leading to adverse effects on firm performance.

The remainder of the paper is organized as follows. The next section describes the institutional setting in Italy. Sections 3 and 4 present the data and empirical design. Sections 5, 6 and 7 present, respectively, the main results, the mechanisms and the analysis of firm outcomes. Section 8 concludes.

# 2 Institutional setting in Italy

## 2.1 Corporate governance of limited liability firms

Italian firms commonly choose to incorporate in one of the two legal forms: some larger firms select the joint-stock company form (*società per azioni*), whereas the vast majority of small and medium-sized companies are constituted as limited liability companies (*società a responsabilità limitata*).

The traditional corporate governance model is the predominant corporate governance structure in Italy.[7] It prescribes the firm's shareholders to appoint the governance body, constituted of one or more directors. Their roles are specified in corporate by-laws and may comprise a wide range of activities, such as appointing the firm's top management, steering corporate strategic decisions, approving financial statements, or supervising chief executives.

Naturally, directors' duties vary across firms. Although publicly and privately-held Italian

[7]The 2003 Italian corporate law reform introduced the possibility for joint-stock companies to adopt corporate governance structures alternative to the traditional one, i.e., two-tiered model (following German tradition), and one-tiered model (following Anglo-Saxon tradition). Although the reform aimed to make the Italian system more flexible and easier to adapt to other legal systems, the adoption of new governance structures remained remarkably low. In the universe of Italian limited liability firms, less than one percent of firms are governed using one-tier or two-tier models. Similarly, they are nearly negligible in the sample used in our analysis, e.g., in 2017, there are only 21 joint-stock companies with the one-tier model and only eight companies with the two-tier model.

companies share the same formal governance structure, lending them with the "classic" – advising and monitoring – roles, in practice, private companies are smaller and more closely-held (for more detail, please see Section 3.2), implying a lower relevance of directors' monitoring. Similarly, while top executives managing the firm are frequently chosen from the outside labor market in large companies, in smaller-sized firms directors themselves tend to retain executive powers.

## 2.2 High-speed train

High-speed rail in Italy consists of two major lines connecting most of the country's large cities (Figure 1). The first line runs from Turin to Salerno via Milan, Bologna, Florence, Rome, and Naples; the second - from Turin to Venice via Milan (the full high-speed service is under-construction on some segments still). Rail traveling is much faster than car-traveling – trains avoid traffic jams and are operated with a maximum speed of 300 kilometers per hour. On top of a significant reduction in traveling time, the high-speed service offers an improvement in train travel quality. All trains are equipped with complimentary wi-fi and in-seat sockets for charging personal devices and offer a possibility to travel in business class with additional services – private cabins for business meetings, extra comfort, and quiet environments. However, the high-speed rail service is significantly more expensive than conventional rail travel.[8]

[Figure 1 here]

[8]For example, on August 1, 2022, a single next-day ticket from Milan to Turin cost 12.45 EUR and 36 EUR for regular and high-speed trains, respectively.

We consider only direct (i.e., the shortest) city-to-city connections throughout the paper. We disregard indirect connections to minimize assumptions regarding passenger mobility patterns, e.g., the number of stops or travel time they are willing to travel. Table 1 lists the pairs of cities connected by a high-speed train line, the year of their connection, the distance and the time traveled between the stations, and the time saved, as well as the size of each local director pool (see Section 3.1 for the detailed data description).[9]

[Table 1 here]

## 2.3 Stylized facts on long-distance commuting

Throughout the paper, we build on a notion that corporate board directors, similar to other high-skill workers, use high-speed train service to commute long distance. Compared to the other occupational segments, they are more likely to afford such journeys and to hold positions with more flexible work hours and locations. To corroborate this argument, we investigate if the high-speed train line's introduction increased long-distance commuting among the high-skill occupations using the Italian Labor Force Survey.[10] We evaluate the train introduction effect on the long-distance commuting of Italian workers, distinguishing them by occupational segment (Table 2). The dependent variables *Commute long distance* and

[9]Table 1 shows that the passengers save time when choosing high-speed train instead of driving a car even in non-peak car-traffic hours. Although time savings may appear rather moderate in size, we argue that they nevertheless help easing director selection: not all job attributes are exchangeable for monetary means.

[10]For the period 2005-2017, this survey covers a repeated cross-section of a representative sample of Italian households and gathers information on workers' demographic characteristics, occupation status, segment, residence, and work locations. We note that this dataset is only used in the paper to show this stylized facts to validate our empirical approach that relies on a stronger response by the high-skill workers' relative to low-skill workers to the expansion of the high-speed train.

*Commute to destination* indicate individuals who work outside the region of their residence and who work in the train destination province (and outside the region of their residence), respectively. The variable *High speed train* indicates firms located in a province in the years following the opening of the high-speed line. *Professional* is an indicator for workers employed in high-skill/high-wage professions in the private sector, such as managers, entrepreneurs, lawyers, or other specialists, except for medical staff and high-school teachers. Our regression specifications control for non-parametric province-level time shocks. On top, regressions reported in Columns 2 and 4 include individual controls such as gender, age, education, and broad occupational segment.

First, we show that high-speed train service does not affect long-distance commuting patterns on average, i.e., to any region in Italy regardless of its high-speed connection status. The estimate on the *High speed train* indicator is statistically and economically insignificant, equal to zero (Table 2, Columns 1 and 2). There is no differential effect for high-skill professional workers either, as the interaction term *High speed train* × *Professional* is not significant either.

Next, we focus on long-distance commuting via the high-speed train-lines. We show that high-speed train connections among cities result in more intense worker's commuting across these locations. Interestingly, the effect is double for professional workers (Table 2, Columns 3 and 4). Overall, the results suggest that the introduction of high-speed train service disproportionally increases long-distance commuting among the high-skill occupations, supporting the use of the train-induced identifying variation in our analysis.

[Table 2 here]

# 3 Data

## 3.1 Data and variable definitions

The analysis relies on two main datasets. The first one, *Infocamere*, is based on administrative data on the Italian limited liability companies gathered by the provincial Chambers of Commerce. It contains information on the registration data of the universe of Italian private non-financial sector firms. Most importantly, this dataset includes personal information on firms' stockholders and directors, i.e., their names, surnames, and personal identification codes. We use this information to derive their age and place of birth.

The second data source is the database managed by the *Cerved Group*, which gathers balance sheet information of the universe of the Italian limited liability firms. Our sample comprises all private non-micro non-financial non-agricultural firms included in the intersection of the *Infocamere* and *Cerved* databases for the years from 2005 to 2017, covering over 295 thousand firm-year observations.[11,12] We follow more than 31 thousand firms and 162 thousand unique individuals who have held positions on their boards.

To measure director and firm quality, in a matched firm-director panel dataset over

[11] We exclude firms in agriculture, finance, insurance, public administration, education, health, care, social activity, household activities, extra-territorial activity. We also drop firms for which information on industry or municipality or other data needed to calculate the main variables used in the analysis is missing. We drop firms located on islands.

[12] Given the low potential of very small firms to invest a non-negligible amount of resources in board selection and remuneration, we exclude all micro-firms from our analysis. More specifically, we drop firms that do not reach a 2-million EUR revenue and a 10-employee threshold over our sample period.

the period 2005-2017, tracking directors across different firms over time, we use a high-dimensional two-way fixed effects model as in Baltrunaite et al. (2023a). To estimate how much of the unexplained variation in firms' total factor productivity can be attributed to an individual board member, two sources of variation are exploited: cross-sectional variation due to the fact that the same person can sit on the boards of several firms and longitudinal variation due to the fact that the same person can switch from one firm to another over time.[13] The estimated director fixed effects, conditionally on firm fixed effects, and time-varying firm characteristics can be interpreted as a measure of directors' talent (i.e., the individual contribution to the variation of the firms' TFP).

Formally, the analysis uses the largest connected set of firms, which consists of $N$ firms, linked to each other via director mobility, and each firm $i$ is observed over $T_i$ years. We have therefore an unbalanced panel of $T = \sum_{i=1}^{i=N} T_i$ firm-year observations. In each year $t$ a firm $i$ is run by one or several among $J$ directors, whose identities are known to us. We estimate the following high-dimensional two-way fixed effect model:

$$y = F\alpha + D\psi + X\beta + \varepsilon \tag{1}$$

$y$ is a $T \times 1$ vector whose $j$-th element is the total factor productivity of firm $i$ in period $t$; $F$ is a $T \times N$ matrix that collects firm dummies; $D$ is a $T \times J$ matrix that collects directors dummies; $X$ is a $T \times K$ matrix of year dummies (with $K = 13$ in our setting); $\varepsilon$ is the $T \times 1$ vector containing the error terms. We use a measure of TFP computed using balance

[13] The presence of "movers", i.e., individuals with multiple board appointments, allows the identification of fixed effects for both "mover" and "non-mover" directors within the connected set of firms.

sheet information (value added, labor costs, intermediate inputs, book value of capital) with the Levinsohn and Petrin (2003) estimator with the Ackerberg et al. (2015) correction, and that has been purged of sector-year and province-year fixed effects. The TFP measure is computed within 2-digit sectors to account for sectoral differences in the productivity function.

The OLS estimation of equation (1) provides a meaningful estimate of the coefficients $\psi$ of interest as long as directors do not systematically sort into firms based on factors that are not observed by the econometricians and are thus included into the error term. As specification (1) features firm fixed effects, sorting based on companies' time-invariant characteristics would not constitute a threat to the identification. The extensive validity checks are presented in Baltrunaite et al. (2023a).

The average of the estimated directors' fixed effects at the firm level is used to measure its board quality. Similarly, the firm fixed effect can be interpreted as a measure of a firm's quality. In our analysis, we use the variable $PcBoard$, defined as the annual percentile rank of the average director fixed effect, and $PcFirm$, defined as the annual percentile rank of the firm fixed effect. In other words, every year we divide the board quality measure $PcBoard$ and firm quality measure $PcFirm$ in the percentile rank from 1 to 100.

To capture plausibly exogenous variation in board appointments, we exploit the high-speed train line's introduction to construct a non-local directors' supply shock for firms located in cities connected by a high-speed train line. We assume that a director's travel costs determine the likelihood of a firm-director match, which is in line with Bernile et al.

(2018) or Giroud (2013), suggesting that the personal costs of performing a task at a distant location decrease with the availability of non-stop flights between the agent performing the task and its location. In our case, we argue that a substantial reduction in travel time and an increase in travel comfort would make the access to directors in train-connected locations easier, reducing the board reliance on a smaller local pool of directors.[14] With more available candidates, firms would face a broader set of choices, enabling them to find more suitable directors.

Our proxy for the non-local pool of directors to which a firm is exposed considers the firm's location and the number of directors working in a location (or locations) accessible to this firm via the high-speed train.[15,16] More precisely, we measure the non-local pool of directors based on the number of directors in location(s) $b \in B$ accessible to firms in a location $A$, in the years after a location $A$ and a location $b$ become connected via the high-speed train. Formally, the variable $NonLocalPOOL$ is an interaction between the indicator variable for firms located within a 10 kilometers distance from a station with a high-speed train connection and the non-local director pool in the destination location(s) (in logarithms).[17] We define the variable as:

[14]Although it may seem that a higher salary may easily compensate for directors' travel time, we argue that the opportunity cost of time for candidate directors may be substantially higher than the monetary value of time saved on the journey. In other words, some job attributes may simply be non-exchangeable for money, as the time endowment is limited to 24 hours per day for everybody and candidate directors may not be budget-constrained when considering potential board appointments.

[15]The most common occupation of a director is an executive in another firm (Guner et al., 2008; Linck et al., 2008). As comprehensive data on executives in Italian private companies do not exist, we use directorship in other firms to proxy for being a potential candidate for board appointments.

[16]A firm's geographical location in our data is at the municipality level, which is the most granular administrative unit in Italy. There are 20 regions, approximately 110 provinces and more than 8,000 municipalities in Italy in the period we consider. We also note that one local labor market (which is a statistical, but not an administrative unit) typically comprises several municipalities.

[17]In case the same city gets connected to different destinations in different years, we consider separate

$$NonLocalPOOL_{ilt} = log(1 + \sum_{b \in B} \mathbf{1}\{d(\text{HST station to b}; l) < 10km\} * \#\text{Directors in b}) \quad (2)$$

where $l$ is the location of the firm, $HST$ is the acronym for the high-speed train, and $B$ is the set of high-speed train service destinations available to firms in municipality $l$ located less than 10 km away from the closest train station served by $HST$.

In terms of geographical boundaries, the overall pool of potential directors in that location is proxied by a pool of individuals that currently work as firm directors in the local labor market (LLM) of that location. Furthermore, the increased supply of directors affects only firms located within 10-kilometer distance from the station in location A: the variable $NonLocalPOOL$ takes the value of zero for firms that are further than 10km from a station connected by a high-speed train.[18] Figure 2 illustrates the relationship between a firm and its non-local director supply in the simplest case with B consisting of one element only.

[Figure 2 here]

To better examine directors' mobility along the train line, we define three variables at a firm-year level, expressed as the percentage of the total number of directors ($BoardSize$). $DestBorn$ considers directors who were born in the high-speed train connected province,

years for each location.

[18]The definition of the "catchment area" in the origin and destination locations is asymmetric in the baseline specification. We motivate this measure by the fact that individuals are very likely to move for work *locally* within the local labor market. Yet, if they have to travel via the high-speed train line to a further destination outside their local labor market, their willingness to cover the entire local labor market at that destination may be lower. For this reason, we only consider firms relatively close (i.e., within 10km distance) to the train station as the ones able to attract directors from further away. We relax this assumption and check if the results are robust to using a symmetric definition of $NonLocalPOOL$ variable in Section 5.1.

while other measures take into account directors who in the previous year served on a board of a firm in the high-speed connected LLM ($DestExp$) or in any other LLM ($NonDestExp$).[19] Moreover, $DirAge$ is the average age of directors sitting on a firm's board, $Exp$ is the fraction of directors that have experience working on boards of other firms. $SameName$ measure fractions of the firm's directors with the same last name as the firm's largest shareholder.

To study firm performance, we use a logarithmic value of revenues ($logRev$), the total factor productivity ($TFP$), calculated using Levinsohn and Petrin (2003) semi-parametric estimator with the Ackerberg et al. (2015) correction, and an indicator variable taking a value of one if the firm does not appear in our sample the following year ($Default$), which we use as a proxy for firm's default.

## 3.2 Descriptive statistics

Over the 2005-2017-year period, our director supply shock measure uses 9 direct high-speed train connections between 11 stations (Table 1). 26% of sample firms in 19% firm-year observations have access to directors from other labor markets, accessible by such train service.[20,21] Their average trip is 129-km-long. It takes 50 minutes and saves at least 48 minutes for a passenger that chooses taking a train instead of a car ride in non-rush hours.

[19] Our data is based on administrative records, and does not include the place of residence for individuals in the sample. Therefore, we rely on their place of birth and the place of work to proxy for the location they reside in.

[20] The variable $Train$ is a dummy variable, taking a value of one if firm's the municipality is located within 10km from a station, connected by a high-speed train in the years $t$ following the opening of the first high-speed train connection.

[21] These calculations are based on data cut at a local labor market (LLM) level in the last year of our sample. We observe that an LLM has 3,101 directors on average. The train-connected LLMs are, on average, larger (51,752 directors) than the not connected LLMs (2,113 directors). Even for these LLMs, an opening of a train line is important as it adds 61,422 directors on average to their local director labor market.

The median sample firm is 24-year-old. Using its 2.2 million EUR assets it produces 12.4 million EUR annual revenues (Table 3). On average, four directors sit on its board. 0.8% of these directors were born at the other end of the high-speed train line. 1.6% of them have experience at another firm located in an LLM connected with a high-speed train, and 2.2% – at another firm in some other LLM.

[Tables 3 and 4 here]

As previously explained in section 3.1, we build firm and board quality measures as annual percentiles of firm and director fixed effects. These fixed effects are calculated within the largest set of companies connected via director mobility, limiting our sample to such connected firms. The size of this sample corresponds to 30% of the universe of Italian companies. We compare the firms in and out of our sample (Table 4) to understand the external validity of our results. Our sample firms appear statistically and economically different from the remaining population of Italian firms in several dimensions. For example, they have larger boards and more often have access to a high-speed train; they are older, larger (in terms of a number of employees, assets, and revenues) and less productive. Our paper shows that only the more productive firms benefit from an increased supply of directors. As our sample covers less productive firms on average, the effect for the out-of-sample Italian firms may be even stronger.

# 4 Empirical design

For several reasons, board quality may correlate with the firm's important characteristics, either observable or unobservable. Using OLS to evaluate the directors' supply-quality relationship may yield biased estimates, with little information on the causal question of interest. To address this matter, we propose a novel identification strategy based on a director supply shock induced by the introduction of the high-speed train line, as explained more in detail in subsection 3.1.

We run the following reduced-form panel regressions to study the effects on board appointment quality:

$$PcBoard_{it} = \gamma^{N} NonLocalPOOL_{ilt} + \gamma^{L} LocalPOOL_{ilt} + X_{it}^{'}\beta_x + \sigma_i + \mu_{tr} + \nu_{ts} + \varepsilon_{it} \quad (3)$$

where $PcBoard_{it}$, $NonLocalPOOL_{ilt}$ and $LocalPOOL_{ilt}$ are measures of board quality, non local and local supply of directors, respectively as defined in subsection 3.1, for each firm $i$, in location $l$ and year $t$. $X_{it}$ is a vector of firm-level controls measured in their logarithmic values: age in years, value of assets in the first year a firm appears in *Cerved* database. $\sigma_i$ is the vector of firm fixed effects. $\mu_{tr}$ is a vector of year-region fixed effects, while $\nu_{ts}$ is the vector of sector-year fixed effects. Firm fixed effects, $\sigma_i$, account for time-constant firm unobservables, while $\mu_{tr}$ and $\nu_{ts}$ absorb non-parametric region-specific and sector-specific time trends.[22]

[22]Last, in Section 7 which investigates the relationship between directors' supply and firm performance,

The identifying assumption of this analysis is that, conditional on covariates, there are no relevant omitted variables that *jointly* determine board selection, the timing of high-speed train service opening between firm headquarters and other cities in Italy, as well as the size of directors' labor market at these locations. Although this assumption is not directly testable in the data, we motivate in detail the role of the control variables and make explicit the remaining threats to the identification.

By construction, our director supply shock is not mechanically correlated with the mere presence of a high-speed train to the headquarters from other cities in Italy. This is because the *NonLocalPOOL* variable captures arguably exogenous variation in the directors' supply stemming from: i) cross-sectional variation across provinces which received or did not receive the high-speed train line; ii) time-series variation due to the staggered timing of the high-speed train line opening, iii) the intensive margin proxied by the pool size of potential non-local directors at the destination location(s).[23]

Furthermore, we provide evidence to support the use of the high-speed train line roll-out as an exogenous shifter of the quality of board appointments. First, the timing of the high-speed train line's opening is not correlated with the country-level economic cycle by construction since different cities experienced the opening of a high-speed train line in different years. Second, the identifying variation does not disproportionately rely on provinces

we run a number of reduced-form regressions as in equation (1) and also show a set of scaled results, in which effects of *NonLocalPOOL* on firm performance are scaled-up by their impact on *PcBoard* (Section 7).

[23]The origin-destination pairs are labeled from the firm's perspective throughout the paper: the origin, thus, is the firms' location and the destinations are the locations connected via the high-speed rail to the origin location.

in specific geographic areas in the country or economic and demographic changes in certain provinces, which may be systematically correlated with the presence or the timing of the introduction of the high-speed train, due to the inclusion of region fixed effects and province-level controls. Third, and most important, we provide evidence that the infrastructure expansions are uncorrelated with pre-existing trends in province-level measures of economic conditions. On average, Figure 3 illustrates that there was no significant pre-trend in the firms' assets, revenues, number of employees, labor productivity or number of firms over five years leading to openings of HST lines.

[Figure 3 here]

One may argue that development of a train connection to a firm's location may affect its operations – for example, improve the transportation of firm's manufactured goods – and then lead to a trickle-down effect on director appointments.[24] If the train-line opening affects the demand *at the province level* (including any effect on province population), we tackle this concern in the main regression specification by controlling for the economic output per capita in each province. If the train-line opening affects the demand *within the province* , for example, by heterogeneously affecting different firms, our estimates rely on an implicit assumption that firm demand for director appointments is unaffected. To support this

[24]We, however, argue that high-speed train connection did not substantially alter the market conditions in which firms operate, as it improved passenger travel comfort only (Beria et al., 2018; Desmaris, 2016), but left transportation costs of goods unchanged. The first cargo service was planned to run on the line only in 2019 (Beria et al., 2018), which is after our sample period. Moreover, the high-speed transportation is mostly used among upper-middle-class, business and tourist passengers, representing a moderate share of the overall passenger transportation within Italy, making it unlikely that the better train connection would create additional demand for firms' output.

claim, we implement several robustness checks showing that the supply, rather than demand of directors, explains the director supply-board quality link.

One may worry about the forward-looking bias in the estimation of directors' quality, whereby the effect mechanically arises because a director is defined as *ex-ante* high-quality if in the future she joins a high-quality firm. To tackle this issue director fixed effects could be estimated using only the period before the introduction of the high-speed train service. Yet, given that our panel only spans the period 2005-2017 and the fact that the first high-speed train connections were launched as early as in 2007, we do not consider this a reasonable strategy in our case: coefficient inconsistency related to the small time dimension may aggravate the analysis more than the gains associated with the removal of the remaining biases due to the forward-looking nature of the fixed effects. Nevertheless, we point out that director fixed effects are estimated controlling for province-year shocks. This allows to capture all observed and unobserved time-varying factors affecting firms in different provinces (see also Section 3.1). Therefore, the remaining confounding variation may only pertain to time changes within a province, conditional on the extensive battery of controls included in the regression equation 3.

# 5 Results

## 5.1 Director supply and board quality

We report the estimated relationship between the directors' supply and the quality of the board in Table 5. On average, the supply of potential non-local directors ($NonLocalPOOL$) does not affect the quality of the firm's board of directors. The result is unchanged using parsimonious (with year, sector, and region fixed effects) and stringent (with the firm, year-sector and year-region fixed effects) regression specifications (Table 5, Columns 1 and 2). The latter specification only exploits the time variation within the firm due to the inclusion of firm fixed effects. Therefore, it limits concerns of a systematic unobservables-based selection of firms founded in the city center, hence, close to the station, having systematically different patterns in their boards' selection.

[Table 5 here]

Board appointments are an equilibrium outcome of a matching process between firms and potential directors. Thus, not all firms are likely to gain equally from a larger pool of potential directors. For example, the best firms are more likely to benefit from the increased director supply as directors previously "constrained" to work in worse-quality firms now may be more willing to move for board appointments in high-quality firms. To evaluate this conjecture, we examine how the director supply-board quality effect varies with firm quality.

The results suggest that this supply-quality relationship is indeed heterogeneous across firms: only better firms benefit from the increased supply of directors. To be precise, a higher

number of potential non-local directors improves the quality of board appointments at higher quality firms (Table 5, Columns 3 and 4). This relationship is robust to measuring firm's quality using a percentile of its fixed-effect or an indicator for firms with quality higher than the annual median quality (*Good*). The interaction coefficient for the better quality firms, $NonLocalPOOL \times Good$, is positive and significant, and so is the combination of the two coefficients (0.07, significant at 5% level), showing the overall positive effect for such firms. The coefficient for lower quality firms is negative, yet not statistically significant. When investigating the timing of the effects (the results are available upon request), we discover that the board supply has an immediate and short-lived negative effect on worse firms, but the positive effect for the good firms starts showing in the third year.

The results are not only statistically but also economically meaningful. For example, on average about 157 thousand directors serve on boards of firms registered in Milan's LLM. For higher quality firms in a location, to which high-speed train to Milan is opened, the firm-board quality percentile increases by 1.3 percentage points, controlling for the firm, year-region, and year-sector fixed effects. This effect is substantial, explaining 13% of the over time variation in board quality of a good firm.

Next, we further investigate the heterogeneity of the director supply-board quality relationship along different segments of firm quality distribution in Column 5. In particular, we replace the variable $NonLocalPOOL$ and the interaction $NonLocalPOOL \times Good$ with four variables showing the $NonLocalPOOL$ effect in each quartile of the firm quality distribution, i.e., $NonLocalPOOL \times Quality1$, $NonLocalPOOL \times Quality2$, $NonLocalPOOL \times Quality3$

and $NonLocalPOOL \times Quality4$ (the main effect $NonLocalPOOL$ is not included in such specification with a full set of quartile dummies due to collinearity).

The evidence reveals heterogeneity also within high and low quality segments. In particular, we find a positive and significant effect for the firms in the third quality quartile, while it is positive, but rather small in magnitude and not statistically significant for the highest-quality firms in the fourth quality quartile. In other words, among high-quality firms, the very best ones seem to have milder effects, perhaps because they are less constrained by their local pool of candidates (e.g., they are able to offer higher financial remuneration or to invest more effort in director recruiting).

The effect instead is negative, although not statistically significant, for firms in the bottom two quartiles, consistent with the evidence in Columns 3 and 4. The negative coefficient is notably higher for firms in the lowest quartile, indicating that relatively higher-quality firms in the second quartile are better equipped to withstand competitive pressures that may arise from the connection of distant director labor markets, compared to those in the first quality quartile. These results suggest that the loss in director quality is less pronounced for firms positioned closer to the median.

## 5.2 Heterogeneity analysis: the role of corporate governance

Director supply effects on board selection may not only depend on the firm "type" (better or worse quality), but also on its corporate ownership and governance characteristics. As private firms differ vastly in these features from public firms - that are, among other differences,

affected by stricter regulation and market scrutiny - it is important to understand how ownership and governance characteristics affect firm choice of board members in the sample of private entities. We provide three heterogeneity tests and focus on the role of ownership concentration, delegated governance and the interaction between the two. More specifically, we estimate the director supply-board quality effect in subsamples of firms with low and high ownership concentration (Table 6, Columns 1 and 2); with and without separation between owner and director roles (Columns 3 and 4) and those characterized by concentrated ownership with board representation and other firms (Columns 6 and 5). To facilitate the comparison of the effects, in Table 6 we present standardized regression coefficients.

First, we investigate how the relationship varies across firms with different levels of ownership concentration. While high ownership concentration guarantees strong monitoring of firm activity (Shleifer and Vishny, 1986), it may limit managerial discretion and initiative (Burkart et al., 1997). One of the channels may be through management: as argued in Bennedsen et al. (2008, p.1099), "since the CEO often is a large owner with significant power, the board puts less emphasis on hiring, monitoring and providing the right incentives for the daily management." In turn, in firms with influential shareholders the role of the board of directors (and attention paid do their selection) may be limited. Hence, such firms may be unresponsive to expanding the pool of available directors.

Conversely, under high ownership concentration - when minority shareholders do not have significant powers - decision-making is easier. Such firm ownership structure is in line with a stronger reaction to the expanded pool of candidates for director appointments. As

ownership concentration may strengthen or weaken the supply - board appointment effect, it remains an empirical question to evaluate it.

The results in Table 6, Columns 1 and 2 are rather comparable, indicating no strong evidence that firms with high versus low ownership concentration react differently to the expansion of the director pool. While the combination of the effects of supply and supply for high quality firms ($NonLocalPOOL+NonLocalPOOL \times Good$) is of a similar magnitude (0.013 and 0.012) it is significant only in Column 2, possibly because of a substantially larger sample size. These results are in line with differences in ownership concentration not playing a crucial role in determining firms' reaction to expanded set of available directors.

[Table 6 here]

Second, we investigate whether the separation between corporate ownership and governance eases or creates obstacles for firms to re-adjust their board appointments in reaction to the expanded potential directors' supply. Previous studies show that outsider-dominated boards are overall more independent to make strong decisions, such as dismissing underperforming CEOs (Weisbach, 1988) or opposing bad proposals (Mace, 1971). In a similar vein, we investigate whether the effect of director supply on board quality among high quality firms is stronger under a stronger influence of non-owner directors. To this end, we examine the sub-samples of firms, in which directors jointly hold (Column 4) or do not hold the majority of companies' shares (Column 3).

The results reveal that the effect of director supply on board quality among better firms is positive and significant with high and low director ownership. Yet, the effect is five times

larger for firms with low director ownership. In other words, firms with lower shareholders' presence on corporate boards show a stronger reaction to the expansion in director supply than those with more owners on boards. The finding supports the idea that a strong intertwine between firm's ownership and governance prevents companies' from exploiting the full set of opportunities available to them arising with the expanded pool of potential candidates for board appointments.

Third, we investigate the role of concentrated ownership when it is combined with a strong role in the board of directors. We separately study firms with (Column 6) and without (Column 5) the majority owner having a position on the board. Interestingly, the results in Column 6 show that the effect of director supply is virtually null among firms where the dominant shareholder also has a seat on the board of directors. In other words, such firms appear to be particularly closed with respect to changes of board members due to the expanded director availability. The finding is in line with the strong shareholders potentially blocking inflow of new talent. In contrast, the effects on board selection documented in the previous section stem entirely from firms without such strong cohesion between ownership and governance (Column 5).

Jointly, these analyses illustrate that governance is important: only firms where board of directors is relatively more independent - i.e., with less cohesion between governance and ownership - appear to exploit new director appointment opportunities that open to them with the expansion of the high-speed train lines.[25]

[25]In this way we also relate to the literature on board independence which mostly focuses on public companies (e.g., Dahya et al., 2008; Knyazeva et al., 2013; Armstrong et al., 2014; Duchin et al., 2010.)

## 5.3 Robustness tests

We evaluate if the director supply-board quality effect is robust to alternative variable definitions, sample selection choices and regression specifications. First, we use an alternative definition of board quality. Instead of averaging the directors' fixed effect within a board and ranking this measure for each year, we rank the directors each year and measure board quality with the average of their percentile rank. The director supply effect remains negative for the worse firms, positive and significant for the better firms, and the difference between the two effects is statistically significant (Table 7, Panel A, Column 1).

Second, small firms may have less sophisticated director selection practices than larger ones and, therefore, may benefit less from expanding the non-local directors' supply. In other words, one would expect that the effect mostly comes from larger firms. To confirm if it is the case, we exclude the firms with fewer than 20 employees. Our results are not only confirmed qualitatively (Table 7, Panel A, Column 2), but are also larger in the absolute value.[26]

Third, our results may be affected by sample selection. The firm- and director-fixed effects are computed using data over the whole sample period. Such a definition may potentially over-represent individuals that become directors in locations accessible via a high-speed train and would not have become in its absence. To evaluate this concern, we keep only the directors (and firms) active in 2005-2006, before the first high-speed train connection and replicate our analysis. The estimates remain consistent with the initial findings (Table 7,

[26] Consistently, the split-sample analysis shows that the effects are virtually null among small firms, while they are confirmed among medium and large size companies. The results are available upon request.

Panel A, Column 3).

We also provide evidence to exclude an alternative explanation for our findings. One may argue that improving a train connection to a firm's location affects its operations. For example, an easier access to a city may increase tourist flows, leading to more business activity and trickle-down effects on director appointments. However, excluding locally operating firms – in accommodation, catering, health, artistic, entertainment and fun activities industries – preserves the results (Table 7, Panel A, Column 4).

Next, we study the sensitivity of our results to alternative definitions of the director supply shock measure by varying the distance, which determines the reach of the high-speed-train induced director supply shock. Differently from the baseline definition, which considers firms within the 10-km distance from the station as "treated", we use several alternative cut-offs. First, we use a parsimonious variable that ignores the differences in the size of directors' pool in each destination and is defined as an indicator for firms within an LLM with a high-speed train connection (Table 7, Panel B, Column 1). Moreover, we set the high-speed train reach for firms located in the same LLM, i.e., similar to a commuting zone (Table 7, Panel B, Column 2) or located within 20km from the station (Table 7, Panel B, Column 3), rather than within 10km from the station. These changes do not significantly affect the results: the coefficients on the interaction variable $NonLocalPOOL \times Good$ remain statistically significant.

To assure that oversampling of firms located close to the stations is not driving the results, we collapse our observations at a LLM-year level (Table 7, Panel B, Column 4),

distinguishing by the firm quality. Even though we now work with 26-times smaller sample, the coefficients remain of the same sign. This finding illustrates that the effects are robust to considering the aggregate measure of economic activity, rather than that of a single firm.

[Table 7 here]

Finally, to tackle the concern that one particular train connection drives the results, we exclude supply-shock-affected stations (and firms located close to these stations) one-by-one. The results remain robust to eliminating any of the train segments (the results are available upon request).

## 5.4 Alternative proxies of director quality

The analysis in our paper relies on director fixed effects as a measure of their talent, estimated using a two-way fixed effects model (Baltrunaite et al., 2023a). More specifically, they measure directors' individual contribution to the variation of the firms' total factor productivity. Such talent definition may comprise all manager characteristics, both observable and unobservable, that make firms operate efficiently, such as education, early work experience, innate ability or charisma, as long as they are time-invariant and portable across firms. While our talent measure may somewhat suffer from an upward bias in levels, this bias should not compromise their relative ranking, as discussed in Baltrunaite et al. (2023a).[27]

[27] In addition, such measure of talent implicitly assumes that director quality is universal - a good director would do good for any type of firm. An alternative view would be to identify specific needs of each firm and distinguish between directors most suitable to tackle these needs. However, such empirical exercise is virtually impossible in a large sample of private companies with limited information on their directors. Thus, we leave this question to the future research focusing on a more targeted sample of firms.

Most important, Baltrunaite et al. (2023a) documents that such measure of talent positively correlates with ex-ante and ex-post indicators of ability, i.e. managers' educational attainment and their forecast precision with respect to the firm's future performance. Although this evidence is based on survey information for a representative, yet much smaller, sample of firms, this is reassuring regarding the informative content of the fixed-effects-based measure.

Other director quality measures used in the literature, such as executive or committee experience, professional networks or educational background, are not available for our large sample of privately held Italian companies. We thus rely on the available administrative data to illustrate the effects of director supply on a few alternative proxies for director talent based on their demographic characteristics and directorship experience. Table 8, Column 1 shows the director supply effect on directors' average age: younger directors have higher education and may bring new innovative ideas and modern approaches to boardrooms. The results show that increasing the supply of potential directors lowers the average board age; the effect is more than twice stronger for the good firms.

[Table 8 here]

Next, using the directorship histories, we create a measure of director's experience on boards of the other companies. Then, we investigate how the director supply affects the fraction of directors with prior experience (Table 8, Column 2). In line with the results on directors' age, the effect is negative for low quality firms, and negative and significant for high quality firms. This evidence, at a minimum, further signals that the expansion of the

available directors results in attracting new younger individuals to boardrooms.[28]

Prior literature has shown that the practice of appointing relatives to direct a company may hinder a firm's access to a broader pool of talent (Burkart et al., 2003; Perez-Gonzalez, 2006; Bennedsen et al., 2007).[29] We investigate whether a shock to directors' supply may affect director appointments based on family links. To measure the presence of family members, we use a fraction of directors having the same surname as the owning family, *SameName*. We show that the fraction of directors having the same last name as the owning family decreases with the pool of directors (Table 8, Column 3). Interestingly, both high and low quality firms reduce the share of family members on their boards as the new candidate directors become available to them. Overall, these results indicate that an expansion of director supply induces firms to open up their boards to individuals outside the family.

# 6 Mechanisms of board turnover

## 6.1 Coming and going directors

Our results indicate that an increase in director supply mostly benefits board appointments in higher quality firms, while lower quality firms seem to be unaffected. To shed light on the director reallocation, we analyze the board size and director inflows and outflows,

[28]The results are qualitatively similar when we use industry experience, defined in an analogous way, as a dependent variable.

[29]On the other hand, if feasible candidates' supply is limited, family members' appointments may be optimal in equilibrium (and not due to social preferences such as nepotism or inheritance norms). For example, related people may be more likely to embrace a longer-term perspective, overcome agency problems between owners and managers (especially when formal institutional or general social trust is weak) or accept a lower remuneration package due to their engagement in a family business.

distinguishing by firm and director quality.

We start by analyzing the effects on the board size in Table 9, Column 1, where we run a regression 3 with the dependent variable defined as the number of directors on the firm's board. To avoid long variable names, in this analysis, we shorten *NonLocalPOOL* and use *NL*. A negative and significant coefficient on *NL* and a positive coefficient on $NL \times Good$ suggest that the board size significantly decreases only for the low quality firms, but does not change for higher quality ones (the combination of $NL \times Good$ is not significant).[30]

To better understand board appointment changes, we use the data at the director-firm-year level and in Table 9, Column 2 (Column 3), we examine how changes in coming (going) directors differ by the quality of the firm (*Good*) and by the quality of the director. For the letter, we define a new variable *GoodD*, which indicates whether director's quality is higher than that of the firm. More specifically, to study the heterogeneity of the effects by the firm-director combination type, we replace $NL$ in our main regression specification with its full interaction with these two variables ($NL$, *Good*, *GoodD*, their 3 two-way interactions and a single triple interaction).

Several interesting patterns emerge. First, the increased director supply worsens labor market outcomes for the lower quality directors. It increases the probability of leaving a good firm and decreases the probability of joining a good firm ($NL$+$NL \times Good$). Second,

[30]New directors are often appointed to replace directors that leave the firm. To examine this possibility, we replicate the main regressions in the subsample of firms for which board size remains constant, but board quality changes. In other words, these are firms that replace existing directors with new ones of better or worse quality. The main result on director supply-quality relationship is confirmed in this sub-sample, suggesting that the estimated effects stem (also) from director replacement. The results are available upon request.

for the good directors, an increase in the director supply raises the probability of joining a good firm and lowers the probability of leaving it ($NL{+}NL \times GoodD + NL \times Good + NL \times GoodD \times Good$). Third, for the worse-quality firms, an increase in the supply of non-local directors increases the likelihood of good directors leaving and decreases the likelihood of joining them ($NL{+}NL \times GoodD$).

[Table 9 here]

All in all, we find that in response to an increase director supply, low-quality firms reduce their board size, arguably due to difficulties in director selection. These firms show a higher separation and lower hiring rates of high-quality directors. High-quality firms, on the contrary, exhibit higher hiring and lower firing rates of these directors, orienting themselves towards high-quality boards.

## 6.2 Directors along the train line

Any board selection effect arising due to the supply shock in the availability of non-local directors should happen "via the high-speed train line". We show that consistent with the improved mobility across locations, firms with access to non-local director pool raise the fraction of directors that were born or worked in the train destination at the expense of directors with experience in other non-train-destination areas (Table 8, Columns 4 - 6).

For example, opening a high-speed train line between Bologna and Milan increases the potential non-local pool of directors by 157 thousand for firms in Bologna. This shock in supply raises the fraction of directors in Bologna, who were born in Milan and who had

director-experience in Milan last year by 1.7 and 6.0 percentage points. It also decreases the fraction of directors who worked in other LLM in the previous year (not Milan, not Bologna) by 0.7 percentage point.

These results align with the firms responding to an increase in director supply by hiring directors located close to the fast-train-destination stations. Interestingly, a larger pool of potential directors facilitates search in corporate directors' labor market and alters board appointments along the high-speed train uniformly for all firms (Columns 4 - 6). The more productive firms do not respond to the shocks in director supply by hiring more directors with links to the destination station than the less productive firms. The estimate on the variable $NonLocalPOOL \times Good$ is not significant.

# 7 Director supply and firm outcomes

We study if better board quality is associated with higher firm performance. In particular, we focus on firm growth, which we proxy by firm revenues and its soundness measured by the probability of default. The results show that for better firms, at the expense of worse firms, a high-speed-train-induced shock to the director supply positively relates to firm's revenues (Table 10, Column 1) and negatively - to the probability of default (Table 10, Column 2).

[Table 10 here]

We then examine directly how the director quality affects the firm's performance. Namely, in regressions in Table 10, Columns 3-4 we instrument for the board quality with a supply

shock interacted with firm quality measure, where the first-stage regression is essentially the one in Table 5, Column 4. This analysis hinges on a stronger assumption that opening a train line only affects the firm's performance via hiring better directors and, hence, these results should be interpreted without a causal meaning. These "scaled" estimates are consistent with board quality raising firm's revenues, and lowering the probability of default. In other words, more capable directors may bring a positive contribution to firms' outcomes, for instance, due to their ability to advise or lead the firm better.

The above mentioned exclusion restriction implies that better train service to a firm's location improves its performance only through attracting better-fit directors to serve on its board. Yet, a better connection between the two cities can benefit a firm via alternative mechanisms, such as creating new buyer-supplier linkages (Bernard et al., 2019), lower costs of getting specialists to assist a firm and similar. We acknowledge that the interpretation of the findings on firm performance relies on this assumption.

# 8 Conclusions

This paper exploits a novel rich dataset of Italian private firms to study how the size of corporate directors' labor market affects board appointments. To establish causality, we rely on a shock in potential non-local directors' supply induced by the reduction in their travel time and the increased comfort via the high-speed train service. We show that once the market for corporate director appointments expands, firms improve their director matches by raising the closeness of the director-firm quality fit. Our study shows that higher-quality

companies attract talented directors at the expense of low-quality firms.

The findings also shed light on the importance of corporate ownership and governance structures among private firms. The director supply-board quality relationship mainly stems from firms with relatively low overlap between shareholders and directors. Similarly to other studies examining the role of independent directors in public firms, we show that the presence of external directors allows selecting board members from a broader talent pool.

Our research sheds light on the potential ripple effects of infrastructure investments in high-speed rail networks. By linking local labor markets, particularly for high-skill professionals like corporate directors, these investments foster a more integrated and dynamic employment landscape. The resulting surge in directors' mobility facilitates greater transparency and efficiency in labor market functioning, empowering firms, particularly those of higher quality, to access a wider pool of directorial talent. This enhanced ability to match directors to firms may also augment overall corporate performance.

We analyze the Italian context, where many limited liability companies are family-owned and rarely rely on external management to run the business (Baltrunaite et al., 2023b). Such lack of meritocracy and excessive familism (Pellegrino and Zingales, 2017) may pose an obstacle to competence-based board selection from outside the firm. We examine the director supply-board appointments relationship in an Italian setting. Our findings, if anything, should generalize also to countries with fewer nepotistic tendencies. Furthermore, the findings are likely to apply to other policentric countries, where economic activity is spread rather evenly over the territory with several industrial centers, which correspond to

distinct director pools (e.g., Germany or The Netherlands). On the contrary, the results are less likely to apply to monocentric countries with a single concentrated center of economic activity (e.g., Hungary, Greece).

Finally, our findings carry significant implications for policymakers. We highlight the role that the supply of potential directors plays in shaping board appointments within private firms. Therefore, policymakers could contemplate incentivizing these entities to diversify their recruitment channels. For instance, the establishment of comprehensive potential director databases, incorporating location information, could serve as a viable strategy to expand the talent pool accessible to private firms.

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# Tables

Table 1: Opening of a high-speed train line

The table lists stations, connected by a high-speed train during the 2005-2017-year period, a number of directors active in the connected local labor market in the year of the train line connection, the distance and the travel time between the two stations. The last column shows how much time a passenger saves when choosing high-speed train instead of a driving a car in non-peak hours.

| Location A | | Location B | | Opening | Distance | Time | |
|---|---|---|---|---|---|---|---|
| City | Directors | City | Directors | | (km) | (hours) | saved (hours) |
| Padova | 20,151 | Venice | 14,929 | 2007 March | 42 | 0.5 | 0.25 |
| Salerno | 7,379 | Naples | 43,427 | 2008 June | 55 | 0.75 | 0 |
| Milan | 156,840 | Bologna | 31,305 | 2008 December | 215 | 1 | 1.5 |
| Florence | 22,128 | Bologna | 31,307 | 2009 July | 105 | 0.5 | 1 |
| Rome | 125,205 | Naples | 45,320 | 2009 November | 225 | 1.25 | 1.25 |
| Milan | 158,453 | Turin | 40,877 | 2009 December | 145 | 1 | 1 |
| Reggio Emilia | 13,283 | Bologna | 31,349 | 2013 June | 70 | 0.5 | 0.5 |
| Reggio Emilia | 13,283 | Milan | 163,842 | 2013 June | 155 | 1 | 1 |
| Verona | 16,839 | Bologna | 31,307 | 2016 December | 145 | 1 | 0.75 |

Table 2: Stylized facts on commuting

The table shows the results from OLS regressions using the Italian Labor Force Survey dataset, for the period 2005-2017. It contains a repeated cross-section of a representative sample of Italian households with information on workers' characteristics. The dependent variable in Columns 1 and 2 is an indicator taking value of one for individuals working outside the region of their residence, while in Columns 3 and 4 - an indicator taking value of one for individuals working in the province accessible via the high-speed train. All regressions include year and province fixed effects. Regressions in Columns 2 and 4 also control for individual's gender, age, education, and broad occupational segment. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

| Dependent variable | Commute | | | |
|---|---|---|---|---|
| | long distance | | to destination | |
| | (1) | (2) | (3) | (4) |
| High-speed train | -0.000 | -0.000 | 0.005** | 0.005** |
| | (0.001) | (0.001) | (0.002) | (0.002) |
| Professional | 0.015*** | 0.007*** | 0.000* | -0.000** |
| | (0.002) | (0.002) | (0.000) | (0.000) |
| High-speed train × Professional | -0.000 | -0.002 | 0.005*** | 0.005*** |
| | (0.003) | (0.003) | (0.002) | (0.002) |
| Observations | 2,620,905 | 2,614,486 | 2,620,905 | 2,614,486 |
| Year and Province FE | Yes | Yes | Yes | Yes |
| Individual controls | | Yes | | Yes |
| R-squared | 0.02 | 0.03 | 0.02 | 0.02 |

Table 3: Summary statistics

This table presents summary statistics for variables used in the study. *Train* is a dummy variable, taking a value of one if firm's municipality is located within 10km from a station, connected by a high-speed train. *NonLocalPOOL* is a number of directors active in firms located in fast train-connected municipalities, in thousand. *LocalPOOL* is a number of directors active in firms of the LLM, in thousand. *Age* is a number of years since the firm was founded. *Employees* is a number of employees working at a firm. *Assets* and *Revenues* are firm's annual levels of assets and revenues, respectively, in million EUR, winsorized at 1 percent and 99 percent levels. The following variables measure the fractions of directors (%), who were born in the connected LLM (*DestBorn*), last year served on a board of a firm in the connected LLM (*ExpDest*) or any other LLM (*ExpNonDest*).

| | count | mean | sd | min | p50 | max |
|---|---|---|---|---|---|---|
| *Connection* | | | | | | |
| Train | 295,194 | 0.19 | 0.39 | 0.00 | 0.00 | 1.00 |
| NonLocalPOOL | 295,194 | 11.39 | 29.33 | 0.00 | 0.00 | 160.92 |
| LocalPOOL | 295,194 | 42.87 | 60.04 | 0.05 | 10.64 | 166.12 |
| *Firm characteristics* | | | | | | |
| Age | 295,194 | 26.34 | 17.39 | 0.00 | 24.00 | 117.00 |
| Employees | 295,194 | 169.96 | 1162.76 | 10.00 | 50.00 | 152,069.33 |
| Assets | 295,194 | 25.10 | 520.40 | 0.00 | 2.20 | 59,549.66 |
| Revenues | 292,139 | 58.50 | 497.08 | 2.00 | 12.44 | 52,987.04 |
| *Board characteristics* | | | | | | |
| BoardSize | 295,194 | 4.25 | 3.14 | 1.00 | 4.00 | 50.00 |
| DestBorn | 295,194 | 0.81 | 6.15 | 0.00 | 0.00 | 100.00 |
| DestExp | 295,194 | 1.57 | 9.12 | 0.00 | 0.00 | 100.00 |
| NonDestExp | 269,578 | 2.24 | 10.07 | 0.00 | 0.00 | 100.00 |
| SameName | 295,194 | 14.65 | 31.45 | 0 | 0 | 100 |

Table 4: Sample selection

This table presents summary statistics for the sample and non-sample Italian firms. *Train* is a dummy variable, taking a value of one if firm's municipality is located within 10km from the station, connected by a high-speed train. *LocalPOOL* is a number of directors active in firms of the LLM, in thousand. *Age* is a number of years since the firm was founded. *Employees* is the number of employees working at a firm. *Assets* and *Revenues* are firm's annual levels of assets and revenues, respectively, in million EUR, winsorized at 1 percent and 99 percent levels. *TFP* is a measure of total factor productivity, calculated using Levinsohn and Petrin (2003) semiparametric estimator. The following variables measure the fractions of directors (%), who were born in the connected LLM (*DestBorn*), last year served on a board of a firm in the connected LLM (*ExpDest*) or any other LLM (*ExpNonDest*).

| | Non sample firm | | Sample firm | | Difference |
|---|---|---|---|---|---|
| | N | Average | N | Average | Average |
| Train | 276,357 | 0.14 | 295,194 | 0.19 | 0.05*** |
| LocalPOOL | 276,357 | 34.63 | 295,194 | 42.87 | 8.24*** |
| BoardSize | 262,752 | 2.37 | 295,194 | 4.25 | 1.87*** |
| Age | 276,357 | 25.23 | 295,194 | 26.34 | 1.11*** |
| Employees | 276,357 | 48.09 | 295,194 | 169.96 | 121.87*** |
| Assets | 276,357 | 2.64 | 295,194 | 25.10 | 22.46*** |
| Revenues | 272,774 | 12.07 | 292,139 | 58.5 | 46.43*** |
| TFP | 272,022 | 0.07 | 291,372 | 0.05 | -0.02*** |
| DestBorn | 262,752 | 0.44 | 295,194 | 0.81 | 0.37*** |
| ExpDest | 262,752 | 0.22 | 295,194 | 1.57 | 1.35*** |
| ExpNonDest | 240,803 | 0.40 | 269,578 | 2.24 | 1.84*** |
| SameName | 262,752 | 38.89 | 295,194 | 14.65 | 24.24 *** |

Table 5: Director supply and board talent

The dependent variable *PcBoard* measures an annual percentile ranking of the average directors' quality in their firms, *PcDirector* is an average of the annual percentile ranking of directors' quality in their firms. *NonLocalPOOL* is a logarithmic value of a number of directors active in firms located in fast train-connected municipalities. *PcFirm* measures an annual percentile ranking of the firm quality. *Good* is an indicator variable taking a value of one if the firm's quality is above year-median. *QualityX* is an indicator variable taking a value of one if the firm's quality falls within $x$ quartile of the distribution that year. $\times$ is an interaction term. All regressions include the following control variables, but the table does not report their coefficients: *LocalPOOL* - the logarithmic value of a number of directors active in firms of the local labor market (LLM); *Age* - the logarithmic value of a number of years since the firm was founded; *Size* - a logarithmic value of firm's assets in firm's first year in the sample; *logGDPcap* - a logarithmic GDP per capita value in the firm's province. Regression specifications include the following fixed-effects: firm, year, region (Column 1); year-region, year-sector, firm (Columns 2-5). Standard errors are clustered at a firm-level and reported in the parentheses below the coefficients. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

| | (1) PcBoard | (2) PcBoard | (3) PcBoard | (4) PcBoard | (5) PcBoard |
|---|---|---|---|---|---|
| NonLocalPOOL | 0.038 | 0.021 | -0.058 | -0.037 | |
| | (0.033) | (0.024) | (0.039) | (0.030) | |
| NonLocalPOOL × PcFirm | | | 0.001** | | |
| | | | (0.001) | | |
| NonLocalPOOL × Good | | | | 0.108*** | |
| | | | | (0.036) | |
| NonLocalPOOL × Quality1 | | | | | -0.067 |
| | | | | | (0.043) |
| NonLocalPOOL × Quality2 | | | | | -0.028 |
| | | | | | (0.038) |
| NonLocalPOOL × Quality3 | | | | | 0.136*** |
| | | | | | (0.038) |
| NonLocalPOOL × Quality4 | | | | | 0.019 |
| | | | | | (0.036) |
| Observations | 295,193 | 293,074 | 289,271 | 289,271 | 289,271 |
| Adj. R2 | 0.025 | 0.806 | 0.807 | 0.807 | 0.807 |
| Year FE | Yes | | | | |
| Region FE | Yes | | | | |
| Sector FE | Yes | | | | |
| Firm FE | | Yes | Yes | Yes | Yes |
| Year-region FE | | Yes | Yes | Yes | Yes |
| Year-sector FE | | Yes | Yes | Yes | Yes |

Table 6: Director supply effects on board talent and the role of governance

Standardized regression coefficients are reported to allow the comparison across split samples. Column 1 (2) uses the subsample of firms with the largest owner's share below (above) 50%. Column 3 (4) uses the subsample of firms with the director ownership share below (above) 50%. Column 5 (6) uses the subsample of firms with the majority owner not being (being) a board director. The dependent variable *PcBoard* measures an annual percentile ranking of the average directors' quality in their firms. *NonLocalPOOL* is a logarithmic value of a number of directors active in firms located in fast train-connected municipalities. *Good* is an indicator variable taking a value of one if the firm's quality is above year-median. × is an interaction term. All regressions include the following control variables, but the table does not report their coefficients: *LocalPOOL* - the logarithmic value of a number of directors active in firms of the local labor market (LLM); *Age* - the logarithmic value of a number of years since the firm was founded; *Size* - a logarithmic value of firm's assets in firm's first year in the sample; *logGDPcap* - a logarithmic GDP per capita value in the firm's province. Regression specifications include firm, year-region, year-sector fixed effects. *NonLocalPOOL+NonLocalPOOL* × *Good* is the sum of two coefficients. *P-value* is the p-value of the null hypothesis that the sum of the two coefficients is equal to zero. Standard errors are clustered at a firm-level and reported in the parentheses below the coefficients. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Share owner 1 | | Director ownership | | Majority owner = director | |
| | ≤ 50% | > 50% | ≤ 50% | > 50% | No | Yes |
| | PcBoard | PcBoard | PcBoard | PcBoard | PcBoard | PcBoard |
| NonLocalPOOL | -0.016* | -0.005 | -0.006 | -0.012 | -0.006 | -0.009 |
| | (0.010) | (0.006) | (0.006) | (0.008) | (0.006) | (0.010) |
| NonLocalPOOL × Good | 0.029** | 0.017** | 0.019*** | 0.015 | 0.019*** | 0.009 |
| | (0.012) | (0.007) | (0.007) | (0.010) | (0.006) | (0.014) |
| Observations | 76,702 | 212,296 | 176,979 | 112,067 | 231,037 | 57,955 |
| Adj. R2 | 0.812 | 0.806 | 0.794 | 0.833 | 0.800 | 0.842 |
| NonLocalPOOL+NonLocalPOOL × Good | 0.013 | 0.012 | 0.014 | 0.003 | 0.013 | 0.000 |
| P-value | 0.158 | 0.034 | 0.022 | 0.068 | 0.014 | 0.987 |

Table 7: Robustness test. Alternative specifications of director supply

The dependent variable *PcBoard* measures an annual percentile ranking of the average directors' quality in their firms. In Panel A, *NonLocalPOOL* is 1) an indicator that takes value of one if the LLM train station was connected with a high-speed train line in a given year (Column 1); a logarithmic value of a number of directors active in firms whose municipalities are within 2) the LLM (Columns 2 and 4); 3) 20km from the train station (Column 3); 4) 10km (Panel B). *Good* is an indicator variable taking a value of one if the firm's quality is above year-median. × is an interaction term. *PcDirector* measures an average of the annual percentile ranking of directors' quality in their firms (Panel A, Column 1). The sample in Panel A, Column 2 uses observations of firms that had no less than 20 employees in any year of our sample. In Panel A, Column 3 we define firm and director quality percentiles over the 2005-2006 year period, before opening of any high speed train connections in our sample. The firms in industries with local services (accommodation, catering, health, artistic, entertainment and fun activities) are excluded in Panel A, Column 4.

Regressions in Panel A and Panel B Columns 1-3 include the following control variables, but the table does not report their coefficients: *LocalPOOL* - the logarithmic value of a number of directors active in firms of the local labor market (LLM); *Age* - the logarithmic value of a number of years since the firm was founded; *logGDPcap* - a logarithmic GDP per capita value in the firm's province; year-region, year-sector, firm fixed effects; the standard errors are clustered at a firm level. Regression specification in Panel B Column 4 controls for *LocalPOOL* and *logGDPcap*, has year and LLM-Good fixed effects, is at a year-LLM level with standard errors clustered at a LLM level. *NonLocalPOOL+NonLocalPOOL × Good* is the sum of two coefficients. *P-value* is the p-value of the null hypothesis that the sum of the two coefficients is equal to zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A**

| | (1) PcDirector | (2) PcBoard | (3) PcBoard | (4) PcBoard |
|---|---|---|---|---|
| NonLocalPOOL | -0.035* | -0.053 | -0.095*** | -0.046 |
| | (0.020) | (0.033) | (0.030) | (0.031) |
| NonLocalPOOL × Good | 0.070*** | 0.140*** | 0.181*** | 0.122*** |
| | (0.024) | (0.039) | (0.035) | (0.037) |
| Observations | 289,271 | 213,742 | 185,400 | 275,292 |
| Adj. R2 | 0.799 | 0.812 | 0.874 | 0.806 |
| NonLocalPOOL+NonLocalPOOL × Good | 0.035 | 0.086 | 0.085 | 0.076 |
| P-value | 0.077 | 0.007 | 0.021 | 0.012 |

**Panel B**

| | (1) PcBoard | (2) PcBoard | (3) PcBoard | (4) PcBoard |
|---|---|---|---|---|
| NonLocalPOOL | -0.421 | -0.049* | -0.018 | -0.038 |
| | (0.323) | (0.027) | (0.026) | (0.053) |
| NonLocalPOOL × Good | 1.147*** | 0.126*** | 0.104*** | 0.155 |
| | (0.381) | (0.031) | (0.030) | (0.108) |
| Observations | 289,271 | 289,271 | 289,271 | 10,921 |
| Adj. R2 | 0.807 | 0.807 | 0.807 | 0.737 |
| NonLocal pool | Train | LLM | 20 km | LLM |
| NonLocalPOOL+NonLocalPOOL × Good | 0.726 | 0.059 | 0.086 | 0.075 |
| P-value | 0.019 | 0.003 | 0.000 | 0.117 |

Table 8: Director characteristics and location

*DirAge* is the average age of a director. *Exp* is the fraction (%) of directors that have experience working on boards of other firms. *SameName* measures a fraction of firm's directors that have the same last name as firm's largest shareholder. The following dependent variables measure the fractions of directors (%), who were born in the connected LLM (*DestBorn*), last year served on a board of a firm in the connected LLM (*DestExp*) or any other LLM (*NonDestExp*). *NonLocalPOOL* is a logarithmic value of a number of directors active in firms located in fast train-connected municipalities. *Good* is an indicator variable taking a value of one if the firm's quality is above year-median. × is an interaction term. All regressions include the following control variables, but the table does not report their coefficients: *LocalPOOL* - the logarithmic value of a number of directors active in firms of the local labor market; *Age* - the logarithmic number of years since the firm was founded; *logGDPcap* - a logarithmic GDP per capita value in the firm's province. Regression specifications include the following fixed-effects: year-region, year-sector, firm. Standard errors are clustered at a firm-level and reported in the parentheses below the coefficients. *NonLocalPOOL+NonLocalPOOL* × *Good* is the sum of two coefficients. *P-value* is the p-value of the null hypothesis that the sum of the two coefficients is equal to zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

| | (1) DirAge | (2) Exp | (3) SameName | (4) DestBorn | (5) DestExp | (6) NonDestExp |
|---|---|---|---|---|---|---|
| NonLocalPOOL | -0.019* | -0.005 | -0.096*** | 0.143*** | 0.501*** | -0.061*** |
| | (0.011) | (0.018) | (0.033) | (0.018) | (0.027) | (0.013) |
| NonLocalPOOL × Good | -0.025** | -0.028 | 0.021 | 0.019 | 0.032 | 0.022 |
| | (0.013) | (0.020) | (0.037) | (0.022) | (0.034) | (0.014) |
| Observations | 289,479 | 264,546 | 289,479 | 289,271 | 289,271 | 264,326 |
| Adj. R2 | 0.741 | 0.117 | 0.741 | 0.516 | 0.515 | 0.117 |
| NonLocalPOOL+NonLocalPOOL × Good | -0.044 | -0.033 | -0.074 | 0.161 | 0.533 | -0.039 |
| P-value | 0.000 | 0.067 | 0.029 | 0.000 | 0.000 | 0.002 |

Table 9: Coming and going directors

The panel is at firm-year level (Column 1) and at director-firm-year level (Columns 2-3). The dependent variables are the number of directors on a board (*BoardSize*), an indicator variable taking a value of one if the director is leaving or starting a job at the particular firm in a given year - *Going* and *Coming*, respectively. *NL* is a logarithmic value of a number of directors active in firms located in fast train-connected municipalities. *Good* is an indicator variable taking a value of one if the firm's quality is above year-median. *GoodD* is an indicator variable taking a value of one if the director's quality is above the firm's quality. × indicates an interaction term. All regressions include the following control variables, but the table does not report their coefficients: *LocalPOOL* - the logarithmic value of number of directors active in firms of the local labor market; *Age* - the logarithmic value of number of years since the firm was founded; *Size* - a logarithmic value of firm's assets in firm's first year in the sample; *logGDPcap* - a logarithmic GDP per capita value in the firm's province. Regressions in Columns 2 and 3 also include *GoodD*, *Good* and *GoodD* × *Good* but the table does not report their coefficients. Regression specifications include year-sector, year-region, firm fixed-effects (Column 1) and director fixed-effects (Columns 2-3). Standard errors are clustered at a firm-level (Column 1) or at a director-level (Columns 2-3) and reported in the parentheses below the coefficients. *NL+NL* × *Good* is the sum of two coefficients. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

| VARIABLES | BoardSize | Going | Coming |
|---|---|---|---|
| NL | -0.0083*** | 0.0004 | -0.0002 |
| | (0.0037) | (0.0003) | (0.0003) |
| NL × Good | 0.0049 | 0.0006** | -0.0011*** |
| | (0.0031) | (0.0003) | (0.0003) |
| NL × GoodD | | 0.0006** | -0.0006** |
| | | (0.0003) | (0.0003) |
| NL × Good × GoodD | | -0.0037*** | 0.0028*** |
| | | (0.0004) | (0.0004) |
| Observations | 289,497 | 1,024,399 | 1,024,399 |
| Adj. R2 | 0.885 | 0.148 | 0.137 |
| NL+NL × Good | -0.0034 | 0.0010*** | -0.0013*** |
| NL+NL × GoodD | | 0.0010*** | -0.0008*** |
| NL+NL × GoodD + NL × Good + NL × GoodD × Good | | -0.0021*** | 0.0009*** |

Table 10: Director supply and firm outcomes

*logRev* is logarithmic value of firm's annual revenues. $Default$ is an indicator variable taking a value of one if the firm is not in the sample the following year and zero otherwise (for consistency we drop 2017-year observations). $NonLocalPOOL$ is a logarithmic value of a number of directors active in firms located in fast train-connected municipalities. *Good* is an indicator variable taking a value of one if the firm's quality is above year-median. $NonLocalPOOL \times Good$ is an interaction between $NonLocalPOOL$ and *Good* respectively. Regressions in Columns 3-4 use instrumental variables - $NonLocalPOOL$ and $NonLocalPOOL \times Good$. All regressions include the following control variables, but the table does not report their coefficients: $LocalPOOL$ - the logarithmic value of a number of directors active in firms of the local labor market; *Age* - the logarithmic number of years since the firm was founded; *logGDPcap* - a logarithmic GDP per capita value in the firm's province. Regression specifications also include year-sector, year-region and firm fixed-effects. Standard errors are clustered at a firm-level and reported in the parentheses below the coefficients. *NonLocalPOOL+NonLocalPOOL* $\times$ *Good* is the sum of two coefficients. *P-value* is the p-value of the null hypothesis that the sum of the two coefficients is equal to zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

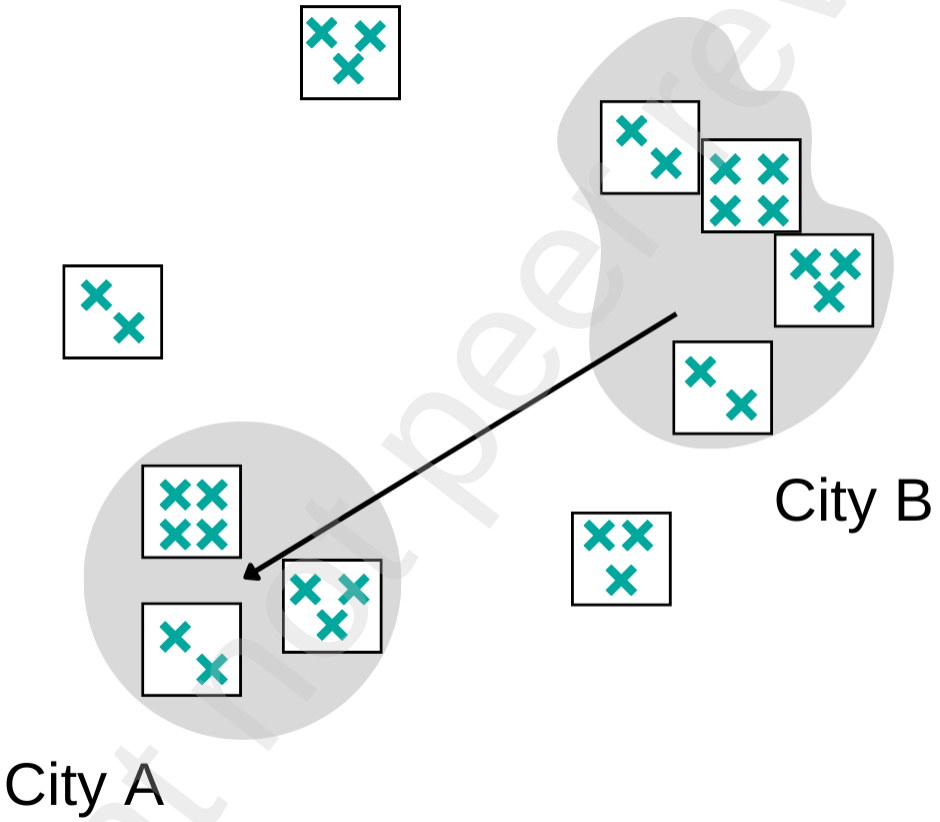
| | (1) logRev | (2) Default | (3) logRev | (4) Default |
|---|---|---|---|---|
| NonLocalPOOL | -0.004*** | 0.001*** | | |
| | (0.001) | (0.000) | | |
| NonLocalPOOL × Good | 0.006*** | -0.001*** | | |
| | (0.001) | (0.000) | | |
| PcBoard | | | 0.050*** | -0.010** |
| | | | (0.017) | (0.004) |
| Observations | 289,271 | 268,968 | 289,271 | 268,968 |
| Adj. R2 | 0.943 | 0.144 | -3.048 | -0.337 |
| NonLocalPOOL+NonLocalPOOL × Good | 0.002 | 0.000 | | |
| Probability | 0.038 | 0.277 | | |

# Figures

Figure 1: The high-speed train line.


This figure displays the high-speed train line connections in Italy.

Figure 2: The non-local director pool measure.




Each square denotes a firm, each × marks a director working in a firm. This figure displays the circled three firms in city $A$, which are located within 10km from the station. For each of these three firms, the opening of a high-speed train increases the non-local supply of directors by 11. These 11 individuals hold positions in the four firms, located in LLM of the city $B$ high-speed train station.

Figure 3: High-speed train service introduction and development of local economic activity.


The figure plots the province-level trends during the period from 5 years before to 5 years after the high-speed train line opening in terms of: logarithmic values of the number of firms (upper left panel), of firms' revenues (upper right panel) and of the number of employees (lower left panel) and firm labor productivity, defined as the value added per worker efficiency unit (lower right panel). Local linear polynomial smoothing with a 95 percent confidence interval.