COMMON OWNERSHIP IN LABOR MARKETS*

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October 25, 2023

Abstract

In this paper, we study the impacts of common ownership on labor market outcomes. To identify the causal effects, we use a firm's addition to the S&P 500 index as a shock to the common ownership of its local competitors that already belong to the S&P 500 index. Using U.S. Census Bureau's Longitudinal Business Database and a matched difference-in-differences analysis, we find that, after a firm enters the S&P 500 index, employee earnings of S&P 500 incumbents in the same local labor market decrease relative to the counterfactual. Perhaps surprisingly, we also find that higher common ownership leads to higher employment of treated S&P 500 incumbents, driven by increased recruiting efforts. While these facts are inconsistent with the canonical oligopsony model, we show that they *can* be rationalized in a generalized model of oligopsony with a recruitment intensity decision by firms. *JEL* Codes: J42, J31, L40, D40, G34.

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I. Introduction

Ownership of publicly traded U.S. corporations by institutional investors went from less than 10 percent in the 1950s to 67 percent by 2010 (Blume and Keim, 2012). Together with the shift in assets from actively managed funds to passively managed index funds, this generated a dramatic increase in common ownership of publicly traded firms (see, for example, Azar and Vives, 2021; Backus et al., 2021b).[1] This trend has raised the alarm that a small number of giant asset managers (especially the largest three, BlackRock, Vanguard, and State Street) could effectively control most large, publicly traded firms in the near future (Coates, 2018). Increased common ownership could increase firms' employer market power, which in turn could contribute to the wage stagnation since the 1970s (Goshen and Levit, 2022; Steinbaum, 2021; Azar and Vives, 2021; Bivens and Mishel, 2015). Although this argument is theoretically appealing, little is known about whether and how common ownership affects employee earnings in reality.

This paper uses employment and payroll data from the U.S. Census Bureau's Longitudinal Business Database and provides the first empirical evidence on the effects of common ownership on employee earnings. We define a local labor market as the interaction between a commuting zone (CZ) and an industry (Rinz, 2020). We study how increases in common ownership affect firms in local labor markets, which we refer to as local firms. To measure the common ownership of a local firm, we combine data on institutional ownership of publicly traded firms from Securities and Exchange Commission Form 13F with data on firms' employment shares in each local labor market. Our first descriptive finding is that average common ownership in local labor markets increased significantly in the United States over the last four decades.

To identify the causal effect of common ownership on employee earnings, we follow Boller and Scott Morton (2020) and use a firm's addition to the S&P 500 index as a shock to the common ownership of its local competitors that already belong to the S&P 500 index (S&P 500 Incumbents). The key idea is that a firm entering the S&P 500 index, which we refer to as a focal firm, experiences a sharp increase in institutional ownership. This, in turn, increases overlap between its ownership and that of local S&P 500 incumbent employers. As a result, the average common ownership of S&P 500 incumbents increases after focal firms in the same local labor markets are added to the S&P 500 index. After a focal firm enters the S&P 500 index, it generates heterogeneous treatment statuses across local labor markets depending on whether the firm operates in a market. Based on this variation, we use a difference-in-differences (DiD) design to estimate the causal effect of common ownership on employee earnings of S&P 500

[1] For earlier contributions that documented the secular rise of common ownership, see also Azar (2012); Fichtner et al. (2017); Azar (2017, 2020).

incumbents in local labor markets.

In DiD analysis, we compare changes in average employee earnings of S&P 500 incumbents in local labor markets where at least one focal firm enters the S&P 500 index (treated local S&P 500 incumbents) to changes in matched S&P 500 incumbents in local labor markets where no firm enters or exits the S&P 500 index within the estimation window (control local S&P 500 incumbents). The main identification assumption underlying the DiD design is that the employee earnings of treated local S&P 500 incumbents would have evolved similarly to that of control local S&P 500 incumbents in the absence of S&P 500 index addition events.

As expected, S&P 500 index additions indeed lead to an increase in the common ownership of treated local S&P 500 incumbents. Specifically, compared to control local S&P 500 incumbents, the common ownership of treated local S&P 500 incumbents increases 1.4 percentage points during a five-year window after treatment. The magnitude of the estimated effect is economically meaningful and represents a 10.3% increase relative to the sample mean of treated local S&P 500 incumbents one year prior to treatment.

S&P 500 index additions lead to lower growth of employee earnings among treated local S&P 500 incumbents. The average annual earnings per employee of treated local S&P 500 incumbents are 1.8% lower compared to the counterfactual during the post-treatment period. Given that the average employee earnings among treated local S&P 500 incumbents are $50,330 (in 2018 dollars) one year prior to treatment, our estimates suggest that an employee of treated local S&P 500 incumbents with average pay earns $921 less per year, or $4,605 less in total relative to the counterfactual during the first five years after treatment. The results are robust to alternative empirical specifications.

Increased common ownership can affect employee earnings through multiple channels, including changes in employers' power in local labor markets and in product markets. Our primary objective is quantifying the overall effects of common ownership on local labor market outcomes, not to disentangle or quantify whether this comes through particular channels. We do offer heterogeneity results supporting the interpretation that employer market power plays some role in explaining the slower growth of employee earnings after S&P 500 incumbents experience a positive shock to common ownership. Threats to the interpretation of the S&P 500 index entry as a common ownership shock could come if the entry event affects outcomes through channels other than common ownership. We discuss and guard against these threats in various ways in Section III. D..

The estimated earnings effect of S&P 500 index additions varies with pre-treatment bargaining power of workers in a local labor market, proxied both by union density and by non-enforceability of noncompete agreements. We split local labor markets into terciles based on workers' bargaining power and re-implement the matched DiD analysis for each subsample.

The estimated effect of S&P 500 index additions on employee earnings is the largest for local labor markets in which workers have the weakest bargaining power. For example, annual earnings per employee among treated local S&P 500 incumbents in local labor markets where the union coverage rate is the lowest are 3% lower in the post-treatment period compared to the counterfactual. In comparison, the estimated average treatment effect is close to zero and statistically insignificant for treated local S&P 500 incumbents in local labor markets with the highest union coverage rate. These heterogeneity estimations suggest that the results are partly driven by increased employers' labor market power. We further find that the estimated effect of S&P 500 index additions on employee earnings varies with pre-treatment labor market power, proxied by employment Herfindahl-Hirschman index (HHI) (Azar, Marinescu and Steinbaum, 2020). Specifically, the estimated effect is larger when pre-treatment employment HHI is lower. This evidence is consistent with a model of oligopsony with common ownership in Azar and Vives (2021). We view these heterogeneity results as enhancing the interpretation that part of the documented earnings effects are driven by changes in employers' labor market power.

Our results on employee earnings could be consistent with the classical monopsony model or other models of employer market power. The classical monopsony model predicts that increased common ownership would reduce total employment, while other models—for example, Jarosch, Nimczik and Sorkin (2021)—show that changes in employer market power could affect employee earnings without affecting employment levels. However, we find that employment of treated local S&P 500 incumbents *increases* after S&P 500 index additions relative to the counterfactual, which is not consistent with prior models of labor market power that we are aware of.

We show that one *can* rationalize our empirical findings in a model of oligopsony with common ownership in which the supply of workers to a firm is a function not only of its wages, but also of its expenditure on recruitment (Manning, 2006; Forsythe and Weinstein, 2021).[2] Our model predicts that higher common ownership among firms in a local labor market would lead to lower equilibrium earnings per employee, but its impact on recruitment intensity is ambiguous. On the one hand, higher common ownership could lower a firm's incentive to spend on recruiting. The reason is that the firm internalizes more of its rivals' profits, but an increased recruitment intensity would lead to more competition and reduce the profits of the firm's competitors. We term it as the "competition channel". On the other hand, a firm's incentive to recruit could increase when common ownership is higher. This is because higher common ownership leads to lower equilibrium earnings per employee, resulting in higher profits per recruited employee. The firm is then incentivized to spend more resources on recruiting, and

[2]One can think of our model, presented in Appendix B , as extending the "generalized model of monopsony" of Manning (2006) from a one-firm setting to a multi-firm setting with strategic interaction.

we term it as the "profit-per-worker channel". The effect of common ownership on equilibrium recruitment intensity and employment is the net effect of the "profit-per-worker channel" and the "competition channel", depending on the parameters in the model.

When the "profit-per-worker channel" dominates, the proposed model could rationalize our empirical findings and has two predictions. One prediction is that the positive effect of common ownership on employment is due to increased recruiting efforts after S&P 500 index addition shocks. The other prediction is that when the unemployment rate in a local labor market is higher, higher common ownership is more likely to increase employment. The reason is that a firm is more likely to recruit from the unemployed, and the increased market share is less likely to come at the expense of its competitors' profits.

We further perform three tests to support the model predictions. First, we use job posting data from Lightcast and find that the job posting rate of treated local S&P 500 incumbents increases after S&P 500 index addition events. Second, we find that the number of establishments in treated local S&P 500 incumbents increases after treatment. These two results suggest that S&P 500 incumbents in treated local labor markets are able to and have incentives to increase their employment level—despite having lower earnings per employee—by increasing their recruitment efforts. Third, we find that the estimated effect on employment is indeed stronger when the unemployment rate in a local labor market is higher. Specifically, among local labor markets with high unemployment rates prior to S&P 500 index additions, the employment of treated local S&P 500 incumbents is 4.66% higher compared to the counterfactual. The estimated average treatment effect is much smaller and statistically insignificant for local labor markets with low unemployment rates prior to treatment.

This paper builds off two strands of literature. First, it adds to the literature on the real effects of common ownership, making two contributions. The first contribution is providing the first measures of common ownership at the local firm and local labor market level. Average local labor market common ownership has increased from 1.74 percentage points in the 1980s to 4.83 percentage points in the 2010s. Based on the modified Herfindahl-Hirschman Index (MHHI) developed in Bresnahan and Salop (1986), this implies that, in the average local labor market in 2010s, local common ownership contributed a 430-point increase to employment HHI, taking the average employment HHI across local labor markets as 1,100 points in Berger, Herkenhoff and Mongey (2022).[3] Such an increase in concentration is considered to likely enhance market power by the 2010 Horizontal Merger Guidelines issued by the Department of

[3]In a local labor market, MHHI is decomposed to employment HHI and MHHI delta. MHHI delta captures local common ownership concentration and is computed as (1-employment HHI)×level of local common ownership. Taking average employment HHI to be 0.11 (1,100 points), and local common ownership to be 4.83 percentage points in 2010s, MHHI delta=10,000*(1-0.11)*4.83/100=430 points.

Justice (DOJ) and the Federal Trade Commission (FTC), suggesting that the overall level of common ownership is high enough to matter for antitrust regulation in local labor markets.[4] The second contribution is providing evidence on the causal effects of common ownership on employee earnings at the local firm level. Prior studies focus on the effects of common ownership on product markets (see, for example, Azar et al., 2018; Newham et al., 2018; Ruiz-Pérez, 2019; Backus et al., 2021a), executive compensation (Antón et al., 2023), and innovation (López and Vives, 2019; Anton et al., 2021), but little is known about its effects on labor market outcomes. This paper starts to fill this gap, and the results suggest that common ownership leads to lower employee earnings in a local firm. To the best of our knowledge, this is the first empirical evidence of the common ownership effects on labor markets (other than compensation for corporate executives). With the availability of the common ownership measure at the local firm level, future research can shed more light on how common ownership affects labor market outcomes beyond the outcomes we consider in the paper.

The paper also relates to the literature on imperfect competition between employers in labor markets. The labor economics literature has found that firms often face upward-sloping labor supply curves, indicating the existence of employer market power (Ashenfelter et al., 2010; Manning, 2011; Staiger et al., 2010; Falch, 2010; Ransom and Sims, 2010; Matsudaira, 2013; Goolsbee and Syverson, 2019; Dube et al., 2020; Manning, 2021; Bassier et al., 2022). Some prior studies measure employer market power by employer concentration, in particular, the Herfindahl-Hirschman Index (HHI) based on either job posting share (Azar et al., 2020) or employment or payroll share (Benmelech et al., 2020; Prager and Schmitt, 2021; Rinz, 2020; Arnold, 2021; Qiu and Sojourner, 2023). The conclusion from these studies is that HHI in a labor market is negatively associated with employee earnings at the market or establishment level. But employer concentration is only one source of employer market power and is far from the only one. For example, search friction or job differentiation can give firms wage-setting power, even in unconcentrated markets (Manning, 2021; Card et al., 2018; Azar et al., 2019). While we find new evidence that common ownership increased in recent decades, these papers show that employment concentration has not. We contribute to this literature by showing that rising connections among firms via common shareholders may have increased employer market power in the United States in recent decades.

[4]The 2010 Horizontal Merger Guidelines are available at https://www.justice.gov/atr/horizontal-merger-guidelines-08192010#5c.

II. Data Description

II. A. Local Labor Market Definition

We follow Rinz (2020) and define a local labor market as the interaction between a commuting zone (CZ) (2000 version) and a four-digit NAICS industry (2017 version). A CZ is a cluster of contiguous counties that reflect the local economies where people live and work. There are 709 CZs in the United States.[5]

II. B. Employee Earnings of Local Firms

To measure the average earnings per employee of a firm in a local labor market, we use data from the 2020 vintage of the U.S. Census Bureau's Longitudinal Business Database (LBD). LBD covers the universe of non-farm establishments in the United States. For each establishment in a year, LBD reports employment in March, total annual payroll, the 2017 version six-digit NAICS industry, geographic location (zip code, time-invariant county and state FIPS codes), and the firm that an establishment belongs to. In LBD, each establishment is assigned a unique longitudinal identifier in LBD (lbdnum), which stays constant even if the ownership of an establishment changes. For each firm, it is assigned a unique longitudinal identifier in LBD (lbdfid). We match an establishment to a unique publicly traded firm in Compustat (Gvkey) using the crosswalk provided by the Census Bureau and further to the firm identifier (Permco) in the Center for Research in Security Prices (CRSP). In each year, we aggregate establishment-level employment and payroll data in LBD to the local firm level (lbdfid$\times$commuting zone$\times$4-digit NAICS). The average earnings per employee in a local firm is defined as the total annual payroll divided by the March employment in a year.

II. C. Common Ownership of Local Firms

To measure common ownership at the local firm level, we combine data on the employment share of each firm in a local labor market with data on institutional ownership at the firm level. The employment share of a firm in a local labor market is calculated using data from LBD.

[5] Ideally, a local labor market is defined as the interaction between a commuting zone and an occupation as in Azar, Marinescu and Steinbaum (2020), Jarosch, Nimczik and Sorkin (2021), and Schubert, Stansbury and Taska (2022) or is defined based on common labor flows as in Arnold (2021). However, LBD data does not allow us to disentangle occupations from industry nor has employee-employer-matched data. We choose the definition of a local labor market as the interaction between a commuting zone and an industry due to data limitations. But Handwerker and Dey (2023) shows that, within an MSA, the correlation between the payroll-based concentration at the occupation$\times$MSA level and the one at the industry$\times$MSA level is very high.

Data on institutional ownership (IO) of U.S. publicly traded firms are from the Thomson Reuters 13F database (13F data) between 1980 and the first quarter of 2013 and from Ben-David, Franzoni, Moussawi and Sedunov (2021) between the second quarter of 2013 and 2018. In the United States, all institutional investment managers with at least $100 million in assets under management are required to file the Securities and Exchange Commission's (SEC) Form 13F and disclose information on their securities holdings. We follow Ben-David et al. (2021) and aggregate the data to the fund family level. In a robustness test, we replace the institutional ownership data between the first quarter of 1999 and the third quarter of 2017 with the data from Backus et al. (2021b) , and our results are robust.

Combining 13F data with the employment share of a local firm, we can measure the common ownership of a local firm in a year. We use information on both publicly traded and privately held firms when constructing the measure. Suppose there are J_m employing firms in a local labor market m. Let ω_j be the employment share for firm j in local labor market m. For each shareholder s, let β_{js} be shareholder s's ownership share in firm j. If firm j is not publicly traded, then $\beta_{js} \equiv 0$. We maintain a proportional control assumption so that shareholder s's voting share is equal to its control share. For firm j, we measure the degree of common ownership with firm k using the "profit weight" in Backus et al. (2021b). Specifically,

$$\lambda_{j,k} = \frac{\sum_{\forall s} \beta_{js}\beta_{ks}}{\sum_{\forall s} \beta_{js}\beta_{js}}, \tag{II. .1}$$

If either firm j or k is not publicly traded or not held by any institutional investors, then $\lambda_{j,k} = 0$. In a robustness test, we also use the common ownership measure developed in Gilje, Gormley and Levit (2020), and our results are robust.

The common ownership of a local firm j in market m, $\lambda_j m$, is then define as:

$$\lambda_{jm} = \sum_{k \neq j} \frac{\omega_k}{1 - \omega_j} \times \lambda_{j,k}, \tag{II. .2}$$

Given that institutional ownership data are at the quarterly level, we first calculate local firm-level common ownership measure in each quarter and then take the simple average across all quarters in a year to construct the annual measure. For each local labor market m, the common ownership is calculated as,

$$\lambda_m = \sum_{j=1}^{J_m} \omega_j \lambda_{jm}, \tag{II. .3}$$

Figure I reports the trend of local labor market–level common ownership by decade between 1980 and 2018. In each decade, we calculate the employment-weighted average of the

common ownership across local labor markets. The figure shows that common ownership at the local labor market level has trended up over the period 1980—2018. Between 1980 and 1989, the average local common ownership is 1.74 percentage points, and it increases to 4.83 percentage points between 2010 and 2018.

Figure II reports the top twenty four-digit NAICS industries in terms of average common ownership in 2018. In each four-digit NAICS industry, we calculate the employment-weighed average common ownership across commuting zones. The top five industries in terms of average common ownership are "General Merchandise Stores (NAICS code=4523)", "Scheduled Air Transportation (NAICS code=4811)", "Couriers and Express Delivery Services (NAICS code=4921)", 'Wired and Wireless Telecommunications Carriers (NAICS code=5173)", "Rail Transportation (NAICS code=4821)".

III. Difference-in-Differences Analysis

To examine whether and how common ownership affects employee earnings, we leverage a credibly exogenous shock to the common ownership of a firm that is already part of the S&P 500 index (S&P 500 incumbent) in a local labor market induced by its competitors' additions to the S&P 500 index and estimate the causal effects of common ownership on annual earnings per employee. Section III. A. introduces the details of the research design and Section III. B. reports the estimation results.

III. A. Empirical Specification

We follow Boller and Scott Morton (2020) and use the addition of a firm to the S&P 500 index (a focal firm) as a shock to the common ownership of an S&P 500 incumbent in a local labor market.[6] Boller and Scott Morton (2020) shows that a firm entering the S&P 500 index experiences a sharp increase in institutional ownership, leading to an increased overlap between the firm and its S&P 500 incumbent competitors via common owners. As a result, the average common ownership of S&P 500 incumbents in a local labor market tends to increase after focal firms enter the S&P 500 index. More importantly, a focal firm's addition to the index does not

[6]Following Boller and Scott Morton (2020), we do not extend our analysis to the S&P 500 index exits for the following reasons. If a firm exits the S&P 500 index because it goes bankrupt, is acquired, or goes private, we then do not have institutional ownership data for this firm after it exits the index. It could also affect the employment concentration in a local labor market and employee earnings (Azar et al., 2020), hence contaminating the effect of common ownership. Firms could also exit the S&P 500 index and switch to the S&P 400 index or the S&P 600 index, but Boller and Scott Morton (2020) shows that index switching does not lead to a significant change in institutional ownership.

change the nature of operations and products of S&P 500 incumbents and is also unlikely to alter their visibility to institutional investors or analysts since they are already part of the S&P 500 index. This strategy has also been used in Antón, Ederer, Giné and Schmalz (2023) to study the effect of common ownership on CEO compensation structure.[7]

One common criticism of the common ownership literature is that common owners of publicly traded firms are usually investors that follow passive investment strategy (i.e., passive investors), and they, therefore, do not have incentives to affect firm decisions.[8] However, some evidence in the literature contradicts this argument. For example, Appel, Gormley and Keim (2016) shows that passive investors are not passive owners. Specifically, they find that passive investors actively influence a firms corporate governance choices and firm performance. Furthermore, Azar, Duro, Kadach and Ormazabal (2021) shows that the "Big Three" asset managers also play an important role in reducing corporate carbon emissions.

To draw causal inferences on whether and how common ownership affects employee earnings, we examine how changes in average annual earnings per employee of S&P 500 incumbents after a local labor market competitor is added to the S&P 500 compared to changes in outcomes among S&P 500 incumbents in local labor markets where no local competitor enters or exits the index within the estimation window. For each index addition event, the estimation window is set at five years before and after the index addition (eleven years total). Given that our common ownership measure is available between 1980 and 2018, we use index addition events between the years 1985 and 2013. We call firms entering the S&P 500 index in the same year as being in the same cohort. Combining data on index additions with data on locations, employment, and firms of establishments in LBD, we can measure heterogeneous treatment statuses induced by S&P 500 index additions across local labor markets.

A local labor market is defined to be treated in a cohort if it satisfies the following three conditions during the year of an index addition event: (1) there exists at least one firm employing workers in the local labor market that enters the S&P 500 index; (2) there is no firm that exits the S&P 500 index; and (3) there is at least one S&P 500 incumbent that employs workers in the local labor market. To avoid multiple, sequential shocks in the same local labor market

[7] To verify that institutional ownership of S&P 500 incumbents does not change after their industry competitors are newly added to the index, we use a similar empirical strategy to the one in Section III. A. and report the dynamic treatment effects in Figure A.1 and Figure A.2. The results show that after a firm is added to the S&P 500 index, the average changes in the firm-level total institutional ownership and the Top1 institutional ownership of S&P 500 incumbents in the same industry (4-digit CRSP SIC code) are close to zero and statistically insignificant.

[8] For example, an article titled "Capitalisms unlikely heroes: why activist investors are good for the public company" in Economist (2015) on February 7 stated: *A rising chunk of the stock market sits in the hands of lazy investors. Index funds and exchange-traded funds mimic the markets movements, and typically take little interest in how firms are run; conventional mutual funds and pension funds that oversee diversified portfolios dislike becoming deeply involved in firms management.*

which can muddy the treatment status of a given local labor market and in a year, if a treated local labor market also experiences other index addition or exit events within the estimation window, we exclude it from the sample. In other words, we require a treated local labor market to only experience one S&P 500 index addition event within the estimation window. A local labor market is defined to be a control local labor market in a cohort if the following two conditions are satisfied: (1) no firm enters or exits the S&P 500 index within the estimation window; and (2) there is at least one S&P 500 incumbent that employs workers. S&P 500 incumbents in treated (control) local labor markets are treated (control) local S&P 500 incumbents. For each cohort of S&P 500 index additions, we restrict our sample to local S&P 500 incumbents with balanced panels of strictly positive earnings per employee and employment within the estimation window.

We use a difference-in-differences (DiD) design to estimate the treatment effects of S&P 500 index additions on average annual earnings per employee of S&P 500 incumbents in a local labor market. In the raw data, the parallel trends assumption is violated. Therefore, we employ a matched DiD estimator, and it involves two steps. In the first step, we match each treated local S&P 500 incumbent to a set of control local S&P 500 incumbents within each cohort. Specifically, we run a linear regression in each cohort by regressing a local S&P 500 incumbent's treatment status on a list of pre-treatment variables. We then match each treated local labor market to the ten nearest control local S&P 500 incumbents based on the estimated propensity scores to form a matched pair. For a cohort in year t, the list of pre-treatment variables used in matching includes the changes in common ownership, the changes in the natural logarithm of average annual earnings per employee, the changes in the natural logarithm of total employment, and the changes in the natural logarithm of the number of establishments in years $t-5$, $t-4$, $t-3$, $t-2$, all relative to the level in year $t-1$. Matching on these variables helps identify control local S&P 500 incumbents such that the trends of these key outcomes are parallel between treated and control local S&P 500 incumbents before treatment. In Section III. C., we show that our results are robust to alternative choices of the number of matched control local S&P 500 incumbents, alternative ways to estimate propensity scores, or using the synthetic DiD estimators in Arkhangelsky, Athey, Hirshberg, Imbens and Wager (2021). As in Antón et al. (2023), we do not restrict potential control local firms to be in the same industry as the treated local firms. Table I reports the means and standard deviations of outcome variables for treated and control local firms one year before S&P 500 index addition events.

In the second step, we estimate the dynamic and average treatment effects on treated of S&P 500 index additions on employee earnings. Following Cengiz, Dube, Lindner and Zipperer (2019), we first stack the observations across all matched pairs and then run the following regression by including matched pair$\times$local S&P 500 incumbent and matched pair$\times$year fixed

effects. There are at least two advantages of this specification. First, it aligns matched pairs of treated and control local S&P 500 incumbents by event time and this is equivalent to a setting in which all the events happen at the same time rather than being staggered over time. Second, we use "clean controls" in the sense that control local S&P 500 incumbents are not treated within the estimation window. Using this specification would mitigate the concerns in Goodman-Bacon (2021) on using the canonical two-way fixed effects model to estimate treatment effects in a DiD setting and is in a similar spirit to the method proposed in Callaway and SantAnna (2021).

$$y_{p(k)jcit} = Treated_{p(k)jci} \times \sum_{n=-5 \& n \neq -1}^{5} \beta_n \times \mathbb{1}(t - t_k = n) + \mu_{p(k)jci} + \eta_{p(k)t} + \epsilon_{p(k)jcit}, \quad \text{(III. .1)}$$

where j, c, i, and t index for S&P 500 incumbent, commuting zone, four-digit NAICS industry, and year, respectively. $p(k)$ indexes for a matched pair of a treated and control local S&P 500 incumbents in cohort k. t_k is the year of index additions in cohort k. $y_{p(k)jcit}$ is the natural logarithm of average annual earnings per employee in local S&P 500 incumbent (jci) in year t of matched pair $p(k)$. The coefficients of interest are β_n. The estimated coefficients capture the dynamics of the relative outcome between treated and control local S&P 500 incumbents over time. The omitted category is $n = -1$, the year immediately before an index addition event. β_n is interpreted as the average relative change in an outcome between treated and control local S&P 500 incumbents across all pairs during time n, relative to time -1. If outcomes in treated and control local S&P 500 incumbents are on similar trends before index addition events, then β_{-5}, β_{-4}, β_{-3}, and β_{-2} would be small in magnitude and statistically insignificant, expressing the procedure's ability to match on pre-treatment variables among control local S&P incumbents.

To estimate the average treatment effect on the treated, we estimate the following regression:

$$y_{p(k)jcit} = \beta \times Treated_{p(k)jci} \times \mathbb{1}(t - t_k > 0) + \mu_{p(k)jci} + \eta_{p(k)t} + \epsilon_{p(k)jcit}, \quad \text{(III. .2)}$$

The parameter of interest is β, and it measures the average change in annual earnings per employee among treated local S&P 500 incumbents relative to that in control local S&P 500 incumbents.

III. B. Main Results

In this subsection, we report the estimated effects of S&P 500 index additions on common ownership and average annual earnings per employee of local S&P 500 incumbents.

We start with estimating equation (III. .1) for common ownership at the local S&P 500 incumbent level. The results are reported in Figure III and columns (1) and (2) of Table II. The results show that the trajectories of common ownership among treated and control local S&P 500 incumbents are parallel before focal firms' additions to the S&P 500 index. During the post-treatment period, we observe a significant increase in the common ownership of treated local S&P 500 incumbents relative to control local S&P 500 incumbents. The common ownership of treated local S&P 500 incumbents on average increases 1.38 percentage points, and it is statistically significant at 1% level. Given that the average common ownership of treated local S&P 500 incumbents one year before treatment is 13.43 percentage points, the estimated average treatment effect is economically meaningful and represents an 10.3% increase. The results confirm that focal firms' additions to the S&P 500 index indeed lead to an increase in the common ownership of local S&P 500 incumbents, and the results are consistent with the evidence in Boller and Scott Morton (2020).

We next report the estimation of equation (III. .1) for the average annual earnings per employee of local S&P 500 incumbents. The results are reported in Figure IV and columns (3) and (4) of Table II. The estimated coefficients during the pre-treatment period are close to zero and statistically insignificant, adding credibility to the maintained parallel trends assumption post-treatment. The trajectories of average annual earnings per employee between treated and control local S&P 500 incumbents only start to diverge after treatment. Average annual earnings per employee of treated local S&P 500 incumbents decreases 1.83% relative to control local S&P 500 incumbents after focal firms enter the S&P 500 index, and it is statistically significant at 1% level. Given that the average annual earnings per employee of treated S&P 500 incumbents one year before treatment is $50,330 (in 2018 dollars), our estimate suggests that an average employee of treated local S&P 500 incumbents earns $921 less per year, or $4,605 in total relative to the counterfactual during the first five years after treatment. Figure IV also shows that the estimated effect becomes stronger over time. During the first year after treatment, the estimate shows that the average annual earnings per employee are 1.34% lower in treated S&P 500 incumbents relative to the counterfactual. By the fifth year after treatment, the magnitude of the estimated negative effect increases to 3.45%. Overall, the results in Table II show that a 10.3% increase in common ownership of S&P 500 incumbents leads to a 1.83% lower in employee earnings during a five-year window after treatment. The implied elasticity of employee earnings to common ownership is -0.18 (=-1.83/10.3), and it is comparable to the

estimated elasticity of vacancy-level posted wages to labor market concentration based on the instrumental variable estimate strategy in Azar et al. (2020).

III. C. Robustness

We further perform several robustness tests to address potential concerns of the main results. The first concern is that the industries of firms entering the S&P 500 index could experience changes in productivity, and local labor markets in these industries could experience different trends of employee earnings unrelated to changes in common ownership. To mitigate this concern, we further include commuting zone and 2-digit NAICS code fixed effects when estimating propensity scores. This specification could mitigate the concerns that time-invariant local or industry shocks drive the results. The estimated results for employee earnings of local S&P 500 incumbents are reported in Figure A.3 and column (2) of Table A.2. The results are similar to the baseline estimates in column (1) of Table A.2.

The second concern is that our results could be driven by local labor market shocks that correlate with both S&P 500 index additions and changes in employee earnings. To mitigate this concern, we include additional covariates to the baseline predictors when estimating propensity scores. The covariates include the pre-treatment averages of demographics (shares of females, whites, blacks, people with ages between 20 and 24, between 45 and 64, and greater than or equal to 65) and the natural logarithm of income per capita at the commuting zone level as well as the pre-treatment averages of total institutional ownership and top 1 institutional ownership at the firm level. We report the results in Figure A.4 and column (3) of Table A.2. Our results are robust.

The third concern is that our results are specific to the source of institutional ownership. To show the robustness of our results, we replace the institutional ownership data between 1999 and 2017 with the data from Backus et al. (2021b). We re-calculate common ownership in these years and re-estimate the equation (III. .1). The estimated results for common ownership and employee earnings of local S&P 500 incumbents are reported in Figure A.5 and column (4) of Table A.2. Our results are robust to using this alternative source of institutional ownership data.

The fourth concern is that our results could be specific to the common ownership measure we use. To mitigate this concern, we use the common ownership measure proposed in Gilje, Gormley and Levit (2020) (GGL thereafter). Compared to the common ownership measure in equation (II. .1), GGL's measure accounts for investors' attention to firms in their portfolios and captures the extent to which common ownership affects managers' incentives to internalize externalities. For each shareholder s, let β_{js} be shareholder s's ownership share in firm j and let

γ_{js} be firm j's weight in institutional owner s's portfolio. For any two firms j and k, their degree of common ownership based on the GGL measure is $GGL_{j,k} = \sum_s \beta_{js}\gamma_{js}\beta_{ks}$. If either firm j or k is not publicly traded or not held by any institutional investors, then $GGL_{j,k} = 0$. Then, the common ownership of firm j in the local labor market m base on the GGL measure is:

$$GGL_{jm} = \sum_{k \neq j} \frac{\omega_k}{1 - \omega_j} \times GGL_{j,k} \tag{III. .3}$$

We calculate the local GGL measure, re-implement the procedure described in Section III. A., and re-estimate equation (III. .1). The estimated results for common ownership and employee earnings of local S&P 500 incumbents are reported in Figure A.6 and column (5) of Table A.2. Our results are robust to using this alternative measure of common ownership.

The fifth concern relates to the validity of the matched DiD strategy. To add more credibility to our empirical strategy, we perform four further tests. In the first test, we report estimation results using alternative numbers of control local S&P 500 incumbents matched to a treated S&P 500 incumbent in each cohort of S&P 500 index addition event. Figure A.7 and Figure A.8 report results when a treated local S&P 500 incumbent is matched to five and fifteen control local S&P 500 incumbents with the closest propensity scores, respectively. The average treatment effects are reported in columns (6) and (7) of Table A.2. The results are robust.

In the second test, for a cohort of S&P 500 index addition events in year t, we leave the change in common ownership, the change in the natural logarithm of average annual earnings per employee, the change in the natural logarithm of employment, and the change in the number of establishments of a local S&P 500 incumbent between $t-2$ and $t-1$ unmatched. If our matched DiD strategy is valid, then the estimated coefficient on $Treated \times Year(-1)$ is expected to be economically small and statistically insignificant. The results on employee earnings are reported in Figure A.9 and column (8) of Table A.2. The estimated coefficient on $Treated \times Year(-1)$ is 0.6 percentage points and is only marginally statistically significant at the 10% level.

In the third test, we perform the analysis at the establishment level. Compared to the baseline estimations, the main difference is that we require establishments to have a balanced panel of strictly positive employee earnings and employment within the estimation window. We re-implement the procedure described in Section III. A., and match each treated establishment to ten control establishments with the closest estimated propensity scores. We re-estimate the equation (III. .1) and report the results in Figure A.10 and column (9) of Table A.2. The estimated average treatment effect on employee earnings at the establishment is slightly larger in magnitude compared to the one at the local firm level in column (1) of Table A.2.

In the fourth test, we estimate the effects using the synthetic difference-in-differences es-

timator in Arkhangelsky et al. (2021). Specifically, for each cohort of S&P 500 index addition event, we estimate using the synthetic DiD estimator and then aggregate estimates across cohorts weighted by the number of treated local S&P 500 incumbents in each cohort (Callaway and SantAnna, 2021). In each cohort, the reported estimates are relative to the pre-treatment average. We compute standard errors based on bootstraps with 300 re-samplings. We report the results in Figure A.11 and column (10) of Table A.2. The estimated effects are similar to the ones based on matched DiD in column (1) of Table A.2.

The sixth concern is that our results could be specific to DiD estimates. To mitigate this concern, we also estimate the effects of common ownership on employee earnings at the local firm level using ordinary least square (OLS) and two-stage least square (2SLS) panel regressions. Our instrumental variable (IV) for common ownership of a local firm is the average of the equally-weighted common ownership of the same firm but in other local labor markets in a given year (Azar et al., 2020; Rinz, 2020). The main identification assumption in our IV analysis is that ownership itself is exogenous, which is commonly assumed in the structural common ownership literature (see, for example, Backus et al., 2021a; Ruiz-Pérez, 2019). This IV purges any idiosyncratic variation in local firm common ownership or variation that is driven by changing labor market shares, and focuses on the part of variation that is driven by nation-wide changes in common ownership in a firm. We control for a list of firm and local firm characteristics including firm size (the natural logarithm of the number of establishments in a firm), firm segment size (the natural logarithm of the number of establishments in a firm in a 4-digit NAICS code), the natural logarithm of a local firm's age, which is the average age of establishments belonging to a local firm, total institutional ownership, and the top 1 institutional ownership. Common ownership and all control variables are lagged one year. Local firm and year fixed effects are included in all specifications. Both OLS and 2SLS results suggest that an increase in common ownership is associated with lower annual earnings per employee, but the magnitude of 2SLS estimate is much larger. The OLS estimates suggest that a one-standard-deviation increase in local firm common ownership is associated with a 0.52% decrease in annual earnings per employee, while IV estimate implies that a one-standard-deviation increase in local firm common ownership reduces employee earnings by 1.11%, or $460 per year. As in Azar et al. (2020) and Rinz (2020), a concern with the IV analysis is that, within a firm, local unobservable shocks driving both employee earnings and common ownership could be correlated across local labor markets. More details are described in Appendix A .

III. D. Labor Market Power vs. Other Mechanisms

The results in Section III. B. show that after a firm is added to the S&P 500 index, S&P 500 incumbents in the same local labor market are more connected to local competitors via common ownership but employee earnings grow more slowly compared to S&P 500 incumbents in markets where no firms enter or exit the S&P 500 index. These results suggest that the dampened wage growth could be attributed to increased common ownership. However, one concern is that S&P 500 index addition itself could directly impact product market competition and the earnings effect could be unrelated to increased common ownership. For example, a firm that enters the S&P 500 index could have lower cost of equity (Baran and King, 2012), which makes it more difficult for S&P 500 incumbents in the same local labor market to compete with it. If this competition effect is large enough, then employee earnings of treated local S&P 500 incumbents would grow more slowly as a consequence. However, recent evidence in Bennett, Stulz and Wang (2020) is inconsistent with this potential mechanism. Specifically, Bennett et al. (2020) shows that the return on assets (ROA) of firms that are newly added to the S&P 500 index becomes lower after inclusion. Furthermore, the authors find that S&P 500 index addition has limited effects on product market competition. In particular, they find that S&P 500 index addition does not impact firm-level measures of product market competition, including the fluidity of the product market (Hoberg, Phillips and Prabhala, 2014), the product similarity between a firm and its rivals (Hoberg and Phillips, 2016), and gross margin. Moreover, Boller and Scott Morton (2020) shows that stock returns of S&P 500 incumbents increase instead of decrease after an industry competitor is added to the S&P 500 index. Therefore, this proposed concern is unlikely to explain our results, given the evidence in the literature.

If the earnings effect is indeed attributed to increased common ownership, there could be multiple potential channels by which the impact occurs. One popular explanation is that increased common ownership leads to higher employer market power, but other mechanisms could also be at play. For example, common ownership could affect the product market behavior of firms (Azar et al., 2018; Ederer and Pellegrino, 2022), which in turn impacts labor market outcomes. If firms share profits with workers, then an increase in product market power tends to raise employee earnings (Van Reenen, 1996; Qiu and Sojourner, 2023). If this channel is at work, then the effect of changes in labor market power on employee earnings could be higher than the estimated effect. However, if firms reduce output because of increased product market power, then labor demand could be reduced, resulting in lower employee earnings (Goshen and Levit, 2022). But we show that local S&P 500 incumbents increase employment after S&P 500 index addition events in Section III. E..

In this paper, we do not attempt to disentangle the labor market power mechanism from

other potential explanations and the estimates in Section III. B. should be interpreted as the overall effects of common ownership on employee earnings through all possible mechanisms. We instead provide two sets of heterogeneity results to illuminate whether labor market power plays a role in explaining the slower growth of employee earnings after S&P 500 incumbents experience a positive shock to common ownership. Results are consistent with some role for labor market power, but this is not meant to rule out changes in product market power as a potential additional channel.

III. D.1. Heterogeneity by Labor Bargaining Power

The first set of tests examines the heterogeneous earnings effect of S&P 500 index additions by labor bargaining power. If the estimated effect is partly driven by increased employers' market power, then stronger labor bargaining power in a local labor market could act as a countervailing force. As a result, the estimated employee earnings effect is expected to be larger (smaller) in local labor markets with weaker (stronger) labor bargaining power before treatment.

We proxy labor bargaining power in two ways. The first is the union coverage rate in a local labor market. Workers on average would have more bargaining power if the union coverage rate is higher in a local labor market. To measure union power at the local labor market level in a year, we rely on data from Current Population Survey (CPS) and estimate the union coverage rate at the commuting zone×NAICS sector×year level as a proxy. For each year, we first estimate the union coverage rate at the State×NAICS sector level weighted by CPS earner weights, and then calculate the union coverage rate at the commuting zone×NAICS sector level as the average union coverage rates at the State×NAICS sector level weighted by the year 2000 population share of each state in the commuting zone.[9]

For each cohort of S&P 500 index additions, we split local labor markets into terciles based on the union coverage rates one year before treatment. For each local labor market in a tercile, we re-implement the procedure described in Section III. A. and re-estimation equation (III. .1) for each subsample. The results are reported in Panel (a) of Figure V. Panel A of Table III reports the average treatment effects across subsamples. The estimates are consistent with our expectations. Among local labor markets with low union coverage rates prior to S&P 500 index additions, the average annual earnings per employee of treated S&P 500 incumbents is 3% lower compared to the counterfactual. In contrast, among local labor markets with high union coverage rates prior to treatment, the estimated average treatment effect is close to zero

[9]The crosswalk between the Census 1990 industry code and NAICS sector is available at https://www.census.gov/topics/employment/industry-occupation/guidance/code-lists.html. The data on NAICS sector=55 is not available in CPS.

and is not statistically significant. The difference between these two estimates is statistically significant at the 1% level.

The second proxy is the non-enforceability of the non-compete agreements (NCAs) in a commuting zone. When NCAs in a commuting zone are less (more) enforceable, then workers' mobility across employers is higher (lower), resulting in a higher (lower) value of outside options and stronger (weaker) worker bargaining power. The data on NCA enforceability index at the state level comes from Marx (2022) and it is available between 1991 and 2014. For each commuting zone in a year, we estimate the enforceability of NCAs as the average NCA enforceability index across states, weighted by the year 2000 population share of each state in the commuting zone.

For each cohort of S&P 500 index additions, we split commuting zones into terciles based on the NCA enforceability index one year before treatment. For each local labor market in a tercile, we re-implement the procedure described in Section III. A. and re-estimate equation (III. .1) for each subsample. The results are reported in Panel (b) of Figure V. Panel B of Table III reports the average treatment effects across subsamples. The estimates again suggest that the estimated employee earnings effect is larger when workers have weaker bargaining power. Among local labor markets with high NCA enforceability indexes prior to S&P 500 index additions, the average annual earnings per employee of treated local S&P 500 incumbents is around 3% lower compared to the counterfactual. For local labor markets with low NCA enforceability indexes prior to treatment, the estimated average treatment effect is smaller (-1.6%). The p-value of the difference between these two estimates is 0.144. Our results support the interpretation that the documented earnings effect in Section III. B. is partly driven by increases in local S&P incumbents' labor market power after treatment.

III. D.2. Heterogeneity by Labor Market Power

The second test examines the heterogeneous earnings effect of S&P 500 index additions by existing labor market power, which is proxied by employment Herfindahl-Hirschman index (HHI) in a local labor market (Azar, Marinescu and Steinbaum, 2020). Ex-ante, it is unclear how employment HHI would affect the estimated employee earnings effect. On the one hand, employees would have fewer outside options and lower bargaining power relative to employers when employment HHI is higher. As a result, the effect of an increase in common ownership on employee earnings could be larger in local labor markets where employers are more concentrated; on the other hand, when employment HHI is higher, the potential increase in labor market power due to increased common ownership would be smaller, and the estimated earnings effect of common ownership could be lower in local labor markets where employers

are more concentrated.

For each local labor market and year, we calculate employment HHI using data from LBD. Let ω_j be the employment share for firm j in local labor market m. Then employment HHI of local labor market m in a year is calculated as,

$$EmploymentHHI_m = \sum_j \omega_{jm}^2$$

For each cohort of S&P 500 index additions, we split local labor markets into terciles based on employment HHI one year before treatment. For each local labor market in a tercile, we re-implement the procedure described in Section III. A. and re-estimate equation (III. .1) for each subsample. The results are reported in Figure VI. Panel C of Table III reports the average treatment effects across subsamples. Among local labor markets with low employment HHI prior to S&P 500 index additions, the average annual earnings per employee of treated S&P 500 incumbents is 1.95% lower compared to the counterfactual. In contrast, among local labor markets with high employment HHI prior to treatment, the estimated coefficient on $Treated \times Post$ is 0.0166 and is not statistically significant. The difference between these two estimates is statistically significant at the 1% level. The estimates are consistent with the model of oligopsony with common ownership in Azar and Vives (2021), which shows that the marginal effect of common ownership on the modified HHI is smaller when employment HHI is higher, leading to a smaller effect on employee earnings.

Overall, we view the heterogeneity results by labor bargaining power and employment HHI as enhancing the interpretation that the labor market power of local S&P 500 incumbents increases after experiencing positive shocks to common ownership, and labor market power is one mechanism behind the documented earnings effect.

III. E. Effects on Employment

We have shown that, after a focal firm enters the S&P 500 index, common ownership of local S&P incumbents increases while the average earnings per employee decrease. We further show evidence suggesting that increased employer market power could be a driving force behind the results. However, it's not clear which model of employer market power the empirical findings best match. There are at least two popular models of employer market power in the literature.

The first one is the classical monopsony model (Robinson, 1933), which combines employer market power with an internal pay equity constraint. Under these conditions, a monopsonistic employer maximizes profits by paying workers less than the perfectly-competitive market wage (their marginal product) and employs fewer workers than they would in a competitive

equilibrium. If the common ownership effect operates along the lines of monopsonistic competition, then we would expect the negative wage effect to be accompanied by lower employment in treated local S&P 500 incumbents relative to the counterfactual after S&P 500 index additions.

The second model argues that changes in employer market power could reduce employee earnings without suppressing the employment level. For example, Jarosch et al. (2021) builds a model based on the structure of a canonical search and bargain model but allows for a finite number of firms. As a result, it is possible for a worker to re-encounter past employers when searching for jobs. In this model, a firm is not a competitor of itself in the future, that is, workers' outside options do not include future vacancies of the firm. Therefore, workers' outside options are worse when bargaining with employers, especially when the distribution of employment is more concentrated, resulting in lower earnings. But their model does not predict "underemployment". Different models of employer market power could have different predictions for employment levels although their predictions on employee earnings are the same. This motivates us to examine the effects of S&P 500 index additions on the employment of S&P 500 incumbents.

We estimate equation (III. .1) by replacing the dependent variable as the natural logarithm of employment. The results are reported in Figure VII and in Table IV. The results show that the employment of S&P 500 incumbents increases after focal firms are added to the S&P 500 index. The trajectories of employment between treated and control local S&P 500 incumbents are parallel before treatment, and they only start to diverge after index addition events. During the post-treatment period, treated local S&P 500 incumbents' employment increases by 2.49% relative to the counterfactual. Given that the average employment of treated local S&P 500 incumbents one year before treatment is 300, our estimates imply that S&P 500 index additions lead the employment of treated local S&P 500 incumbents to increase by seven relative to the counterfactual. Although our result is inconsistent with the evidence in Arnold (2021) and Marinescu, Ouss and Pape (2021), the estimate is consistent with the evidence in Brown and Medoff (1989), which finds that acquisitions in Michigan increased employment. More recently, Prager and Schmitt (2021) also reports that hospital nursing & pharmacy employment grew faster in commuting zones that experienced a large increase in merger-induced concentration.[10]

[10]The interpretation of the result in Prager and Schmitt (2021) should be under the caveat that there is evidence of differential pre-trends in nursing & pharmacy employment between treated and control hospitals.

IV. Discussions

We find that an increase in common ownership of S&P 500 incumbents in a local labor market leads to a lower growth rate of employee earnings but a higher growth of total employment. These results are at odds with the theoretical predictions from Robinson (1933) and Jarosch et al. (2021). We argue that our findings could be consistent with a model of oligopsony with common ownership that incorporates a costly recruitment-intensity margin as in Manning (2006). In this section, we discuss the intuitions of the model and provide further empirical evidence to support predictions from this model. We present a model in Appendix B that formalizes the discussions in this section.

In this model of oligopsony, a firm is connected to its competitors via common ownership, and the firm partially internalizes its competitors' profits in its objective function. Each firm chooses wages and recruiting intensity to maximize its objective function. When a firm increases its wages, its market share increases. However, some of the increased market share comes at the expense of its competitors' profits. As a result, when a firm's common ownership with its competitors is higher, the marginal cost of increasing wages is higher, resulting in lower equilibrium wages *ceteris paribus*.

However, the prediction on how common ownership affects a firm's recruitment intensity is unclear ex-ante. On the one hand, an increase in a firm's recruitment intensity would increase its market share, but some of the increased market share comes at the expense of its competitors' profits. Given that the firm partially internalizes its competitors' profits, higher common ownership would reduce the firm's incentive to increase recruitment intensity *ceteris paribus*. We term this as the "competition channel". On the other hand, higher common ownership can increase a firm's incentive to increase recruitment intensity. The reason is that higher common ownership leads to lower wages in equilibrium, and then each additional worker that the firm hires is more profitable. We term this as the "profit-per-worker channel". The effect of common ownership on recruitment and employment is the net effect of "profit-per-worker channel" and the "competition channel".

When the "profit-per-worker channel" dominates, the proposed model could rationalize our empirical findings and has two predictions. One prediction is that the positive effect of common ownership on employment in III. E. is due to increased recruiting efforts after S&P 500 index addition shocks. The other prediction is that when the unemployment rate in a local labor market is higher, higher common ownership is more likely to increase employment. The reason is that a firm is more likely to recruit from the unemployed, and the increased market share is less likely to come at the expense of its competitors.

In the following subsections, we perform three empirical tests to support the model predic-

tions. Section IV. A. and Section IV. B. examine how S&P 500 incumbents' recruiting intensity changes after their local competitors are added to the S&P 500 index. In Section IV. C., we examine the heterogeneous employment effect by the pre-treatment unemployment rate in a local labor market.

IV. A. Job Posting Rate

In the first test, we use data from Lightcast (formerly known as Burning Glass Technologies), one of the leading data vendors in job postings in the U.S. The data is available since 2010. For each job posting, Lightcast provides detailed information, including the date of the posting as well as the employer's name, industry, and geographic location. We match each firm in Lightcast to Compustat (Gvkey) using the crosswalk in Babina, Fedyk, He and Hodson (forthcoming). For each year, we aggregate data to firm×commuting zone×4-digit NAICS code level (local firm) and calculate the number of total unfilled job postings. We then aggregate payroll and employment data from LBD to the firm×commuting zone×4-digit NAICS code×year level and merge it with the Lightcast data. If a local firm in LBD is matched at least once with Lightcast data, then we impute the number of job postings to be zero in unmatched years.

We again focus on S&P 500 incumbents and re-implement the procedure described in Section III. A.. Due to the short panel of Lightcast data, we use S&P 500 index addition events between 2013 and 2015 and choose the estimation window to be three years before and after the event year (seven years in total). For each local firm in each cohort, we define the job posting rate as the total number of unfilled job postings in a year divided by the pre-treatment average employment. When estimating propensity scores, we also match on the trends of job posting rate during the pre-treatment period. We match each treated local firm to ten control local firms with the closest propensity scores and re-estimate the equation (III. .1).

We report the results in Figure VIII and Table V. The results show that the job posting rate of treated local firms on average increases 13.7 percentage points after S&P 500 index additions relative to the counterfactual, representing a 42.3% increase relative to the mean one year before treatment (32.4 percentage points).

IV. B. Number of Establishments

In the second test, we further examine the effects of S&P 500 index additions on the number of establishments. We estimate equation (III. .1) by replacing the dependent variable as the natural logarithm of the number of establishments in a local S&P 500 incumbent. The results

are reported in Figure IX and in Table VI. The results show that the number of establishments of S&P 500 incumbents increases after focal firms are added to the S&P 500 index. The trajectories of the number of establishments between treated and control local S&P 500 incumbents are parallel before treatment. They only start to diverge after index addition events. During the post-treatment period, the number of establishments of treated S&P 500 incumbents increases by 1.05% relative to the counterfactual. By the end of the fifth year after treatment, our estimation shows that the number of establishments of treated local S&P 500 incumbents increases 2.1% relative to the counterfactual. This evidence is also consistent with the evidence that treated local S&P 500 incumbents increase their hiring efforts after experiencing positive shocks to common ownership.

IV. C. Heterogeneous Employment Effect by Unemployment Rate

In the third test, we examine the heterogeneous employment effect by the pre-treatment unemployment rate in a local labor market. Our proposed model predicts the positive employment effect to be stronger in local labor markets with higher unemployment rates. For each cohort of S&P 500 index additions, we split commuting zones into terciles based on the unemployment rate one year before treatment. For each local labor market in a tercile, we re-implement the procedure described in Section III. A. and re-estimate equation (III. .1) for each subsample. We use the natural logarithm of employment as the dependent variable. The results are reported in Table VII.

The estimates suggest that the estimated employment effect is larger when the unemployment rate in a local labor market is higher. Among local labor markets with high unemployment rates prior to S&P 500 index additions, the employment of treated local S&P 500 incumbents is 4.66% higher compared to the counterfactual. For local labor markets with low unemployment rates prior to treatment, the estimated average treatment effect is much smaller (-0.0016) and statistically insignificant. The difference between these two estimates is statistically significant at the 5% level.[11]

Overall, in this section, we propose that a model of oligopsony with common ownership and costly recruitment intensity could rationalize our empirical findings in Section III. B. and Section III. E.. The model predicts that higher common ownership always leads to lower equilibrium wages but could lead to higher recruitment intensity and employment if the "profit-per-worker channel" dominates. The positive effect on employment is predicted to be stronger

[11] In Table A.3, we report estimated earnings effect by the unemployment rate in a local labor market. The estimated earnings effects in local labor markets with high, medium, and low unemployment rates one year before treatment are -0.0240. -0.0245, and -0.0181, respectively, and all estimates are at least statistically significant at the 5% level.

when the unemployment rate is higher since a firm is more likely to recruit from the unemployed, and the increased market share is less likely to come at the expense of its competitors' profits.

We further provide evidence supporting the model predictions. Specifically, we show that S&P 500 index additions of focal firms lead to higher job posting rates and more new establishments in treated S&P 500 incumbents. These results could explain the positive effect on employment in Section III. E.. Furthermore, we find that the positive employment effect concentrates in local labor markets with higher unemployment rates before treatment, further supporting the model prediction.

V. Conclusion

In this paper, we contribute to the literature on employer market power by measuring common ownership at the local firm and local labor market level, and providing the first empirical evidence on the effects of common ownership on labor outcomes at the local firm level. We explore natural experiments generated when S&P 500 firms have a local competitor added to the S&P 500 index and use a difference-in-differences design to estimate causal effects. Our results suggest that the average annual earnings per employee among treated local S&P 500 incumbents are lower compared to the counterfactual after their local competitors enter the S&P 500 index. Further analyses show that the effect mainly comes from local labor markets in which workers have weaker bargaining power or local labor market concentration is lower prior to treatment.

We also find that S&P 500 index additions lead to an increase in the employment of treated local S&P 500 incumbents. We show that, while this is inconsistent with existing models of employer market power, it *can* be rationalized through a model of oligopsony with common ownership that incorporates an endogenous recruitment intensity. We further show that S&P 500 incumbents increase recruiting efforts after experiencing positive shocks to common ownership, and the employment effect concentrates in local labor markets with higher unemployment rates. These empirical findings support the model predictions.

The policy implications of anticompetitive effects of common ownership in labor markets are complex. Legal scholars have mostly analyzed the antitrust implications of horizontal shareholding in product markets (Elhauge, 2015; Baker, 2015; Posner et al., 2017; Rock and Rubinfeld, 2020; Posner, 2021), as well as labor market power (Marinescu and Hovenkamp, 2019; Krueger and Posner, 2018; Naidu and Posner, 2021). Evaluating the competitive effects of common ownership in labor markets will require a combination of insights from these two

literatures. One potential approach would be tackling the issue directly by breaking up large common owners. However, it is important to take into account that there are substantial trade-offs from a social point of view, as low-cost index funds provide substantial cost savings for retail investors compared to more expensive actively managed funds.

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APPENDIX

A PANEL REGRESSIONS

In this subsection, we use OLS and 2SLS panel regressions to estimate the relation between common ownership and annual earnings per employee at the local firm level. Section A.A. introduces empirical specifications and Section A.B. reports OLS and 2SLS estimation results.

A.A. Empirical Specification

To construct the sample for panel regressions, we merge LBD data with one-year-lagged common ownership and control variables at the local firm level. We control for a list of firm and local firm characteristics, including firm size (the natural logarithm of the number of establishments in a firm), firm segment size (the natural logarithm of the number of establishments in a firm in a 4-digit NAICS code), the natural logarithm of a local firm's age, which is the average age of establishments belonging to a local firm, total institutional ownership, and the top 1 institutional ownership.

We start with OLS panel regressions and study how changes in common ownership relate to changes in annual earnings per employee in a local firm by including local firm and year fixed effects. Specifically, we estimate the following equation:

$$y_{jci,t} = \alpha\lambda_{jci,t-1} + \beta X_{jci,t-1} + \gamma_{jci} + \delta_t + \varepsilon_{jci,t}, \tag{A.1}$$

where j, c, i, and t index for firm, commuting zone, four-digit NAICS industry, and year, respectively. $y_{jci,t}$ is the natural logarithm of annual earnings per employee in local firm (jci) in year t. $\lambda_{jci,t-1}$ is common ownership in a local firm jci in year $t-1$. $X_{jci,t-1}$ is a vector of control variables in a local firm jci measured at year $t-1$. The variable γ_{jci} represents local firm fixed effects, which helps to control for any time-invariant unobserved characteristics at the local firm level. The variable δ_t represents year fixed effects, which helps to control for any time-varying shocks at the national level. Unless otherwise stated, observations are unweighted and standard errors are clustered at the local labor market level.

Identification assumptions of OLS include a linear functional form, constant treatment effect, and that changes in unobserved characteristics are mean independent of changes in local firm common ownership conditional on the vector of control variables and fixed effects, that is,

$$E[\varepsilon_{jci,t}|\lambda_{jci,t-1}, X_{jci,t-1}, 1_{jci}, 1_t] = E[\varepsilon_{jci,t}|X_{jci,t-1}, 1_{jci}, 1_t] = 0$$

These identification assumptions of OLS could fail and then our estimates would be biased. However, the direction of bias is not clear ex ante. On one hand, our estimate could be biased downward. For instance, if a local labor market experiences a negative shock to labor productivity, then employee earnings would decrease. At the same time, it might induce exits of some privately-held firms. This would drive up the measure of local firm common ownership, resulting in a downward bias of the OLS estimate. On the other hand, our estimate could be biased upward. If a publicly traded firm in a local labor market experiences a shock to firm-specific productivity and decides to acquire some private-held firms in the market. This increased firm-level productivity could drive up both employee earnings and local firm common ownership simultaneously, resulting in an upward bias of the OLS estimate.

To mitigate the above-mentioned endogeneity concerns, we also use an instrumental variables (IV) strategy and implement it using two-stage least squares (2SLS). The construction of the IV for common ownership at the local firm level follows the idea in Azar et al. (2020) and Rinz (2020). Specifically, our IV for common ownership in a local firm in a given year is the average of the equally-weighted common ownership of the same firm but in other local labor markets. Our use of the equally-weighted average of common ownership ensures that our instrument only uses information on ownership, and no information on endogenous employment shares. The main identification assumption in our IV analysis is that ownership itself is exogenous, which is commonly assumed in the structural common ownership literature (see, for example, Backus et al., 2021a; Ruiz-Pérez, 2019).

We again index firm, commuting zone, and four-digit NAICS industry by j, c, and i, respectively, and denote the number of local labor markets that a firm operates in a year t as N_{jt}. The IV for local firm common ownership can then be expressed as follows.

$$\lambda^{IV}_{j,(ci),t} = \frac{1}{N_{jt}-1} \sum_{(ci)' \neq (ci)} \lambda^{Equally-weighted}_{j,(ci)',t}$$

This IV purges of any idiosyncratic variation in local firm common ownership and focuses on the part of variation that is related to nation-wide common ownership change within a firm. In the labor productivity shock example above, our IV would exclude changes in local firm common ownership induced by unobserved local shocks in OLS. Studies commonly use this type of leave-one-out instrument to deal with endogeniety of local prices (Nevo, 2001).

However, the estimated results based on this IV strategy should be interpreted carefully. The main threat to the identification of this IV strategy is that, for a given firm, the local shocks driving changes in both employee earnings and local firm common ownership could be correlated across local labor markets.

A.B. Estimation Results

We report the estimated effects of common ownership on annual earnings per employee in Table A.4. Column (1) reports OLS estimates. The estimated coefficient on *Common Ownership* is -0.0414 and is statistically significant at 10% level. The estimated effect implies that a one-standard-deviation increase in local firm common ownership (0.1265) is associated with a 0.5% (=0.1265*-0.0414) decrease in annual earnings per employee. This is $207 per year given the sample mean of $41,480 (in 2018 dollars).

Column (2) reports 2SLS estimates. The first stage Kleibergen-Paap F-statistic is large, suggesting our instrumental variable is strong. The magnitude of the estimated common ownership effect is larger than the one from OLS. Our results show that a one-standard-deviation increase in local common ownership is associated with a 1.1% (=0.1265*-0.0875) decrease in annual wages per employee, or $460 per year.

B Oligopsony with Common Ownership and Endogenous Recruitment Intensity

In this section, we develop a theoretical model that can rationalize our empirical findings. Specifically, we extend the classical model of oligopsony in two directions: (i) it has differentiated jobs and wage competition, as in Bhaskar et al. (2002), and (ii) it incorporates a recruitment-intensity margin as in Manning (2006). With these additional features, our model shows that a higher common ownership in a labor market could lead to lower wages and a higher total employment in equilibrium.[12]

Let's consider a labor market with J firms offering differentiated jobs. The market is an oligopsony and firms compete in wages. There is a continuum of workers of mass 1. Worker-i's utility from working at firm j is,

$$u_{ij} = \alpha \log(w_j) + \epsilon_{ij}, \tag{A.1}$$

where w_j is the wage of firm j's jobs, and ϵ_{ij} is a worker-firm match-specific shock. We assume that the match-specific shocks are independent and identically distributed, with a Type I extreme value distribution. A higher α expresses a relatively more significant role for wages and a more minor role for non-wage job attributes between firms in governing worker util-

[12] An important difference between our setup and that of Bhaskar et al. (2002) is that they model differentiated jobs and workers using a Hotelling (1929) linear city model, while we use a multinomial logit random utility model for the labor supply specification.

ity, making jobs at different firms closer substitutes. This reduces firms' differentiation in jobs and market power as employers. α is a key parameter that determines the impact of common ownership on total employment

Firms engage in informative advertising of their job openings. We model informative recruiting expenditures similarly to the model of informative product advertising in Butters (1977) and Hamilton (2009). A worker observes the job posting of firm j with probability ϕ_j. Among all the job postings that the worker observes, she chooses the one that offers the highest utility. It is possible that the worker observes zero job postings. Therefore, there can be frictional unemployment for this reason, even there is no outside option in the model.[13] Firm j chooses its recruitment intensity ϕ_j given a cost function $a(\phi_j) = -\theta \log(1-\phi_j)$. Recruitment cost is zero when $\phi_j = 0$, and approaches to infinity as ϕ_j is close to one. $a(\phi_j)$ is convex, so that there is an increasing marginal cost of increasing recruitment intensity.[14] Manning (2006) provides evidence supporting this assumption. If there were no recruiting costs ($\theta = 0$), all firms would advertise job postings to all workers and there would be no frictional unemployment. As recruiting cost increases, employer competition would weaken and the employment rate could fall as a consequece.

We will focus on finding symmetric equilibria. For this purpose, it is useful to calculate the probability that firm j faces k rivals for a given worker who is informed about its job posting, when each of its symmetric rival sets its recruitment intensity to ϕ_{-j}. When there are $J-1$ rival firms, such a probability is given by the binomial distribution:

$$p(k; \phi_{-j}, J-1) = \binom{J-1}{k} \phi_{-j}^{k} (1-\phi_{-j})^{J-1-k}. \tag{A.2}$$

For a given set of chosen wages and recruitment intensities by firm j and each of its rival, $\{w_j, w_{-j}, \phi_j, \phi_{-j}\}$, the employment share of firm j among all potential workers in the labor market (including the unemployed) is given by

$$s_j(w_j, w_{-j}, \phi_j, \phi_{-j}) = \phi_j \sum_{k=0}^{J-1} p(k; \phi_{-j}, J-1) s_j^{(k)}(w_j; w_{-j}), \tag{A.3}$$

where

$$s_j^{(k)}(w_j; w_{-j}) = \frac{\exp(\alpha \log(w_j))}{\exp\left[\alpha \log(w_j)\right] + k \exp\left[\alpha \log(w_{-j})\right]}$$

[13] It would be possible to add an outside option to our model, corresponding to out of the labor force, but it is not essential to the point we want to make.

[14] Forsythe and Weinstein (2021) shows that firm-level recruiting expenditures are indeed associated with increased hiring by the firm.

is the market share of firm j among the workers that are informed about the job postings of firm j and its k rivals.

The intuition of equation (A.3) is the following. When firm j sets its recruitment intensity to be ϕ_j, a measure of workers of that size are informed about its job posting. Among these ϕ_j workers, $p(k; \phi_{-j}, J-1)$ of them also observe the job postings of firm j's k rivals. Among the workers that observe k rivals' job postings, firm j's market share is given by the multinomial logit market share $s_j^{(k)}(w_j; w_{-j})$.

The employment share of a firm j's rival among all potential workers in the labor market is given by

$$s_{-j}(w_j, w_{-j}, \phi_j, \phi_{-j}) = \phi_{-j} \sum_{k=0}^{J-2} p(k; \phi_{-j}, J-2) \left[\phi_j s_{-j}^{(k+1)} + \frac{1-\phi_j}{k+1} \right], \tag{A.4}$$

where

$$s_{-j}^{(k)}(w_j, w_{-j}) = \frac{\exp(\alpha \log(w_{-j}))}{\exp\left[\alpha \log(w_j)\right] + k \exp\left[\alpha \log(w_{-j})\right]}$$

is the market share of firm $-j$ among the workers that are informed about the job postings of firm j and firm $-j$'s k rivals. There are two terms in the bracket in equation (A.4) and the interpretation is the following. With a probability of ϕ_j, a worker that is informed about the job postings of firm $-j$ and its k rivals could also observe firm j's job posting. In this case, firm $-j$'s market share is given by $s_{-j}^{(k)}(w_j, w_{-j})$; with a probability of $1-\phi_j$, a worker that is informed about the job postings of firm $-j$ and its k rivals does not observe firm j's job posting. In this case, firm $-j$'s market share is simply $1/(k+1)$.

For a given set of chosen wages and recruitment intensities by firm j and each of its rival, $\{w_j, w_{-j}, \phi_j, \phi_{-j}\}$, the profit of firm j is given by

$$\pi_j(w_j, w_{-j}, \phi_j, \phi_{-j}) = (A - w_j) s_j(w_j, w_{-j}, \phi_j, \phi_{-j}) - a(\phi_j), \tag{A.5}$$

where A is the additional revenue for firm j from hiring another worker, which we assume is symmetric across firms.

When there is common ownership in the labor market, that is, firms are connected via common owners, firm j would partially internalize the profits of its rivals. We incorporate this idea into our model by assuming that firm j chooses its wages, w_j, and recruitment intenstiy, ϕ_j, to maximize its profit plus a weight λ times the profits of its rivals in the labor market, taking the choices of $\{w_{-j}, \phi_{-j}\}$ by its rivals as given:

$$\max_{w_j, \phi_j} \left(A - w_j\right) s_j(w_j, w_{-j}, \phi_j, \phi_{-j}) - a(\phi_j) + \lambda \cdot (J-1) \left[\left(A - w_{-j}\right) s_{-j}(w_j, w_{-j}, \phi_j, \phi_{-j}) - a(\phi_{-j}) \right]. \tag{A.6}$$

The first-order condition for firm j with respect to its wage is,

$$-s_j + (A - w_j)\frac{\partial s_j}{\partial w_j} + \lambda \cdot \left[(J-1)\left(A - w_{-j}\right) \frac{\partial s_{-j}}{\partial w_j} \right] = 0, \tag{A.7}$$

where the market share slopes with respect to firm j's wage are

$$\frac{\partial s_j}{\partial w_j} = \frac{\alpha}{w_j}\phi_j \sum_{k=0}^{J-1} p(k; \phi_{-j}, J-1) s_j^{(k)} (1 - s_j^{(k)}) \tag{A.8}$$

$$\frac{\partial s_{-j}}{\partial w_j} = -\frac{\alpha}{w_j}\phi_{-j}\phi_j \sum_{k=0}^{J-2} p(k; \phi_{-j}, J-2) s_{-j}^{(k+1)} s_j^{(k+1)}. \tag{A.9}$$

Intuitively, an increase in its wages by one dollar has two opposing effects on firm j's profits. On one hand, it reduces its profits per worker by one dollar, and this reduces overall profits by its market share s_j. This is captured in the first term of equation (A.7). On the other hand, increasing wages would increase firm j's market share by $\frac{\partial s_j}{\partial w_j}$, and this increases its profits because the margin $A - w_j$ is applied to more workers. This is captured in the second term of equation (A.7). With common ownership, firm j internalizes the fact that some of this increase in its market share comes at the expense of its rivals, whose profits firm j internalizes at a rate λ. This is what drives the third term of equation (A.7). This last term, *ceteris paribus*, implies that an increase in common ownership reduces firm j's incentive to increase wages.

The first-order condition for firm j with respect to its own recruiting effort is,

$$(A - w_j)\frac{\partial s_j}{\partial \phi_j} - \theta/(1 - \phi_j) + \lambda \cdot \left[(J-1)\left(A - w_{-j}\right) \frac{\partial s_{-j}}{\partial \phi_j} \right] = 0, \tag{A.10}$$

where the market share slopes with respect to firm j's recruitment intensity are

$$\frac{\partial s_j}{\partial \phi_j} = s_j/\phi_j \tag{A.11}$$

$$\frac{\partial s_{-j}}{\partial \phi_j} = \phi_{-j} \sum_{k=0}^{J-2} p(k; \phi_{-j}, J-2) \left[s_{-j}^{(k+1)} - \frac{1}{k+1} \right]. \tag{A.12}$$

The intuition is as follows. Increasing its recruitment intensity has opposing effects on firm j's profits. An increase in its recruitment intensity would increase firm j's market share by $\frac{\partial s_j}{\partial \phi_j}$, and this increases profits because the margin $A - w_j$ is applied to more workers. This is captured in the first term of equation (A.10). But increasing recruitment intensity is costly and

the marginal cost is reflected in the second term of equation (A.10).

Common ownership makes firm j internalize the fact that, when it increases recruitment intensity, some of its increase in market share comes at the expense of its rivals. As in the first-order condition for wages (equation (A.7)), firm j internalizes its rivals' profits at a rate λ. This is captured by the third term of equation (A.10). *Ceteris paribus*, this would imply that higher common ownership would reduce firm j's incentive to increase recruitment intensity. However, if common ownership drives down wages in equilibrium, then it increases the first term of equation (A.10), implying that each additional worker that firm j hires is more profitable. This would increase firm j's incentive to increase its recruitment intensity. These two conflicting economic forces are the reason why, as we will see in the numerical simulations, the effect of common ownership on employment could be positive or negative, depending on the parameters.

We solve the model numerically by finding the solution to the two non-linear equations obtained by imposing symmetry, that is, setting $w_j = w_{-j} = w$ and $\phi_j = \phi_{-j} = \phi$ in the first-order conditions.

$$\begin{cases} (A-w)\left\{\frac{\partial s_j}{\partial w_j} + \lambda(J-1)\frac{\partial s_{-j}}{\partial w_j}\right\} = (1-(1-\phi)^J)/J \\ (A-w)\left\{\frac{\partial s_j}{\partial \phi_j} + \lambda(J-1)\frac{\partial s_{-j}}{\partial \phi_j}\right\} = \theta/(1-\phi) \end{cases}, \tag{A.13}$$

where all the market share slopes are evaluated at the symmetric wage and recruitment intensity values ($w_j = w_{-j} = w$ and $\phi_j = \phi_{-j} = \phi$):

$$\begin{array}{l} \frac{\partial s_j}{\partial w_j} = \frac{\alpha}{w}\phi\sum_{k=0}^{J-1} p(k;\phi,J-1)\frac{k}{(k+1)^2} \\ \frac{\partial s_{-j}}{\partial w_j} = -\frac{\alpha}{w}\phi^2\sum_{k=0}^{J-2} p(k;\phi,J-2)\frac{1}{(k+2)^2} \\ \frac{\partial s_j}{\partial \phi_j} = \frac{1-(1-\phi)^J}{\phi J} \\ \frac{\partial s_{-j}}{\partial \phi_j} = \phi\sum_{k=0}^{J-2} p(k;\phi,J-2)\left[\frac{1}{k+2} - \frac{1}{k+1}\right] \end{array}. \tag{A.14}$$

In equilibrium, the total employment in a labor market is equal to $1-(1-\phi)^J$. Therefore, the effect of common ownership on recruitment intensity and total employment would be qualitatively the same.

We set the number of firm J to be 20 and marginal product of labor A to be 1 (as a normalization) when solving the model. We report the results in Figure A.12. In the left panel, we examine how the impacts of common ownership on wages, recruitment intensity, and employment vary with the wage sensitivity parameter α. In this panel, we set the cost of recruitment intensity θ=0.3. In the right panel, we examine how the impacts of common ownership on wages, recruitment intensity, and employment vary with θ that governs recruiting cost. In this

panel, we set the wage sensitivity parameter α=3.

As can be seen in Figure A.12, an increase in common ownership always reduces equilibrium wages but its impact on recruitment intensity or total employment depends on α or θ. In this example, common ownership generates an increase in employment when the wage sensitivity parameter α or the cost of recruitment intensity parameter θ is relatively high, and common ownership generates a decrease in employment when α or θ is relatively low.

As we discussed earlier, the intuition for the ambiguous effect of common ownership on employment is the following. A higher common ownership implies that a firm would internalize more the effect of an increased recruitment intensity on its rivals' profits, because some of the extra recruited workers could have otherwise been employed by firms that share common owners. This effect implies that a higher common ownership would tend to reduce equilibrium recruitment intensity. However, a higher common ownership also reduces equilibrium wages, increasing the profits per worker that the firms receive. These higher profits per job *increase* a firm's incentive to recruit more workers in equilibrium, at least when these workers are more likely to be recruited from the unemployed. When the later "profit-per-worker" effect dominates, the net effect of common ownership on equilibrium employment could be positive.

The positive effect of common ownership on employment is more likely to happen when equilibrium employment is lower without common ownership, because then recruited workers are more likely not coming from rival firms. A higher wage-sensitivity parameter α implies that firms are closer substitutes, resulting in higher equilibrium wages. In this model, higher wages imply that profits per worker are lower, and a firm has less incentive to spend resources on advertising their job openings. As a result, equilibrium employment would be *lower* when there is no common ownership. Similarly, when the recruitment cost parameter θ is higher, a firm has less incentive to spend on recruitment, leading to *lower* equilibrium employment when common ownership is zero. Therefore, when α or θ is higher, higher common ownership could increase a firm's incentive to spend resources on recruitment because newly recruited workers more likely come from the unemployed, and it comes less at the expense of its rival firms.

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Main Figures and Tables

Figure I
Common Ownership in Local Labor Markets: 1980–2018

This figure reports the average local labor market common ownership in each of the last four decades. Local labor market common ownership in a year is the employment-weighted local firm-level common ownership based on the U.S. Census Bureau's Longitudinal Business Database. In each decade, we calculate employment-weighted average local labor market common ownership across local labor markets.

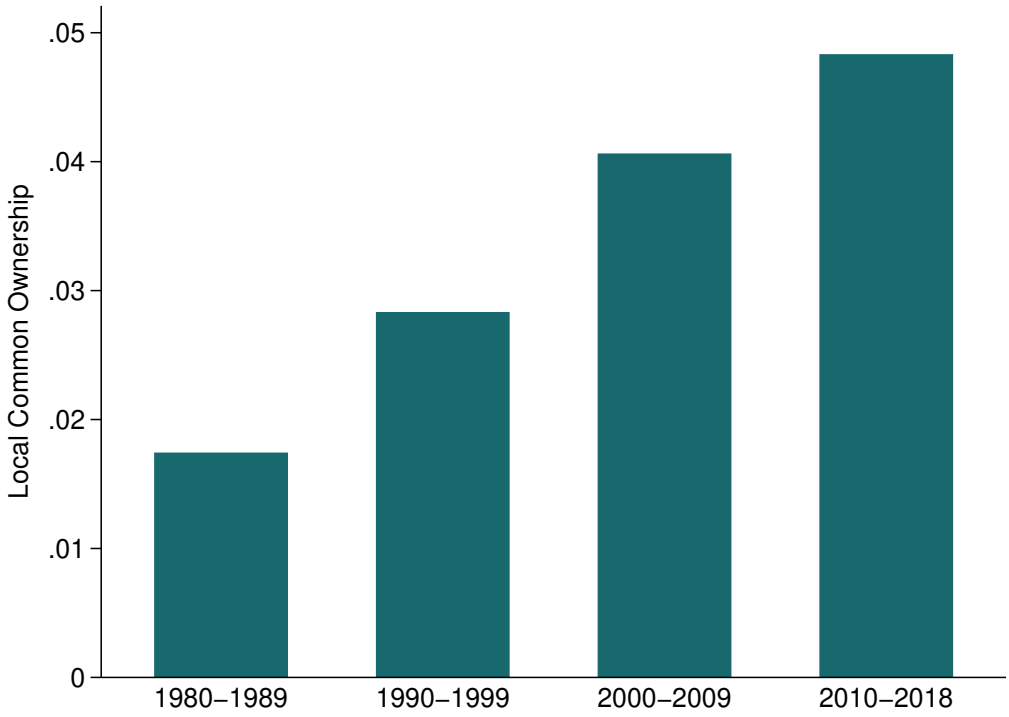


Figure II
Common Ownership Across Four-Digit NAICS Industries in 2018

This figure reports the top twenty four-digit NAICS industries in terms of average local labor market common ownership in 2018. Local labor market common ownership in a year is the employment-weighted local firm-level common ownership based on the U.S. Census Bureau's Longitudinal Business Database. In each four-digit NAICS industry, we calculate the employment-weighed average local labor market common ownership across commuting zones.

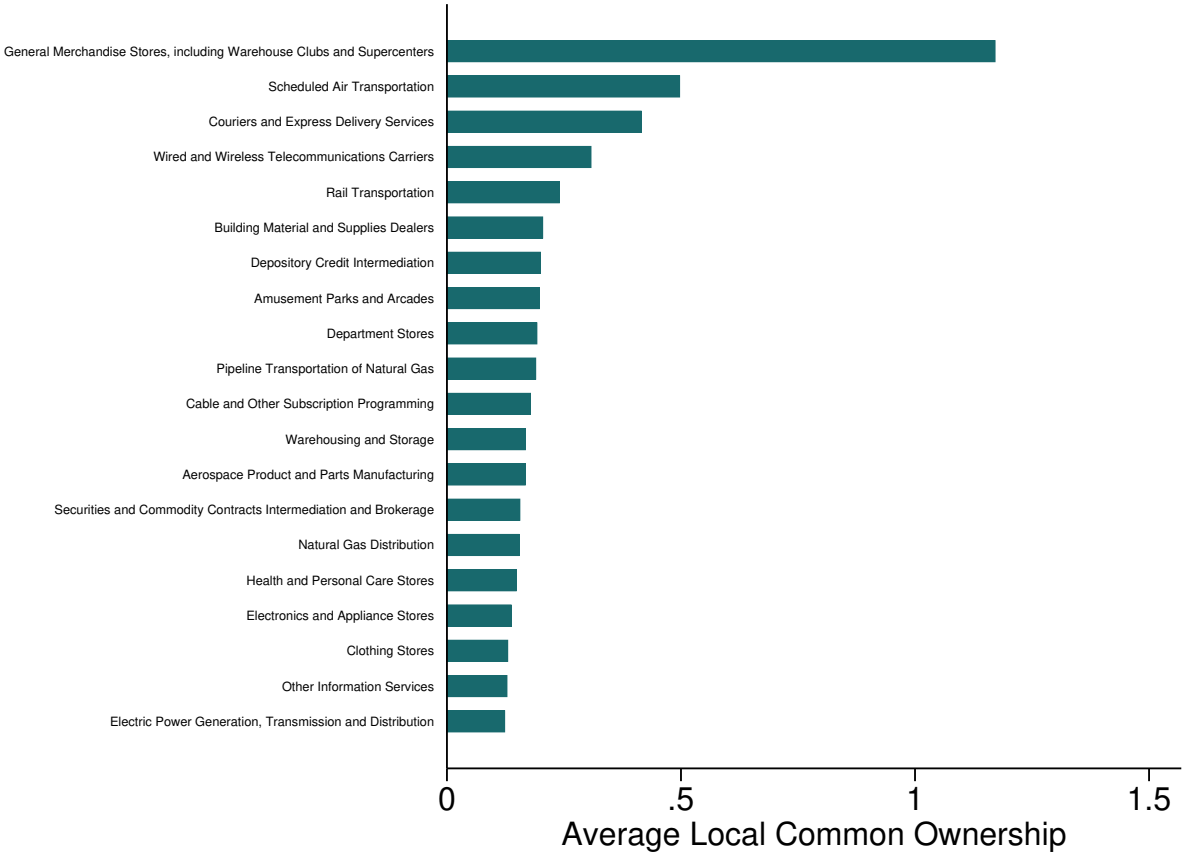


Figure III
Effect of S&P 500 Index Additions on Common Ownership of Local S&P 500 Incumbents

This figure reports the estimates of equation (III. .1) for common ownership at the local S&P 500 incumbent level. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

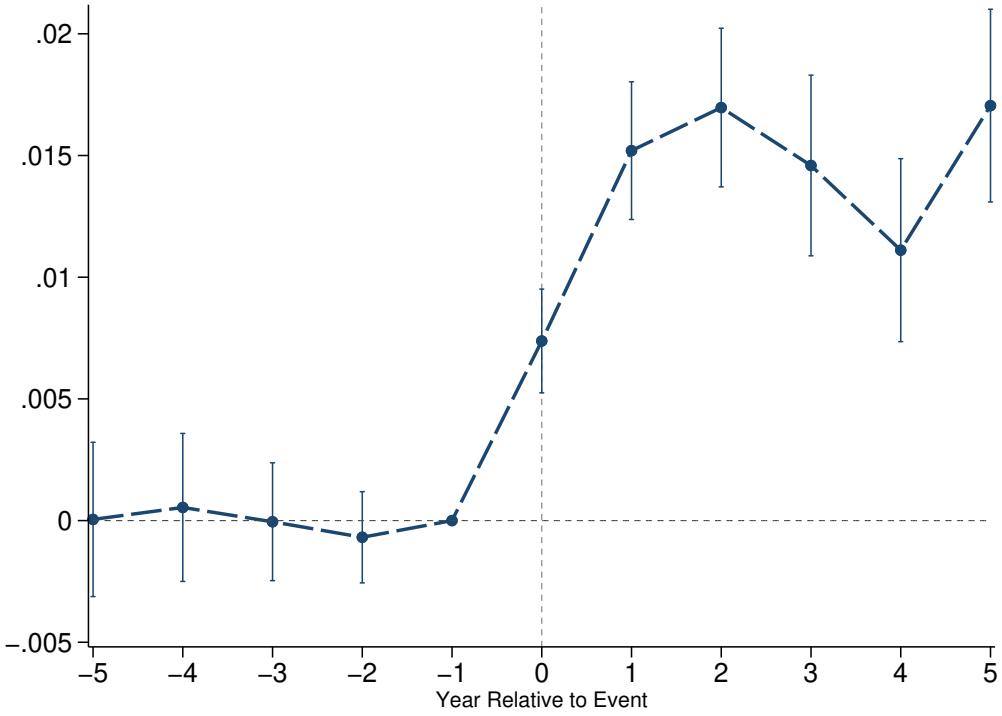


Figure IV
Effect of S&P 500 Index Additions on Employee Earnings of Local S&P 500 Incumbents

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

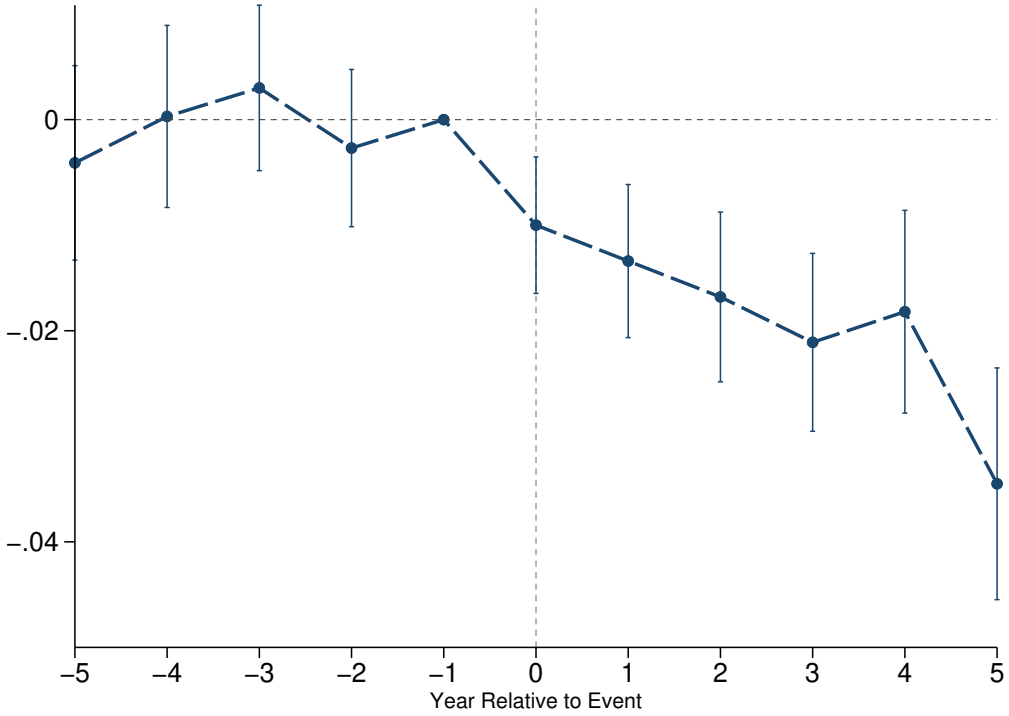
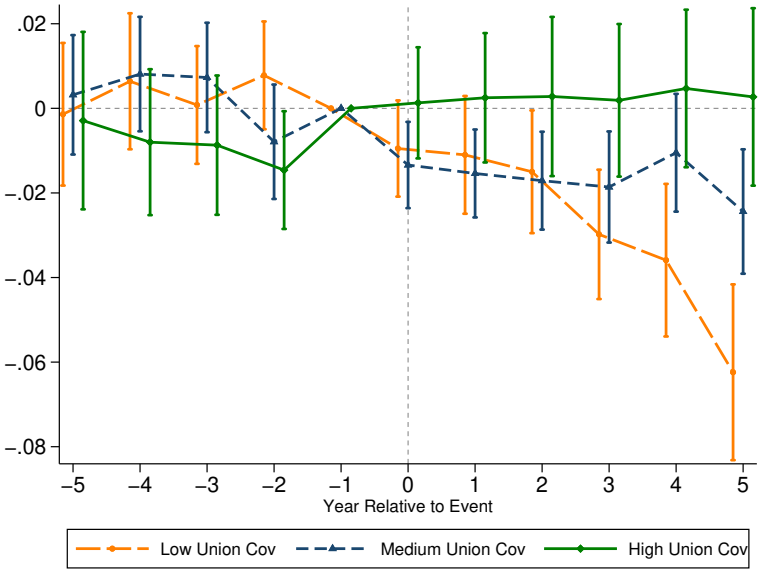


Figure V
Heterogeneous Earnings Effects by Worker Bargaining Power

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level by workers' bargaining power one year before treatment. In Panel (a), workers' bargaining power is proxied by the union coverage at the commuting zone×NAICS sector×year level. In Panel (b), workers' bargaining power is proxied by the non-enforceability index of noncompete agreements (NCAs) at the commuting zone×year level. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

(a) Union Coverage Rate



(b) NCA Enforceability Index

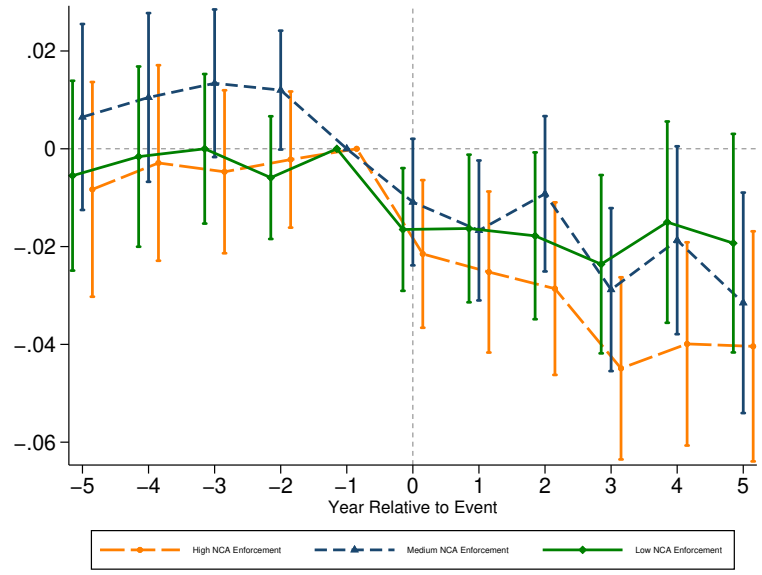


Figure VI
Heterogeneous Earnings Effects by Employment HHI

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level by local labor market-level employment HHI one year before treatment. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

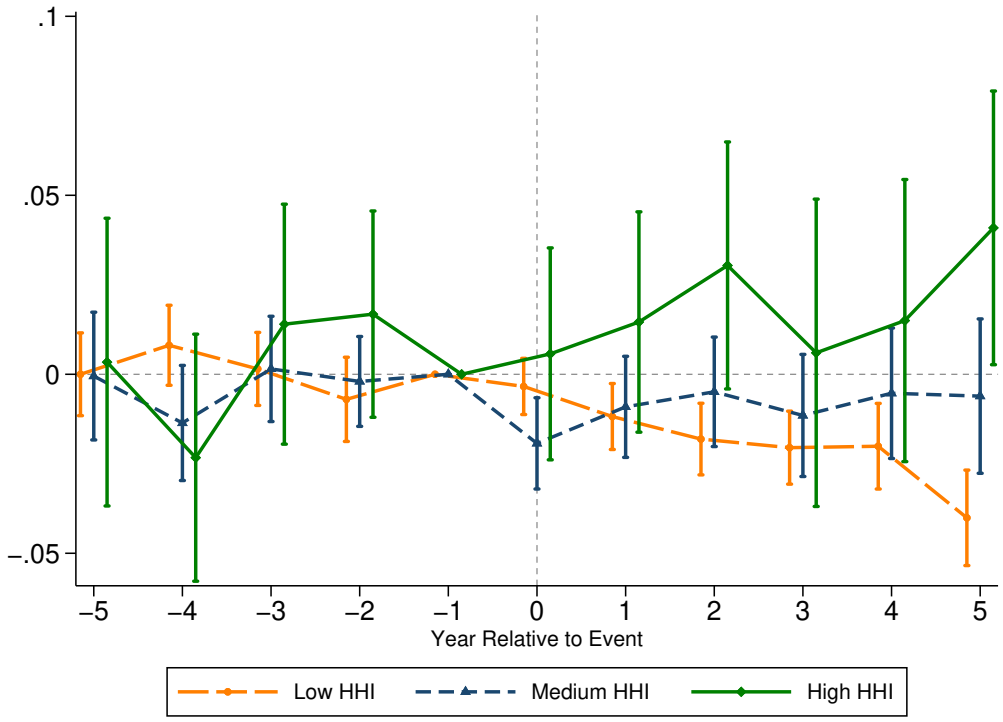


Figure VII
Effect of S&P 500 Index Additions on Employment of Local S&P 500 Incumbents

This figure reports the estimates of equation (III. .1) for the natural logarithm of employment at the local S&P 500 incumbent level. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

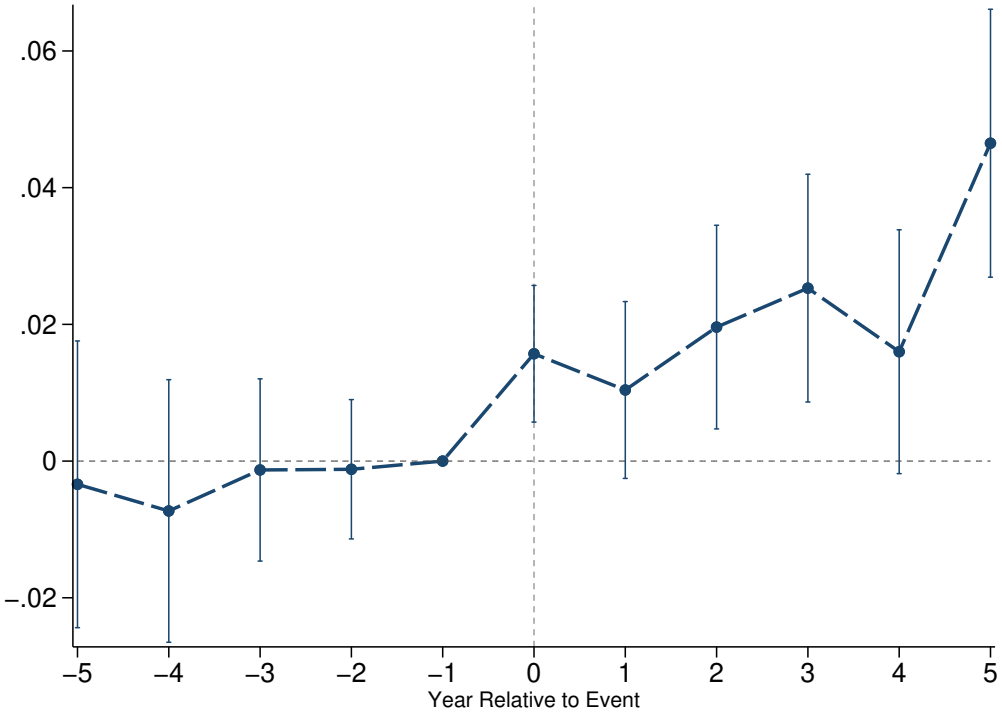


Figure VIII
Effect of S&P 500 Index Additions on Job Posting Rate of Local S&P 500 Incumbents

This figure reports the estimates of equation (III. .1) for the annual job posting rate at the local S&P 500 incumbent level. The job posting rate of a local firm is constructed from Lightcast data and is defined as the total number of unfilled job postings in a year divided by the pre-treatment average employment in a cohort of S&P 500 index addition event. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

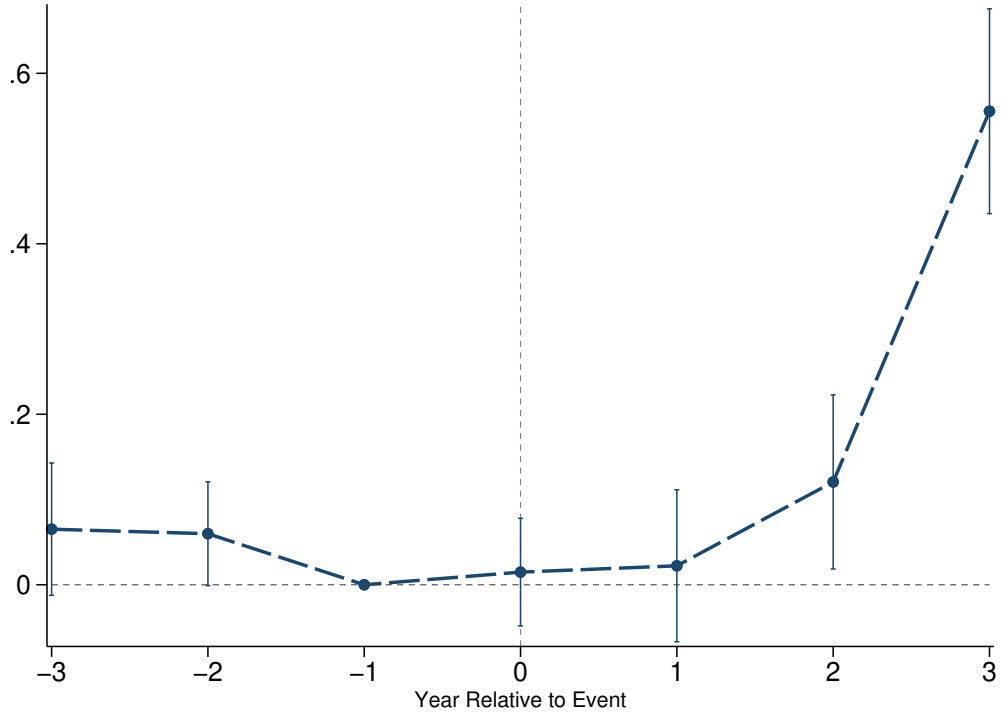


Figure IX
Effect of S&P 500 Index Additions on Number of Establishments of Local S&P 500 Incumbents

This figure reports the estimates of equation (III. .1) for the natural logarithm of the number of establishments at the local S&P 500 incumbent level. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

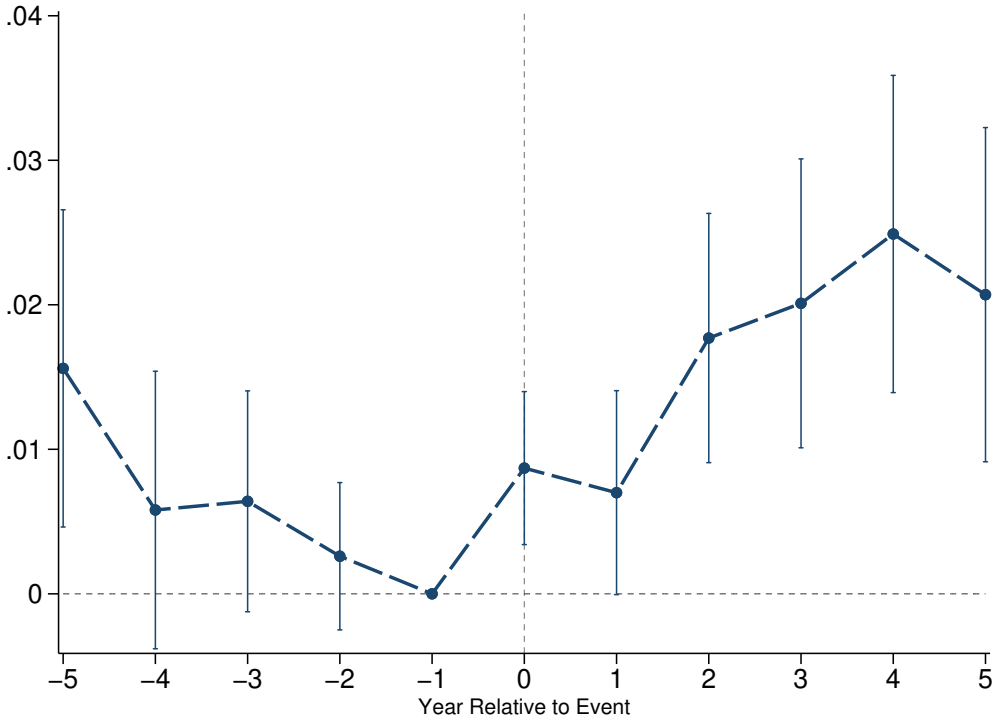


Table I
Summary Statistics

This table reports the means and standard deviations of main outcome variables for treated and control local S&P 500 incumbents one year prior to S&P 500 index addition events. The average annual earnings per employee is in 2018 dollars. Variable definitions are available in Table A.1. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	Treated		Control	
	Mean	Std.Dev.	Mean	Std.Dev.
Common Ownership	0.134	0.174	0.120	0.186
Annual Earnings per Employee ($000)	50.33	39.33	55.13	43.81
Total Employment	300	1300	277.3	1300
Number of Establishments	4.965	14.77	3.545	10.55

Table II
Effects of S&P 500 Index Additions on Common Ownership and Employee Earnings of Local S&P 500 Incumbents

This table reports the estimates of equations (III. .1) and (III. .2) for common ownership and average annual earnings per employee at the local S&P 500 incumbent level. In columns (1) and (2), the dependent variable is common ownership at the local S&P 500 incumbent level. In columns (3) and (4), the dependent variable is the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. Standard errors are clustered at the local labor market level. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	Common Ownership	Common Ownership	Log(Annual Earnings per per Employee)	Log(Annual Earnings per Employee)
	(1)	(2)	(3)	(4)
Treated×Post	0.0138***		-0.0183***	
	[0.0014]		[0.0033]	
Treated×Year(-5)		0.0000		-0.0041
		[0.0016]		[0.0047]
Treated×Year(-4)		0.0005		0.0003
		[0.0016]		[0.0044]
Treated×Year(-3)		-0.0000		0.003
		[0.0012]		[0.0040]
Treated×Year(-2)		-0.0007		-0.0027
		[0.0010]		[0.0038]
Treated×Year(0)		0.0074***		-0.0100***
		[0.0011]		[0.0033]
Treated×Year(+1)		0.0152***		-0.0134***
		[0.0014]		[0.0037]
Treated×Year(+2)		0.0170***		-0.0168***
		[0.0017]		[0.0041]
Treated×Year(+3)		0.0146***		-0.0211***
		[0.0019]		[0.0043]
Treated×Year(+4)		0.0111***		-0.0182***
		[0.0019]		[0.0049]
Treated×Year(+5)		0.0171***		-0.0345***
		[0.0020]		[0.0056]
Pair×Local Labor Firm FEs	✓	✓	✓	✓
Pair×Year FEs	✓	✓	✓	✓
Adjusted R^2	0.747	0.747	0.866	0.866
N	1,109,000	1,109,000	1,109,000	1,109,000

Table III
Heterogeneous Earnings Effects

This table reports the heterogeneous effects on average annual earnings per employee at the local S&P 500 incumbent level. Panels A and B report the results by worker bargaining power one year before treatment. In Panel A, worker bargaining power is proxied by the union coverage rate at the commuting zone×NAICS sector×year level. In Panel B, worker bargaining power is proxied by the non-enforceability index of noncompete agreements (NCAs) at the commuting zone×year level. In Panel A, columns (1)—(3) report the average treatment effect on treated for local labor markets falling in the bottom, medium, and top tercile of union coverage rate one year before treatment, respectively. In Panel B, columns (1)—(3) report the average treatment effect on treated for local labor markets in commuting zones falling in the top, medium, and bottom tercile of NCA enforceability index one year before treatment, respectively. Panel C reports the results by pre-treatment employment HHI in a local labor market. Columns (1)—(3) report the average treatment effect on treated for local labor markets falling in the bottom, medium, and top tercile of employment HHI one year before treatment, respectively. Standard errors are clustered at the local labor market level. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	Panel A: Union Coverage Rate		
	Low	Medium	High
	(1)	(2)	(3)
Treated×Post	-0.0300***	-0.0187***	0.0095
	[0.0060]	[0.0054]	[0.0060]
Pair×Local Firm FEs	✓	✓	✓
Pair×Year FEs	✓	✓	✓
Adjusted R^2	0.855	0.878	0.810
N	415,000	484,000	202,000
	Panel B: NCA Enforcement		
	High	Medium	Low
	(1)	(2)	(3)
Treated×Post	-0.0298***	-0.0278***	-0.0155**
	[0.0074]	[0.0069]	[0.0065]
Pair×Local Firm FEs	✓	✓	✓
Pair×Year FEs	✓	✓	✓
Adjusted R^2	0.834	0.842	0.854
N	245,000	264,000	258,000
	Panel C: Employment HHI		
	Low	Medium	High
	(1)	(2)	(3)
Treated×Post	-0.0195***	-0.0064	0.0166
	[0.0043]	[0.0061]	[0.0131]
Pair×Local Firm FEs	✓	✓	✓
Pair×Year FEs	✓	✓	✓
Adjusted R^2	0.861	0.861	0.817
N	843,000	228,000	38,500

Table IV
Effect of S&P 500 Index Additions on Employment of Local S&P 500 Incumbents

This table reports the estimates of equations (III. .1) and (III. .2) for the natural logarithm of employment at the local S&P 500 incumbent level. Columns (1) and (2) report the average and dynamic treatment effects, respectively. Standard errors are clustered at the local labor market level. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	Log(Employment)	Log(Employment)
	(1)	(2)
Treated×Post	0.0249***	
	[0.0076]	
Treated×Year(-5)		-0.0034
		[0.0107]
Treated×Year(-4)		-0.0073
		[0.0098]
Treated×Year(-3)		-0.0013
		[0.0068]
Treated×Year(-2)		-0.0012
		[0.0052]
Treated×Year(0)		0.0157***
		[0.0051]
Treated×Year(+1)		0.0104
		[0.0066]
Treated×Year(+2)		0.0196**
		[0.0076]
Treated×Year(+3)		0.0253***
		[0.0085]
Treated×Year(+4)		0.0160*
		[0.0091]
Treated×Year(+5)		0.0465***
		[0.0100]
Pair×Local Firm FEs	✓	✓
Pair×Year FEs	✓	✓
Adjusted R^2	0.926	0.926
N	1,109,000	1,109,000

Table V
Effect of S&P 500 Index Additions on Job Posting Rate of Local S&P 500 Incumbents

This table reports the estimates of equations (III. .1) and (III. .2) for job posting rate at the local S&P 500 incumbent level. Columns (1) and (2) report the average and dynamic treatment effects, respectively. The job posting rate of a local firm is constructed from Lightcast data and is defined as the total number of unfilled job postings divided in a year by the pre-treatment average employment in a cohort of S&P 500 index addition event. Standard errors are clustered at the local labor market level. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	Job Posting Rate	Job Posting Rate
	(1)	(2)
Treated×Post	0.1366***	
	[0.0359]	
Treated×Year(-3)		0.0652*
		[0.0396]
Treated×Year(-2)		0.0599*
		[0.0311]
Treated×Year(0)		0.0148
		[0.0322]
Treated×Year(+1)		0.0222
		[0.0455]
Treated×Year(+2)		0.1206**
		[0.0521]
Treated×Year(+3)		0.5555***
		[0.0613]
Pair-Local Labor Firm FEs	✓	✓
Pair-Year FEs	✓	✓
Adjusted R^2	0.756	0.758
N	37,500	37,500

Table VI

Effect of S&P 500 Index Additions on Number of Establishments of Local S&P 500 Incumbents

This table reports the estimates of equations (III. .1) and (III. .2) for the natural logarithm of the number of establishments at the local S&P 500 incumbent level. Columns (1) and (2) report the average and dynamic treatment effects, respectively. Standard errors are clustered at the local labor market level. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	Log(Number of Establishments)	Log(Number of Establishments)
	(1)	(2)
Treated×Post	0.0105**	
	[0.0045]	
Treated×Year(-5)		0.0156***
		[0.0056]
Treated×Year(-4)		0.0058
		[0.0049]
Treated×Year(-3)		0.0064
		[0.0039]
Treated×Year(-2)		0.0026
		[0.0026]
Treated×Year(0)		0.0087***
		[0.0027]
Treated×Year(+1)		0.0070**
		[0.0036]
Treated×Year(+2)		0.0177***
		[0.0044]
Treated×Year(+3)		0.0201***
		[0.0051]
Treated×Year(+4)		0.0249***
		[0.0056]
Treated×Year(+5)		0.0207***
		[0.0059]
Pair×Local Firm FEs	✓	✓
Pair×Year FEs	✓	✓
Adjusted R^2	0.894	0.894
N	1,109,000	1,109,000

Table VII
Heterogeneous Employment Effects by Unemployment Rate

This table reports the heterogeneous effects on employment of local S&P 500 Incumbents by commuting zone-level unemployment rate one year before treatment. The dependent variable is the natural logarithm of employment at the local S&P 500 incumbent level. Columns (1)—(3) report the average treatment effect on treated for local labor markets in commuting zones falling in the top, medium, and bottom tercile of the unemployment rate one year prior to treatment, respectively. Standard errors are clustered at the local labor market level. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	High	Medium	Low
	(1)	(2)	(3)
Treated×Post	0.0466***	0.0232*	-0.0016
	[0.0165]	[0.0138]	[0.0163]
Pair×Local Firm FEs	✓	✓	✓
Pair×Year FEs	✓	✓	✓
Adjusted R^2	0.917	0.920	0.924
N	211,000	340,000	233,000

Appendix Figures and Tables

Figure A.1
Effects of S&P 500 Index Additions on Total Institutional Ownership of S&P 500 Incumbents

This figure reports the effect of S&P 500 index additions on the total institutional ownership of S&P 500 incumbents in the same industry (4-digit CRSP SIC code). The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the 4-digit CRSP SIC code level.

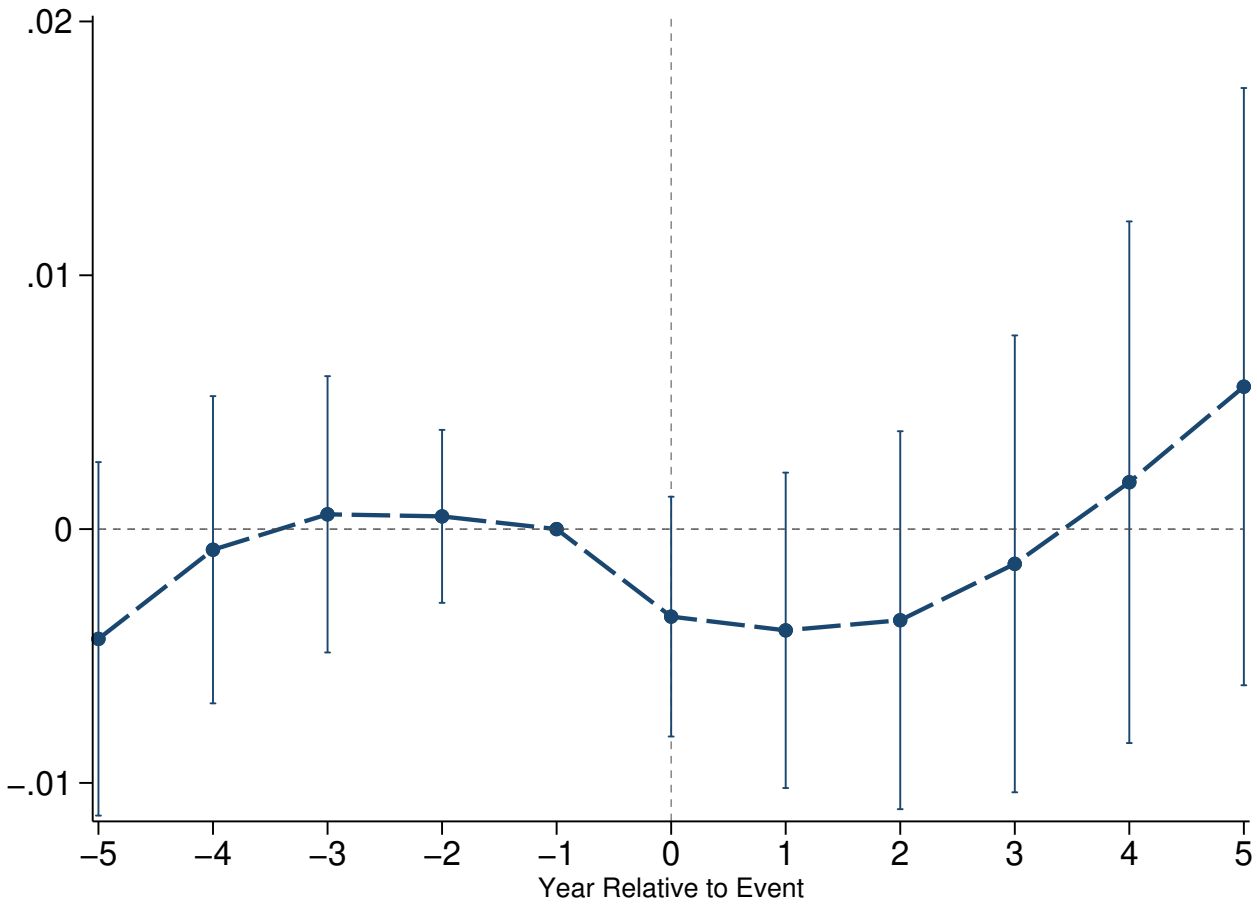


Figure A.2
Effects of S&P 500 Index Additions on Top 1 Institutional Ownership of S&P 500 Incumbents

This figure reports the effect of S&P 500 index additions on the Top 1 institutional ownership of S&P 500 incumbents in the same industry (4-digit CRSP SIC code). The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the 4-digit CRSP SIC code level.

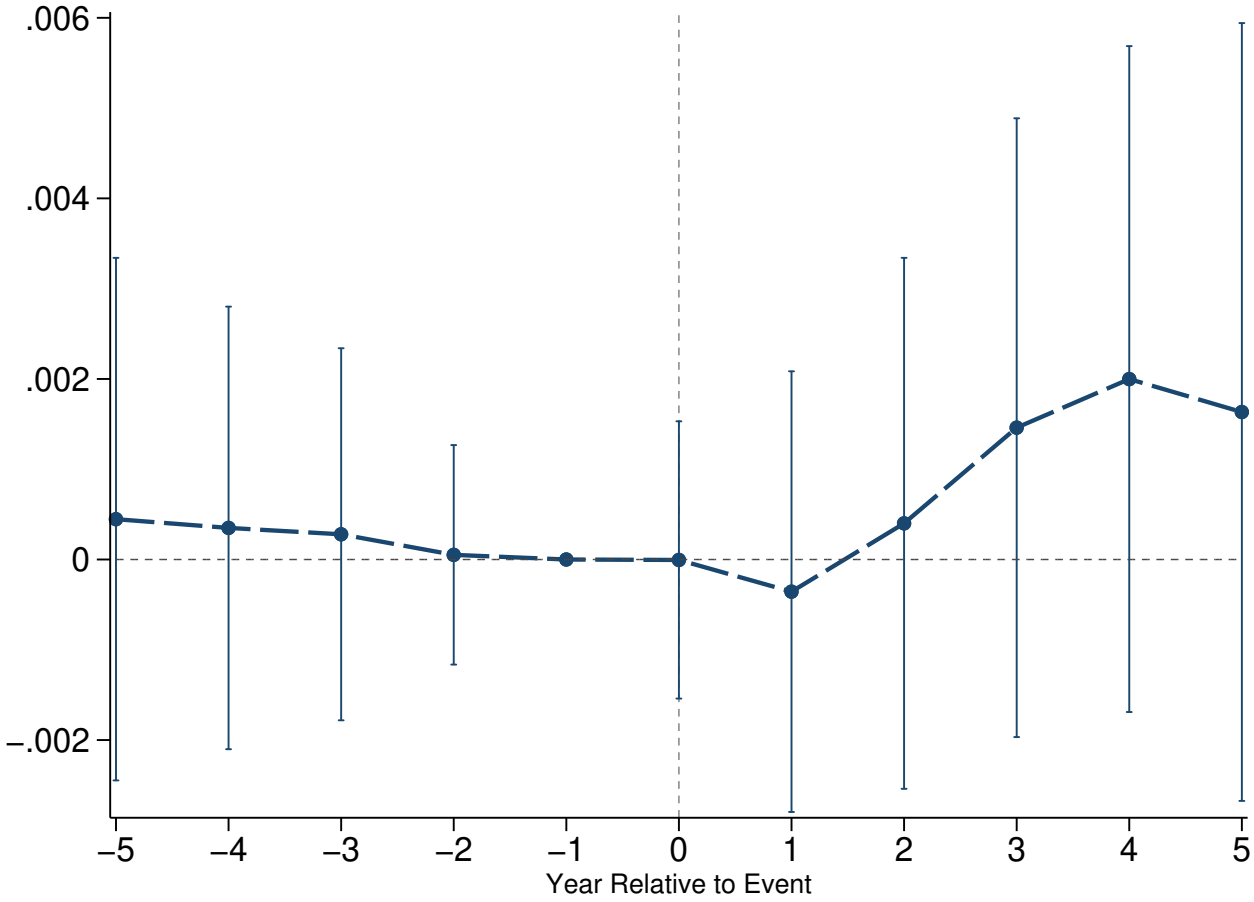


Figure A.3
Robustness: Include Commuting Zone and 2-digit NAICS Fixed Effects

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. Compared to the baseline estimations, we further include commuting zone and 2-digit NAICS code fixed effects when estimating propensity scores. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

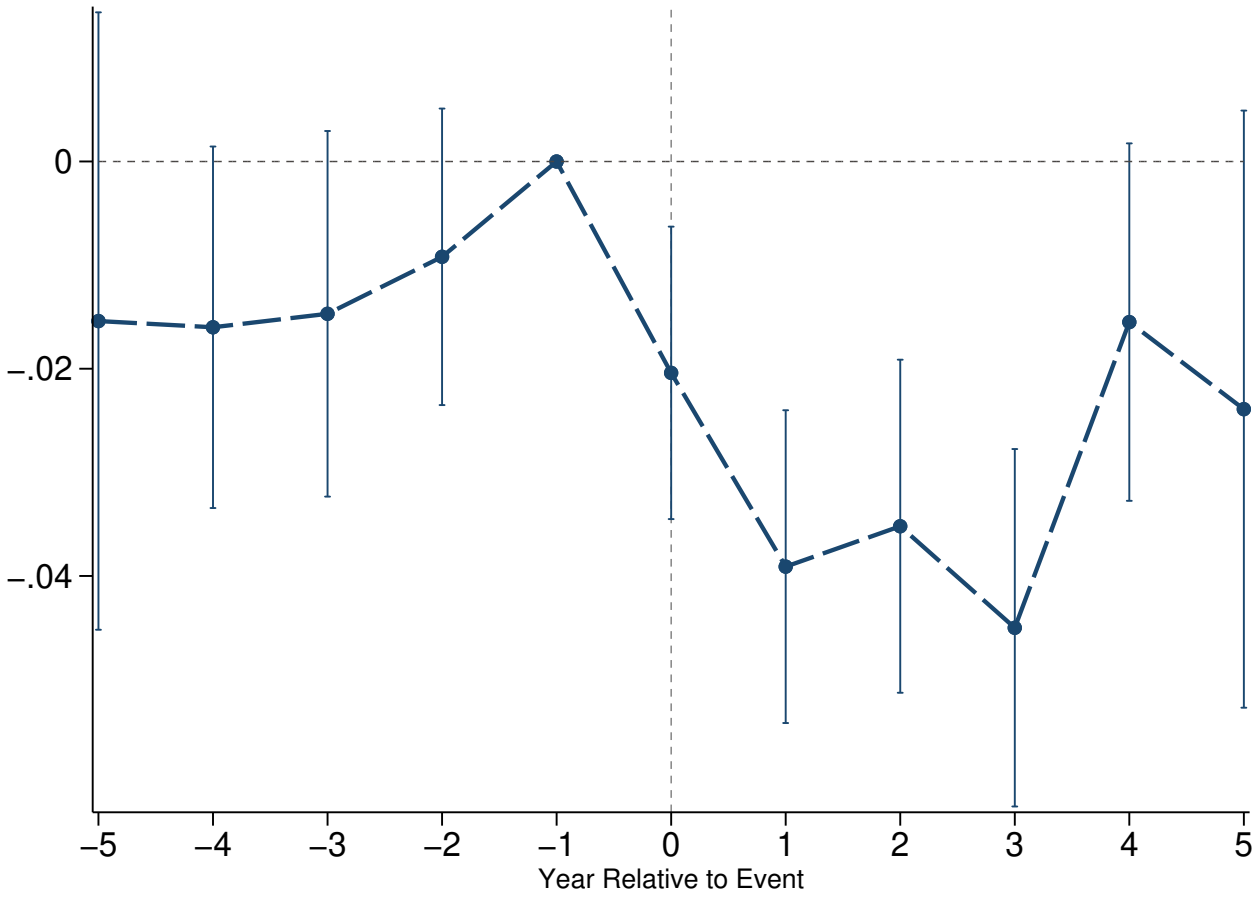


Figure A.4
Robustness: Include Additional Covariates

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 level. Compared to the baseline estimations, we further include the pre-treatment averages of demographics (shares of females, whites, blacks, people with ages between 20 and 24, between 45 and 64, and greater than or equal to 65) and the natural logarithm of income per capita at the CZ level and the pre-treatment averages of total institutional ownership and top 1 institutional ownership when estimating propensity scores. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

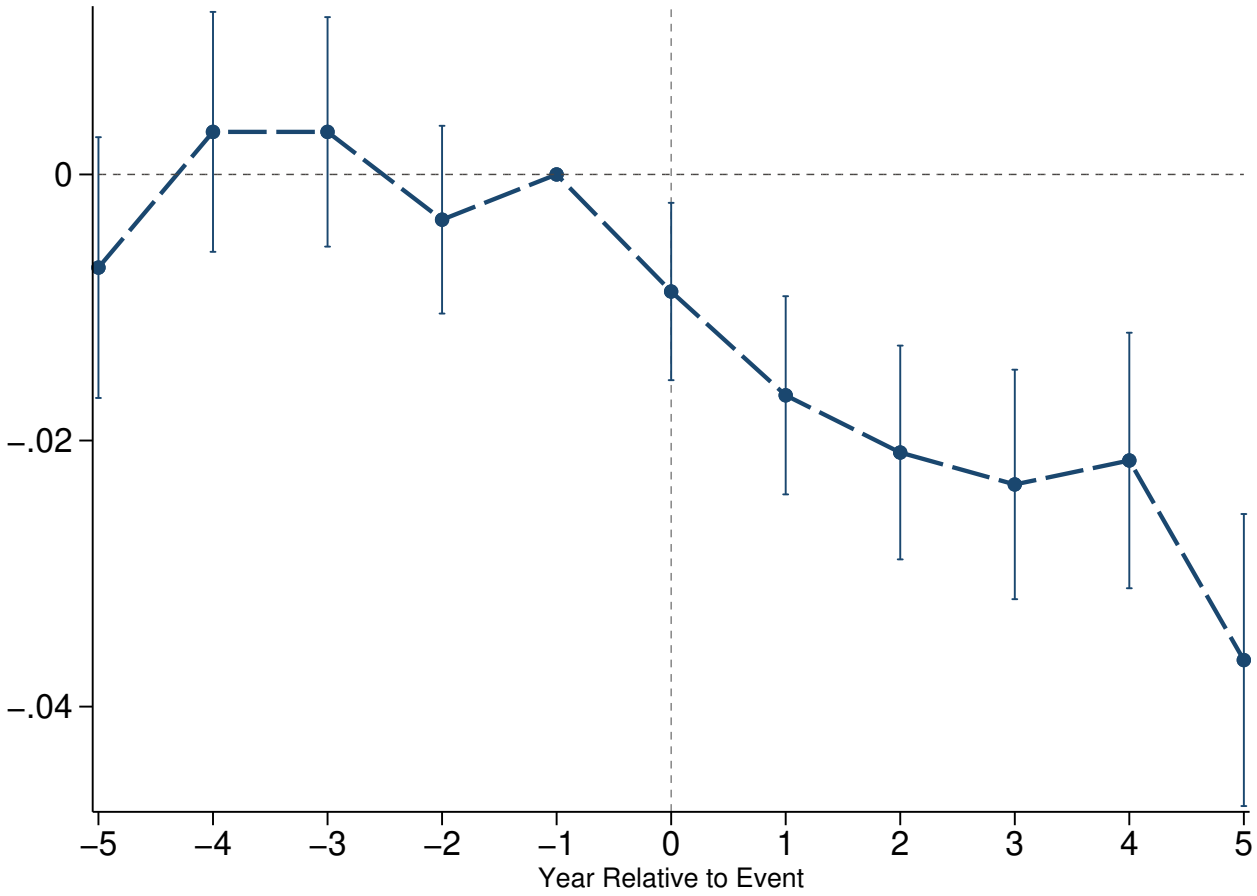
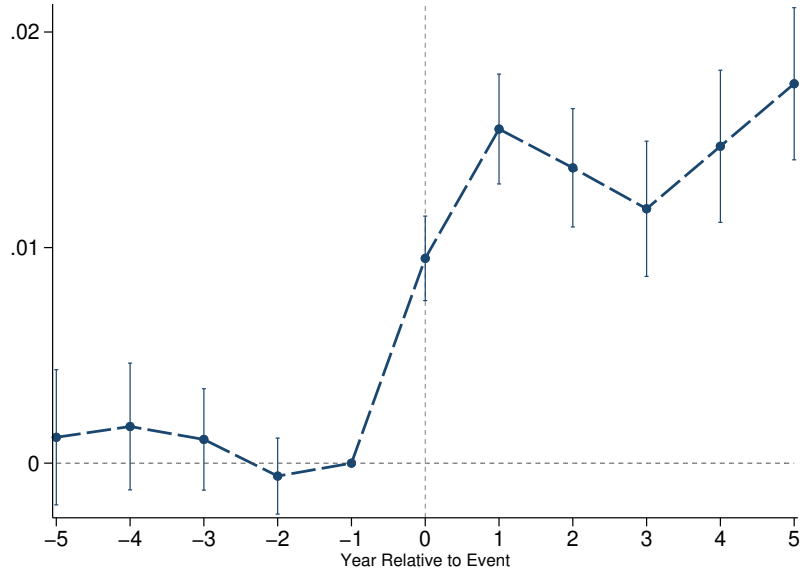


Figure A.5
Robustness: Backus, Conlon and Sinkinson (2021b) Data

This figure reports the estimates of equation (III. .1) for common ownership in Panel (a) and the natural logarithm of average annual earnings per employee in Panel (b) at the local S&P 500 incumbent level. Compared to the baseline estimations, we replace the institutional ownership data between the first quarter of 1999 and the third quarter of 2017 with the data from Backus, Conlon and Sinkinson (2021b). The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

(a) Common Ownership



(b) Log(Annual Earnings per Employee)

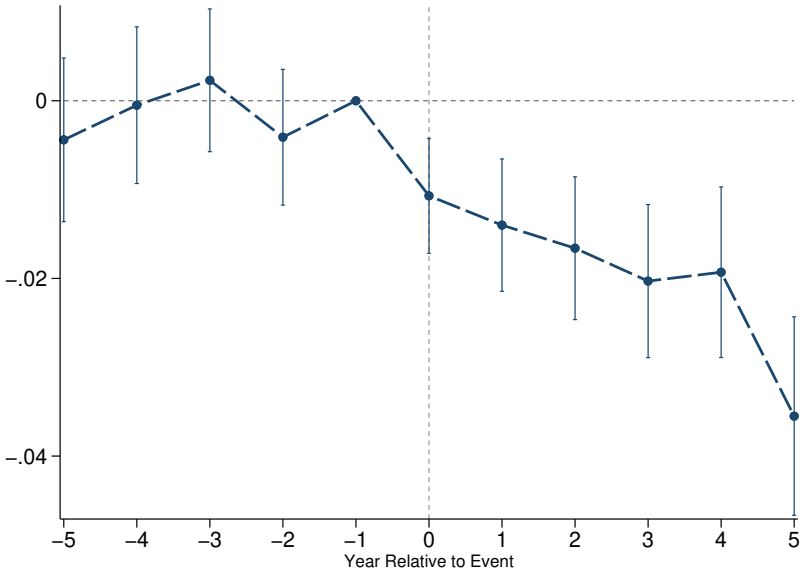
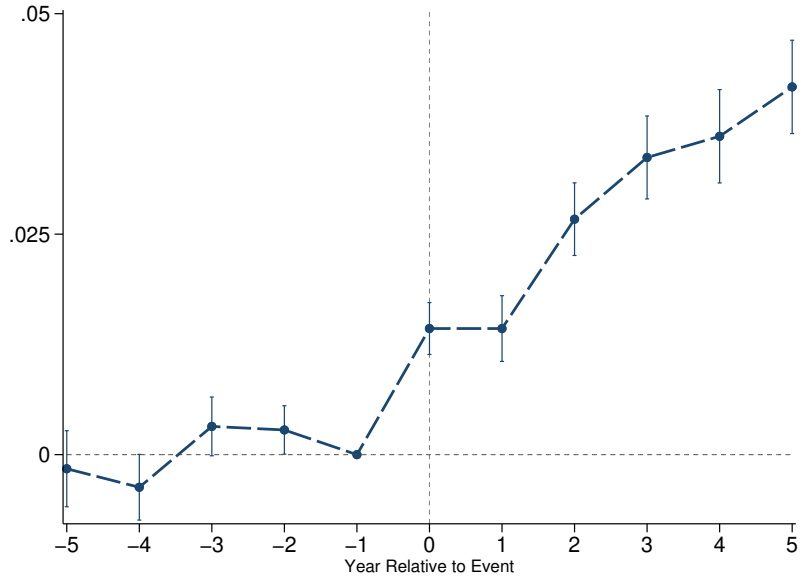


Figure A.6
Robustness: Gilje, Gormley and Levit (2020) Common Ownership Measure

This figure reports the estimates of equation (III. .1) for GGL common ownership measure in Panel (a) and the natural logarithm of average annual earnings per employee in Panel (b) at the local S&P 500 incumbent level. Compared to the baseline estimations, we use the common ownership proposed in Gilje, Gormley and Levit (2020). The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

(a) Common Ownership



(b) Log(Annual Earnings per Employee)

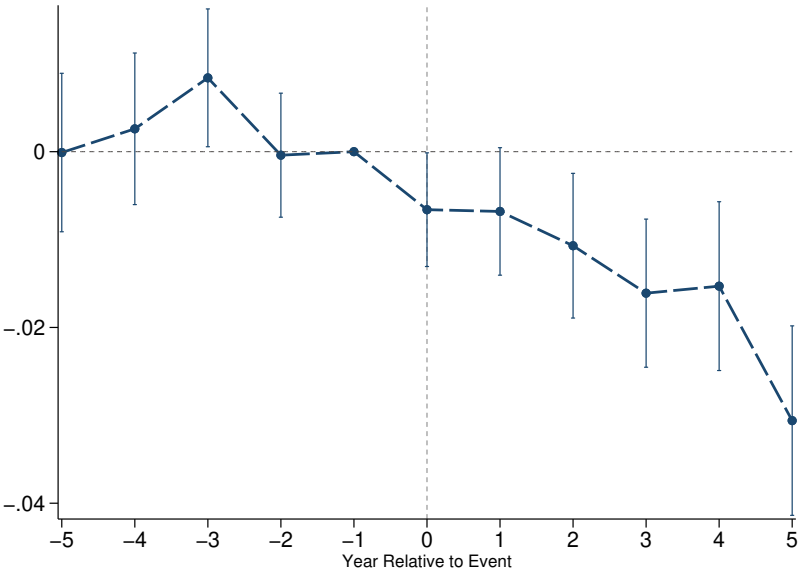


Figure A.7
Robustness: Match to Five Local Control S&P 500 Incumbents

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. For each cohort of S&P 500 index addition event, we match each treated local S&P 500 incumbent to five control local S&P 500 incumbents with the closest propensity scores. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

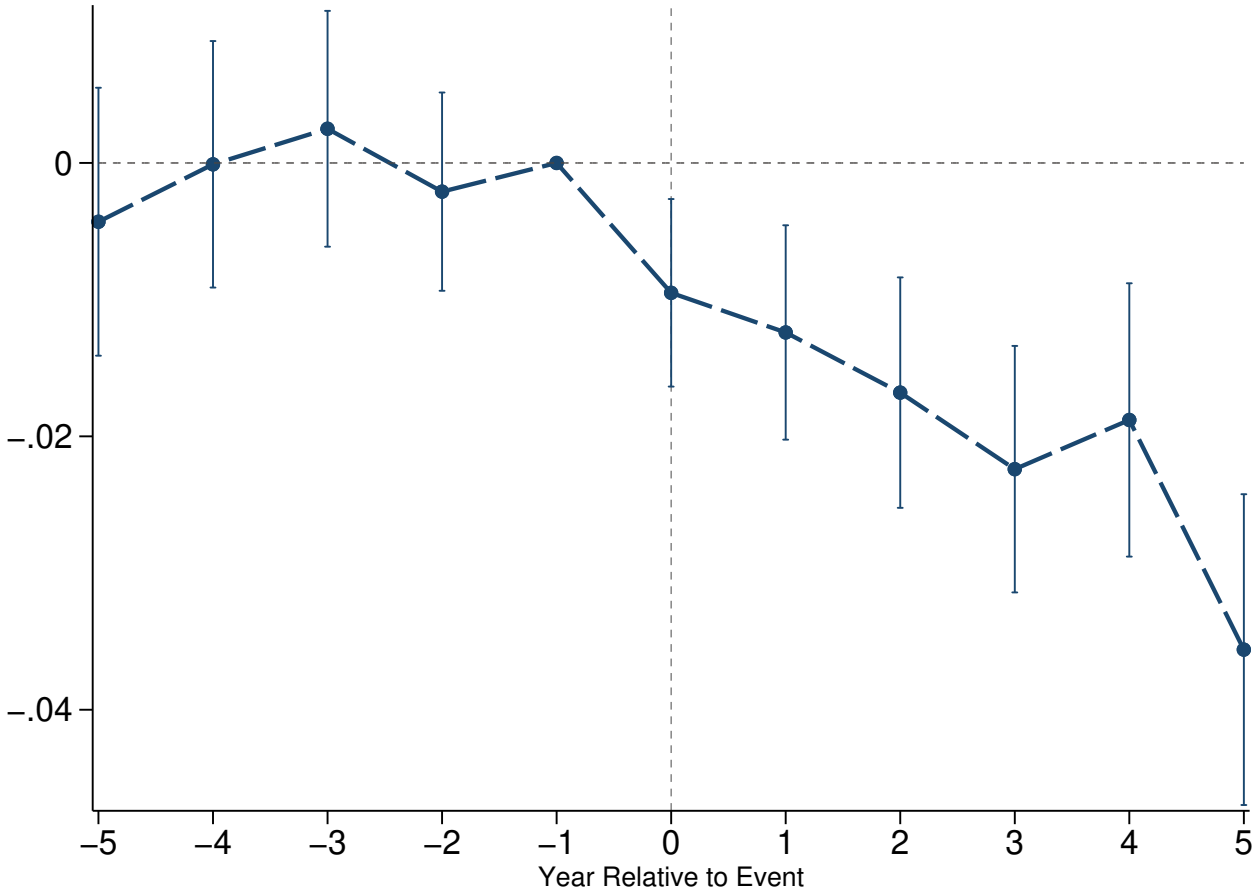


Figure A.8
Robustness: Match to Fifteen Local Control S&P 500 Incumbents

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. For each cohort of S&P 500 index addition event, we match each treated local S&P 500 incumbent to fifteen control local S&P 500 incumbents with the closest propensity scores. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

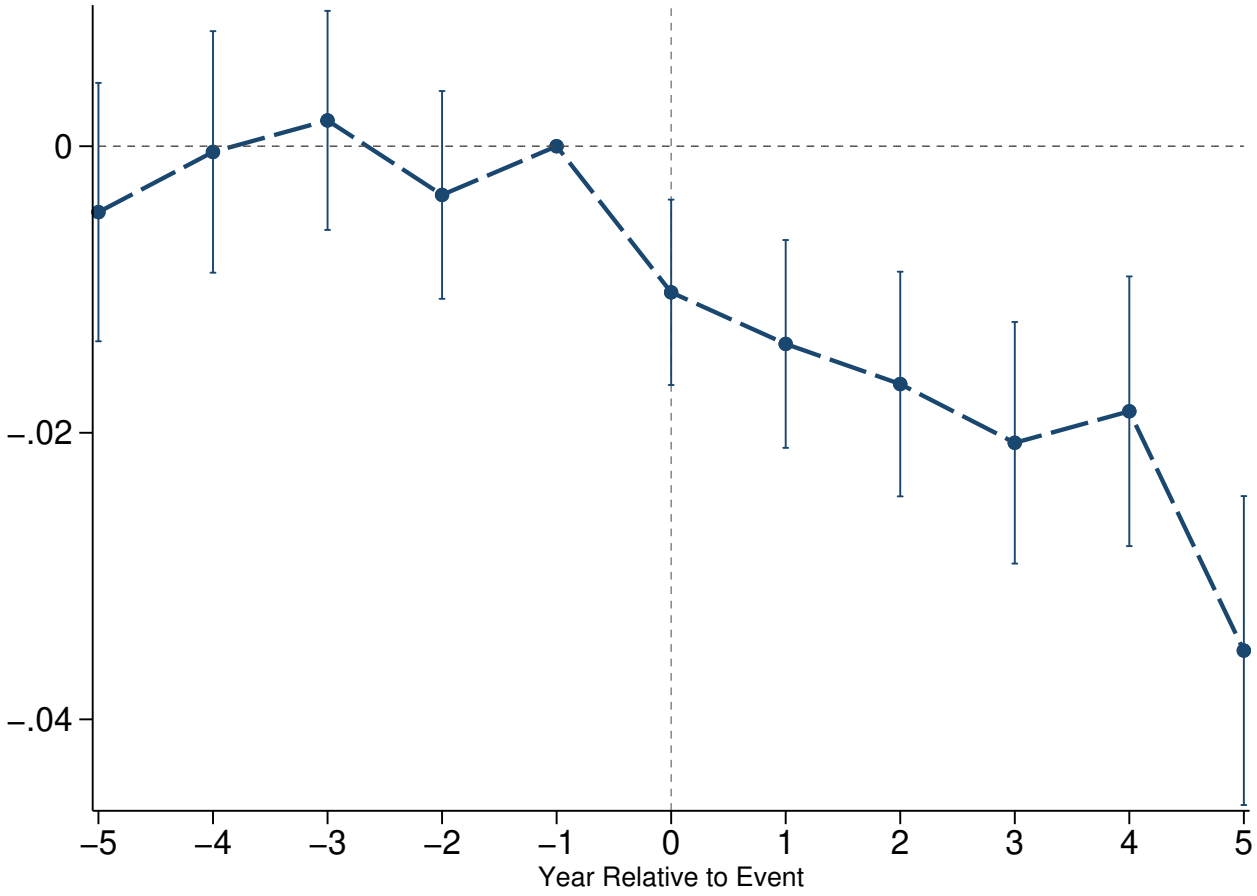


Figure A.9
Robustness: Leave Trends between t-2 and t-1 Unmatched

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. Compared to the baseline estimations, we leave the change in common ownership, the change in the natural logarithm of employee earnings, the change in the natural logarithm of employment, and the change in the natural logarithm of the number of establishments in a local firm between years t-2 and t-1 as unmatched. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

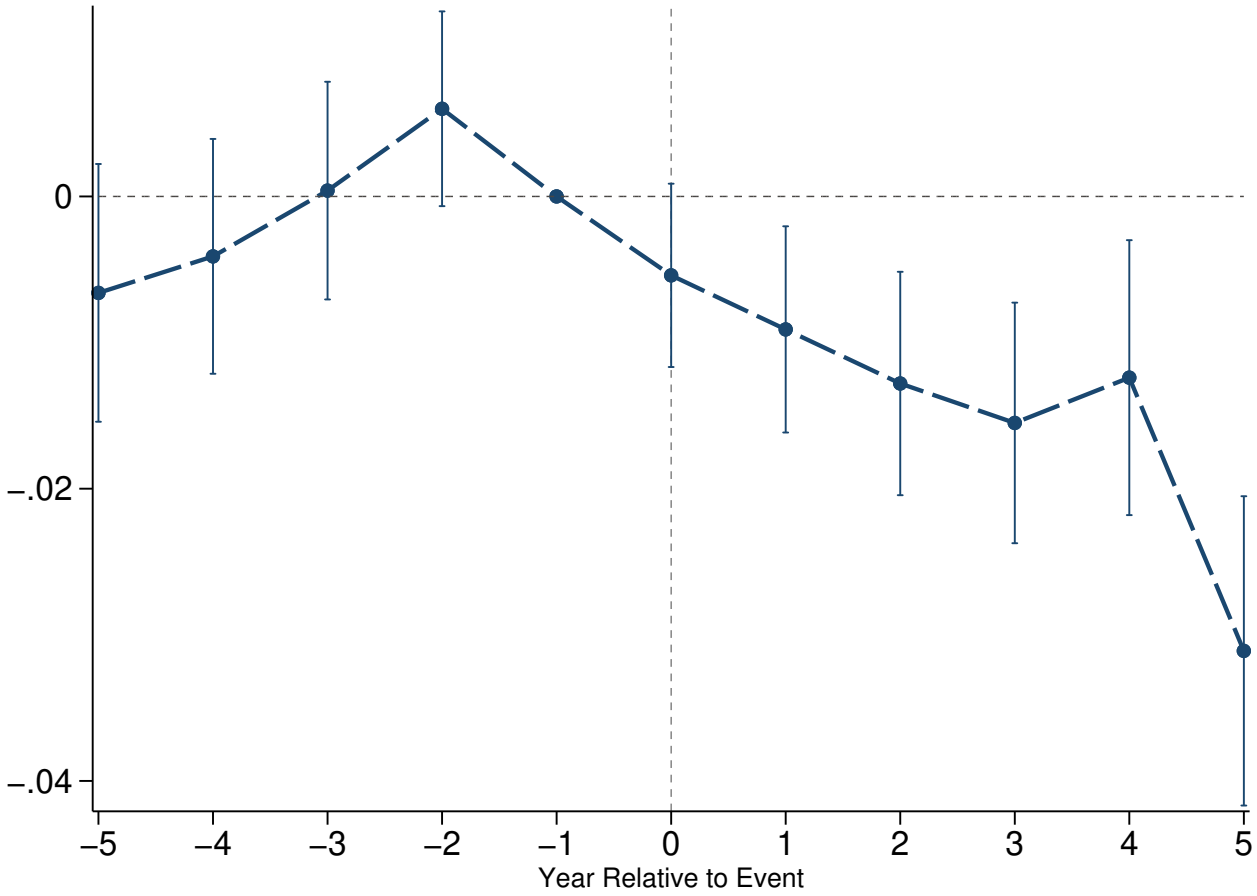


Figure A.10
Robustness: Establishment-Level Analysis

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. Compared to the baseline estimations, we conduct analyses at the establishment level. The bars around point estimates represent 95% confidence intervals, and they are based on standard errors clustered at the local labor market level.

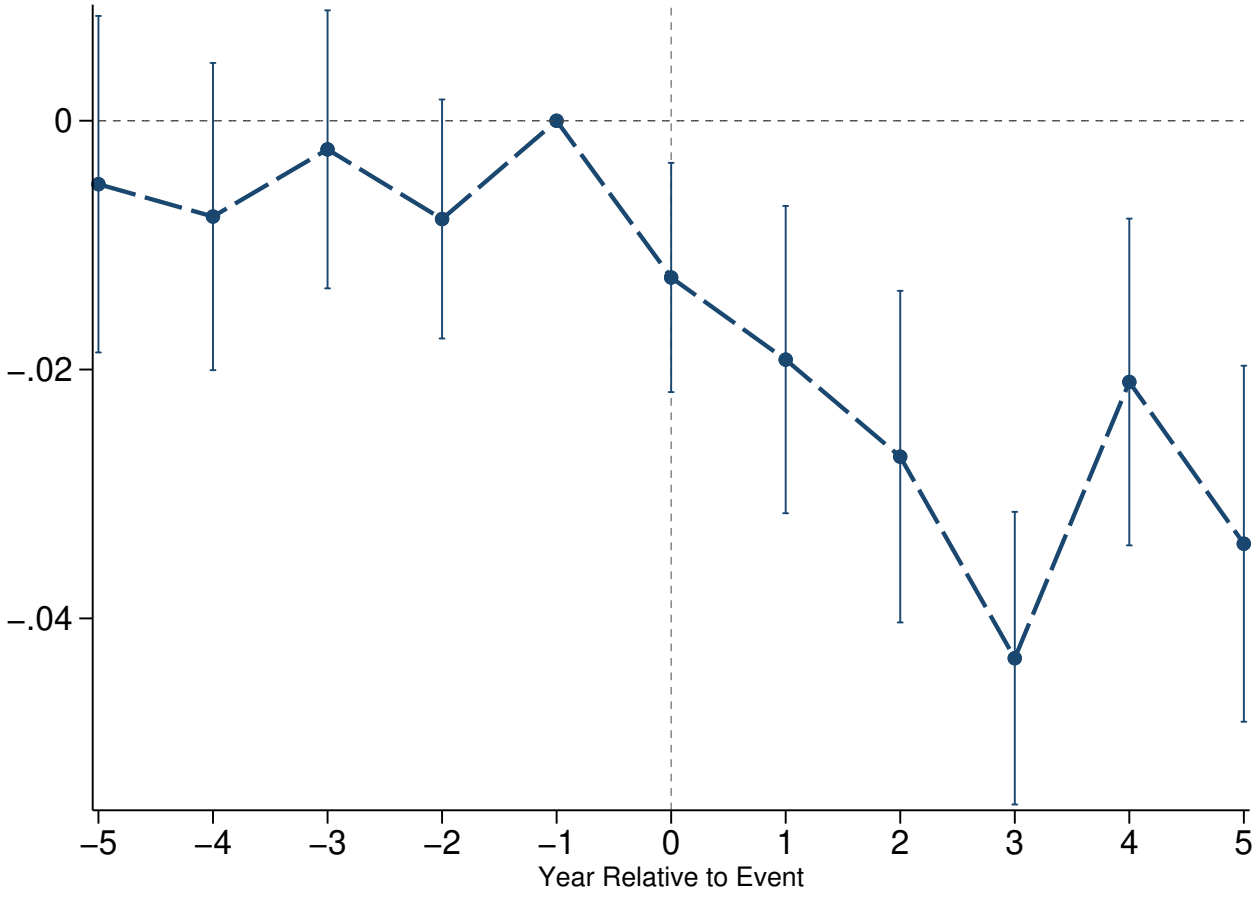


Figure A.11
Robustness: Synthetic Difference-in-Differences

This figure reports the estimates of equation (III. .1) for the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. Compared to the baseline estimations, we estimate the effects using the synthetic difference-in-differences estimator in Arkhangelsky, Athey, Hirshberg, Imbens and Wager (2021). The bars around point estimates represent 95% confidence intervals, and they are based on bootstrapped standard errors with 300 re-samplings.

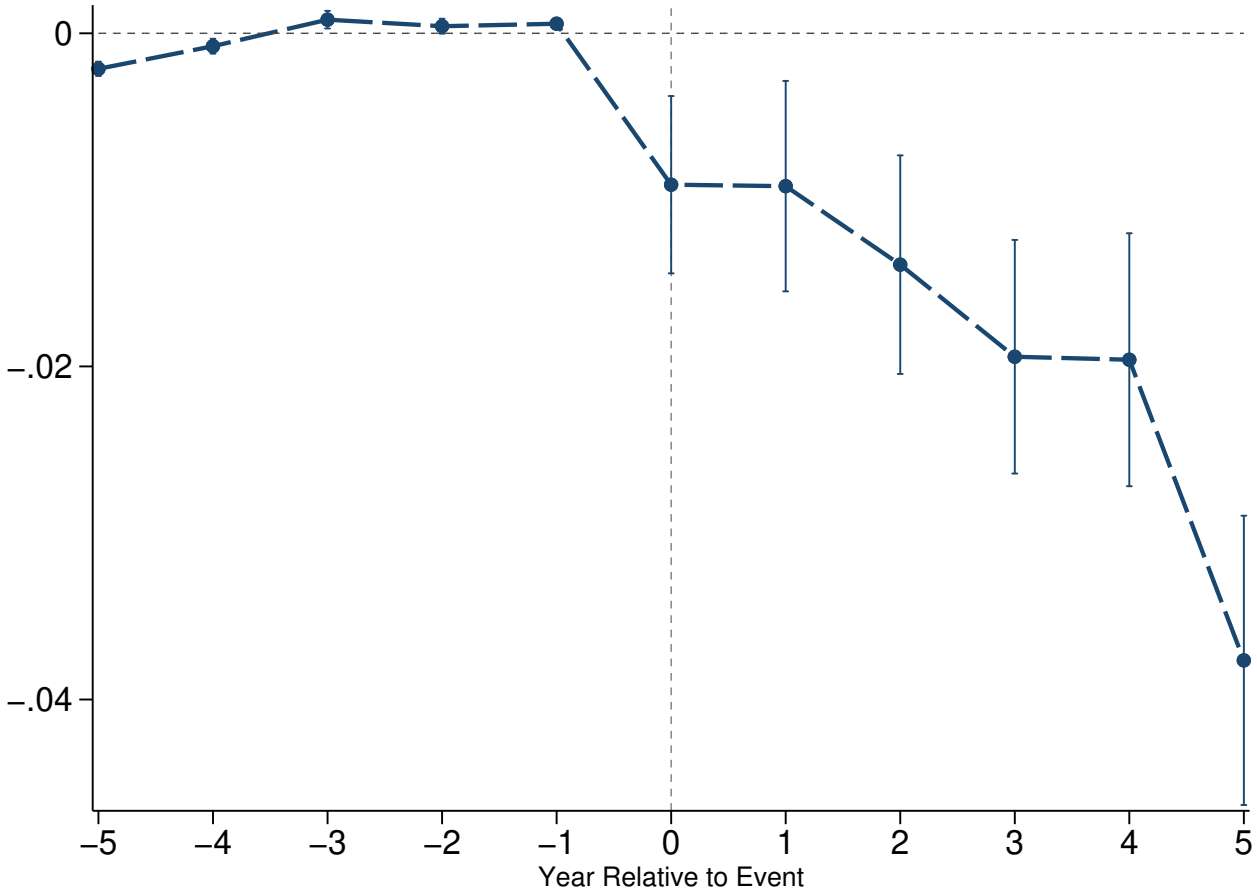
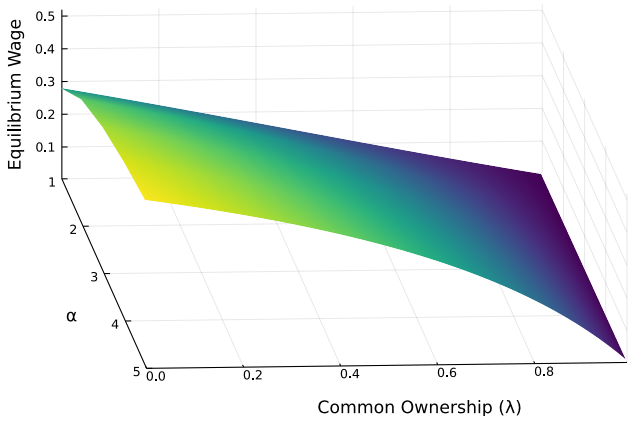
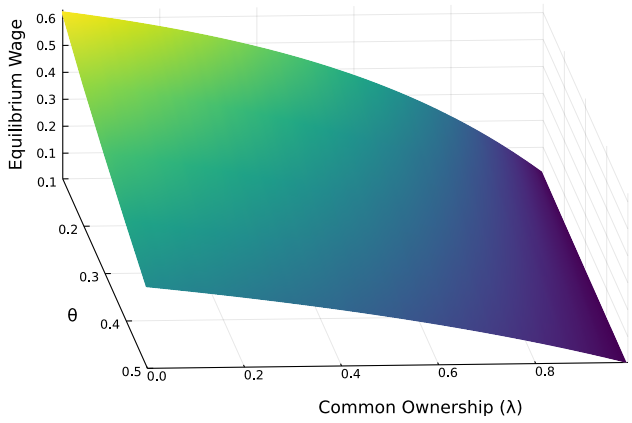


Figure A.12
Theoretical Effect of Common Ownership on Wages, Recruitment Intensity, and Employment

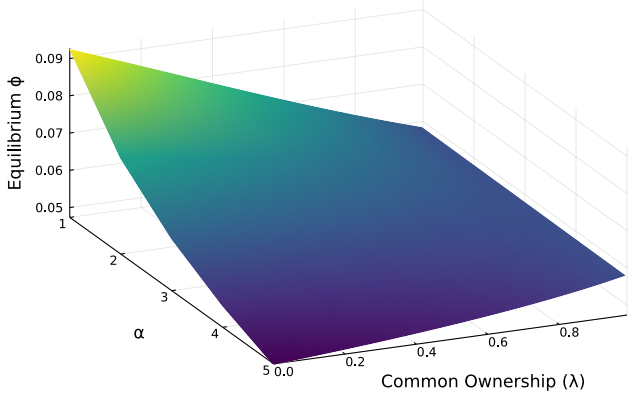
This figure shows the solution to the model for the following parameter values: number of firms $J = 20$, marginal product of labor $A = 1$ (as a normalization), cost of recruitment intensity parameter $\theta = 0.3$ (in the varying α case), and wage sensitivity parameter $\alpha = 3$ (in the varying θ case). The common ownership parameter λ ranges from 0 to 1.



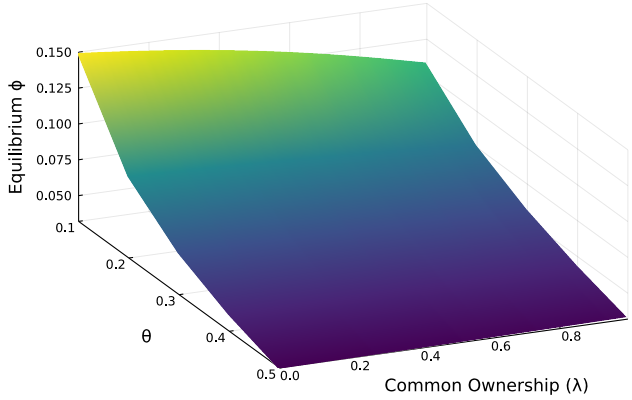
(a) Equilibrium Wage (Varying α)



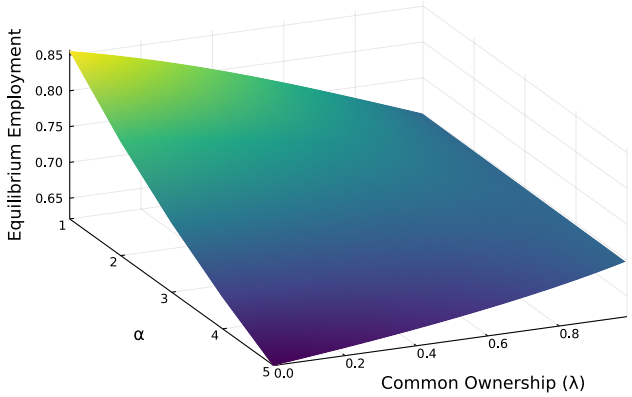
(b) Equilibrium Wage (Varying θ)



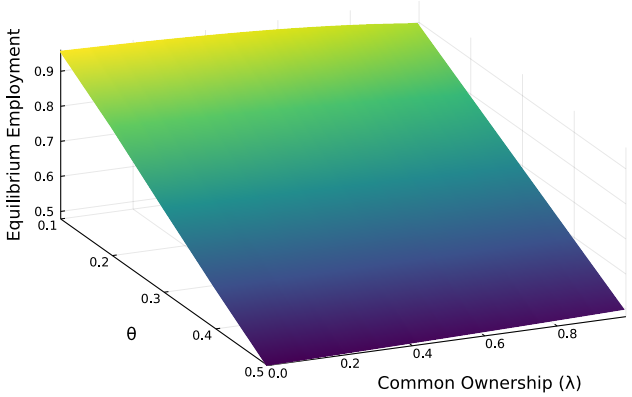
(c) Equilibrium Recruitment Intensity ϕ (Varying α)



(d) Equilibrium Recruitment Intensity ϕ (Varying θ)



(e) Equilibrium Employment (Varying α)



(f) Equilibrium Employment (Varying θ)

Table A.1
Variable Definitions

Variable	Definition
Common Ownership	Common ownership at the local firm level. *Source:* Longitudinal Business Database (LBD) and institutional ownership data from Thomson Reuters 13F Database and Ben-David et al. (2021).
Log(Annual Earnings per Employee)	The natural logarithm of average annual earnings per employee at the local firm level. *Source:* Longitudinal Business Database (LBD).
Log(Employment)	The natural logarithm of employment at the local firm level. *Source:* Longitudinal Business Database (LBD).
Log(Number of Establishments)	The natural logarithm of the number of establishments at the local firm level. *Source:* Longitudinal Business Database (LBD).
Job Posting Rate	The total number of unfilled job postings divided by the pre-treatment average employment at the local firm level in each cohort of S&P 500 index additions. *Source:* Longitudinal Business Database (LBD) and Lightcast.
Union Coverage Rate	The union coverage rate at the commuting zone×NAICS sector×year level. For each year, we first use data from CPS and estimate the union coverage rate at the State×NAICS sector level weighted by CPS earner weights. We then calculate the union coverage rate at the commuting zone×NAICS sector level as the average union coverage rates at the State×NAICS sector level weighted by the population share of each state in the commuting zone (measured in year 2000). *Source:* County-level Census Gazetteer files and IPUMS-CPS.
NCA Enforceability Index	The NCA enforceability index at the commuting zone level. The average NCA enforceability index of all the states in the CZ weighted by the state population share in the commuting zone (measured in year 2000). *Source:* County-level Census Gazetteer files and Marx (2022).
Employment HHI	Employment Herfindahl-Hirschman Index (HHI) at the commuting zone×NAICS sector×year level. *Source:* Longitudinal Business Database (LBD).
Unemployment Rate	Unemployment rate at the commuting zone×year level. *Source:* County-level data from Local Area Unemployment Statistics (LAUS) program through the Bureau of Labor Statistics (BLS).

Table A.2
Robustness Checks

This table reports the average treatment effects on treated of robustness tests based on equation (III. .2). The dependent variable is the natural logarithm of average annual earnings per employee at the local S&P 500 incumbent level. Column (1) reports the baseline estimation. In column (2), we include commuting zone and 2-digit NAICS fixed effects when estimating propensity scores. In column (3), we include additional covariates when estimating propensity scores. The covariates include the pre-treatment averages of demographics (shares of females, whites, blacks, people with ages between 20 and 24, between 45 and 64, and greater than or equal to 65) and the natural logarithm of income per capita at the commuting zone level as well as the pre-treatment averages of total institutional ownership and top 1 institutional ownership. In column (4), we replace the institutional ownership data between the first quarter of 1999 and the third quarter of 2017 with the data from Backus, Conlon and Sinkinson (2021b). In column (5), we use the common ownership proposed in Gilje, Gormley and Levit (2020). In columns (6) and (7), we match each treated local S&P 500 incumbent in each cohort of S&P 500 index addition event to five and fifteen control local S&P 500 incumbents with the closest estimated propensity scores, respectively. In column (8), for a cohort of S&P 500 index addition event in year t, we leave the change in common ownership, the change in the natural logarithm of average annual earnings per employee, the change in the natural logarithm of total employment, and the change in the natural logarithm of the number of establishments in a local firm between $t-2$ and $t-1$ unmatched. In column (9), we perform the analysis at the establishment level. In column (10), we estimate the effects using the synthetic difference-in-differences estimator in Arkhangelsky, Athey, Hirshberg, Imbens and Wager (2021). Standard errors in columns (1)—(9) are clustered at the local labor market level. The standard error in column (10) is based on bootstraps with 300 re-samplings. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	Baseline	CZ and NAICS2 Fixed Effects	Additional Covariates	Backus et al. Data	GGL Measure	Matched to 5 Controls	Matched to 15 Controls	Leave Trends bwt t-2 and t-1 Unmatched	Establishment Level	Synth DiD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treated×Post	-0.0183***	-0.0188***	-0.0205***	-0.0181***	-0.0165***	-0.0185***	-0.0178***	-0.0135***	-0.0216***	-0.0200***
	[0.0033]	[0.0063]	[0.0033]	[0.0033]	[0.0033]	[0.0033]	[0.0032]	[0.0031]	[0.0054]	[0.0028]
Pair×Local Firm FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Pair×Year FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Adjusted R^2	0.866	0.821	0.865	0.863	0.868	0.866	0.866	0.869	0.841	
N	1,109,000	1,108,000	1,107,000	1,109,000	1,109,000	605,000	1,613,000	1,109,000	3,313,000	2,932,000

Table A.3
Heterogeneous Earnings Effects by Unemployment Rate

This table reports the heterogeneous effects on employee earnings of local S&P 500 Incumbents by commuting zone-level unemployment rate one year before treatment. Columns (1)—(3) report the average treatment effect on treated for local labor markets in commuting zones falling in the top, medium, and bottom tercile of the unemployment rate one year prior to treatment, respectively. Standard errors are clustered at the local labor market level. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	High	Medium	Low
	(1)	(2)	(3)
Treated×Post	-0.0240***	-0.0245***	-0.0181**
	[0.0071]	[0.0059]	[0.0073]
Pair×Local Firm FEs	✓	✓	✓
Pair×Year FEs	✓	✓	✓
Adjusted R^2	0.846	0.847	0.839
N	211,000	340,000	233,000

Table A.4
Panel Regressions: Common Ownership and Employee Earnings

This table reports the estimated relation between common ownership and the natural logarithm of average annual earnings per employee at the local firm level. Columns (1) and (2) report the results using OLS and 2SLS, respectively. The instrumental variable (IV) for common ownership of a local firm is the average of the equally-weighted common ownership of the same firm but in other local labor markets in a given year. Standard errors are clustered at the local labor market level. ***, **, and * represent significance at 1%, 5%, and 10% levels, respectively.

	OLS	2SLS
	(1)	(2)
Common Ownership	-0.0414*	-0.0875**
	[0.0239]	[0.0413]
Firm Size	0.0001	0.0005
	[0.0057]	[0.0057]
Firm Segment Size	-0.0034	-0.0033
	[0.0043]	[0.0043]
Local Firm Age	-0.0308***	-0.0308***
	[0.0033]	[0.0033]
Total Institutional Ownership	0.0353**	0.0359**
	[0.0153]	[0.0153]
Top1 Institutional Ownership	-0.1414***	-0.1564***
	[0.0499]	[0.0480]
Local Firm FEs	✓	✓
Year FEs	✓	✓
Kleibergen-Paap rk Wald F-stat		3,500
N	6,012,000	6,012,000