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"If you want a thing done well, do it yourself" - Empirical Evidence for Principal-Agent Problems in Austrian SMEs

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Delegating management can come at a cost. Using data on 47,178 Austrian SMEs, this paper finds that separating ownership and management can lower operational efficiency and profitability. The analysis uses the distance between owners and firms as an instrument to study this relationship. The efficiency finding is particularly robust. Results are consistent with conflicts of interest between owners and managers and highlight the potential value of incentives, reporting and monitoring when owners delegate control.

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D22, D23, G34, L25.

Keywords
Corporate governance, Agency costs, Managerial delegation,
Ownership–management separation, Private firms, Instrumental variables.



How costly is the principal–agent problem?

The separation of ownership and management can create conflicts of interest when managers do not fully share owners' objectives. This principal-agent problem is central to corporate governance, yet its impact on firm performance is difficult to isolate empirically.



Ownership-management separation matters

The preferred estimates indicate that ownership-management separation lowers firm efficiency and profitability substantially. The estimates relate to firms whose organizational structure responds to owner-firm distance. The results are remarkable remarkably stable when robustness checks are performed.



IFLD: One Database to Answer Them All (Nearly)

The study uses the new IFLD database for 2021. The IFLD links information from the Austrian commercial register on shareholders, their ownership stakes and managing directors with firm balance sheets and owner and firm locations. This combination enables the analysis of ownership–management separation and firm performance.

The views expressed are those of the authors and do not necessarily reflect those of the Oesterreichische Nationalbank or the Eurosystem.

"If you want a thing done well, do it yourself" Empirical Evidence for Principal-Agent Problems in Austrian SMEs

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Abstract

How costly is the classic principal–agent problem when owners delegate managerial control? I study this question in a newly constructed dataset of 47,178 privately held Austrian SMEs that jointly identifies shareholders, managing directors, ownership stakes, firm accounts, and owner locations. To address the endogenous choice of managerial delegation, I use owner–firm distance as an instrument for ownership–management separation, exploiting the higher costs of direct owner involvement when owners reside farther from the firm. In the preferred 2SLS specification, separation reduces log total asset turnover by 0.471, corresponding to a decline of approximately 37.5%, and lowers return on assets by 10.8 percentage points. The identification strategy is subjected to an extensive set of diagnostics addressing plausible violations of the exclusion restriction, including within-regime distance tests, finer geographic fixed effects, the exclusion of large cities, municipality-level negative controls, support restrictions, alternative ownership structures, and inverse-probability reweighting. The operational-efficiency result is particularly stable across these exercises. While the exclusion restriction remains a maintained assumption, the diagnostics provide little evidence that the findings are driven by direct geographic channels. The results indicate economically substantial performance consequences of ownership–management separation, consistent with important agency frictions in privately held firms.

Keywords: Corporate governance, Agency costs, Managerial delegation, Ownership–management separation, Private firms, Instrumental variables.

JEL classification: D22, D23, G34, L25.

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Non-Technical Summary

Motivation. The separation of ownership and management can give firms access to specialized expertise, but it can also create conflicts of interest when managers do not fully share owners' objectives. This principal–agent problem is central to corporate governance, yet its impact on firm performance is difficult to isolate empirically. The OeNB's Integrated Firm-Level Database (IFLD) provides a new basis for studying this relationship among privately held Austrian firms.

Framework. The analysis compares firms in which managing shareholders jointly own all the equity with firms in which at least some equity is held by shareholders who do not manage the firm. Because organizational choices and performance may reflect common underlying factors, a simple comparison cannot establish causality. The paper therefore uses the distance between firms and their owners' residences as an instrument: greater distance makes direct owner involvement more costly and ownership–management separation more likely. A causal interpretation requires that, after accounting for firm characteristics, industry and region, distance affects performance only through this organizational choice.

Central Results. The results indicate that ownership–management separation can substantially reduce operational efficiency and profitability, consistent with economically important conflicts of interest between owners and managers. The results are remarkably stable when robustness checks are performed. The robustness checks examine single-owner firms, stricter definitions of ownership–management separation, comparisons within smaller geographic areas, the exclusion of larger cities, and adjustments for observable differences between the firm groups. Additional checks assess whether distance captures local economic conditions or affects performance independently of management structure. The efficiency finding is more stable across these exercises than the profitability finding. The findings relate to firms whose management structure responds to owner–firm distance.

Evidence. The study uses data for 2021 on 47,178 Austrian small and medium-sized limited liability companies owned exclusively by individuals. The IFLD links information from the Austrian commercial register on shareholders, their ownership stakes and managing directors with firm balance sheets and owner and firm locations. This combination makes it possible to determine which shareholders also manage the firm, assess firm performance and calculate the distance between each firm and its owners. Operational efficiency is measured by the revenue generated per euro of total assets, while profitability is measured by net profit relative to total assets. For firms with several owners, distances are weighted by their respective ownership shares.

Policy relevance. The findings highlight the potential value of governance arrangements that support delegated management, such as incentives aligned with owners' interests, reliable reporting and formal monitoring. The paper does not evaluate the effectiveness of these arrangements. Nor does it imply that owner-management is universally preferable: delegation can also provide managerial expertise and enable firms to grow beyond the limits of owners' own managerial capacity.

1 Introduction

The separation of ownership and managerial control lies at the heart of the classical principal–agent problem. Delegating managerial authority can bring benefits from specialization and professional expertise, but it also creates scope for vertical agency frictions when managers do not fully bear the residual consequences of their decisions and their actions are imperfectly observable. Whether these agency frictions translate into economically meaningful performance losses is ultimately an empirical question. This paper estimates the causal effect of ownership–management separation on the performance of 47,178 privately held Austrian SMEs. I exploit the great-circle distance between firms and their owners' residences as an instrument for ownership–management separation. In the preferred workhorse 2SLS specification, the estimated effect on total asset turnover ($\log(TAT)$) is -0.471, corresponding to a decline in total asset turnover of approximately 37.5%, while the estimated effect on return on assets (ROA) is -0.108, or approximately 10.8 percentage points.

The separation of ownership and control is a canonical source of agency frictions (Berle and Means 1932; Jensen and Meckling 1976). Empirically, however, isolating the performance consequences of ownership–management separation is difficult for two reasons. First, agency costs are not directly observable, and market values are typically unavailable for privately held SMEs. Following Ang, Cole, and Lin (2000), I therefore use accounting-based performance measures together with organizational form to study the consequences of vertical agency frictions. Second, organizational form is endogenous: firms may select into ownership–management separation based on unobserved characteristics, such as managerial ability, growth opportunities, or local economic conditions, that also affect performance. A causal interpretation therefore requires a source of variation in organizational form that is not driven by these determinants of firm performance.

Recent studies address this endogeneity using prevalence-based instruments. Gogineni, Linn, and Yadav (2022), for example, exploit variation in the prevalence of non-owner management across geographic areas and industries, while Johannes and Lefebvre (2025) employ a related approach for privately held firms. I instead exploit owner–firm distance as an instrument for ownership–management separation. The identifying idea follows directly from the monitoring problem underlying the principal–agent framework: geographic separation raises the time and travel costs associated with direct owner involvement and therefore makes delegation of managerial authority more attractive. Importantly, identification comes from the geographic relationship between a firm and its own owners rather than from the governance choices of peer firms. Related evidence shows that geographic proximity can affect corporate monitoring (Quan and Zhang 2021).

Against this background, the paper makes three contributions. First, it provides causal evidence on a classical principal–agent question: the performance consequences of separating ownership from managerial control. Privately held firms provide an unusually informative setting because complete owner–management overlap remains empirically important and can be compared with organizational structures in which ownership and managerial authority are separated.

Second, the analysis draws on a newly constructed dataset of 47,178 Austrian SMEs that jointly identifies shareholders, managing directors, ownership stakes, firm-level accounting information, and owner locations. This combination makes it possible to observe ownership and managerial control jointly at the individual level and to distinguish complete owner-management from different forms of managerial delegation at scale.

Third, the paper addresses the endogenous choice of managerial delegation using owner–firm distance as an instrument for ownership–management separation. Identification comes from the geographic relationship between a firm and its own owners rather than from the governance choices of peer firms. Because distance may also affect the feasibility of owner monitoring directly, the analysis devotes particular attention to the exclusion restriction through

within-regime distance tests, finer geographic controls, local-environment negative controls, alternative ownership structures, support restrictions, and reweighting exercises. The resulting 2SLS estimates are most naturally interpreted as effects for firms and governance margins whose organizational form responds to variation in owner–firm distance.

The remainder of the paper proceeds as follows. Section 2 reviews the theoretical foundations and empirical literature on agency costs, with particular attention to identification challenges in privately held firms. Section 3 describes the institutional setting, data, and construction of the main variables. Section 4 develops the empirical framework. Section 5 presents the main results. Section 6 examines identification and robustness. Section 7 discusses the economic interpretation and scope of the estimates, and Section 8 concludes.

2 Literature

2.1 Agency Costs, Performance Proxies, and Management Form

The theoretical foundation of this paper builds on the principal–agent framework of Jensen and Meckling (1976). Once managers are delegated authority to operate a firm on behalf of owners, their objectives need not be fully aligned with those of the principals. Agency costs comprise monitoring expenditures by principals, bonding expenditures by agents, and the residual loss that remains when managerial actions are not fully aligned with owners' interests. In the corporate setting, the canonical vertical agency problem therefore arises from the separation of ownership and managerial control.

An important implication is that agency costs need not appear exclusively as lower firm-level performance. Owners may respond to delegation by increasing monitoring or other costly governance activities that limit managerial distortions. Firms with ownership–management separation may consequently exhibit relatively small performance differences even when agency costs remain economically relevant. This distinction is particularly important for empirical work that relies on accounting outcomes rather than directly observed monitoring expenditures or managerial behavior.

A related empirical challenge is that agency costs are not directly observable. In Jensen and Meckling's formulation, they ultimately affect firm value, yet market values are typically unavailable for privately held SMEs. Empirical studies therefore rely on accounting-based performance measures and organizational characteristics as indirect indicators of agency frictions. A prominent early contribution is Ang, Cole, and Lin (2000), who use management form together with measures of firm efficiency to operationalize agency costs. Firms that are fully owned and managed by the same individual provide a natural benchmark because the classic vertical owner–manager conflict is absent by construction. In firms in which ownership and managerial control are separated, by contrast, such agency frictions can arise.

Ang, Cole, and Lin (2000) use total asset turnover (TAT) as a measure of operational efficiency, an approach subsequently adopted in related studies (Singh and Davidson III 2003; Fleming, Heaney, and McCosker 2005; Garanina and Kaikova 2016; Gogineni, Linn, and Yadav 2022; Johannes and Lefebvre 2025). Consistent with this literature, I use TAT as the primary measure of operational efficiency and complement it with return on assets (ROA) as a broader measure of firm profitability. The private-firm setting is particularly useful for this approach because fully owner-managed firms remain empirically relevant, whereas such firms are uncommon among publicly traded corporations. Using the National Survey of Small Business Finance, Ang, Cole, and Lin (2000) show that firms managed by non-owner managers exhibit lower operational efficiency, that agency-cost proxies decline with the owner-manager's equity share, and that they increase with the number of non-manager shareholders.

Subsequent work extends this evidence across institutional settings and firm types. For privately held firms, Fleming, Heaney, and McCosker (2005) study Australian SMEs and document

that dispersed ownership and external management are associated with lower asset utilization,[1] consistent with agency theory. Bitler, Moskowitz, and Vissing-Jørgensen (2005) take a more structural approach, estimating production functions in survey-based panel data and using reported managerial hours as a proxy for effort.

The broader governance literature also shows that owner-management is not universally superior to professional management. Barth, Gulbrandsen, and Schøne (2005) find that the productivity consequences of family ownership depend importantly on who manages the firm, while evidence from listed firms links greater managerial ownership to higher operational efficiency and productivity (Singh and Davidson III 2003; Palia and Lichtenberg 1999). Related research on family-controlled firms likewise emphasizes that family ownership and family management can generate both benefits and governance frictions (Bennedsen et al. 2007; Bennedsen et al. 2015). Taken together, this evidence points to an organizational trade-off: delegation may bring gains from managerial specialization and expertise while simultaneously creating scope for vertical agency frictions.

A separate strand examines horizontal agency conflicts between controlling and minority shareholders (Nagar, Petroni, and Wolfenzon 2011). The present paper instead focuses on the vertical agency conflict between owners and managers. Overall, the empirical literature points to economically meaningful links between ownership, managerial control, and firm performance, but the direction and magnitude of these relationships vary across settings. Establishing the causal performance effect of ownership–management separation therefore remains an identification challenge.

2.2 Identification Challenges and Instrumental-Variable Approaches

A central econometric concern is that ownership structure and managerial delegation are endogenous organizational choices. Firms may select into different governance structures in response to unobserved characteristics—such as managerial talent, growth opportunities, or local economic conditions—that also affect performance. This concern is longstanding in the corporate-governance literature. Demsetz and Villalonga (2001), for example, explicitly treat ownership structure as endogenous and show that simple associations between ownership and performance need not have a causal interpretation. Early empirical studies of agency costs, including Ang, Cole, and Lin (2000), primarily rely on multivariate regressions and related controls. While such approaches address observable differences and some forms of heterogeneity, they provide limited leverage against endogenous organizational choice.

More recent work therefore employs instrumental-variable strategies. Gogineni, Linn, and Yadav (2022) examine vertical and horizontal agency costs using a large dataset of approximately 42,000 U.K. firms observed over multiple survey waves. They construct several proxies for agency costs, including TAT, and use instrumental variables to address the endogeneity of organizational structure. Johannes and Lefebvre (2025) focus on privately held firms and similarly use instrumental variables to study the effect of agency costs on efficiency and performance, including heterogeneity by firm size.

Both studies employ prevalence-based instruments related to the approach of Becker, Cronqvist, and Fahlenbrach (2011). In particular, Gogineni, Linn, and Yadav (2022) and Johannes and Lefebvre (2025) exploit the prevalence of a given management form among firms in the same geographic area and/or industry as a source of variation in organizational structure. Such peer-share instruments can provide a strong first stage, but their exclusion restriction requires that local or industry-specific factors affecting the prevalence of management forms do not independently affect firm performance. Their implementation can also be sensitive to the construction and size of geographic-industry cells.[2] Taken together, this literature highlights both the importance and

[1] The definition of asset utilization, asset-utilization efficiency, and operational efficiency corresponds to the definition of TAT used in this paper.

[2] For comparison with this literature, Section 6.4 briefly discusses prevalence-based instruments as a literature-

the difficulty of addressing endogenous organizational choice. Instrumental-variable approaches strengthen causal interpretation, but the credibility of the resulting estimates ultimately depends on the economic source of identifying variation and the corresponding exclusion restriction. This motivates the owner–firm distance design developed below.

2.3 Distance, Delegation, and Monitoring Feasibility

This paper brings a monitoring-informed identification strategy to the private-firm governance setting. I use the great-circle distance between firm location and the residential addresses of shareholders—denoted $DIST$—as an instrument for ownership–management separation. The economic logic is that greater owner–firm distance increases the time and travel costs associated with direct owner involvement in day-to-day management, thereby making the separation of ownership and managerial control more likely.

Related evidence in the corporate-governance literature supports the underlying economic relevance of geographic proximity. Quan and Zhang (2021), using relocations of independent directors in Chinese listed firms, show that more distant directors participate less actively in board monitoring and are less effective monitors. Firms with more distant independent directors also exhibit lower performance. Their evidence demonstrates that geographic distance can materially affect the costs and effectiveness of corporate monitoring.

The role of distance in the present design is nevertheless distinct. Whereas Quan and Zhang (2021) study distance as a determinant of monitoring behavior and its consequences, I use owner–firm distance as a source of variation in the organizational separation of ownership and management. Distance-induced costs of direct owner involvement support instrument relevance insofar as they affect the decision to delegate managerial control. At the same time, the monitoring mechanism raises a potential concern regarding the exclusion restriction: owner–firm distance may influence firm performance through monitoring effectiveness even conditional on organizational form. Section 6.1 therefore provides additional diagnostic evidence on potential direct-distance channels.

Recent evidence from private firms also shows that geographic frictions can shape governance choices through other margins. Baltrunaite and Karmaziene (2024) exploit the expansion of high-speed rail in Italy and show that reductions in the cost of accessing non-local directors affect board appointments and director–firm matching in private firms, with weaker effects when owners themselves serve as directors. This evidence further illustrates that geographic accessibility can be economically relevant for the allocation of managerial and governance roles, although the underlying mechanism differs from the owner–firm distance margin studied here.

Distance measures have been used as sources of identifying variation in a variety of economic settings (Dittmar 2011; Becker and Woessmann 2009). At the same time, distance-based designs may be vulnerable to place-based confounding if geographic distance proxies for regional characteristics or sorting patterns that independently affect firm outcomes (Dieterle and Snell 2016; Edwards 2021; Zhao 2023). The empirical design therefore combines sector and regional fixed effects with a set of geographic, direct-effect, and local-environment diagnostics. The identifying assumptions and corresponding robustness exercises are discussed in Section 6.

3 Institutional Setting and Data

3.1 Institutional Setting

Austria provides a particularly useful institutional setting for studying the separation of ownership and managerial control in privately held firms. The analysis focuses on limited liability companies (*Gesellschaften mit beschränkter Haftung*, GmbHs), a corporate form in which ownership and

based benchmark, while the corresponding leave-one-out geographic and industry peer-share specifications are reported in detail in Appendix G.

executive management are legally distinct functions. Austrian GmbHs are required to have one or more managing directors (*Geschäftsführer*), who are responsible for managing the firm's operations and representing the company externally. Managing directors are generally appointed by the shareholders and may, but need not, hold an ownership stake in the firm[3]. This institutional structure therefore allows firms operating under the same legal form to differ in whether ownership and managerial control coincide.

This distinction is directly observable in the Austrian commercial register (*Firmenbuch*). For each firm, the register identifies its shareholders, their ownership stakes, and the individuals appointed as managing directors. This allows me to determine whether the firm's entire equity is held by shareholders who simultaneously serve as managing directors, or whether ownership and managerial control do not fully coincide. Importantly, the governance classification used in the empirical analysis is constructed entirely from commercial-register information and does not rely on survey responses or self-reported measures of managerial control.

The institutional setting is particularly well suited to the analysis of vertical owner–manager agency frictions. In a fully owner-managed firm, the individuals holding the firm's entire equity also exercise formal managerial authority. Once ownership and management no longer fully coincide, residual ownership claims and managerial decision rights are distributed across different individuals, creating scope for conflicts of interest and monitoring problems. The empirical analysis exploits this variation while restricting the sample to the same corporate form and, ultimately, to privately held GmbHs owned exclusively by natural persons. This substantially reduces institutional heterogeneity that would arise from comparing firms across legal forms or fundamentally different ownership structures.

3.2 Data and Sample

The empirical analysis uses the Integrated Firm-Level Database (IFLD) of the Austrian Central Bank (OeNB). The IFLD links administrative and commercial-register information from several sources, including the Austrian commercial register, financial statements, AnaCredit, SABINA, Statistics Austria, and internal OeNB reporting systems. The analysis is cross-sectional and refers to the year 2021.

Information on shareholders, ownership stakes, and managing directors is obtained directly from the Austrian commercial register. Financial-statement information is primarily based on annual accounts filed with the commercial register. For approximately 10% of firms, the corresponding filings are available only in unstructured PDF form. For these firms, standardized financial-statement variables are obtained from SABINA. Credit-related variables used in supplementary specifications are obtained from the linked IFLD sources.

The initial firm population contains 249,192 entities. I apply a sequence of restrictions designed to obtain a homogeneous sample of economically active, privately held Austrian SMEs for which ownership, management, and financial information can be measured consistently. Table 1 summarizes the resulting sample construction.

First, I require the financial-statement items necessary to construct the outcome variables and baseline covariates and impose a minimum activity threshold of EUR 50,000 in both annual revenue and total assets. I then restrict the sample to small and medium-sized enterprises (SMEs)[4] and to Austrian limited liability companies (GmbHs). Focusing on a single legal form ensures that firms are subject to a common institutional and accounting framework.

I further restrict the sample to the sectors included in the empirical analysis and exclude firms with public ownership. The ownership-network information must be sufficiently complete to identify at least 95% of registered share capital. Finally, I retain only firms owned exclusively

[3]Under Section 15 of the Austrian Limited Liability Companies Act (*GmbH-Gesetz*), a GmbH must have one or more managing directors, who are appointed by the shareholders. Managing directors may, but need not, be shareholders themselves.

[4]SMEs are defined according to European Commission Recommendation 2003/361.

by natural persons and remove a small number of observations with implausible financial ratios. The resulting estimation sample contains 47,178 firms.

Restricting ownership to natural persons serves two purposes. First, it permits a direct mapping between shareholders, their residential locations, and the firm's management structure. Second, it excludes corporate ownership chains in which control may be exercised indirectly through another legal entity. The resulting sample therefore provides unusually detailed information on both sides of the owner–manager relationship within privately held firms.

Table 1: Sample construction

Sample restriction	Dropped	Remaining
All firms in IFLD		249,192
Required financial-statement items available	104,611	144,581
Activity threshold: revenue and total assets > EUR 50,000	32,470	112,111
Restrict to SMEs	9,034	103,077
Restrict to Austrian GmbHs	6,869	96,208
Sector restrictions	25,783	70,425
Exclude public ownership	880	69,545
Ownership-network information available	6,128	63,417
Restrict to natural-person owners only	15,620	47,797
Remove implausible financial ratios	619	47,178
Final estimation sample		47,178

Notes: Restrictions are reported in the order in which they are implemented in the data-processing pipeline. Because some restrictions overlap, the number of observations removed at intermediate steps depends on their ordering, while the final sample is unaffected. Ownership-network information is classified as available when identified natural-person shareholders account for at least 95% of a firm's registered share capital.

3.3 Ownership and Management Structure

The key governance variable captures whether ownership and managerial control fully coincide within the firm. Because the Austrian commercial register identifies both shareholders and managing directors at the individual level, I can determine which shareholders simultaneously hold formal managerial positions and calculate the share of total equity held by these owner-managers.

For each firm, I aggregate the ownership stakes of all shareholders who also serve as managing directors. I then define the binary ownership–management indicator MGT_i as

$$MGT_i = \begin{cases} 0 & \text{if managing shareholders jointly hold 100\% of the firm's equity,} \\ 1 & \text{if managing shareholders jointly hold less than 100\% of the firm's equity.} \end{cases}$$

I refer to firms with $MGT_i = 0$ as *100% owner-managed firms*. In these firms, the entire equity is held by individuals who are simultaneously responsible for managing the firm. Ownership claims and formal managerial control therefore fully coincide. Firms with $MGT_i = 1$, by contrast, exhibit some degree of separation between ownership and management. In these firms, at least part of the equity is held by shareholders who do not simultaneously serve as managing directors, and the complete overlap between residual ownership claims and formal managerial authority is therefore absent.

This distinction provides a transparent empirical benchmark for vertical agency frictions. In a 100% owner-managed firm, the individuals making managerial decisions jointly bear the

full residual consequences of those decisions through their ownership claims. Once ownership and management no longer fully coincide, managerial decision rights and residual ownership claims are distributed across different individuals, creating scope for conflicts of interest between owners and managers. Importantly, MGT_i should therefore be interpreted as an indicator of the separation between ownership and management rather than as a direct measure of realized agency costs.

In the final sample of 47,178 firms, 28,789 firms (61.0%) are classified as 100% owner-managed, while 18,389 firms (39.0%) exhibit some degree of separation between ownership and management. The sample contains 81,836 shareholder positions and 58,105 managing directors. Ownership is highly concentrated: slightly more than half of all firms have a single shareholder, and more than 99% have five or fewer shareholders.

The binary classification deliberately focuses on the sharp distinction between complete and incomplete overlap of ownership and management. It therefore abstracts from the extent to which ownership and managerial control are separated among firms with $MGT_i = 1$. In additional analyses, I examine stricter and more granular definitions of the ownership–management structure to assess whether the results depend on this binary classification.

3.4 Outcome Variables and Owner–Firm Distance

The primary outcome variable is total asset turnover (TAT), defined as annual revenue divided by total assets. Total asset turnover measures the amount of revenue generated per unit of assets employed by the firm and has been widely used in the empirical agency-cost literature as a measure of asset utilization and operational efficiency. Because the distribution of TAT is strongly right-skewed, the main specifications use $\log(TAT)$.

As a second performance measure, I use return on assets (ROA), defined as net profit divided by total assets. Whereas TAT primarily captures operational asset utilization, ROA provides a broader measure of accounting profitability. Because a small number of observations generate extreme values of ROA, I winsorize the variable at the 1st and 99th percentiles throughout the empirical analysis. The two outcomes therefore capture related but distinct dimensions of firm performance.

The empirical design additionally requires a measure of the geographic separation between firms and their owners. For every shareholder j of firm i, I calculate the great-circle distance s_{ij} between the firm's location and the shareholder's place of residence. Locations are observed at the municipality level. Consequently, shareholders residing in the same municipality as the firm are assigned a distance of zero.

Because firms may have more than one shareholder, I aggregate shareholder-level distances into a firm-level measure using ownership stakes as weights. Let k_{ij} denote shareholder j's ownership share in firm i. Owner–firm distance is defined as

$$DIST_i = \sum_{j \in J_i} s_{ij} k_{ij}, \tag{1}$$

where J_i denotes the set of shareholders of firm i. The measure therefore assigns greater weight to the residential location of shareholders with larger ownership stakes.

The distribution of $DIST$ contains substantial mass at zero: 24,721 of the 47,178 firms have owners whose ownership-share-weighted distance is zero, reflecting the high frequency with which firms and their owners are located in the same municipality. At the same time, there is substantial variation in positive distances. Mean owner–firm distance is 41.6 kilometers in the full sample. Distance differs markedly across ownership–management structures, providing the empirical variation examined in the identification strategy below.

4 Empirical Strategy

4.1 Endogenous Ownership–Management Structure

The empirical objective is to estimate how the separation of ownership and managerial control affects firm performance. A simple comparison of 100% owner-managed firms and firms with an ownership–management separation is unlikely to recover a causal effect, however, because the ownership–management structure is itself an endogenous organizational choice.

In particular, firms may adopt different management structures in response to characteristics that also affect performance. Larger and older firms may require more specialized managerial organization, while differences in growth opportunities, managerial ability, ownership complexity, or local economic conditions may simultaneously influence both governance and firm outcomes. Consistent with this concern, firms with ownership–management separation are, on average, larger and older than 100% owner-managed firms and also differ in several financial characteristics.

As a descriptive benchmark, I estimate ordinary least squares regressions of the form

$$Y_i = \alpha + \beta^{OLS} MGT_i + X_i'\gamma + \delta_{s(i)} + \lambda_{r(i)} + \varepsilon_i, \tag{2}$$

where Y_i denotes firm performance, measured by either $\log(TAT_i)$ or ROA_i, and MGT_i equals one when ownership and management do not fully coincide. The vector X_i contains firm-level covariates, while $\delta_{s(i)}$ and $\lambda_{r(i)}$ denote sector and regional fixed effects, respectively.

The coefficient β^{OLS} therefore captures the conditional association between ownership–management separation and firm performance. I do not interpret it causally. Unobserved determinants of both organizational structure and performance may remain even after conditioning on observable firm characteristics and fixed effects. The empirical strategy consequently requires a source of variation in MGT_i that is plausibly unrelated to otherwise unobserved determinants of firm performance.

4.2 Identification Using Owner–Firm Distance

To address the endogenous choice of ownership–management structure, I use the geographic distance between a firm's location and its owners' places of residence as an instrument for MGT_i. The firm-level measure $DIST_i$, defined in Equation 1, is the ownership-share-weighted great-circle distance between the firm and its shareholders.

The relevance of the instrument follows from the organizational costs associated with geographic separation. When owners reside close to the firm, direct participation in management is comparatively easier. Greater distance increases the time and travel costs associated with continuous involvement in the firm's operations and therefore makes a complete overlap between ownership and managerial control less likely. The first-stage prediction is consequently that firms whose owners reside farther away are more likely to exhibit an ownership–management separation.

Owner–firm distance is also closely related to the monitoring environment emphasized in principal–agent theory. Geographic proximity facilitates direct observation, informal interaction, and the acquisition of firm-specific information, whereas greater distance may make owner monitoring more costly. This mechanism is economically relevant because monitoring is one of the principal means through which owners can limit managerial agency problems. At the same time, it raises an important identification concern. For $DIST_i$ to serve as an instrument for MGT_i, geographic distance must not affect firm performance independently of the ownership–management structure.

The exclusion restriction therefore requires that, conditional on observed firm characteristics and fixed effects, owner–firm distance affects performance through its effect on the firm's ownership–management structure rather than through an independent performance channel. This assumption would be violated, for example, if greater distance reduced firm performance

directly by impairing owner monitoring even when the firm's ownership–management structure remained unchanged, or if distance systematically captured otherwise unobserved differences in owner characteristics, firm location, or local economic conditions.

These concerns motivate the geographic, ownership-structure, and direct-effect diagnostics reported in Section 6. The formal identifying assumptions are stated in the next subsection.

4.3 Estimation and Identifying Assumptions

I estimate the effect of ownership–management separation on firm performance using two-stage least squares (2SLS). The first stage relates the ownership–management structure to owner–firm distance:

$$MGT_i = \pi_0 + \pi_1 DIST_i + X_i'\pi + \delta_{s(i)} + \lambda_{r(i)} + u_i, \tag{3}$$

where MGT_i equals one when ownership and management do not fully coincide and zero when managing shareholders jointly hold the firm's entire equity. $DIST_i$ denotes the ownership-share-weighted owner–firm distance defined in Equation 1. The vector X_i contains firm-level controls, while $\delta_{s(i)}$ and $\lambda_{r(i)}$ denote sector and regional fixed effects, respectively. The coefficient π_1 captures the first-stage relationship between owner–firm distance and the probability of ownership–management separation.

Although MGT_i is binary, I estimate the first stage using a linear probability model rather than a logit or probit specification. This is deliberate: conventional 2SLS is based on the linear projection of the endogenous variable on the instrument and the included covariates. Using fitted probabilities from a nonlinear first-stage model would no longer correspond to the standard linear 2SLS estimator (Angrist and Pischke 2009, p. 190). The structural equation of interest is

$$Y_i = \alpha + \beta MGT_i + X_i'\gamma + \delta_{s(i)} + \lambda_{r(i)} + \varepsilon_i, \tag{4}$$

where Y_i denotes firm performance, measured by either $\log(TAT_i)$ or ROA_i. Because MGT_i is potentially correlated with unobserved determinants of firm performance, Equation 4 is estimated by instrumenting MGT_i with $DIST_i$. The coefficient β is the parameter of interest.

For completeness, I also report the corresponding reduced-form relationship,

$$Y_i = \rho_0 + \rho_1 DIST_i + X_i'\rho + \delta_{s(i)} + \lambda_{r(i)} + \nu_i, \tag{5}$$

which measures the relationship between owner–firm distance and firm performance using the same covariate set and fixed effects as the first-stage and 2SLS specifications. Standard errors are clustered at the NUTS-3 level throughout the main analysis.

The main specification—I refer to this specification as the *workhorse specification* throughout the paper—includes the logarithm of firm age and the logarithm of total assets as firm-level controls, together with sector fixed effects at the NACE 1-digit level and regional fixed effects at the NUTS-3 level. Firm age and size are included because both characteristics are strongly associated with organizational structure and firm performance and may also correlate with owner–firm distance. The fixed effects absorb broad differences in production technologies across industries and persistent differences in local economic conditions across regions.

I use this workhorse specification throughout the main analysis. A more parsimonious *baseline specification* includes only sector and regional fixed effects. I also report an *extended specification* that additionally controls for contemporaneous financial characteristics. These financial variables are not included in the workhorse specification because they may themselves be affected by the firm's ownership–management structure and therefore constitute potential mediators rather than predetermined confounders. Conditioning on such variables could remove part of the effect of interest or introduce post-treatment bias. The extended specification is consequently used as a robustness exercise rather than as the primary specification.

The IV strategy relies on three core identifying conditions. An additional monotonicity condition is required for the supplementary LATE interpretation.

First, owner–firm distance must be relevant for the firm's ownership–management structure. In the present setting, this requires that $\pi_1 \neq 0$ in Equation 3. The economic rationale is that greater geographic separation raises the costs of direct owner involvement in the firm's operations and therefore makes complete overlap between ownership and managerial control less likely. The strength of this relationship is assessed empirically using the first-stage coefficient and the corresponding weak-instrument diagnostics.

Second, conditional on the included covariates and fixed effects, owner–firm distance must be independent of unobserved determinants of firm performance. This assumption rules out systematic sorting of owners or firms across distance that is correlated with otherwise unobserved productivity or performance determinants. The workhorse specification addresses observable differences in firm age, size, industry, and regional economic conditions, while Section 6 examines the sensitivity of the results to alternative geographic and ownership restrictions.

Third, the exclusion restriction requires that owner–firm distance affects firm performance only through its effect on the ownership–management structure. This is the most demanding identifying assumption. In particular, geographic distance may affect the ease with which owners acquire information about the firm or monitor managerial behavior. Such monitoring considerations are central to principal–agent theory, but they constitute a threat to the exclusion restriction if distance affects performance directly even when the ownership–management structure is unchanged. I therefore examine this possibility explicitly in Section 6 using subsample and interaction diagnostics that assess whether distance predicts performance within more narrowly defined ownership–management regimes.

Finally, the additional LATE interpretation requires monotonicity. In the present setting, this means that greater owner–firm distance must not induce a firm that would otherwise exhibit an ownership–management separation to become fully owner-managed. Under this additional assumption, the IV estimates admit a local interpretation for firms whose organizational structure responds to owner–firm distance. I examine this interpretation more explicitly in Appendix A.

The 2SLS coefficient β is the central causal parameter in the empirical analysis. It captures the effect of ownership–management separation generated by the variation in MGT_i induced by owner–firm distance. If treatment effects are heterogeneous across firms, this instrument-based effect need not coincide with the average treatment effect in the full population. The supplementary LATE analysis is therefore used to characterize more explicitly the firms and margins of organizational choice that contribute to the IV estimates.

Inference is based on heteroskedasticity-robust standard errors clustered at the NUTS-3 level, allowing for arbitrary within-region correlation in the regression residuals. The sample comprises 35 NUTS-3 clusters. To address potential finite-cluster distortions in conventional cluster-robust inference, I additionally report wild-cluster-bootstrap tests for the key coefficients. The bootstrap maintains NUTS-3 as the clustering level and therefore provides a complementary finite-cluster inference procedure without changing the underlying clustering structure.

5 Main Results

5.1 First Stage and Reduced Form

Table 2 reports the first-stage and reduced-form relationships underlying the IV design. The first-stage estimates show that owner–firm distance is positively and strongly related to ownership–management separation. In the workhorse specification, the coefficient on $DIST_i$ is 0.000078, implying that an increase in owner–firm distance of 100 kilometers is associated with an increase of 0.78 percentage points in the probability that ownership and management do not fully coincide. The coefficient is very similar in the more parsimonious baseline specification.

Table 2: First stage and reduced form

	(1) Baseline	(2) Workhorse
First Stage: Dependent variable MGT		
$DIST$ (km)	0.000076***	0.000078***
	(0.000012)	(0.000013)
Cluster-robust first-stage F	37.01	37.93
Reduced Form – Panel A: Dependent variable $\log(TAT)$		
$DIST$ (km)	-0.00004486***	-0.00003689***
	(0.00001569)	(0.00001353)
Reduced Form – Panel B: Dependent variable ROA		
$DIST$ (km)	-0.000008551***	-0.000008452***
	(0.000002761)	(0.000002703)
$\log(AGE)$	No	Yes
$\log(SIZE)$	No	Yes
Sector FE ($NACE1$)	Yes	Yes
Region FE ($NUTS3$)	Yes	Yes
Observations	47,178	47,178

Notes: The first-stage regressions relate owner–firm distance to the ownership–management indicator MGT. The reduced-form regressions relate owner–firm distance directly to firm performance. The workhorse specification additionally controls for log firm age and log total assets. All specifications include NACE 1-digit sector fixed effects and NUTS-3 region fixed effects. The reported first-stage F-statistic is the cluster-robust Wald statistic for the excluded instrument, with inference clustered at the NUTS-3 level. ROA is winsorized at the 1st and 99th percentiles. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

While the per-kilometer coefficient is small, the distribution of owner–firm distance is highly skewed and contains substantial mass at zero, suggesting that a linear specification may obscure economically relevant nonlinearities. I therefore estimate an auxiliary workhorse specification that includes both an indicator for positive owner–firm distance and continuous distance measured in hundreds of kilometers. The indicator for positive distance is associated with an increase of 14.3 percentage points in the probability of ownership–management separation, over and above the continuous distance gradient. Conditional on positive distance, additional geographic separation is associated with a statistically significant but economically much smaller increase of approximately 0.48 percentage points per 100 kilometers.

This nonlinear first-stage relationship is not, by itself, indicative of weak identification. The linear 2SLS design requires owner–firm distance to generate systematic variation in the endogenous ownership–management structure, but it does not require the marginal first-stage effect to be constant across the distance distribution. Consistent with this, the cluster-robust first-stage F-statistic in the workhorse specification is 37.93. The concentration of the first-stage relationship at particular margins is nevertheless relevant for the interpretation of the IV estimates, because firms whose organizational structure responds to these margins may contribute disproportionately to the instrument-induced variation.

I therefore complement the continuous-distance 2SLS estimates with Wald/LATE benchmarks based on alternative binary-distance thresholds in Appendix A. These analyses provide a transparent characterization of the local variation underlying the IV estimates and of the firms whose ownership–management structure is responsive to geographic separation.

The reduced-form estimates are reported separately for the two performance measures. Panel A shows the relationship between owner–firm distance and $\log(TAT)$. In the workhorse specification, the coefficient on $DIST_i$ is -0.00003689 and statistically significant at the 1% level. Thus, an increase in owner–firm distance of 100 kilometers is associated with a decline in $\log(TAT)$ of approximately 0.0037, corresponding to about 0.37% lower total asset turnover.

Panel B reports the reduced form for ROA. The workhorse coefficient on $DIST_i$ is -0.000008452 and is likewise statistically significant at the 1% level. An increase in owner–firm distance of 100 kilometers is therefore associated with a decline in ROA of approximately 0.085 percentage points.

Taken together, the first-stage and reduced-form estimates establish the two empirical relationships underlying the IV design: greater owner–firm distance predicts a higher probability of ownership–management separation and, at the same time, lower firm performance. The reduced form does not by itself identify the causal effect of ownership–management separation. I therefore turn next to the 2SLS estimates, which constitute the main results of the analysis.

5.2 Ownership–Management Separation and Firm Performance

Table 3 presents the main estimates of the relationship between ownership–management separation and firm performance. Columns (1) and (2) report OLS estimates, while columns (3) and (4) report the corresponding 2SLS estimates using owner–firm distance as an instrument for MGT. The baseline specifications include sector and regional fixed effects, whereas the workhorse specifications additionally control for firm age and total assets. The parallel structure of the table therefore allows the sensitivity of the OLS and IV estimates to the same set of observable firm characteristics to be compared directly.

Panel A reports the results for operational efficiency, measured by $\log(TAT)$. In the baseline OLS specification, ownership–management separation is associated with significantly lower asset turnover. The estimated coefficient is -0.0762 and statistically significant at the 1% level. Once firm age and size are included, however, the OLS coefficient attenuates sharply to -0.0122 and is no longer statistically distinguishable from zero. Thus, the conditional cross-sectional relationship between ownership–management separation and operational efficiency is highly sensitive to observable differences in firm characteristics.

The corresponding 2SLS estimates exhibit a markedly different pattern. The baseline IV coefficient is -0.5918, while the workhorse estimate is -0.4707. Both are statistically significant at the 1% level. Although the coefficient becomes somewhat smaller in absolute magnitude after controlling for firm age and size, it remains economically large and highly significant. The contrast with the OLS results is particularly pronounced in the workhorse specification: conditional on the same covariates and fixed effects, the OLS coefficient is close to zero, whereas the estimate based on the variation in MGT induced by owner–firm distance remains strongly negative.

Panel B reports the corresponding estimates for profitability (return on assets). Here, the OLS relationship is more stable across specifications. The coefficient on MGT is -0.0169 in the baseline model and -0.0146 in the workhorse specification, with both estimates statistically significant at the 1% level. The 2SLS estimates are again substantially larger in absolute magnitude. The baseline coefficient is -0.1128, and the workhorse estimate is -0.1078, with both coefficients statistically significant at the 1% level. Hence, while the negative OLS association with profitability is less sensitive to the inclusion of firm age and size than the corresponding association with asset turnover, the IV estimates point to a considerably stronger negative relationship for both dimensions of firm performance.

The systematic differences between the OLS and IV estimates are consistent with endogenous selection into ownership–management structures. To assess this formally, I implement cluster-robust control-function tests corresponding to a Wu–Hausman test of the exogeneity of MGT. The null hypothesis of exogeneity is rejected in both workhorse specifications, with p-values of 0.011 for $\log(TAT)$ and 0.008 for ROA. Conditional on the validity of the instrument, these results

support treating the OLS estimates as descriptive conditional associations rather than as causal effects. The coefficient on the first-stage residual is positive in both control-function regressions, indicating that unobserved factors associated with a higher probability of ownership–management separation are also positively related to firm performance. This pattern is consistent with upward bias in the OLS estimates toward zero.

The difference between the OLS and 2SLS coefficients should nevertheless not be interpreted as a pure measure of omitted-variable bias. If the effect of ownership–management separation is heterogeneous across firms, 2SLS places greater weight on firms whose organizational structure responds to the variation generated by owner–firm distance. The larger IV coefficients may therefore reflect both endogenous selection and heterogeneity in the effect of ownership–management separation. I examine this local interpretation more explicitly in the supplementary Wald/LATE analyses in Appendix A. The economic magnitude of the main 2SLS estimates is discussed in the next subsection.

Table 3: Ownership–management separation and firm performance: OLS and 2SLS estimates

	OLS		2SLS	
	(1) Baseline	(2) Workhorse	(3) Baseline	(4) Workhorse
Panel A: Dependent variable $\log(TAT)$				
MGT	-0.0762***	-0.0122	-0.5918***	-0.4707***
	(0.0116)	(0.0107)	(0.1743)	(0.1587)
R^2	0.3687	0.4716	0.3679	0.4716
Wu–Hausman (p-value)	–	–	–	0.011
Panel B: Dependent variable ROA				
MGT	-0.0169***	-0.0146***	-0.1128***	-0.1078***
	(0.0017)	(0.0018)	(0.0334)	(0.0320)
R^2	0.0158	0.0189	0.0141	0.0177
Wu–Hausman (p-value)	–	–	–	0.0081
$\log(AGE)$	No	Yes	No	Yes
$\log(SIZE)$	No	Yes	No	Yes
Sector FE ($NACE1$)	Yes	Yes	Yes	Yes
Region FE ($NUTS3$)	Yes	Yes	Yes	Yes
Observations	47,178	47,178	47,178	47,178

Notes: Columns (1) and (2) report OLS estimates and are interpreted as non-causal benchmarks. Columns (3) and (4) report two-stage least squares estimates, instrumenting MGT with ownership-share-weighted owner–firm distance. MGT equals one when ownership and management do not fully coincide and zero when managing shareholders jointly hold the firm's entire equity. The workhorse specifications additionally control for log firm age and log total assets. All specifications include NACE 1-digit sector fixed effects and NUTS-3 region fixed effects. ROA is winsorized at the 1st and 99th percentiles. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. As a finite-cluster robustness check, the workhorse 2SLS coefficients are additionally assessed using wild-cluster-bootstrap inference with 1,999 replications and Rademacher weights. The corresponding bootstrap p-values are discussed in the text and are not separately reported in the table. The reported Wu–Hausman p-values are based on cluster-robust control-function tests of the coefficient on the first-stage residual in the corresponding workhorse specification. The R^2 values for the 2SLS specifications are reported for descriptive purposes and should not be interpreted as goodness-of-fit measures directly comparable to OLS. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Given that inference is based on 35 NUTS-3 clusters, I additionally assess the workhorse 2SLS coefficients using wild-cluster-bootstrap inference. The asset-turnover estimate remains statistically significant at the 5% level, with a bootstrap p-value of 0.033. The corresponding ROA estimate also remains statistically significant at the 5% level, with a bootstrap p-value

of 0.046. These bootstrap results are not reported separately in Table 3. Thus, the statistical significance of both workhorse 2SLS estimates is robust to finite-cluster bootstrap inference.

5.3 Economic Magnitudes and Interpretation

The main 2SLS estimates are statistically significant under both conventional clustered and wild-cluster-bootstrap inference and are also economically large. Because asset turnover enters the regressions in logarithms, the coefficient on MGT should not be interpreted directly as a percentage change. The workhorse estimate of -0.4707 corresponds to a proportional change of

$$100\,[\exp(-0.4707) - 1] = -37.5\%. \tag{6}$$

Thus, the instrument-induced shift from complete ownership–management overlap to an ownership–management separation is associated with approximately 37.5% lower asset turnover. The corresponding baseline estimate of -0.5918 implies a reduction of approximately 44.7%. Controlling for firm age and size therefore reduces the estimated magnitude, but the implied effect remains large. To provide an intuitive interpretation, a 37.5% reduction would imply that a firm generating one euro of revenue per euro of assets under complete ownership–management overlap would generate approximately 63 cents per euro of assets following the instrument-induced change in organizational structure.

The profitability estimates are similarly substantial. Since ROA is expressed as a ratio rather than in logarithms, the workhorse coefficient of -0.1078 corresponds directly to a decline of approximately 10.8 percentage points. The baseline estimate implies a decline of 11.3 percentage points. These magnitudes are large relative to the cross-sectional profitability of firms in the sample: mean ROA is approximately 8.9%. The ROA results therefore suggest that the lower operational efficiency captured by asset turnover is accompanied by an economically meaningful deterioration in profitability rather than merely reflecting a reallocation of assets or revenues with little effect on the firm's bottom line.

The magnitude of the IV estimates warrants careful interpretation. In particular, the 2SLS coefficients should not be read as the effect of mechanically moving every firm in the population from complete ownership–management overlap to separation. Identification comes from the component of MGT that is systematically shifted by owner–firm distance. If the effect of ownership–management separation is heterogeneous across firms, the resulting IV estimate need not coincide with the average treatment effect for the full population. With a continuous instrument such as owner–firm distance, 2SLS generally places greater weight on local margins at which the organizational structure responds more strongly to changes in the instrument. The estimate should therefore be interpreted as a weighted average of effects for instrument-responsive firms rather than as an average effect for all firms in the sample. In the supplementary binary-instrument LATE framework, these instrument-responsive firms correspond to compliers.

This distinction is particularly relevant given the nonlinear first-stage relationship documented in Section 5.1. Much of the association between owner–firm distance and the ownership–management structure is concentrated at the extensive margin between zero and positive distance, while the additional gradient in distance is considerably smaller. The main continuous-instrument 2SLS estimate therefore aggregates causal effects across the distance margins that generate changes in organizational structure, with greater weight placed on margins that induce more first-stage variation. The supplementary Wald/LATE analyses in Appendix A provide a more transparent binary-instrument interpretation by defining alternative distance thresholds, identifying the corresponding complier groups, and characterizing the firms whose ownership–management structure responds to these margins.

The economic interpretation of the estimates is nevertheless consistent with the agency framework developed above. When managing shareholders hold the firm's entire equity, managerial decision rights and residual ownership claims are fully aligned. Once ownership and management

cease to overlap completely, the individuals exercising managerial authority no longer jointly bear the full residual consequences of managerial decisions. The resulting separation creates scope for weaker incentives, costly monitoring, and conflicts of interest between owners and managers. The negative effects on both asset turnover and ROA are consistent with such agency frictions having economically important consequences for firm performance.

At the same time, the estimates do not identify a particular agency mechanism. Neither MGT nor the IV design directly measures managerial effort, monitoring intensity, private benefits, or information asymmetries. The results therefore provide evidence on the performance consequences of ownership–management separation rather than a direct estimate of any individual component of agency costs. Moreover, the causal interpretation continues to depend on the identifying assumptions underlying owner–firm distance, most importantly the exclusion restriction. Section 6 therefore examines alternative ownership structures, geographic restrictions, and additional diagnostic tests designed to assess whether the main estimates can plausibly be attributed to the instrument-induced variation in ownership–management separation.

6 Identification and Robustness

The robustness analysis is organized around the main threats to the interpretation of the distance-based IV design. I first examine potential direct effects of owner–firm distance, then assess the sensitivity of the results to alternative ownership structures and treatment definitions. I subsequently address geographic confounding and the support of the instrument before considering additional specification, reweighting, and sample robustness checks.

6.1 Direct Effects of Owner–Firm Distance

The identifying assumption underlying the IV strategy is that owner–firm distance affects firm performance only through its effect on the separation of ownership and management. This restriction deserves particular attention because geographic distance may also affect the costs of owner involvement and monitoring. Such costs are consistent with the relevance of the instrument if they induce owners to delegate management. The exclusion restriction would be violated, however, if distance affected firm performance directly, for example by reducing monitoring effectiveness even conditional on the firm's ownership–management structure.

I examine this concern by studying the association between owner–firm distance and firm performance within different ownership–management regimes. Table 4 reports the results. These regressions should be interpreted as exclusion diagnostics rather than formal tests of the exclusion restriction. In particular, ownership–management separation is endogenous in the empirical framework, so conditioning on MGT does not generate exogenous subsamples. Nevertheless, the regressions are informative about whether the data exhibit the patterns that would be expected under a direct distance channel.

Column (1) restricts the sample to fully owner-managed firms ($MGT = 0$), for which the organizational treatment is absent. Column (2) considers firms with ownership–management separation ($MGT = 1$). Column (3) uses the full sample and interacts owner–firm distance with MGT, providing a direct test of whether the distance–performance gradient differs systematically across the two organizational regimes. Finally, Column (4) focuses on the particularly restrictive subsample in which managing directors hold no equity in the firm. All specifications include the workhorse controls and sector and region fixed effects.

Panel A considers log asset turnover, $\log(TAT)$. Among fully owner-managed firms in column (1), the coefficient on distance is small and statistically insignificant. In Column (2), the point estimate is more negative and is statistically significant under conventional NUTS-3-clustered inference. Importantly, however, statistical significance in one subsample and insignificance in another does not itself establish that the two coefficients differ. The full-sample interaction

Table 4: Owner–firm distance and firm performance within ownership–management regimes

	(1) $MGT = 0$	(2) $MGT = 1$	(3) Full sample	(4) Manager equity = 0
Panel A: Dependent variable $\log(TAT)$				
$DIST$ (km)	-0.0000268	-0.0000387***	-0.0000252	-0.0000187
	(0.0000226)	(0.0000142)	(0.0000228)	(0.0000124)
$DIST \times MGT$			-0.0000154	
			(0.0000238)	
Panel B: Dependent variable ROA				
$DIST$ (km)	-0.0000111**	-0.00000462	-0.0000110**	-0.0000145**
	(0.00000515)	(0.00000328)	(0.00000504)	(0.00000541)
$DIST \times MGT$			0.00000523	
			(0.00000609)	
$\log(AGE)$	Yes	Yes	Yes	Yes
$\log(SIZE)$	Yes	Yes	Yes	Yes
Sector FE ($NACE1$)	Yes	Yes	Yes	Yes
Region FE ($NUTS3$)	Yes	Yes	Yes	Yes
Observations	28,789	18,389	47,178	3,173

Notes: The table reports reduced-form regressions of firm performance on owner–firm distance within different ownership–management regimes. Column (1) restricts the sample to fully owner-managed firms ($MGT = 0$), Column (2) to firms with ownership–management separation ($MGT = 1$), Column (3) uses the full sample and interacts owner–firm distance with MGT and Column (4) restricts the sample to firms in which managing directors hold no equity. All specifications include log firm age, log total assets, NACE 1-digit sector fixed effects, and NUTS-3 region fixed effects. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. As a finite-cluster robustness check, the reported coefficients are additionally assessed using wild-cluster-bootstrap inference with 1,999 replications and Rademacher weights. The corresponding bootstrap p-values are discussed in the text and are not separately reported in the table. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

specification in column (3) addresses this comparison directly. The coefficient on $DIST \times MGT$ is -0.0000154 and is statistically insignificant under conventional clustered inference. Wild-cluster-bootstrap inference leads to the same conclusion, with a bootstrap p-value of 0.521.

Finite-cluster inference also weakens the evidence for the negative within-$MGT = 1$ association itself. While the distance coefficient in Column (2) is significant using conventional clustered standard errors, its wild-cluster-bootstrap p-value is 0.067. The corresponding bootstrap p-values are 0.271 for the fully owner-managed sample in Column (1), 0.295 for the distance coefficient in the full-sample interaction specification, and 0.220 for the zero-manager-equity sample in Column (4). Thus, none of the central asset-turnover distance diagnostics is statistically significant at the 5% level under wild-cluster-bootstrap inference.

As an additional robustness check, I estimate a fully interacted specification in which firm age, firm size, sector fixed effects, and region fixed effects are all allowed to vary with MGT. This specification reproduces the within-$MGT = 0$ distance slope in Column (1) and implies the corresponding within-$MGT = 1$ slope from Column (2). The interaction between distance and MGT remains statistically insignificant ($p = 0.616$), indicating that the result is not driven by imposing common coefficients on the controls or fixed effects across organizational regimes.

Panel B repeats the exercise using return on assets (ROA). The conventional clustered estimates provide somewhat more evidence of negative within-regime associations. The distance coefficient is negative and statistically significant in the fully owner-managed sample in Column (1) and in the zero-manager-equity sample in Column (4). The full-sample distance coefficient in

Column (3) is also negative and significant under conventional clustered inference. These associations are, however, sensitive to finite-cluster inference. The wild-cluster-bootstrap p-values are 0.070 in Column (1), 0.066 for the distance coefficient in Column (3), and 0.061 in Column (4). The corresponding coefficient in the $MGT = 1$ subsample is statistically insignificant, with a bootstrap p-value of 0.363.

More importantly for the direct-monitoring interpretation, the interaction between distance and MGT in Column (3) is positive rather than negative and is statistically insignificant. Its wild-cluster-bootstrap p-value is 0.420. Allowing all controls and fixed effects to vary across the two organizational regimes produces the same qualitative result: the distance–MGT interaction remains statistically insignificant ($p = 0.302$).

Importantly, the diagnostics do not provide robust evidence of a stronger negative distance–performance relationship among firms with ownership–management separation. This finding is particularly relevant to our identification strategy, as such a pattern would be consistent with additional monitoring costs arising from the interaction between geographic distance and delegated management. Although some within-regime coefficients are negative and statistically significant under conventional clustered inference, these associations are sensitive to finite-cluster corrections.

Taken together, the results provide little empirical support for an additional distance-related monitoring penalty specific to ownership–management separation. Nevertheless, more general direct effects of owner–firm distance cannot be ruled out. Moreover, because organizational structure is endogenous, the within-regime regressions should be interpreted as diagnostic evidence rather than as a formal validation of the exclusion restriction.

6.2 Ownership Structure and Treatment Definition

Single-owner firms. A central concern with the main treatment definition is that firms with multiple shareholders may combine ownership and managerial roles in relatively complex ways. Although the indicator captures whether ownership and management are separated, the treated group may reflect different combinations of managing and non-managing shareholders and different ownership stakes. I therefore begin the robustness analysis by restricting the sample to firms with a single shareholder.

This restriction substantially sharpens the interpretation of both the treatment and the instrument. In a single-owner firm, $MGT = 0$ means that the sole owner manages the firm, whereas $MGT = 1$ means that the sole owner delegates management. The treatment therefore corresponds directly to the organizational choice between owner-management and delegated management. At the same time, owner–firm distance no longer represents an ownership-share-weighted average across multiple shareholders, but simply the geographic distance between the sole owner and the firm.

The single-owner specification is therefore a particularly informative robustness check of the main design. It removes much of the heterogeneity in ownership structure that could otherwise complicate the interpretation of MGT and of the distance instrument. If the main results were driven primarily by complex multi-owner arrangements or by the construction of ownership-share-weighted distance, they should weaken substantially in this restricted sample.

At the same time, the single-owner specification should not be interpreted as providing stronger identification than the main model. It applies to a more specific population and substantially reduces the number of treated firms: among 24,815 single-owner firms, only 2,166 exhibit ownership–management separation. The resulting first stage is therefore less precisely estimated than in the full sample, and the corresponding 2SLS estimates are expected to be less precise. I therefore use the single-owner sample as a robustness check of the treatment and instrument definitions rather than as an alternative main specification.

Polar governance structures. I further restrict the sample to the two polar governance structures, comparing fully owner-managed firms with firms in which managing directors hold no equity. This removes intermediate ownership–management configurations from the treatment comparison and therefore sharpens the contrast between the two organizational forms.

Table 5 summarizes the two complementary restrictions. The single-owner sample simplifies the ownership structure, whereas the polar-governance sample sharpens the treatment contrast by removing intermediate ownership–management configurations.

Table 5: Ownership structure and treatment-definition robustness

	Single-owner firms		Polar governance structures	
	$\log(TAT)$	ROA	$\log(TAT)$	ROA
First Stage				
$DIST$ (km)	0.000072***		0.000078***	
	(0.000017)		(0.000018)	
Cluster-robust first-stage F	18.06		19.21	
Reduced Form				
$DIST$ (km)	-0.000037**	-0.000014**	-0.000029**	-0.000014***
	(0.000017)	(0.000005)	(0.000013)	(0.000004)
Second Stage				
MGT	-0.5150**	-0.1907**	-0.3678**	-0.1854***
	(0.2415)	(0.0929)	(0.1789)	(0.0557)
Wild-cluster-bootstrap p-value	0.051	0.015	0.051	0.014
$\log(AGE)$	Yes	Yes	Yes	Yes
$\log(SIZE)$	Yes	Yes	Yes	Yes
Sector FE ($NACE1$)	Yes	Yes	Yes	Yes
Region FE ($NUTS3$)	Yes	Yes	Yes	Yes
Observations	24,815		31,962	

Notes: The single-owner specification restricts the sample to firms with one shareholder and compares owner-managed firms with firms in which the sole owner delegates management. The polar-governance specification restricts the sample to fully owner-managed firms and firms in which managing directors hold no equity, thereby excluding intermediate ownership–management configurations. $DIST$ denotes owner–firm distance in kilometers. All specifications include log firm age, log total assets, NACE 1-digit sector fixed effects, and NUTS-3 region fixed effects. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. First-stage F-statistics are cluster-robust Wald statistics. Wild-cluster-bootstrap p-values are based on 1,999 replications using Rademacher weights at the NUTS-3 cluster level. ROA is winsorized at the 1st and 99th percentiles in the full sample before imposing the respective sample restrictions. Significance levels based on conventional clustered inference: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 5 shows that the identifying relationship between owner–firm distance and managerial delegation remains present under both restrictions. In the single-owner sample, which contains 24,815 firms, the coefficient on $DIST$ in the first stage is 0.0000715 and the cluster-robust first-stage F-statistic is 18.06. Restricting the sample instead to the two polar governance structures leaves 31,962 firms, including 28,789 fully owner-managed firms and 3,173 firms in which managing directors hold no equity. In this sample, the first-stage coefficient is 0.000078 and the cluster-robust first-stage F-statistic is 19.21. Thus, instrument relevance is preserved both when ownership complexity is removed and when intermediate ownership–management configurations are excluded.

The reduced-form relationships are also consistently negative. In the single-owner sample, the coefficient on $DIST$ is -0.0000368 for log asset turnover and -0.0000136 for ROA. In the polar-governance sample, the corresponding estimates are -0.000029 and -0.000014, respectively.

In particular, the reduced-form estimate for asset turnover in the single-owner sample is close to the full-sample workhorse estimate, while the negative relationship with profitability is preserved under both restrictions.

The 2SLS estimates show the same qualitative pattern. Among single-owner firms, the coefficient on MGT is -0.515 for log asset turnover, compared with -0.471 in the full-sample workhorse specification. Restricting the comparison to fully owner-managed firms and firms with zero managerial ownership yields an estimate of -0.368. Conventional NUTS-3-clustered inference rejects the null at the 5% level in both restricted samples, while wild-cluster-bootstrap p-values are 0.051 in each case. Hence, the negative asset-turnover estimates are preserved across both restrictions, although finite-cluster inference is marginal.

For ROA, the corresponding 2SLS estimates are -0.191 in the single-owner sample and -0.185 in the polar-governance sample, compared with -0.108 in the full-sample workhorse specification. Wild-cluster-bootstrap inference yields p-values of 0.015 and 0.014, respectively. The profitability result is therefore also preserved when either complex ownership structures or intermediate governance configurations are removed.

Taken together, the two exercises address distinct aspects of the treatment definition. The single-owner restriction shows that the main results do not depend on multi-owner structures or on aggregating owner distances using ownership shares. The polar-governance restriction shows that they are not specific to grouping partial ownership–management separation together with complete managerial delegation. At the same time, both exercises concern more specific firm populations than the workhorse specification and are therefore best interpreted as robustness checks rather than as alternative main estimands.

6.3 Geographic Robustness and Sample Restrictions

Because the instrument is explicitly geographic, a central concern is that owner–firm distance may partly capture spatial differences in local economic conditions rather than variation in the costs of direct owner involvement. The workhorse specification already includes NUTS-3 regional fixed effects, but residual geographic heterogeneity may remain at a finer spatial level. Moreover, the estimated relationship could be disproportionately influenced by urban agglomerations or by particular parts of the distance distribution.

I therefore examine the geographic dimension of the identification strategy along three complementary margins. First, I strengthen the control for local geographic heterogeneity by replacing NUTS-3 fixed effects with substantially finer postal-code fixed effects, and I separately exclude firms located in cities with more than 50,000 inhabitants. Second, I examine whether owner–firm distance systematically predicts observable municipality characteristics capturing demographic, settlement, and labor-market conditions. Third, I assess whether the results depend on particular parts of the distance distribution by restricting the support of the instrument to an intermediate distance range. Unless stated otherwise, these exercises retain the workhorse specification and NUTS-3 clustering so that each robustness check changes only the geographic dimension under consideration.

Finer geographic fixed effects and exclusion of cities with more than 50,000 inhabitants. The postal-code specification provides a particularly demanding check for local geographic confounding. Replacing the 35 NUTS-3 fixed effects with 2,155 postal-code fixed effects absorbs much finer spatial heterogeneity in local economic conditions, infrastructure, labor markets, and other place-specific factors that may be correlated with both owner–firm distance and firm performance.

Importantly, the clustering level is held fixed at NUTS-3. This isolates the effect of introducing finer geographic controls from changes in the assumed error-correlation structure. Postal-code fixed effects therefore absorb local-level differences, while NUTS-3 clustering continues to allow regression residuals to be arbitrarily correlated across firms within the broader regional economic

Table 6: Geographic robustness: finer fixed effects and exclusion of cities with more than 50,000 inhabitants

	Postal-code FE		Excl. cities > 50,000 inhabitants	
	(1) log(TAT)	(2) ROA	(3) log(TAT)	(4) ROA
First Stage				
$DIST$ (km)	0.0000786***		0.0000646***	
	(0.0000132)		(0.0000129)	
First-stage F	35.35		25.20	
Reduced Form				
$DIST$ (km)	-0.0000344**	-0.00000819***	-0.0000369	-0.00000868**
	(0.0000133)	(0.00000293)	(0.0000229)	(0.00000414)
Second Stage				
MGT	-0.4383**	-0.1043***	-0.5711	-0.1343*
	(0.1641)	(0.0341)	(0.3379)	(0.0698)
log(AGE)	Yes	Yes	Yes	Yes
log($SIZE$)	Yes	Yes	Yes	Yes
Sector FE ($NACE1$)	Yes	Yes	Yes	Yes
Region FE ($NUTS3$)	No	No	Yes	Yes
Postal-code FE	Yes	Yes	No	No
Observations	47,014	47,014	31,443	31,443

Notes: The table reports geographic robustness checks based on the workhorse specification. Columns (1) and (2) replace the NUTS-3 regional fixed effects with postal-code fixed effects while retaining NUTS-3 as the clustering level. Fixed-effect singleton removal reduces this sample by 164 observations. Columns (3) and (4) retain the workhorse specification but exclude firms located in Austrian cities with more than 50,000 inhabitants. The excluded cities are Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt, Villach, Wels, St. Pölten, and Dornbirn. *ROA* is winsorized at the 1st and 99th percentiles using the full-sample cutoffs before applying the sample restriction. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. Significance stars are based on these clustered standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

environment. In this sense, the specification strengthens geographic control without imposing the more restrictive assumption that residual dependence vanishes across neighboring postal-code areas within the same NUTS-3 region.

The resulting estimates are very similar to the workhorse specification. The first-stage remains strong, with a cluster-robust first-stage F-statistic of 35.35. The 2SLS coefficient for log asset turnover is -0.438, compared with -0.471 in the workhorse specification, while the ROA coefficient is -0.104, compared with -0.108. Both estimates remain statistically significant under NUTS-3-clustered inference.

The second geographic robustness check addresses the possibility that the results are driven by firms located in cities with more than 50,000 inhabitants. These cities may differ systematically from the rest of the country in labor-market conditions, competition, financing opportunities, infrastructure, and other local characteristics that could be correlated with both organizational form and firm performance. In addition, geographic distance may be measured less informatively within more populous municipalities, where an owner and a firm can be assigned a distance of zero despite being located at economically meaningful distances from one another. I therefore exclude all firms located in Austrian cities with more than 50,000 inhabitants while otherwise retaining the workhorse specification and NUTS-3 clustering.

This restriction reduces the sample from 47,178 to 31,443 firms, but the first stage remains relevant, with a cluster-robust first-stage F-statistic of 25.20. The 2SLS point estimates remain

negative and, if anything, somewhat larger in absolute magnitude than in the full sample. The coefficient for log asset turnover changes from −0.471 in the workhorse specification to −0.571, while the ROA coefficient changes from −0.108 to −0.134. Statistical precision declines substantially in the smaller sample: the corresponding conventional clustered p-values are 0.100 and 0.063, respectively. The reduced-form estimate for asset turnover is virtually unchanged in magnitude, but is also estimated less precisely. Overall, the results provide no indication that the workhorse estimates are driven by firms located in the excluded cities, although the substantial loss of observations naturally reduces precision.

Local-environment negative-control diagnostics. A central concern with a geographic instrument is that owner–firm distance may proxy for systematic differences in the local environments in which firms are located rather than only affecting managerial delegation. If firms with more distant owners were disproportionately located in municipalities with different demographic, settlement, or labor-market characteristics, these local conditions could affect firm performance directly and thereby generate a correlation between the instrument and the outcome that is unrelated to the governance channel.

To probe this possibility, I examine whether owner–firm distance predicts four municipality characteristics that capture distinct dimensions of the local environment: the share of residents aged 65 or older, the foreign-resident share, the commuter share, and average household size. These variables are useful as negative-control outcomes because the management form of an individual SME cannot plausibly have a material causal effect on municipality-wide demographic or household characteristics. At the same time, systematic associations between owner–firm distance and these variables would be informative about residual place-based sorting. For example, such associations would indicate that firms with more distant owners are systematically located in observably different local environments even after conditioning on sector, region, firm age, and firm size.

Conversely, an absence of systematic relationships does not establish the exclusion restriction, since unobserved local characteristics may still matter. It does, however, weaken the alternative explanation that the identifying variation in owner–firm distance primarily reflects broad observable differences in municipalities rather than variation in the feasibility of owner involvement and managerial delegation.

The results provide little evidence of systematic sorting along these observable municipality characteristics. Expressing distance in units of 100 kilometers and standardizing each municipality characteristic, the reduced-form coefficients range from approximately −0.0026 to 0.0021 standard deviations per 100 kilometers. Although the foreign-resident share and average household size are individually significant at conventional levels before adjustment, none of the four associations remains statistically significant after Holm correction for multiple testing.

As an additional negative-control exercise, I replace the main performance outcomes with the standardized municipality characteristics in otherwise unchanged 2SLS specifications. None of these placebo estimates is statistically significant after Holm adjustment. Instrument relevance remains essentially unchanged, with cluster-robust first-stage F-statistics of approximately 37.8–37.9. These results do not establish the exclusion restriction, but they provide little indication that the identifying variation in owner–firm distance primarily reflects broad observable differences in firms' local environments. Full results are reported in Appendix Table B.1.

Intermediate-distance support. While the preceding exercises address geographic confounding arising from local economic conditions, a separate concern is whether the results depend disproportionately on particular parts of the distance distribution. The full-sample distance distribution contains both a large mass of firms at zero or very small owner–firm distances and a relatively thin upper tail. I therefore complement the geographic-control exercises with a restriction of the instrument's support.

A more targeted sensitivity check focuses on the intermediate distance range in which owner–firm distance may be particularly informative about the costs of direct owner involvement. At very short distances, the economic difference between owners living, for example, 3 rather than 10 kilometers from the firm is plausibly limited. At very large distances, frequent physical presence and close day-to-day involvement may already be impractical, so additional increases in distance may have little incremental relevance for organizational choice. These considerations suggest that intermediate distances may provide particularly informative variation. At the same time, any such range necessarily requires arbitrary cutoffs. I therefore treat this exercise strictly as a robustness check rather than as an alternative preferred specification.

Concretely, I restrict the sample to firms with ownership-share-weighted owner–firm distance between 15 and 100 kilometers. Because short distances account for a large share of the full distribution, this restriction reduces the sample to 6,861 firms. The first stage remains relevant but is substantially weaker than in the full sample, with a cluster-robust first-stage F-statistic of 11.33.

For log asset turnover, the reduced-form coefficient remains negative and statistically significant, and the corresponding 2SLS estimate is -1.063 ($p = 0.007$). Thus, the negative asset-turnover estimate remains present when identification relies only on intermediate-distance variation. In contrast, the profitability result is not robust within this distance range. The reduced-form coefficient for ROA is statistically insignificant, and the 2SLS estimate is small, positive, and statistically indistinguishable from zero ($\hat{\beta} = 0.052$, $p = 0.622$). Full regression results are reported in Appendix Table C.1.

These estimates should not be interpreted as direct tests of equality with the full-sample 2SLS coefficients. Restricting the support of a continuous instrument changes the distance margins that generate variation in organizational structure and may therefore change the weighting of instrument-responsive firms. The results nevertheless indicate that the main asset-turnover finding is not driven solely by observations at the extremes of the distance distribution, whereas the ROA result is less stable across different regions of instrument support.

6.4 Alternative Specifications and Reweighting

Inverse-probability reweighting. A further concern is that owner-managed firms and firms with ownership–management separation differ systematically in observable characteristics. Although the IV strategy is designed to address the endogeneity of organizational form, substantial differences in covariate support may still make the resulting estimates sensitive to the composition of the sample. I therefore complement the main specification with inverse-probability reweighting.

The purpose of this exercise is not to create random assignment or to replace the IV identification strategy. Rather, IPW reweights the sample toward greater balance in observed characteristics and thereby examines whether the IV results are sensitive to observable differences between the two organizational regimes. Because reweighting changes the composition of the pseudo-population, the resulting weighted IV coefficient should likewise be interpreted as a sensitivity estimate rather than as an alternative estimate of the population average treatment effect.

I estimate the propensity to exhibit ownership–management separation using the covariates from the workhorse specification: log firm age, log total assets, and indicators for NACE 1-digit sectors and NUTS-3 regions. Financial ratios are deliberately excluded from the propensity-score model because they may themselves respond to organizational form and therefore potentially lie on the causal pathway from governance to performance. Based on the estimated propensity scores, I construct stabilized inverse-probability weights and re-estimate the workhorse IV specification using these weights.

The reweighting diagnostics indicate substantial common support. Estimated propensity scores range from 0.135 to 0.610 between the 1st and 99th percentiles, with a median of 0.396. The stabilized weights are well behaved: the median weight is 0.953, the 99th percentile is 2.011,

and the maximum weight is 5.936. Reweighting therefore does not rely on a small number of observations receiving extremely large weights.

Consistent with this, the effective sample size remains 43,950 firms, or 93.2% of the original sample. The corresponding effective sample sizes are 16,188 for firms with ownership–management separation and 27,878 for fully owner-managed firms.

The weighting procedure also substantially improves covariate balance. The standardized mean difference in log firm age falls from 0.417 to −0.037, while that for log firm size falls from 0.173 to −0.012. Differences in sector and regional composition are similarly small after weighting: the maximum absolute difference in category shares falls from 0.051 to 0.002 for NACE 1-digit sectors and from 0.006 to 0.001 for NUTS-3 regions. Detailed balance diagnostics are reported in Appendix Table D.1.

Table 7: Inverse-probability-weighted IV estimates

	(1) log(TAT)	(2) ROA
First Stage		
$DIST$ (km)	0.0000804***	
	(0.0000134)	
Cluster-robust first-stage F	35.89	
Reduced Form		
$DIST$ (km)	-0.0000357**	-0.00000844**
	(0.0000145)	(0.00000360)
Second Stage		
MGT	-0.4444**	-0.1049***
	(0.1644)	(0.0368)
log(AGE)	Yes	Yes
log($SIZE$)	Yes	Yes
Sector FE ($NACE1$)	Yes	Yes
Region FE ($NUTS3$)	Yes	Yes
IPW weights	Yes	Yes
Observations	47,178	47,178

Notes: The table reports the workhorse IV specification using stabilized inverse-probability weights. Propensity scores are estimated from a logit model for MGT including log firm age, log total assets, NACE 1-digit sector indicators, and NUTS-3 regional indicators. Financial covariates are deliberately excluded from the propensity-score model because they may themselves be affected by organizational form. The first stage is identical across the two outcome specifications and is therefore reported only once. ROA is winsorized at the 1st and 99th percentiles. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. Significance stars are based on these clustered standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7 reports the reweighted IV estimates. Instrument relevance is essentially preserved after reweighting. The coefficient on owner–firm distance in the first stage is 0.0000804 and the cluster-robust first-stage F-statistic is 35.89, compared with 37.93 in the unweighted workhorse specification.

The weighted second-stage estimates are also close to the corresponding unweighted results. For log asset turnover, the 2SLS coefficient changes from −0.471 in the workhorse specification to −0.444 after reweighting. For ROA, the estimate changes only marginally, from −0.108 to −0.105. Both weighted estimates remain statistically significant under conventional NUTS-3-clustered inference.

Overall, the IPW exercise indicates that the main IV results are not particularly sensitive to observable differences in age, size, sector composition, and regional composition across organizational regimes. At the same time, IPW does not address unobserved selection or relax the exclusion restriction underlying the distance instrument. I therefore interpret the weighted estimates as a complementary composition-robustness exercise rather than as an alternative identification strategy.

Additional specification and sample checks. Several additional specification and sample checks yield similar conclusions. First, winsorizing firm age, firm size, and total asset turnover at the 1st and 99th percentiles leaves the asset-turnover estimate virtually unchanged ($\hat{\beta} = -0.478$) and preserves a negative profitability estimate ($\hat{\beta} = -0.130$). Second, replacing the broad NACE 1-digit sector fixed effects with substantially finer NACE 2-digit fixed effects attenuates the asset-turnover coefficient to -0.386, while leaving the ROA estimate nearly unchanged at -0.116. Third, excluding firms younger than five years yields estimates of -0.571 for log asset turnover and -0.085 for ROA. Instrument relevance remains stable across all three exercises, with cluster-robust first-stage F-statistics between 36.34 and 38.03. Overall, the results are not particularly sensitive to firm-level outliers, finer industry controls, or the inclusion of young firms. Full estimates are reported in Appendix Table E.1.

Financial covariates. A further sensitivity check adds contemporaneous financial characteristics to the workhorse specification, including an indicator for outstanding bank loans, the equity ratio, inventory ratio, liquidity ratio, short-term asset structure, and the self-financing ratio. Their inclusion is conceptually ambiguous. While these variables may capture financial characteristics correlated with both organizational form and performance, organizational form may itself affect borrowing, capitalization, liquidity, and asset composition. They may therefore partly represent mediators rather than pre-treatment confounders, such that conditioning on them can alter the total-effect estimand.

The augmented specification leaves instrument relevance largely unchanged (cluster-robust first-stage $F = 34.96$). The 2SLS estimate for log asset turnover changes from -0.471 in the workhorse specification to -0.674, while the ROA estimate changes from -0.108 to -0.090. Both estimates remain negative and statistically significant. Thus, conditioning on the additional financial characteristics does not overturn the main results, but given their potentially endogenous nature, I treat this specification as a sensitivity check rather than as a preferred estimate or a causal decomposition of direct and mediated effects.

Leave-one-sector-out analysis. A leave-one-sector-out exercise yields estimates close to the workhorse specification when any of eight of the nine NACE-1 sectors is omitted. The exception is wholesale and retail trade: excluding this sector substantially attenuates both reduced-form and 2SLS estimates, while the first stage remains strong. Exploratory splits within this broad sector indicate that the pattern is concentrated primarily in wholesale trade rather than retail trade. Because these finer sectoral comparisons are ex post and subgroup instrument strength varies substantially, I interpret them as diagnostic evidence of possible treatment-effect heterogeneity rather than as a separate causal heterogeneity result. Full estimates are reported in Appendix Table F.1.

Comparison with prevalence-based instruments. For comparison with prevalence-based instruments used in recent agency-cost research (Gogineni, Linn, and Yadav 2022), Appendix G implements corresponding leave-one-out geographic and industry peer-share instruments. Because their economic logic and identifying variation differ from the owner–firm distance design, I treat this exercise as a literature-based benchmark rather than as an alternative preferred identification strategy.

Taken together, the robustness exercises leave the main findings qualitatively unchanged across alternative ownership structures, treatment definitions, sample restrictions, fixed-effect structures, and reweighting schemes. The diagnostic analyses also provide little evidence that owner–firm distance primarily captures observable differences in firms' local environments or a direct distance–performance relationship specific to delegated firms. At the same time, several exercises indicate that effect magnitudes vary across samples and sectors, reinforcing the interpretation of the workhorse 2SLS estimates as the primary reference point rather than as universal treatment effects.

7 Economic Interpretation and Scope of the Estimates

7.1 Operational Efficiency versus Profitability

A notable feature of the results is that the estimated effect of ownership–management separation is more stable for operational efficiency, measured by the logarithm of total asset turnover ($\log(TAT)$), than for profitability, measured by return on assets (ROA). Across the main specification and most robustness exercises, the estimates for $\log(TAT)$ remain negative and significant at the 5% level, whereas the corresponding ROA estimates are less precisely estimated in some restricted samples. This difference is economically plausible because the two outcomes capture distinct margins of firm performance.

Total asset turnover measures the amount of revenue generated per unit of assets and is therefore closely related to asset utilization and operational discipline. Consistent with the empirical agency-cost literature, it has been used as a performance-based proxy for inefficiencies associated with ownership and governance structures (Ang, Cole, and Lin 2000; Singh and Davidson III 2003; Fleming, Heaney, and McCosker 2005; Gogineni, Linn, and Yadav 2022; Johannes and Lefebvre 2025). These margins correspond naturally to the agency-cost interpretation emphasized in the literature: managerial discretion may reduce the intensity or efficiency with which firm resources are employed even when the underlying asset base is unchanged (Jensen and Meckling 1976). A deterioration in operational discipline can therefore translate relatively directly into lower asset turnover.

Profitability is a broader outcome. In addition to operational efficiency, ROA reflects margins such as pricing, input costs, demand conditions, financing decisions, and other firm-specific shocks. These additional sources of variation can weaken the empirical link between governance and measured profitability even when organizational form affects operational decisions. Moreover, accounting profitability is inherently more volatile than an asset-utilization ratio and remains sensitive to relatively small changes in the profit numerator despite the winsorization applied throughout the analysis.

The greater stability of the $\log(TAT)$ estimates should therefore not be interpreted as evidence that ownership–management separation affects efficiency but not profitability. Rather, the pattern is consistent with operational efficiency being a more proximate and less noisy margin through which agency frictions may become visible in accounting data, while profitability aggregates a wider range of firm-specific influences.

7.2 Financial Structure as a Potential Channel

Financial decisions provide a second margin through which ownership–management separation may affect firm performance. Managers make or influence decisions concerning borrowing, capitalization, liquidity, and asset composition, all of which can affect both the resources available to the firm and the way in which those resources are employed. At the same time, external financiers—and banks in particular—may themselves provide monitoring that constrains managerial discretion (Grossman and Hart 1982; Diamond 1984). Financial structure may therefore be both an outcome of governance and a factor shaping the severity of agency frictions.

This dual role is important for the empirical specification. If organizational form affects financing decisions, conditioning on contemporaneous financial ratios can block part of the pathway through which governance affects firm performance. Financial variables are then potential mediators rather than pre-treatment confounders, making their inclusion problematic when the object of interest is the total effect of ownership–management separation (Angrist and Pischke 2009; Pearl, Glymour, and Jewell 2016). This is why the workhorse specification does not condition on financial characteristics.

As a sensitivity exercise, Section 6.4 augments the workhorse model with measures of bank borrowing, capitalization, liquidity, and asset structure. The estimated effects remain negative for both performance outcomes, although their magnitudes change. For $\log(TAT)$, the 2SLS coefficient changes from approximately -0.471 in the workhorse specification to -0.674 when financial characteristics are included. For ROA, the corresponding estimate changes from approximately -0.108 to -0.090.

These coefficient changes should not be interpreted as a causal decomposition of the governance effect. Because the financial characteristics are measured contemporaneously with firm performance and may themselves respond to organizational form, the data do not identify whether a particular financial variable mediates the effect of ownership–management separation. The results are nevertheless consistent with financial policy and balance-sheet structure forming part of the broader set of decisions through which governance may ultimately be reflected in firm performance.

7.3 Heterogeneity and Scope of the Estimates

The IV estimates should not be interpreted as average treatment effects for all firms. With continuous owner–firm distance as the instrument, the 2SLS coefficient is most naturally interpreted as a weighted average of treatment effects over firms and governance margins whose organizational form responds to variation in owner–firm distance. In this sense, the identifying variation comes from instrument-responsive firms, although the continuous instrument does not define a single complier group in the same way as the binary-distance Wald design reported in Appendix A.

The ownership-structure exercises help clarify the organizational margin to which the estimates apply. Among single-owner firms, the relevant choice is simply whether the sole owner manages the firm or delegates management, while the polar-governance restriction compares fully owner-managed firms with firms in which managing directors hold no equity. The negative performance effects remain present under both restrictions. This supports the interpretation that the main result reflects the separation of ownership and managerial control rather than peculiarities of complex multi-owner structures or intermediate ownership configurations.

The intermediate-distance restriction is particularly informative about the economic content of the instrument. Very small differences in owner–firm distance are unlikely to materially alter the feasibility of regular personal involvement, whereas at very large distances close day-to-day presence may already be impractical. Restricting the sample to distances between 15 and 100 kilometers therefore focuses on a range in which variation in distance has an especially plausible economic interpretation. Within this range, the negative effect on operational efficiency remains present, whereas the profitability effect becomes small and statistically indistinguishable from zero. This is consistent with the broader pattern that operational efficiency is the more stable performance margin.

The geographic exercises likewise suggest that the estimated relationship is not confined to a particular local economic environment. Introducing substantially finer postal-code fixed effects leaves the estimates close to their full-sample values, while excluding firms located in larger cities preserves negative point estimates but reduces precision. These results provide little indication that the main findings are driven solely by metropolitan firms or broad urban–rural differences.

Finally, the sectoral evidence points to some variation in the economic importance of ownership–management separation. Leave-one-sector-out estimates remain broadly stable for

most sectors, whereas excluding wholesale and retail trade substantially attenuates both performance estimates, with exploratory evidence pointing primarily to wholesale trade. These comparisons do not identify separate causal treatment effects by industry, because the identifying variation and implied weighting of instrument-responsive firms differ across samples. Taken together, the evidence therefore supports interpreting the workhorse 2SLS coefficient as a local, design-specific effect whose magnitude may vary across outcomes, sectors, and identifying margins rather than as a universal treatment effect applying equally to all Austrian SMEs.

8 Discussion and Conclusion

This paper examines a classical principal–agent question: what are the performance consequences of separating ownership from managerial control? Using a setting in which complete owner-management and managerial delegation can both be observed, I exploit owner–firm distance as an instrument for the endogenous choice of organizational form. The results indicate that ownership–management separation reduces both operational efficiency and profitability.

Main findings and economic magnitude. In the preferred workhorse IV specification, ownership–management separation reduces operational efficiency measured by $\log(TAT)$ by $\hat{\beta} = -0.4707$. Because the dependent variable is expressed in logarithms while the treatment is binary, this corresponds to a decline in total asset turnover of approximately 37.5% ($e^{-0.4707} - 1 \approx -0.375$). The estimated effect on profitability is also economically substantial: the workhorse coefficient for ROA is -0.1078, corresponding to a decline of approximately 10.8 percentage points.

These magnitudes indicate that the organizational margin identified by owner–firm distance is economically consequential. The results are consistent with the central principal–agent prediction that separating ownership from managerial control creates scope for incentive and monitoring frictions that can translate into lower firm performance (Berle and Means 1932; Jensen and Meckling 1976). At the same time, the estimates should not be interpreted as average effects applying uniformly to all firms. Their local interpretation is discussed in Section 7.

Interpretation and contribution to the literature. The findings extend a long empirical literature that interprets differences in asset utilization across ownership and governance structures through the lens of agency costs. Starting with Ang, Cole, and Lin (2000), total asset turnover has become a widely used performance-based proxy for agency-related inefficiencies, with subsequent evidence linking stronger owner control or managerial ownership to higher operational efficiency (Singh and Davidson III 2003; Fleming, Heaney, and McCosker 2005; Gogineni, Linn, and Yadav 2022; Johannes and Lefebvre 2025). The present results are consistent with this literature, but move beyond conditional comparisons of organizational forms by exploiting variation in ownership–management separation induced by owner–firm distance.

In this respect, the paper complements recent instrumental-variable approaches to the agency-cost problem. Gogineni, Linn, and Yadav (2022) and Johannes and Lefebvre (2025) address the endogeneity of organizational structure using instruments based on the local prevalence of management forms. The present analysis addresses the same endogeneity problem using owner–firm distance as an instrument for managerial delegation. This provides a distinct source of identifying variation that is directly connected to the feasibility and cost of personal owner involvement. The results therefore add evidence that the relationship between ownership–management separation and firm performance is not confined to correlations in observed governance structures, but remains present when organizational form is shifted by geographic variation in owner proximity.

The Austrian setting further allows ownership and managerial control to be observed jointly in a large sample of privately held firms, including a sizable group in which the two functions fully coincide. This makes it possible to study the classical owner–manager agency problem in

an organizational setting in which the separation of ownership and control remains a meaningful firm-level choice.

Scope and limitations. Several limitations qualify the interpretation of the results. First, as in any instrumental-variable design, the exclusion restriction cannot be tested directly. The analysis addresses several plausible alternative channels through fine geographic fixed effects, restrictions of the geographic sample, municipality-level negative controls, and direct-effect diagnostics. In particular, the latter provide little evidence that the distance–performance gradient becomes systematically more negative under ownership–management separation. In addition, inverse-probability reweighting leaves the main qualitative results intact after substantially improving balance in observable firm characteristics. Taken together, these exercises reduce the scope for several observable and specification-based threats to identification. Nevertheless, the exclusion restriction remains a maintained identifying assumption rather than an empirically verified condition. More general direct effects of owner–firm distance that operate similarly across organizational forms cannot be ruled out entirely.

Second, the external validity of the IV estimates is necessarily limited. As discussed in Section 7, the identifying variation comes from firms and governance margins whose organizational form responds to owner–firm distance. The variation in effect magnitudes across some restricted samples and sectors therefore cautions against extrapolating the workhorse coefficient to all Austrian SMEs or to organizational changes unrelated to owner proximity.

Third, neither agency costs nor the underlying managerial behavior are directly observed. Ownership–management separation captures a governance structure in which vertical agency frictions can arise, while $\log(TAT)$ and ROA capture their potential consequences in firm performance. The data do not directly observe managerial effort, private benefits, monitoring intensity, or the design of incentive contracts. Moreover, owners may respond to delegation by increasing costly monitoring, thereby limiting observed performance losses without eliminating agency costs. The empirical results are therefore consistent with a principal–agent interpretation, but they do not identify a specific behavioral mechanism through which the estimated performance effects arise.

Finally, the analysis is cross-sectional and based on Austrian firms observed in 2021. The design can therefore speak to the performance consequences of the organizational margin identified in this setting, but it does not reveal the dynamic adjustment process surrounding changes in ownership and managerial control or whether the effects persist over longer horizons. The institutional setting of privately held Austrian SMEs also limits direct extrapolation to publicly traded firms, larger corporations, or countries with substantially different ownership, governance, and financing structures.

Conclusion and implications. This paper provides evidence that the separation of ownership and managerial control can have economically meaningful consequences for the performance of privately held SMEs. Using owner–firm distance as an instrument for organizational form, the preferred estimates indicate substantial reductions in operational efficiency and profitability when ownership and management are separated. The operational-efficiency result is particularly persistent across alternative ownership structures, geographic specifications, sample restrictions, and reweighting schemes.

The findings are consistent with the classical principal–agent view that delegation creates scope for incentive and monitoring frictions (Berle and Means 1932; Jensen and Meckling 1976). They do not imply that delegation is necessarily inefficient or that owner-management is universally preferable. Delegation may bring benefits through specialization, managerial expertise, or the ability to expand beyond the owner's own managerial capacity. Rather, the results indicate that these potential benefits can be accompanied by economically important agency costs when ownership and managerial control are separated.

From a governance perspective, the results highlight the potential importance of mechanisms that substitute for direct owner involvement when management is delegated. Such mechanisms may include incentive alignment, reporting systems, or formal monitoring arrangements. The present analysis does not identify the effectiveness of these mechanisms, but it suggests that the performance consequences of delegation may depend in part on the governance arrangements that accompany the separation of ownership and managerial control.

More broadly, the results provide evidence that the classical owner–manager agency problem remains economically relevant in a modern private-firm setting. In a setting in which ownership and management can still coincide within the same individual, the separation of these roles is associated with sizable performance consequences along the organizational margins shifted by owner–firm distance. The estimates should not be interpreted as universal effects for all firms, but they provide evidence that agency frictions can represent an economically important cost of managerial delegation in the private-SME setting studied here.

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Appendix

A Binary-Distance Wald/LATE Benchmark

The main analysis uses continuous owner–firm distance as the instrument. With a continuous instrument, however, the 2SLS coefficient generally represents a weighted average of treatment effects across firms and margins of organizational choice rather than the treatment effect for a single, uniquely defined group of compliers. As a complementary interpretative exercise, I therefore discretize owner–firm distance and report a binary-instrument benchmark. For a distance cutoff c, define

$$Z_i(c) = \mathbf{1}\{DIST_i > c\}, \tag{A.1}$$

where $Z_i(c) = 1$ denotes firms whose ownership-share-weighted owner–firm distance exceeds the cutoff. Under the standard IV assumptions of relevance, independence, exclusion, and monotonicity, the unconditional Wald estimand is

$$LATE(c) = \frac{E[Y_i \mid Z_i(c) = 1] - E[Y_i \mid Z_i(c) = 0]}{E[MGT_i \mid Z_i(c) = 1] - E[MGT_i \mid Z_i(c) = 0]}. \tag{A.2}$$

The binary-distance design is reported as an interpretative benchmark rather than as an alternative preferred specification. Unlike the continuous instrument used in the main analysis, the binary instrument permits the conventional principal-strata interpretation of the unconditional Wald estimand under monotonicity. The exclusion restriction remains a maintained identifying assumption in this exercise, as in the main continuous-distance design.

A.1 50-km Benchmark

I retain 50 km as the benchmark cutoff. This cutoff was specified in the original binary-distance analysis and is therefore not selected ex post on the basis of the estimated treatment effects. At this threshold, 42,257 firms are classified as near ($DIST \leq 50$ km) and 4,921 as far ($DIST > 50$ km). The share of firms with ownership–management separation is 0.377 among near firms and 0.499 among far firms, implying an unconditional first-stage difference of 0.122.

Table A.1 reports both the unconditional Wald estimate and a binary-IV specification using the same covariates and fixed effects as the workhorse continuous-distance specification.

The unconditional Wald estimates are negative for both outcomes. For $\log(TAT)$, introducing the workhorse controls and fixed effects substantially reduces the magnitude of the binary-IV coefficient, from -1.120 to -0.431. For ROA, by contrast, the unadjusted and adjusted estimates are very similar, at -0.123 and -0.130, respectively. The adjusted estimates are also similar in sign and order of magnitude to the continuous-distance workhorse estimates reported in the main analysis. They should not, however, be interpreted as identifying the same weighting of firms or treatment margins.

A.2 Principal Strata and Observable Characteristics

The binary instrument also permits a conventional principal-strata decomposition. Under monotonicity, firms can be classified conceptually as always-takers, never-takers, or compliers. Their individual types are not observed, but their population shares are identified from the treatment rates across instrument states:

$$\pi_{AT} = E[MGT \mid Z = 0], \tag{A.3}$$

$$\pi_{NT} = 1 - E[MGT \mid Z = 1], \tag{A.4}$$

$$\pi_C = E[MGT \mid Z = 1] - E[MGT \mid Z = 0]. \tag{A.5}$$

Table A.1: Binary-distance IV benchmark at the 50-km cutoff

	log(TAT)		ROA	
	(1) Raw Wald	(2) Workhorse	(3) Raw Wald	(4) Workhorse
MGT	-1.120***	-0.431***	-0.123***	-0.130***
	(0.189)	(0.154)	(0.043)	(0.042)
Raw first-stage difference	0.122	–	0.122	–
First-stage F	81.01	72.17	81.01	72.17
log(AGE)	No	Yes	No	Yes
log($SIZE$)	No	Yes	No	Yes
Sector FE ($NACE1$)	No	Yes	No	Yes
Region FE ($NUTS3$)	No	Yes	No	Yes
Observations	47,178	47,178	47,178	47,178

Notes: The instrument is $Z_i = \mathbf{1}\{DIST_i > 50\}$, where $DIST$ denotes ownership-share-weighted owner–firm distance in kilometers. Columns (1) and (3) report unconditional just-identified Wald estimates. Columns (2) and (4) report binary-instrument IV estimates using the workhorse controls and fixed effects. The raw first-stage difference is $E[MGT \mid Z = 1] - E[MGT \mid Z = 0]$. First-stage F-statistics are cluster-robust Wald statistics. ROA is winsorized at the 1st and 99th percentiles. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

At the 50-km cutoff, the estimated shares are 37.7% always-takers, 50.1% never-takers, and 12.2% compliers. Thus, the conventional 50-km Wald estimand pertains to the approximately 12% of firms whose ownership–management separation responds to crossing this binary-distance margin.

Following Abadie (2003), I additionally characterize these principal strata using pre-treatment or predetermined firm characteristics. Financial ratios are deliberately excluded because they may themselves be affected by organizational form. The analysis considers firm age, firm size, an urban-area indicator, and an indicator for manufacturing. Because principal-stratum membership is latent, complier means are estimated using the standard binary-instrument complier weights. Statistical uncertainty in differences between complier and non-complier groups is evaluated using 1,999 bootstrap resamples at the NUTS-3 cluster level.

The complier profile differs most clearly from that of always-takers. Compliers are younger and smaller, with the corresponding bootstrap confidence intervals excluding zero. By contrast, the data provide little evidence of differences between compliers and never-takers in age or size. Urban location also does not differ systematically across the groups. Manufacturing is the main observable characteristic on which compliers differ from both comparison groups: approximately 18.2% of compliers are classified in manufacturing, compared with 8.6% of never-takers and 12.6% of always-takers.

These comparisons underscore the local nature of the binary-instrument estimand. In particular, the characteristics in Table A.2 describe the complier population implied by the 50-km binary contrast. They should not be interpreted as describing a uniquely defined complier population for the continuous-distance 2SLS specification used in the main analysis.

A.3 Sensitivity to the Distance Cutoff

A binary-distance instrument necessarily requires a cutoff, and different cutoffs define different instrument contrasts and potentially different complier populations. I therefore re-estimate the binary-IV specification over a range of alternative thresholds. Table A.3 reports selected cutoffs, while Figure A.1 displays the workhorse-adjusted estimate for log(TAT) between 20 and 150 km.

For operational efficiency, the estimated binary-IV coefficient is close to zero at very short

Table A.2: Observable characteristics of principal strata

	Compliers	Never-takers	Always-takers	C − NT	C − AT
log(AGE)	2.110	2.168	2.604	-0.059 [-0.254, 0.139]	-0.495 [-0.673, -0.338]
log($SIZE$)	13.140	13.389	13.569	-0.249 [-0.549, 0.212]	-0.429 [-0.669, -0.092]
Urban area	0.319	0.342	0.327	-0.023 [-0.142, 0.109]	-0.009 [-0.105, 0.097]
Manufacturing	0.182	0.086	0.126	0.097 [0.044, 0.183]	0.056 [0.016, 0.130]
Group share	0.122	0.501	0.377		

Notes: The table reports estimated observable characteristics of the principal strata implied by the 50-km binary-distance instrument. C denotes compliers, NT never-takers, and AT always-takers. Bracketed values are 95% percentile-bootstrap confidence intervals for the differences in group means, based on 1,999 bootstrap resamples of NUTS-3 clusters. The urban-area indicator equals one for firms located in Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt, Villach, Wels, St. Pölten, or Dornbirn. Manufacturing equals one for firms classified in manufacturing. Financial variables are not included because they may be endogenous to organizational form.

Table A.3: Binary-IV estimates across alternative distance cutoffs

Cutoff	Complier share	log(TAT)	ROA	First-stage F
20	0.116	0.088	-0.129	131.57
30	0.124	-0.079	-0.132	99.22
50	0.122	-0.431	-0.130	72.17
75	0.120	-0.655	-0.119	38.41
100	0.111	-0.871	-0.193	25.06
150	0.119	-1.103	-0.208	28.36
200	0.151	-0.919	-0.234	49.39
300	0.190	-0.880	-0.248	46.23
500	0.232	-0.721	-0.192	109.68

Notes: Each row defines the binary instrument as $Z_i(c) = \mathbf{1}\{DIST_i > c\}$ using the cutoff shown in the first column. The complier share is the corresponding unconditional first-stage difference in treatment probabilities. The reported outcome coefficients are from binary-IV specifications using log(AGE), log($SIZE$), $NACE1$ sector fixed effects, and $NUTS3$ region fixed effects. First-stage F-statistics are cluster-robust Wald statistics based on NUTS-3 clustering. Because changing the cutoff changes both the instrument and the implied complier composition, the sequence of coefficients should not be interpreted as a dose-response relationship with distance.

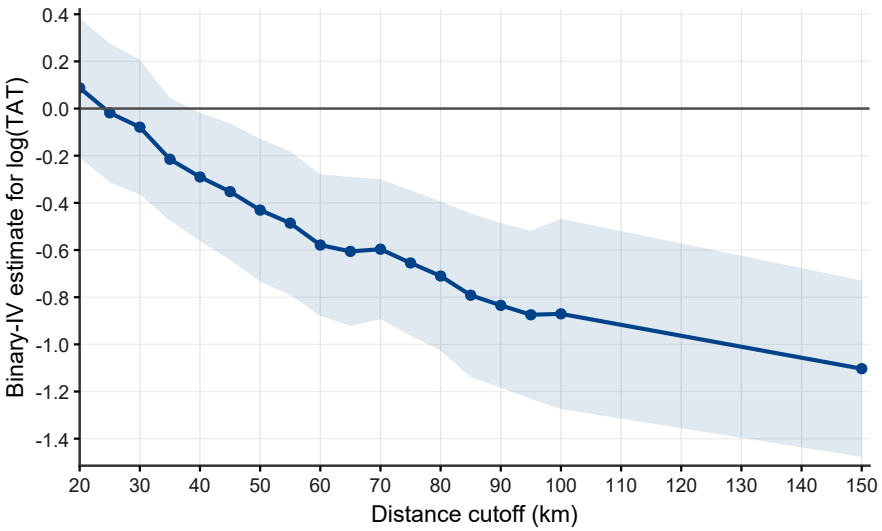


Figure A.1: Sensitivity of the binary-IV estimate for $\log(TAT)$ to the distance cutoff

Notes: The figure reports workhorse-adjusted binary-IV estimates for $\log(TAT)$ for distance cutoffs between 20 and 150 km. The shaded area represents the 95% confidence band based on heteroskedasticity-robust standard errors clustered at the NUTS-3 level. All specifications include $\log(AGE)$, $\log(SIZE)$, $NACE1$ sector fixed effects, and $NUTS3$ region fixed effects. Each cutoff defines a different binary instrument and potentially a different complier population. The horizontal pattern therefore does not represent a causal dose-response function of owner–firm distance.

cutoffs and becomes progressively more negative as the threshold moves toward intermediate owner–firm distances. At the 50-km benchmark, the workhorse-adjusted coefficient is -0.431 and reaches approximately -1.10 at 150 km. At higher thresholds not shown in the figure for readability, the magnitude attenuates again, with estimates of approximately -0.92, -0.88, and -0.72 at 200, 300, and 500 km, respectively. The first stage remains informative throughout this range, so the pattern is not simply attributable to a collapse in instrument relevance.

For profitability, the results are less sensitive to adjustment and remain negative throughout the reported cutoff range. The workhorse binary-IV estimate is approximately -0.13 for cutoffs between 20 and 50 km, becomes more negative at higher intermediate thresholds, and is -0.19 at 500 km. The similarity between the unadjusted and workhorse-adjusted profitability estimates across cutoffs contrasts with the larger compositional adjustment observed for $\log(TAT)$.

Overall, the cutoff exercise supports two conclusions. First, the negative performance relationship is not specific to a single 50-km threshold. Second, the variation in coefficient magnitude across thresholds is consistent with the fact that alternative binary instruments place identifying weight on different firms and organizational margins. For this reason, the binary results are used to illuminate the local nature of the IV design rather than to select an "optimal" distance cutoff. The continuous-distance workhorse specification remains the preferred empirical specification.

B Local-Environment Negative-Control Diagnostics

To further assess whether owner–firm distance proxies for systematic differences in firms' local environments, I construct four negative-control outcomes from municipality characteristics: the share of residents aged 65 or older, the foreign-resident share, the commuter share, and average household size. Each variable is standardized to have mean zero and unit standard deviation.

These characteristics are useful diagnostic outcomes because the management form of an individual SME cannot plausibly have a material causal effect on municipality-wide demographic or household structure. At the same time, such variables may capture observable dimensions

of local environments that could otherwise be correlated with both owner location and firm performance.

Panel A of Table B.1 reports reduced-form regressions of the standardized municipality characteristics on owner–firm distance, expressed in units of 100 km. All specifications include log firm age, log total assets, NACE 1-digit sector fixed effects, and NUTS-3 region fixed effects. The estimated associations are quantitatively very small, ranging in absolute magnitude from 0.0008 to 0.0026 standard deviations per 100 km. While the foreign-resident share and household size yield individual p-values below 0.05, neither association remains statistically significant after adjusting for multiple hypothesis testing using Holm's (Holm 1979) step-down procedure.

Panel B reports corresponding placebo 2SLS estimates in which MGT is instrumented by owner–firm distance exactly as in the workhorse specification, while each municipality characteristic replaces firm performance as the dependent variable. Two of the unadjusted placebo coefficients are marginally significant at the 10% level, but none remains statistically significant after Holm adjustment. The Holm-adjusted p-values range from 0.37 to 0.43.

The exercise should be interpreted as a diagnostic for observable place-based sorting rather than as a formal test of the exclusion restriction. Unobserved local characteristics may still be correlated with owner–firm distance. Nevertheless, the absence of systematic relationships across these four observable dimensions provides little support for a broad explanation in which the instrument primarily captures differences in local demographic, settlement, or labor-market environments.

Table B.1: Local-environment balance and negative-control diagnostics

	Aged 65+	Foreign share	Commuter share	Household size
Panel A: Reduced-Form Local-Environment Diagnostics				
$DIST$ (100 km)	0.0008	0.0021**	-0.0014	-0.0026**
	(0.0010)	(0.0010)	(0.0009)	(0.0012)
Raw p-value	0.413	0.048	0.119	0.039
Holm-adjusted p-value	0.413	0.156	0.237	0.156
Panel B: Placebo 2SLS Estimates				
MGT	0.1055	0.2676*	-0.1799	-0.3285*
	(0.1315)	(0.1548)	(0.1304)	(0.1910)
Raw p-value	0.428	0.093	0.177	0.095
Holm-adjusted p-value	0.428	0.371	0.371	0.371
First-stage F	37.83	37.83	37.93	37.83
log(AGE)	Yes	Yes	Yes	Yes
log($SIZE$)	Yes	Yes	Yes	Yes
Sector FE ($NACE1$)	Yes	Yes	Yes	Yes
Region FE ($NUTS3$)	Yes	Yes	Yes	Yes
Observations	47,104	47,104	47,178	47,104

Notes: All dependent variables are standardized to mean zero and unit standard deviation. Panel A reports reduced-form regressions using ownership-share-weighted owner–firm distance measured in units of 100 km. Panel B reports placebo 2SLS estimates in which MGT is instrumented by owner–firm distance. All specifications control for log firm age and log total assets and include NACE 1-digit sector fixed effects and NUTS-3 region fixed effects. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. The reported first-stage F-statistics are cluster-robust Wald statistics. Holm-adjusted p-values account for the four outcomes within each panel. The slight difference in sample size reflects missing municipality-level information. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, based on unadjusted p-values.

C Intermediate-Distance Support Restriction

As a sensitivity check on the support of the continuous instrument, I restrict the sample to firms with ownership-share-weighted owner–firm distances between 15 and 100 km. This range excludes both the large concentration of observations at zero or very short distances and the relatively thin upper tail of the distance distribution. The restriction is not treated as an alternative preferred specification because the choice of endpoints is necessarily arbitrary.

Table C.1 reports the corresponding workhorse specification. The restriction reduces the sample from 47,178 to 6,861 firms. Instrument relevance declines relative to the full sample but remains meaningful, with a cluster-robust first-stage F-statistic of 11.33.

Table C.1: IV estimates restricted to owner–firm distances of 15–100 km

	(1) $\log(TAT)$	(2) ROA
Reduced Form		
$DIST$ (km)	-0.001267**	0.0000624
	(0.000601)	(0.000118)
Second Stage		
MGT	-1.0634***	0.0524
	(0.3696)	(0.1053)
Cluster-robust first-stage F	11.33	
$\log(AGE)$	Yes	Yes
$\log(SIZE)$	Yes	Yes
Sector FE ($NACE1$)	Yes	Yes
Region FE ($NUTS3$)	Yes	Yes
Observations	6,861	6,861

Notes: The sample is restricted to firms with ownership-share-weighted owner–firm distance between 15 and 100 km. The reduced form regresses the respective outcome directly on $DIST$. In the second stage, MGT is instrumented by $DIST$. All specifications control for $\log(AGE)$ and $\log(SIZE)$ and include $NACE1$ sector and $NUTS3$ region fixed effects. ROA is winsorized at the 1st and 99th percentiles using the full-sample cutoffs. The first-stage F-statistic is the cluster-robust Wald statistic for the excluded instrument. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

The reduced-form relationship for $\log(TAT)$ remains negative within the restricted support, and the corresponding 2SLS estimate is -1.063. By contrast, the reduced-form relationship for ROA is close to zero, and the 2SLS coefficient is small, positive, and statistically indistinguishable from zero.

The restricted-support estimates should not be interpreted as direct tests of equality with the full-sample coefficients. Restricting the support of a continuous instrument changes the distance margins that generate identifying variation and may therefore alter the weighting of instrument-responsive firms. The exercise nevertheless shows that the negative operational-efficiency result is not driven solely by observations at the extremes of the distance distribution, whereas the profitability result is less stable across regions of instrument support.

D Inverse-Probability-Weighting Diagnostics

The inverse-probability-weighting exercise reported in the main text is intended as a composition-robustness check rather than as an alternative identification strategy. This Appendix reports additional diagnostics for the propensity-score model and the resulting stabilized weights.

The propensity score is estimated from a logit model for MGT including $\log(AGE)$, $\log(SIZE)$, $NACE1$ sector indicators, and $NUTS3$ region indicators. Financial characteristics are deliberately excluded because they may themselves respond to organizational form and thus potentially constitute post-treatment variables.

The estimated propensity scores exhibit substantial overlap. Between the 1st and 99th percentiles, propensity scores range from 0.135 to 0.610, with a median of 0.396. The resulting stabilized ATE weights are also well behaved: the median weight is 0.953, the 99th percentile is 2.011, and the maximum weight is 5.936. Thus, the reweighted estimates do not depend on a small number of observations receiving extremely large weights.

To quantify the amount of information retained after reweighting, I compute the effective sample size as

$$ESS = \frac{(\sum_i w_i)^2}{\sum_i w_i^2}, \tag{D.1}$$

where w_i denotes the stabilized inverse-probability weight. The overall effective sample size is 43,950 firms, corresponding to 93.2% of the unweighted sample of 47,178 firms. The group-specific effective sample sizes are 16,188 among firms with ownership–management separation and 27,878 among fully owner-managed firms.

Table D.1 summarizes covariate balance before and after reweighting.

Table D.1: Covariate balance before and after inverse-probability weighting

	Before IPW	After IPW
Standardized mean differences		
$\log(AGE)$	0.417	-0.037
$\log(SIZE)$	0.173	-0.012
Maximum absolute difference in category shares		
Sector indicators ($NACE1$)	0.051	0.002
Region indicators ($NUTS3$)	0.006	0.001

Notes: The table reports balance diagnostics comparing firms with ownership–management separation ($MGT = 1$) and fully owner-managed firms ($MGT = 0$) before and after inverse-probability weighting. For the continuous covariates, balance is summarized by standardized mean differences. For the categorical $NACE1$ and $NUTS3$ indicators, the table reports the maximum absolute difference in category shares across the two organizational regimes. Stabilized ATE weights are derived from a logit propensity-score model including $\log(AGE)$, $\log(SIZE)$, $NACE1$ sector indicators, and $NUTS3$ region indicators.

Reweighting substantially improves balance in the observed covariates. The standardized mean difference in firm age falls from 0.417 to -0.037, while the corresponding difference in firm size declines from 0.173 to -0.012. Differences in sector and regional composition are likewise nearly eliminated: the maximum absolute difference in category shares falls from 0.051 to 0.002 for NACE-1 sectors and from 0.006 to 0.001 for NUTS-3 regions.

Taken together, the overlap, weight, effective-sample-size, and balance diagnostics indicate that the weighted IV estimates reported in the main text are not driven by extreme propensity

scores or a small number of highly influential observations. At the same time, improved balance on observables does not address selection on unobserved characteristics and does not relax the exclusion restriction underlying the distance instrument. The IPW results should therefore be interpreted as a complementary robustness exercise rather than as a separate source of identification.

E Additional Specification and Sample Robustness

Table E.1 reports three additional robustness exercises based on the workhorse specification. Each exercise changes only one dimension of the preferred specification or sample while retaining the ownership-share-weighted owner–firm distance instrument, log firm age and log total assets as controls, NUTS-3 regional fixed effects, and NUTS-3-clustered inference.

The first exercise examines whether the estimates are sensitive to extreme firm-level observations. Firm age, total assets, and total asset turnover are winsorized at the 1st and 99th percentiles. ROA is already winsorized at these thresholds throughout the analysis. Importantly, owner–firm distance is not winsorized in this exercise. This separates robustness to firm-level outliers from sensitivity to the support and tail behavior of the instrument, which is examined separately in Section 6.3. The resulting 2SLS estimate for log asset turnover is -0.478, almost identical to the workhorse estimate of -0.471. The corresponding ROA coefficient is -0.130 and remains negative and statistically significant.

The second exercise replaces the NACE 1-digit sector fixed effects with substantially finer NACE 2-digit fixed effects. This specification absorbs heterogeneity across more narrowly defined industries while leaving the regional controls and clustering structure unchanged. The first stage remains essentially as strong as in the workhorse specification ($F = 37.64$). The log asset-turnover coefficient falls in absolute magnitude to -0.386, whereas the ROA estimate remains close to the main result at -0.116. Both coefficients remain negative and statistically significant.

Finally, I exclude firms younger than five years to assess whether the results are driven by start-up and early-life-cycle dynamics. This restriction reduces the sample to 36,635 firms but leaves instrument relevance largely unchanged ($F = 36.34$). The resulting 2SLS estimates are -0.571 for log asset turnover and -0.085 for ROA. Thus, both performance effects remain negative after removing young firms, although the profitability estimate is somewhat smaller in absolute magnitude.

Taken together, these exercises show that the main results are not particularly sensitive to extreme firm-level observations, the level of sectoral aggregation used for fixed effects, or the inclusion of young firms. The asset-turnover coefficient remains negative and statistically significant across all three specifications, while the profitability coefficient also remains negative but exhibits somewhat greater variation in magnitude.

Table E.1: Additional specification and sample robustness

	(1) Winsorized	(2) $NACE2$ FE	(3) Excl. start-ups
Second Stage			
MGT: log(TAT)	-0.4780***	-0.3858**	-0.5706***
	(0.1580)	(0.1528)	(0.1593)
MGT: ROA	-0.1304**	-0.1155***	-0.0850**
	(0.0531)	(0.0324)	(0.0390)
Cluster-robust first-stage F	38.03	37.64	36.34
log(AGE)	Yes	Yes	Yes
log($SIZE$)	Yes	Yes	Yes
Sector FE	$NACE1$	$NACE2$	$NACE1$
Region FE ($NUTS3$)	Yes	Yes	Yes
Observations	47,178	47,178	36,635

Notes: The table reports 2SLS estimates from variants of the workhorse specification. In column (1), firm age, total assets, and total asset turnover are winsorized at the 1st and 99th percentiles. Owner–firm distance is left unchanged. ROA is winsorized at the 1st and 99th percentiles throughout the paper. Column (2) replaces NACE 1-digit sector fixed effects with NACE 2-digit sector fixed effects. Column (3) excludes firms younger than five years. MGT is instrumented by ownership-share-weighted owner–firm distance. First-stage F-statistics are cluster-robust Wald statistics. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

F Leave-One-Sector-Out Robustness

To assess whether the main estimates are disproportionately driven by a particular broad industry, I re-estimate the workhorse specification nine times, sequentially excluding each NACE 1-digit sector. This exercise differs from estimating separate sector-specific treatment effects. Its purpose is to assess the sensitivity of the aggregate results to the presence of individual sectors in the estimation sample.

Table F.1 shows that the estimates are remarkably stable for eight of the nine exclusions. The log asset-turnover coefficients range from -0.423 to -0.630, compared with -0.471 in the full-sample workhorse specification. The corresponding ROA estimates range from -0.107 to -0.134, compared with -0.108 in the full sample. Instrument relevance also remains strong across these specifications.

The notable exception is wholesale and retail trade. Excluding this sector, which accounts for 13,943 firms in the full sample, attenuates the log asset-turnover estimate to -0.124 and the ROA estimate to -0.027. Neither estimate is statistically distinguishable from zero. Importantly, this change is not accompanied by a weak first stage: the corresponding cluster-robust first-stage F-statistic remains 28.27. The reduced-form relationships likewise become substantially smaller when the trade sector is removed. Since the first stage remains informative, the attenuation is not attributable to a loss of instrument relevance. The pattern is instead consistent with heterogeneity in the relationship between distance-induced organizational form and performance across sectors.

Because wholesale and retail trade is itself a broad and economically heterogeneous NACE 1-digit category, I further decompose this sector into its three NACE 2-digit components as an exploratory diagnostic. The pattern differs substantially across these subindustries. In wholesale trade (NACE 46), the first stage remains informative ($F = 20.10$), and the 2SLS estimates are -0.983 for log asset turnover and -0.269 for ROA. In retail trade (NACE 47), the first stage also remains relevant ($F = 16.31$), but the corresponding estimates are substantially smaller, at -0.125 and -0.092, respectively. For motor vehicle trade and repair (NACE 45), the first stage

Table F.1: Leave-one-sector-out robustness

		First Stage	Second Stage	
Excluded sector ($NACE1$)	Obs.	F	log(TAT)	ROA
Construction	37,810	37.67	-0.4228**	-0.1077***
			(0.1823)	(0.0340)
Accommodation and food services	42,326	28.82	-0.4405**	-0.1337***
			(0.1641)	(0.0371)
Energy	46,800	37.40	-0.4710***	-0.1084***
			(0.1590)	(0.0321)
Real estate activities	39,966	78.27	-0.6303***	-0.1194***
			(0.1989)	(0.0359)
Wholesale and retail trade	33,235	28.27	-0.1242	-0.0268
			(0.2682)	(0.0488)
Manufacturing	41,871	36.16	-0.4479***	-0.1074***
			(0.1636)	(0.0317)
Information and communication	43,558	28.63	-0.5009***	-0.1093***
			(0.1670)	(0.0324)
Transportation and storage	44,868	32.89	-0.5522***	-0.1116***
			(0.1608)	(0.0342)
Water supply and waste mgt.	46,990	37.85	-0.4716***	-0.1079***
			(0.1589)	(0.0321)

Notes: Each row reports a separate 2SLS estimation of the workhorse specification after excluding the indicated NACE 1-digit sector. MGT is instrumented by ownership-share-weighted owner–firm distance. All specifications control for log firm age and log total assets and include NACE 1-digit sector fixed effects and NUTS-3 region fixed effects. ROA is winsorized at the 1st and 99th percentiles. The first-stage F-statistics are cluster-robust Wald statistics for the excluded instrument. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. The corresponding full-sample workhorse estimates are -0.4707 for log(TAT) and -0.1078 for ROA, with a first-stage F-statistic of 37.93. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

is weak ($F = 0.85$), so the corresponding IV estimates are not informative.

The exploratory split therefore points to wholesale trade as the component for which the negative relationship is most pronounced. However, these sector-specific coefficients should not be interpreted as formal evidence of differences in causal treatment effects across industries. The decomposition was motivated ex post by the leave-one-sector-out result, and the identifying variation and implied weighting of instrument-responsive firms differ across the three subindustries. I therefore treat the exercise only as a diagnostic indication of possible sectoral heterogeneity.

G Comparison with Prevalence-Based Instruments

Recent studies of agency costs use prevalence-based instruments that exploit similarities in governance arrangements across geographically or industrially proximate firms. For comparison with this approach, I construct two related leave-one-out prevalence measures for the Austrian sample. The geographic peer share is the prevalence of ownership–management separation ($MGT = 1$) among other firms located in the same broad postal area, defined by the first two digits of the postal code. The industry peer share is the corresponding prevalence among other firms in the same NACE 2-digit industry. In both cases, the focal firm's own management form is excluded from the calculation. This leave-one-out construction prevents the endogenous treatment of firm i from mechanically entering its own instrument.

The economic rationale for these prevalence measures differs from that of the owner–firm

distance instrument used in the main analysis. Peer-share instruments exploit the tendency of governance arrangements to cluster across local or industry environments. Their exclusion restriction therefore requires that the conditions generating such common governance choices do not also affect firm performance directly. This is potentially demanding because local managerial labor markets, governance norms, competitive conditions, and industry-specific technologies may influence both managerial organization and firm outcomes. In contrast, the first-stage mechanism underlying owner–firm distance is tied directly to the cost and feasibility of owner involvement and monitoring.

Table G.1 reports the results using the same workhorse controls, sector and region fixed effects, and NUTS-3-clustered inference as in the main specification. The geographic peer share provides essentially no first-stage relevance: its cluster-robust first-stage F-statistic is only 0.47. The industry peer share is more predictive, with a corresponding F-statistic of 12.79. When both instruments are included simultaneously, the cluster-robust first-stage F-statistic is 6.43. In the joint first stage, the coefficient on the geographic peer share is 0.083 (SE = 0.122), whereas the industry peer-share coefficient is 0.371 (SE = 0.104). Thus, the predictive content of the prevalence-based specification is driven predominantly by the industry component.

The reduced-form relationships reinforce the need for caution. Conditional on the workhorse controls and fixed effects, the geographic peer share is negatively associated with log asset turnover (-0.553, SE = 0.290) and ROA (-0.155, SE = 0.044), despite providing little explanatory power for management form. The industry peer share is also strongly negatively related to both log asset turnover (-1.725, SE = 0.256) and ROA (-0.136, SE = 0.029). These patterns are consistent with the concern that prevalence measures may contain information about local or industry environments that is directly related to firm performance, although they do not by themselves establish a violation of the exclusion restriction.

Conventional 2SLS estimates based on the prevalence instruments are negative but extremely large in magnitude. In the joint specification, the coefficient equals -4.727 for log asset turnover and -0.422 for ROA. Given the comparatively weak joint first stage, I do not use these coefficients for quantitative inference. Even when the industry instrument is used alone and instrument relevance is stronger, identification relies on variation across NACE 2-digit industries within the broader NACE 1-digit fixed-effect categories. Such industries may differ directly in capital intensity, production technology, margins, or other determinants of asset turnover and profitability.

The prevalence-based exercise is therefore informative primarily as a comparison with an identification strategy used in the recent literature. In the Austrian data, these leave-one-out prevalence measures provide a substantially less favorable first stage than owner–firm distance, while the source of their remaining variation raises distinct exclusion-restriction concerns. I therefore treat the exercise as a literature-based benchmark rather than as an alternative preferred identification strategy. It does not provide an independent validation of the owner–firm distance instrument, whose exclusion restriction remains a maintained identifying assumption.

Table G.1: Comparison with prevalence-based instruments

	Geographic peer share	Industry peer share	Geographic + Industry peer shares
First Stage			
Cluster-robust first-stage F	0.47	12.79	6.43
Second Stage: Dependent variable $\log(TAT)$			
MGT	-6.6551	-4.6539	-4.7274
	(11.2050)	(1.2178)	(1.2949)
Second Stage: Dependent variable ROA			
MGT	-1.8457	-0.3673	-0.4216
	(2.7698)	(0.1273)	(0.1388)
$\log(AGE)$	Yes	Yes	Yes
$\log(SIZE)$	Yes	Yes	Yes
Sector FE ($NACE1$)	Yes	Yes	Yes
Region FE ($NUTS3$)	Yes	Yes	Yes
Observations	47,178	47,178	47,178

Notes: The geographic instrument is the leave-one-out share of firms with ownership–management separation ($MGT = 1$) within the same broad postal area, defined by the first two digits of the Austrian postal code. The industry instrument is the corresponding leave-one-out share within the same NACE 2-digit industry. The focal firm's own MGT status is excluded from both shares. All specifications correspond to the workhorse model and control for log firm age and log total assets and include NACE 1-digit sector fixed effects and NUTS-3 region fixed effects. Heteroskedasticity-robust standard errors clustered at the NUTS-3 level are reported in parentheses. The reported first-stage F-statistics are cluster-robust Wald statistics. Second-stage estimates are reported for completeness. Conventional significance tests are not emphasized because first-stage strength is weak in the geographic and joint specifications.

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