Labor in the Boardroom*

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Abstract

We estimate the effects of a mandate allocating a third of corporate board seats to workers (*shared governance*). We study a reform in Germany that swiftly abolished this mandate for certain firms incorporated after August 1994 but locked it in for the slightly older cohorts. In sharp contrast to the canonical hold-up hypothesis – by which increasing labor's power reduces owners' capital investment – we find that granting workers formal control rights *raises* capital formation. Shared-governance firms shifted their production process towards higher capital intensity, as the capital share increases. This effect is not driven by outsourcing labor-intensive production steps. We also document a moderate compositional shift towards skilled labor. Shared governance does not raise wage premia or rent sharing, consistent with the absence of hold-up patterns. Leverage is unaffected, but firms with shared governance face lower interest rates, perhaps due to an associated collateral channel or reflecting worker preferences for safer projects. Overall, the evidence is inconsistent with hold-up mechanisms at play. Instead, shared governance may crowd in investment by facilitating cooperation, perhaps by institutionalizing communication and repeated interactions between labor and capital.

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1 Introduction

A fundamental question societies face is whether – and how – to involve workers in decision-making at their workplace. Many countries, particularly in continental Europe, grant workers formal authority in firms' decision-making (Hall and Soskice, 2001). Such codetermination or shared governance institutions include worker-elected directors on company boards. By contrast, in many liberal market economies such as the United States, firms are legally controlled solely by their owners, although policy proposals to mandate worker-elected directors are under consideration.[1] The consequences of granting workers such authority and voice remain highly debated. By the influential hold-up hypothesis (Grout, 1984), granting workers control rights will discourage capital formation, as capitalists anticipate that labor will grab a larger share of the fruits from investments (Jensen and Meckling, 1976, 1979). On the other hand, worker participation may help overcome coordination issues and hence crowd in otherwise inefficiently low investment (Lancaster, 1973; Van der Ploeg, 1987), improve information flows (Hirschman, 1970; Freeman and Medoff, 1984; Freeman and Lazear, 1995) and foster long-term employment relationships and the enforcement of implicit contracts (Malcomson, 1983; Hogan, 2001). Compelling evidence to adjudicate between these views is scant due to the absence of experiments randomizing shared governance across firms.

We provide quasi-experimental evidence on the effects of shared governance by studying a 1994 reform in Germany that sharply abolished worker-elected directors in certain firms and permanently preserved their presence in others. Before the law change, all shareholder corporations had to apportion at least one-third of their supervisory board seats to representatives elected by their workforce.[2] In two-tier board settings such as Germany's, the supervisory board appoints, monitors, dismisses, and sets the compensation for the executive board and is involved in decisions of fundamental importance to the company. A 1994 reform swiftly abolished worker-elected directors in *newly incorporated* firms, so that these firms were formally completely controlled by their shareholders unless reaching a threshold of 500 employees. Importantly, the reform permanently locked in shared governance in incumbent firm cohorts incorporated right before the reform.

The sharp law change permits a difference-in-differences design comparing shareholder corporations incorporated just before or after the August 1994 cutoff as well as untreated

[1] In the US, two federal bills proposed in 2018, the *Accountable Capitalism Act* and the *Reward Work Act*, would mandate that 40% or 1/3, respectively, of the directors of large companies be worker representatives.

[2] We use shareholder corporations to refer to *Aktiengesellschaften* and *Kommanditgesellschaften auf Aktien*. Formally, the law required shareholder corporations to have one-third (in corporations with less than 2000 employees) or half of the supervisory board seats (in corporations with more than 2000 employees) apportioned to the workers. The chairman of the supervisory board, typically a shareholder representative, can break tie votes in a supervisory board with worker-shareholder parity.

non-shareholder corporation types (*Gesellschaften mit beschränkter Haftung* (*GmbH*)).[3] We implement this design by combining a rich set of administrative and survey data on firms, establishments, and workers from 1990 until 2016: (i) financial data for public and private firms combining three Bureau van Dijk data sets, ownership, and supervisory and executive board composition, (ii) administrative matched employee-establishment data covering the universe of social security records merged to the Bureau van Dijk firm-level data (Orbis-ADIAB), (iii) a comprehensive data set of incorporated companies (Mannheim Enterprise Panel), (iv) additional data on board composition for listed firms (Hoppenstedt Aktienführer), and (v) a dataset on executive compensation covering a subset of our analysis sample (Kienbaum).

To assess the validity of the design, we test for the possibility and do not detect that firms may have manipulated the incorporation date, e.g., by delaying incorporation around the reform cutoff date or switching corporate forms from shareholder to other forms, implementing a McCrary (2008) test of the density around the cutoff. We also check for effects on industry composition and legal form among entrants. Consistent with survey evidence that firms were not deterred by one-third codetermination (Albach et al., 1988), we find no evidence for compositional shifts.[4] Several additional institutional features support the research design. For example, grandfathered firms cannot escape the mandate through simple re-incorporation. In addition, the arbitrary grandfathering cutoff date has been challenged by shareholders, suggesting that the mandate binds in older corporations. The courts – including the Federal Constitutional Court – have upheld the law's constitutionality.

First, we study board composition outcomes, starting by verifying that the reform shifted worker presence on corporate boards, information only available for a subsample (listed corporations). Turning to our full firm sample, we find that shared governance sharply raises the probability of having a female supervisory board member by about 20 percentage points. We also document a sharp reduction of about 50% in the presence and share of supervisory board members holding nobility-indicating titles, a proxy for high socio-economic status. In

[3] In our specifications, we do not condition on firm size but implement an intent-to-treat design, permitting treated firms to cross the size threshold (500 employees) above which shared governance is mandated regardless of incorporation date. The vast majority, 99.8%, of German firms have fewer than 500 employees, capturing more than 65% of private-sector employment. About 12% of shareholder firms in our sample cross the 500 threshold. Correspondingly, IV estimates for the effect of shared governance would scale up our intent-to-treat effects by about 14%. Moreover, the treatment does not affect the probability of crossing this threshold.

[4] In a survey of firms incorporated before the 1994 reform, Albach et al. (1988) find that codetermination in the supervisory board is generally not seen as an impediment to incorporation as a shareholder corporation. Rather, the surveyed firms generally accept shared governance, in particular because of the information and specific knowledge about the firm that worker representatives bring to the board room, and oppose an abolishment of shared governance. In a survey sampling shareholder corporations founded between 1994 and 1996, Schawilye, Gaugler, and Keese (1999) find that the top reasons for incorporating as a shareholder corporation are: (1) image and public relations concerns (high prestige of shareholder corporations), (2) raising capital, (3) corporate organization, (4) generational change and transfer of ownership.

an attenuated way, these composition effects pass through into the executive board – which the supervisory board appoints, controls and sets compensation for.

Second, we study how shared governance shifts the production process, with a particular focus on capital formation. Most importantly, we find strong positive effects on fixed (long-term) assets: firms with shared governance have about 30 to 50% larger fixed capital stocks. This core result sharply contradicts the predicted disinvestment following the hold-up and agency cost views of shared governance (see, e.g., Jensen and Meckling, 1979). The positive effects on capital formation even outpace a small increase in employment, leading the capital/labor ratio to increase in these firms.

We next dissect the positive effect of shared governance on capital formation. We start by studying whether shared governance crowded in capital formation within a given production function, or whether the firms may have shifted to a technologically more capital-intensive mode of production. In a canonical Cobb-Douglas setup, the capital share (one minus the payroll/value added ratio) would reflect this technological shift. We document a large and significant increase in the capital share of 6-7ppt (control mean: 0.30). Unless one is willing to believe that shared governance *lowers* worker bargaining power (and raises the capital income share through that channel), firms in fact appear to have shifted *towards* a capital-intensive mode of production – in further sharp contrast to the disinvestment predicted by the hold-up view of shared governance.[5]

One mechanism raising capital intensity may be that owners strategically substitute into labor-substituting capital (Acemoglu, 2002) to offset worker participation. However, we find, if anything, a positive albeit statistically insignificant effect on employment, inconsistent with the substitution channel. Moreover, we find some evidence pointing towards a labor-complementing capital interpretation because the workforce under shared governance shifts from lower-skilled into higher skilled worker groups.

Another mechanism resulting in higher capital shares could be that firms outsource steps of the value added chain that may be particularly labor-intensive. However, we find that the share of sales produced in-house (value added over revenue) increases significantly by 12ppt (control mean: 0.59). Moreover, drawing on our matched employer-employee data, we find that the share of occupations associated with outsourcing in Germany (e.g., Goldschmidt and Schmieder, 2017) if anything increase (albeit only marginally significantly). Overall, we therefore conclude that shared governance appears to raise capital intensity without negative effects on employment, pointing towards scale increases and a technological shift to capital intensity in production.

[5]We also generated a capital-intensity index at the occupation level, finding suggestive positive but noisy support for the channel in that design.

Third, we turn to wages, as wage increases are the core transmission mechanism through which hold-up discourages capital investments, whereby labor grabs a larger share of the value-added pie once capital is installed. More generally, the idea that involving workers in corporate decision-making may boost wages is one rationale cited in favor of the institution in the policy debate. We start by studying administrative earnings outcomes, finding at best small and insignificant wage increases in shared governance firms (compared to their control firms). For median wages, we find statistically insignificant point estimates between 2.6 and 4.2%, with similar results for the mean wage. Turning to the wage structure within the firm, we do not find evidence for wage compression, e.g., comparing the 25th and 75th percentile or the share of workers above the social security earnings cap. In light of potential composition effects in the workforce, we then isolate firm's wage policies by analyzing premia in form of firm fixed effects estimated off movers between establishments controlling for worker effects (Abowd, Kramarz, and Margolis, 1999; Card, Heining, and Kline, 2013). Here, we find precisely estimated zero effects on wage policies, with confidence intervals ruling out pay premia effects above 5%. Likewise, we estimate a similar rent-sharing elasticity between value added and wage premia in firms with and without shared governance. In contrast to the hold-up view by which shared governance would lead workers to grab rents, the empirical institution of shared governance does not lead to an increase (or decrease) in wages – consistent with and in fact rationalizing our first key finding that capital formation is not curbed.

In a final step, we turn to firms' financials and the capital side of income, documenting that firms in which workers have formal control rights, do not appear to see their external-finance capacity reduced. There is no clear effect on profitability (estimates varying from slightly negative to zero). Leverage is unchanged but interest payments over debt are reduced– perhaps due to an associated collateral channel or reflecting worker preferences for safer projects.[6]

Overall, the evidence is inconsistent with hold-up mechanisms at play. Instead, shared governance may crowd in investment by facilitating cooperation perhaps by institutionalizing communication or repeated interactions between labor and capital. These results can be reconciled by a series of long-standing hypotheses about share governance we review in Section 2. The core of these theories is that shared governance solves coordination problems that would otherwise leave investment perhaps inefficiently low (Lancaster, 1973; Van der Ploeg, 1987; Addison et al., 2007). While our evidence is inconsistent with the hold-up view of shared governance specifically, we however cannot definitely distinguish empirically among

[6]We also do not find strong effects on a set of five standard indicators of financial constraints and distress, although these largely inherit the previously documented shift in asset structure, along with a shift from liquid into fixed assets (while total assets increase).

those alternative models.

Our paper contributes to a small set of empirical studies on shared corporate governance (reviewed in Scholz and Vitols, 2019; Addison, 2009). Most of the existing literature does not use quasi-experimental variation in codetermination but considers firms with and without codetermination, controlling for or matching on observable characteristics. Three notable exceptions are Gorton and Schmid (2004), Lin, Schmid, and Xuan (2018), Kim, Maug, and Schneider (2018), and Redeker (2019), all of which use the parity (50/50) codetermination threshold at 2,000 employees, comparing larger firms with one-half employee representation on the supervisory board to smaller ones with one-third representation.[7] By contrast, we analyze a policy change that circumvents potential endogeneity concerns related to employment as an assignment variable. Moreover, our design analyzes a *persistent* change in shared governance rules rather than transitory exposure around employment cutoffs. Finally, our comparison is relative to a counterfactual of *no* worker-elected directors as opposed to an intensive margin shift from one-third to parity representation (with shareholders still retaining the tie-breaking vote).

At a broader level, our paper contributes to studies of worker representation, unions, and industrial relations, which we discuss in Section 2, as well as the empirical literature on the firm and worker effects of board behavior and composition more generally (see, e.g., Shleifer and Vishny, 1997; Bebchuk and Weisbach, 2010; Bertrand and Schoar, 2003; Ahern and Dittmar, 2012; Bertrand et al., 2018; Hwang, Shivdasani, and Simintzi, 2018).

The paper proceeds as follows. In Section 2, we review and discuss mechanisms and existing theories by which shared governance may affect firm- and worker-level outcomes. In Section 3 we describe the institutional context and the reform. Section 4 presents our datasets and empirical strategy. Section 5 reports effects of the reform on board composition. In Section 6 we report on the effects of shared governance on production outcomes, including our core result on capital formation. Section 7 studies the distributional consequences of shared governance for wages, rent sharing, profitability and external finance. The last section concludes.

2 How Might Shared Governance Affect Firms?

Even in shared governance settings, shareholders generally maintain majority control of the corporation. A core question is then why shared governance and worker representatives on the board may affect firm and worker behavior and outcomes given that the shareholders, in

[7] An additional contribution to the literature analyzes the wage effects of the introduction of parity codetermination to industries without any codetermination in 1951 and 1976 (Svejnar, 1981).

unison, could overrule the workers. Nonetheless, many decisions in the supervisory board are taken unanimously with consensus between shareholder and worker representatives (Gold, 2011; Steger, 2011). Here, we describe four core mechanisms through which shared governance may operate to affect firm and worker behavior.

First, worker representation on the board could increase workers' bargaining power to **extract rents**. Several authors have argued that unions and other forms of worker representation can be thought of as rent-extracting institutions (see, e.g., Grout, 1984; Lindbeck and Snower, 1989). As a consequence, shared governance could exacerbate hold-up problems as firm-side investment incentives are lowered (see, e.g., Menezes-Filho, Ulph, and Van Reenen, 1998), although Card, Devicienti, and Maida (2014) find no evidence that bargaining reduces the return on investment. Likewise, Addison et al. (2007) find that works councils, a codetermination institution related to the one we study, does not depress investment. Firms might also strategically increase debt when worker bargaining power is increased (Matsa, 2010).[8] Increasing worker bargaining power has also been hypothesized to lead to an entrenchment of incumbent workers (Lindbeck and Snower, 1989; Pagano and Volpin, 2005; Atanassov and Kim, 2009). Relatedly, worker representatives on the board might advocate to keep employee numbers low in order to increase the capital-labor ratio and to reap ensuing rents (Lindbeck and Snower, 1989; Gurdon and Rai, 1990).

Second and countering the hold-up mechanism, shared governance could be a mechanism to enforce **incomplete contracts**. In the presence of asymmetric information, for example, management might misinform workers about the firm's situation (Tirole, 1986; Freeman and Lazear, 1995). As a consequence, workers might disregard information from management, ruling out potentially efficient contractual arrangements that are contingent on the firm's situation (Grossman and Hart, 1981). Better information about the state of the firm's finances or product demand through worker representatives on the board could then facilitate efficient state-contingent wage contracts (Malcomson, 1983) or effort provision (Freeman and Lazear, 1995). Several observers have associated the robustness of the German labor market in recent decades and during the Great Recession with the presence of opening clauses and "employment pacts" between firms and worker representatives aimed at preventing bankruptcy or layoffs through hours changes or "wage moderation" in tough times (Dustmann et al., 2014; Bellmann, Gerner, and Laible, 2016).[9] More generally, worker representation might lead firms

[8] See also Lin, Schmid, and Xuan (2018) for evidence on employee representation in Germany and financial leverage. Contrasting the strategic debt evidence, Chen, Kacperczyk, and Ortiz-Molina (2011) show that firms in more unionized industries have lower bond yields.

[9] For a sample of large firms, Rehder (2003) reports a strong, positive correlation between employee board representation and the share of such company-wide pacts. See also Kim, Maug, and Schneider (2018) for evidence that labor representation in corporate governance is associated with employment insurance and lower wages.

to honor implicit contracts and thus resolve hold-up problems leading to underinvestment by workers (Hogan, 2001). Prime examples of such potential hold-up situations include firm-specific training (Becker, 1962; Hashimoto, 1981) or back-loaded compensation rewarding earlier performance (Lazear, 1979; Gibbons and Murphy, 1992). As a consequence, worker board presence could lead to more firm-specific investment by workers (Smith, 1991).[10]

Third, shared governance could operate as an institution of **collective voice** for the workforce (Hirschman, 1970; Freeman and Medoff, 1984; Freeman and Lazear, 1995). By engaging in voice, workers can inform the employer about adverse conditions in the workplace rather than voting with their feet and quitting (Freeman, 1980). Worker voice could also have direct productivity-enhancing effects by fostering information flow between management and the workforce. The information channel is particularly relevant in Germany: the executive board is legally required to report planned firm policy to the supervisory board, and the supervisory board, in its active advisory capacity, can demand reports from management (Lutter, 2001). Finally, voice might increase job satisfaction and performance via workers' perception about procedural justice (Greenberg and Folger, 1983).

Finally, worker representation on the supervisory board could affect **corporate governance**. The increased diversity could decrease managerial accountability (Tirole, 2001, 2010, p. 59-60). Or, monitoring through worker representatives could also be more stringent, if shareholder directors may be relatively more influenced by executives (Hermalin and Weisbach, 1998). Similarly, worker-elected directors could have longer horizons and more at stake compared to outside shareholder directors with limited incentives.

3 Shared Governance in Germany and 1994 Reform

We describe shared corporate governance in Germany and the 1994 reform we study, which sharply reduced worker representation on corporate boards in certain newly incorporated firms.

3.1 Shared Corporate Governance in Germany

Corporate Governance in Germany Similar to many continental European countries, Germany has a two-tier board system with a supervisory and an executive board for shareholder corporations, i.e. firms whose common equity could be traded on stock exchanges. Figure 1 illustrates the corporate governance structure in the German two-tier system. The

[10] See also Acemoglu and Pischke (1999a,b); Acemoglu, Aghion, and Violante (2001) for similar arguments related to unions.

executive board is the managing body and responsible for day-to-day business. The supervisory board—composed of representatives for shareholders and, in many cases, workers—is responsible for the selection, monitoring, auditing, compensation structuring, and dismissal of the executive board (§84, 87 and 111 *AktG*). The German Corporate Governance Code advises that the supervisory board be involved in all decisions of fundamental importance to the company, e.g., strategic planning and larger financial decisions.

Shared Governance Two legal institutions allow for a direct participation of workers in their employer's decision-making: worker representatives on the supervisory board and works councils.[11] The variation we study concerns mandates for worker representatives on the supervisory board, an institution introduced in the early years of the Federal Republic of Germany in the aftermath of World War II.[12] Worker representatives are elected by the firm's workforce in general, secret, equal and direct[13] elections, which are organized by works councils (*Betriebsräte*); in many cases, worker board representatives also serve on the works council. Importantly, workers are formally involved in governance but are not residual claimants of profits as, e.g., in employee-owned firms (Kruse, Freeman, and Blasi, 2010; Pencavel, 2013). All–or, for larger firms, the majority–of the worker representatives on the supervisory board have to be employees of the firm. For larger firms with larger boards, the additional external worker-elected directors are proposed by the union and elected by the firm's workforce (§7 *Mitbestimmungsgesetz*, §4 *Drittelbeteiligungsgesetz*). Though not required by law, a large share of worker-elected directors are union members (Addison, 2009). Unions and associated organizations also offer training programs for worker representatives on supervisory boards.[14]

[11]Works councils have extensive consultation, information and codetermination rights in areas such as work hours, occupational safety, and organizational or staffing changes and can directly negotiate with the employer. The 1994 law change did not directly affect the institution of works councils.

[12] Two key factors made the historical context favorable for the expansion of worker involvement (see McGaughey, 2016, for a detailed history of shared governance in Germany). First, while industry leaders had collaborated with the Nazi regime, the workers' movement was less tainted. Second, the United Kingdom, one of the Allies, had just nationalized several core industries, making shared governance an acceptable compromise to owners and industry leaders. Two landmark acts, in 1951 and 1952, mandated supervisory board parity in the mining and steel sectors for firms with more than 1,000 employees (1951), and a third of supervisory boards seats to workers in the other sectors and smaller steel and mining firms (1952) (exempting family firms and non-corporations with fewer than 500 employees). In the 1960s, the union movement began pushing for further expansion, and the social-liberal coalition passed the codetermination law of 1976 (*Mitbestimmungsgesetz*), mandating parity also in non-mining/steel sectors for firms with more than 2000 employees.

[13]In firms with more than 2,000 employees, the workforce can also decide to elect delegates who then vote for the directors. In firms with more than 8,000 employees, the elections are through delegates by default but employees can choose to have direct elections (§9 MitbestG).

[14]Unions negotiate with employer associations at the sectoral level, setting wage floors, work hours and working conditions. In general, covered employers may only deviate in ways beneficial to the employees

The mandated worker share of supervisory board seats ranges from zero to full parity, and varies by the company's legal form and size (employee count), ownership structure and founding date (Table 1). In large firms with more than 2000 employees, workers elect 50% of the supervisory board seats. Shareholders elect the other 50% and the chairperson of the board, generally a shareholder representative, can break ties.[15] In firms between 500 and 2000 employees, workers elect one-third of the supervisory board seats. Figure 1, panel (b), illustrates corporate governance in corporations with the one-third worker-director mandate.

For firms with fewer than 500 employees, rules are differentiated by legal form. Private limited liability corporations (e.g., *Gesellschaft mit beschränkter Haftung*) and non-corporations (e.g., *Offene Handelsgesellschaften (OHG)* or individual merchants) have been exempt from *any* worker representatives on supervisory boards from the beginning of the institution in the 1950s. In contrast, the rules for shareholder corporations were sharply changed by a 1994 reform as a function of incorporation date as we describe below.

3.2 1994 Abolition of Shared Governance in New Corporations

Since 1952, shareholder corporations had been required to have at least one-third worker representatives on the supervisory board regardless of their size. A 1994 reform of the Corporation Law (*Aktiengesetz*) swiftly abandoned this requirement for newly incorporated shareholder corporations while keeping it in already founded corporations. The law was a result of last-minute political compromise and did not affect non-shareholder corporations. Figure 2 and Table 1 illustrate the changes in worker board representation induced by the 1994 reform, which locked in differences in worker representation that continue to the present.

Abolition in Corporations Founded after August 10th, 1994 The reform abolished the one-third mandate only for new corporations incorporated after August 10, 1994.[16] As a consequence, these firms *cannot* have any worker-elected board members unless they grow very large: the same rules apply as in older corporations upon having 500 employees, i.e.

(*Günstigkeitsprinzip*, §4(3) *TVG*). Since the 1990s, opening clauses have become more prevalent, permitting firms to directly negotiate with their workforce and, in some cases, deviate downwards (see Dustmann et al., 2014, for an overview).

[15] In the mining, coal and steel industry, there is complete parity on the supervisory board between worker and shareholder representatives without tie-breaking by the chair (*Montan-Mitbestimmungsgesetz*).

[16] In addition to the liberalization of the shared governance mandate, the 1994 law included several other changes (e.g., rules for use of profits and for general shareholder meetings), all of which were applicable regardless of the incorporation date, and were considered secondary to the abolition of shared governance by commentators. See, for example, "Nicht nur weiße Salbe", *Frankfurter Allgemeine Zeitung*, May 27, 1994, p. 13.

one-third supervisory board representation up to 2000 employees and parity in larger firms.[17] Figure 1 panel (a) illustrates corporate governance in these corporations without the worker-director mandate.

Lock-In in Corporations Founded Before August 10, 1994 Importantly, the law locked in the worker representation mandate in already founded shareholder corporations, as a result of a compromise between the center-right parties (which were against grandfathering) and the center-left party (which wanted to preserve the mandate for new firms).[18] In fact, grandfathered companies incorporated just before August 10, 1994, cannot simply escape the shared governance mandate by re-incorporating.[19] Figure 1 panel (b) illustrates corporate governance in these corporations with the worker-director mandate. The 1994 grandfathering rule has been challenged in legal cases brought by shareholders of older corporation on the grounds that the arbitrary nature of the cutoff date violates the constitutional principle of equality. However, the courts have upheld the clause.[20]

4 Data and Empirical Methodology

We describe the data as well as our difference-in-differences methodology.

4.1 Data

Below we describe our data sets and sample construction. The variables and their construction are described in detail in Appendix Section A.3. In lieu of summary statistics for our

[17] For the vast majority of firms, the 500 employee cutoff is not binding as only 0.02% of firms, and less than 35% of employment is in firms above this threshold. In our sample of shareholder corporations, which are generally larger, still only 29% of firms reach the 500 employee threshold. New shareholder corporations with fewer than 500 employees cannot have worker-elected board members as the corporate law leaves no room for choice (see, e.g., Raiser, Veil, and Jacobs, 2015, §1 Rn. 26, and §23 (5) and §96 AktG).

[18] Specifically, the grandfathering rule was a last-minute compromise in late May 1994, between the conservative-liberal governing coalition (Christian Democrats (CDU/CSU) and Free Democrats (FDP)) and the center-left opposition (Social Democrats, SPD), which held a majority in the upper chamber (*Bundesrat*). The government proposed to abolish shared governance in the majority of corporations, *including* existing ones), while the opposition was in favor of maintaining shared governance for *all* corporations. The law was then swiftly passed in both chambers in the subsequent weeks and mandated a cutoff date of August 10, 1994, the day after the law's promulgation. The initially proposed bill and compromise committee recommendation are reported in *Drucksache* 12/6721 and 12/7848, respectively (*Deutscher Bundestag, 1994*), the minutes of plenary proceedings in *Plenarprotokoll* 12/233 and 12/237 (*Stenographischer Bericht, Deutscher Bundestag, 1994*).

[19] Specifically, a change of legal form and temporally connected re-incorporation of an old shareholder corporation as an ostensibly new shareholder corporation does not invalidate the mandate for board representation of workers (see, e.g., Raiser, Veil, and Jacobs, 2015, §1 Rn. 5).

[20] For example, the Federal Constitutional Court (*Bundesverfassungsgericht*) dismissed a shareholder lawsuit in 2014 (BVerfG, 09.01.2014, Az. 1 BvR 2344/11).

firm groups (since all variables will rather be outcome variables as treatment is assigned at incorporation), we will later on include control means for all outcome variables in each respective regression column.

Firm Panel Data: Amadeus and Orbis Historical Our main data source is firm-level panel data on balance sheets and income statements from Bureau van Dijk's Amadeus and Orbis Historical data sets, the largest available dataset for German firms. It is based on official company registers, company reports, and credit rating agency information. For our main analysis, we focus on shareholder corporations and limited liability corporations incorporated from August 1992 through August 1996. We drop utilities, rail transportation and other industries with heavy state involvement or organizations not part of private-sector employment (see Appendix Section A.2). In addition, we drop state-owned firms in other industries, defined as those where a public authority has a 100% voting share. We further follow Gopinath et al. (2017) to clean the data.

Matched Employer-Employee Data: Orbis-ADIAB We study worker-level outcomes with administrative employer-employee data from IAB merged with the Orbis firm-level data.[21] The administrative data also allow us to zoom into firms around their time of legal incorporation as a shareholder or non-shareholder corporation in the Commercial Register. In Appendix Figure B.2, we assess the quality of the incorporation date variable in the administrative data. Panel (a) plots a histogram of the date of the first appearance of an establishment in the administrative data relative to a firm's incorporation date as reported in Orbis (based on the Commercial Register). For more than 50% of firms, the first occurrence of an establishment in the administrative data is within a year of the incorporation. There is a small tail of establishments that appear in the administrative data before the legal incorporation. This could be due to the fact that establishments can keep the same establishment number even if the legal form or ownership of the firm changes.[22] There is a larger tail of first appearances *after* the legal incorporation. This could be due to the fact that the match between firm records (including the incorporation date) and establishments only occurs for the years between 2006 and 2014. As a consequence, we will miss establishments that had existed at some point before 2006 but were closed by 2006, e.g., due to a firm's location change. In panel (b), we provide a binned scatter plot of the first appearance date of establishments

[21] The dataset was created by linking administrative employer-employee data at the establishment level with Orbis financial and production data at the firm level. The record linkage was conducted based on establishment data from 2006 to 2014. The match rate for shareholder corporations such as the ones we study in this paper is the highest among all legal forms at 70.34% (see Schild, 2016; Antoni et al., 2018, , who alsoe describe the linking process).

[22] `https://www.arbeitsagentur.de/betriebsnummern-service/grundsaetze-vergabe`

in the administrative data against firms' incorporation date. The figure also includes the diagonal in maroon. For the time range from 1990 to 1992, the average first appearance date in the administrative data is about a year or two after the legal incorporation. From 1993 onwards, the mean first appearance date in the administrative data tracks the legal incorporation date very closely. In panel (c), we plot the cdf of establishment entry around the incorporation year. There is a sharp jump from about 0.10 to 0.60 from the year before legal incorporation to the year after. Finally, we plot employment around incorporation in panel (d) and show a substantial increase in employment recorded in administrative records around the time of incorporation.

Firm Panel Data: Mannheim Enterprise Panel (MUP) We further draw on data from the Mannheim Enterprise Panel provided by ZEW, Mannheim, a firm panel data set containing information on incorporations, exits, and basic information such as employment and financial indicators (described in Bersch et al., 2014). Comprehensive data on incorporations are provided by Creditreform e.V., Germany's largest credit rating agency, based on official registers and are available from 1991 onward. We primarily use the MUP to study the selection of firms into entry and, conditional on entry, into industries, as well as to analyze the lifecycle and survival of firms.

Hoppenstedt Aktienführer While our sample of Bureau van Dijk firms does come with board membership information (and is our main dataset for our study of board-level outcomes), it does not differentiate between worker and capital representatives. To provide one intervention check that the reform shifts board composition, we therefore additionally draw on the Hoppenstedt Aktienführer covering all *listed* German firms from 1979 to 2015 importantly including data on worker representatives on firms' supervisory boards.[23] We focus on consolidated statements from firms and again drop state-owned enterprises.

4.2 Empirical Methodology

Our identification strategy is to exploit the quasi-experiment induced by the 1994 reform, which generates a discontinuity in the mandated presence of workers on the supervisory board of shareholder corporations at the cutoff date for incorporation. We compare shareholder corporations incorporated before and after the cutoff date to non-shareholder corporations (for which the rules were not changed) founded before or after the cutoff date.

[23]The historical Hoppenstedt Aktienführer data have been digitized through a project by the German Research Foundation (*DFG*) and were retrieved from https://digi.bib.uni-mannheim.de/aktienfuehrer/.

We estimate the following difference-in-differences specification for outcome Y_{ft} of firm j in period t (where we stack firm level panel data):

$$Y_{ft} = \alpha + \phi_Y \cdot \mathbb{1}(\text{Incorporation}_f < 0) \times \text{ShareholderCorp}_f \tag{1}$$

$$+ \mathbb{1}(\text{Incorporation}_f < 0)\beta + \text{ShareholderCorp}_f\gamma + X'_{jt}\delta + \epsilon_{jt}, \tag{2}$$

where Incorporation_f is a variable measuring firm's incorporation date relative to August 10, 1994, and ShareholderCorp_f is an indicator for shareholder corporations. The parameter of interest ϕ_Y is the coefficient on the interaction of the indicator for incorporation before August 10, 1994, with the indicator for shareholder corporations, thereby capturing the effect of the law-mandated presence of workers on the supervisory board that was relaxed after August 10, 1994. The specification includes a baseline effect for incorporation before August 10, 1994, $\mathbb{1}(\text{Incorporation}_f < 0)$, regardless of corporation type. This will capture, e.g., differences in the business cycle at the time of incorporation. The specification also includes a baseline effect for shareholder corporations, ShareholderCorp_f, regardless of incorporation date.

In our main specifications, we focus on corporations incorporated within two years before and after the reform, i.e. from August 1992 through August 1996. We also report results for other bandwidths between one and three years around August 10, 1994.

In some specifications, we additionally include control variables X_{jt} that include year effects, industry effects (2-digit NACE designations), and industry-by-year effects. Unless reported otherwise, we winsorize all outcome variables at the 1% level; financial variables are CPI-adjusted with base year 2015. We restrict our sample to corporations with 10 or more employees.

Importantly, we will estimate intent-to-treat specifications, since firms incorporated after August 10, 1994, can become subject to the one-third mandate if they cross the 500-employee threshold. About 12% of shareholder firms in our sample cross the 500 threshold. Correspondingly, IV estimates for the effect of shared governance would scale up our intent-to-treat effects by about 14%. Moreover, we will show that the treatment does not affect the probability of crossing this threshold.

As treatment varies between firms but not within firms over time, we cluster standard errors at the firm level.

We now consider and then test for potential threats to identification that could impede the interpretation of $\hat{\phi}_Y$ as the causal effect of mandated worker presence on the board.

Strategic Delay of Incorporation: McCrary Test First, firms might manipulate the incorporation date by delaying incorporation around the reform cutoff date. Our first check is

a visual inspection of the incorporation frequency of shareholder corporations in the sample around the reform cutoff (Figure 3, panel (a)). This analysis uses the Mannheim Enterprise Panel's comprehensive data on incorporations from 1991 onward. The figure reveals no evidence of a spike in incorporations after August 10, 1994, nor of a missing mass of incorporations in the time period leading up to the reform. In the same figure, we formally implement a McCrary (2008) test of continuity of the density against the alternative of a jump in the density function at the reform cutoff date, for which we find no evidence.

Composition of New Firms by Legal Form Second, firms may substitute into different corporation types after the reform. Figure 3 panel (b) reports an RD specification in a sample of all firms, using as outcome variable an indicator for shareholder corporation status (*Aktiengesellschaft* or *Kommanditgesellschaft auf Aktien*). This probability did not change discontinuously around the reform cutoff date. Several institutional features render such manipulation unlikely a priori, as discussed in Section 3. The grandfathering was an unexpected political compromise, with no clear indication that strategic delay of incorporation would relax the firm's mandate. In addition, the legislative process was finalized within weeks of reaching the compromise, and mandated the day after the law's promulgation as cutoff date. Finally, Albach et al. (1988) report survey evidence that corporations did not view one-third codetermination as an impediment to their operation or incorporation.

Industry Composition and Selection Third, we test whether the industry composition of shareholder corporations was affected by the 1994 reform.[24] We consider NACE Level-1 industry codes as binary outcome variables in specifications following (2). Figure 4 (detailed table in Appendix Table C.1) reports that the reform did not statistically significantly affect the fraction of shareholder corporations incorporated in any particular industry, and the coefficients are jointly insignificant in an F-test ($p = 0.91$).

5 The Effects on the Composition of Supervisory and Executive Boards

In a first step of our analysis, we study the effect of the reform on the share of worker representatives on the corporate board and then turn to characteristics of supervisory board members, as well as of executive board members. This step not only serves as an intervention

[24] In addition to actual effects of the reform, changes in, e.g., the business cycle, might spuriously affect the type and trajectory of the firm cohorts around the reform cutoff (see, e.g., Geroski, 1995; Geroski, Mata, and Portugal, 2010).

check but also documents a channel by which the institution may shape corporate governance and ultimately affect firm outcomes.

5.1 Validation Test: Realized Shifts in Worker Representation on Supervisory Boards

We verify that the reform in practice shifted worker representation on the board by incorporation date. Figure 5 shows the share of workers on the supervisory board by incorporation date and firm size. We draw on data from the Hoppenstedt Aktienführer, which lists supervisory board members and incorporation year for listed corporations. We restrict the sample to shareholder corporations founded between 1989 and 1999 for which board composition data is reported.[25] The left (navy-colored) bars represent corporations incorporated during or before 1994, the right (maroon-colored) bars represent corporations incorporated during or after 1995. For firms smaller than 500 employees (in dark shades, for whom the reform changed the rules), there is a stark difference: workers comprise, on average, 29 percent of the supervisory board of shareholder corporations incorporated during or before 1994. In sharp contrast, workers comprise only around 3 percent of the supervisory board of shareholder corporations founded during or after 1995.[26] In the lighter shades, we additionally report the outcomes for very large firms, for whom the mandate did not change and for whom the data show no discernible difference, both around one-third worker representation, confirming that the comparison is not driven by differential reporting or data quality after 1994.

5.2 Additional Effects on Board Composition

We now analyze the effects on the composition of the supervisory board and the executive board (see Section 3 for an overview of the institutions). We report the estimates on board composition in Table 2, based on specification (2) for bandwidths of two years. We present estimates at the two-year bandwidth as our main specification, and report additional variants with smaller and larger bandwidths in the Appendix. Panel A reports the results for supervisory boards; Panel B does so for executive boards. We primarily rely on the currently

[25] Specifically, we only consider firm-year observations for which data on the role (chair person, worker representative, etc.) of individual supervisory board members is reported for at least one-third of the supervisory board. In addition, we only rely on data from the 1990s due to a structural break in reporting in 2000.

[26] The non-negative worker share in these corporations is likely due to a small amount of measurement error, e.g., because the employment concepts for codetermination and in the Hoppenstedt data might differ slightly so that corporations reported to have fewer than 500 employees in the Hoppenstedt Aktienführer might still be subject to codetermination for firms with more than 500 employees.

available version of Orbis board data, which offers a snapshot of board members.[27] The dataset contains information on the names, including titles, and gender of board members. Our data does not permit us to decompose potential composition effects effect into direct effects from the worker representatives and indirect or spillover effects by which the presence of worker representatives may affect the composition of shareholder representatives as well. We then additionally study the same outcomes on the executive board to address whether shared governance affects manager selection at the highest corporate level, a natural transmission channel, as the supervisory board appoints and controls executives.

Gender Composition We find that shared corporate governance sharply increases the probability of having at least one woman on the supervisory board by about 15 percentage points, relative to a control base of 35 percent. We also detect positive though only marginally significant point estimates of about 5 percentage points on the share of female supervisory board members. Turning to executive boards, we find positive but not statistically significant point estimates for the presence of women between 5 and 6 percentage points, while the share female is not affected.

Academic Titles In Germany, doctorate degrees are strongly associated with family backgrounds of high socioeconomic status and are highly valued distinctions for a position in the economic elite (Hartmann and Kopp, 2001). In the average control firm, about 23% of supervisory board members hold doctorates (and (likely largely nominal) professorial positions), denoted by academic titles "*Dr.*" and "*Prof.*". We find that worker presence on the supervisory board does not significantly affect the probability of at least one supervisory board member holding a doctorate with point estimates ranging between a 1 and 4 percentage point increase. Relatedly, the share of supervisory board members with a doctorate or professorship is about three percentage points lower with a confidence interval including zero. On the executive board, we next find a marginally significant 8 percentage point effect on the indicator outcome (and a statistically not significant increase in the share by 0.027 (SE 0.017)).

Nobility Titles Next, we document the effect on the presence and share of supervisory board members with a nobility title, classified on the basis of names ("*von*", "*zu*", "*Graf*", "*Baron*", "*Freiherr*". we find that about 9 percent of boards have at least one member with a nobility title while the overall share on the supervisory board is 2.4 percent (compared to about 0.1% in the population). In columns 5 and 6 of Table 2, we document that shared

[27] Board member information is missing for 99% of observations in the Orbis Historical dataset.

governance decreases the presence of holders of nobility markers on the supervisory board by 5 percentage points ($p < 0.10$), and its share by 1.7 percentage points ($p < 0.01$). Since about 9 percent of supervisory boards in the control group have at least one member with such a tag on the supervisory board, making up an average 2.4 percent of the seats, the presence of workers on the supervisory decreases both the share as well as the probability of having any nobility title on the supervisory board by about 60 to 70%. On the executive board, we find a sharp reduction in the presence of executives with a nobility background by 3.5 percentage points (SE 1.5 ppt) relative to a post-reform shareholder corporation mean of 5.6 %, i.e. a relative effect of -60%. Similarly, the share of aristocratic executives is reduced by about 0.2 percentage points from a control group mean of 0.4%.

6 Effects of Shared Governance on Production and Capital Intensity

Below we present the evidence on the effects of shared governance on the firm essentially as a production function. We again present estimates at the two-year bandwidth as our main specification, and report additional variants with smaller and larger bandwidths in the Appendix.

6.1 Firm Survival

We first investigate the effect of shared governance on firm survival and find no evidence for effects on survival. We draw on data from the Mannheim Enterprise Panel containing comprehensive information on all incorporations in Germany from 1991 onward (while our main Bureau van Dijk data will consist of panels from future years). Figure 6 Panel (a) plots the survival probability of shareholder and non-shareholder corporations separately by incorporation date, comparing firms incorporated in a two-year window before the reform ("Old") to those incorporated in a two-year window after the reform ("Young"). Depending on the group, between about 50 to 60 percent of firms still exist 15 years after incorporation. We find slightly lower survival rates for younger firms, of which about 53 percent still exist 15 years after incorporation, compared to older firms with a survival probability of about 58 percent. For both younger and older firms, we find slightly lower survival rates among shareholder corporations compared to non-shareholder corporations. Importantly, however, there does not appear to be a *differentially* lower or higher survival rate for old shareholder corporations, locked into shared governance, compared to slightly younger shareholder corporations. Panel (b) reports the difference-in-differences estimates on the survival probability

by firm age (time since incorporation), finding a flat line at zero. Formally, the difference-in-differences analysis, comparing slightly older and younger shareholder and non-shareholder corporations indicates a point estimate of 0.0015 (SE 0.004) for the effect of shared governance on the hazard of firm exit (over all age groups). The estimates thus rule out even small effects of shared governance on firm survival. This result is interesting in its own right as an outcome, but moreover permits us to study the remaining firm outcomes without having to account for differential attrition.

6.2 Firm Scale: Output and Inputs

We now turn to the production side of the firm, studying measures of scale on the output and input sides, reporting effects in Table 3.

Output We report effects on log revenue and value added in columns 1 and 2 of Table 3. Once we add controls to net out year and industry factors, we cannot reject zero on these two estimates, although the value added effects are positive throughout at around 0.07 to 0.17 (with revenue point estimates being more volatile). That is, we find no evidence that shared governance leads to reductions in firm size, an important result in its own right but also a foundation for our subsequent analysis of production inputs.

Employment We consider both employment in the Bureau van Dijk Orbis data and the administrative data from IAB. The employment concepts differ as Orbis reports a head count of all employees, including ones abroad, while the IAB data only includes employment subject to German social security, which is the employment concept that is somewhat lower but the one relevant for determination of shared governance (see, e.g., Müller-Glöge et al., 2019, DrittelbG Rn. 3).

We first analyze effects on log employment and find small, positive and statistically insignificant effects. In our most fine-grained specifications, we find effects of 0.094 (SE 0.120) and 0.063 (SE 0.116) in the Orbis and IAB data, respectively. While the point estimates in the Orbis data range between 0.094 and 0.188 between specifications, the IAB data reveal estimates between 0.063 and 0.083. In all cases, the confidence interval includes zero.

In a further step, we draw on the Orbis-ADIAB data to provide a time series of employment in the four categories of firms we consider. Appendix Figure B.4 plots employment relative to incorporation both as an inverse hyperbolic sine transformation (panel (a)) and in levels (panel (b)). The information is based on a balanced panel of firms incorporated between 1990 and 1999; when no employment is recorded or the establishment does not exist in the administrative data, we set employment to zero. The figures show that employment in

older shareholder corporations, hence mandated to have worker-elected directors regardless of size, grows more rapidly on average after incorporation, ultimately somewhat larger than slightly younger shareholder firms not subject to the mandate, although our econometric analysis shows that we cannot detect statistically significant differences.

We additionally study whether old shareholder corporations are more likely to cross the 500 employee threshold, above which all firm types become subject to shared governance (see Section 3). About 12% of firms in the post-cutoff-date-incorporation group cross this threshold. Positive treatment effects on this outcome would indicate that new shareholder corporations avoid codetermination by remaining small. In the data, we find no evidence for such a pattern, with confidence intervals ruling out even small positive effects. In the most fine-grained specifications, we find a point estimate of 0.005 (SE 0.031) in the Orbis data and of -0.020 (SE 0.022) in the IAB data (which are more relevant for determination of shared governance).

Capital We next study the effect of shared governance on capital measures. The Bureau van Dijk data does not report capital expenditures ("investment") but instead contains information on capital stocks. We start with fixed assets, which comprise tangible assets, such as buildings and equipment, and intangible assets, such as patents or trademarks, and other fixed assets (such as investments or long-term receivables). The point estimates for the effect on log fixed assets is around 0.50 with confidence intervals excluding zero, and stable across specifications. We further study tangible assets, documenting a similar 0.31-0.34 effect (albeit noisily estimated with SEs around 0.2).

These estimates on capital formation are a central result of our analysis, implying that hold-up mechanisms – which would have predicted negative effects on capital formation – are not at play in the institution of shared governance, or are dominated by positive counteracting forces crowding in investment, ultimately generating a large positive net effect. We will devote much of the rest of the paper to unpacking and understanding this result.

Intermediate Inputs The larger (though noisily estimated) value-added effects compared to revenue are perhaps indicative of more insourcing and less outsourcing when worker representatives are on the board. Indeed, we find a large reduction in materials accompanying the large but noisily estimated increase in value added, with no clear effects on total revenue, pointing towards a shift in the mode of production. We will provide more granular analyses of potential shifts in the production function below, studying firm-level accounting data and worker-level data to study the occupational structure.

6.3 Productivity, Capital Intensity, and Skill Structure

We next dissect the positive effect of shared governance on capital formation. We assess whether shared governance crowded in capital formation within a given production function – simply raising the capital/labor ratio – or whether the firms may have adopted a technologically more capital-intensive mode of production, as if shared governance firms shifted towards a larger Cobb-Douglas technological capital weight for example or shifted outsourcing practices. We report these estimates in Table 4 for the firm level results, and further in Table 5 by zooming into the occupation and skill structure of the workforce.

Productivity The type of capital that is the focus of the hold-up model is productive capital such as machines or intangible productive assets such as patents. To trace this effect in the data, we confirm a positive effect on value added per worker of around 24,000 Euro in column 1 of Table 4, precisely estimated. In logs, the effect is large (0.14-0.20, column 2), although noisily estimated. Juxtaposed with the treatment effect on fixed assets per worker 62,000 Euro per worker or 0.38-0.40 in logs (both statistically significant, reported in columns 3 and 4), the evidence points towards our aforementioned results reflecting an increase in productive capital. In column 5 of Table 4, we further study effects on log TFP (which we construct as detailed in Appendix Section A.3). Firm-level TFP essentially stays flat, with zero or very small, noisily negative effects. We would have expected the efficiency measure to be strongly negative if the additional capital in shared governance firms were unproductive (e.g., investments in land not used in production, simply reflecting mismeasured book values, or unproductive amenities). Moreover, the TFP result is interesting in its own right as some theories reviewed in Section 2 would perhaps have shown up through TFP (although our TFP estimates have large confidence intervals).

Capital Share We now study the capital share of each sample firm, calculated as one minus the wage bill divided by value added (see column 1 of Table 4). In a canonical Cobb-Douglas setup, this capital share would reflect a technological shift from labor to capital intensive production. Column 6 reports a large and significant increase in the capital share, of around 6-7ppt (control mean: 0.25-030). Unless one is willing to believe that shared governance *lowers* worker bargaining power (and raises the capital income share through an associated bargaining channel in the other direction), this evidence is consistent with shared-governance firms having shifted towards a more-capital-intensive mode of production. This additional result is again in sharp contrast to the disinvestment predicted by the hold-up

view of shared governance.[28] The result is also a validation of the previous measurement of capital intensity by measuring capital stocks directly, because the capital share is entirely independently constructed by measuring payroll and value added.

Inhouse Production vs. Outsourcing One mechanism raising capital intensity may be that owners strategically substitute into labor-substituting capital (Acemoglu, 2002) to offset worker participation. However, we have, if anything, already documented a positive albeit statistically insignificant effect on employment, not consistent with the substitution channel.

Another mechanism resulting in higher capital intensity could be that firms respond to labor power by outsourcing steps of the value added chain that may be particularly labor-intensive. We study this possibility by estimating effects on the firm-level ratio of value added to revenue, as a proxy for in-house production. We find that this share of sales produced in-house actually *increases* by 12-13 percentage points, off a control mean of 0.37-0.40, statistically significant at the 5% for two specifications and at 10% levels for those with industry fixed effects. From this perspective, more standard outsourcing of labor-intensive tasks is unlikely to explain the capital intensity. Instead, perhaps in practice shared governance firms may purchase and own capital assets (e.g., buildings, land or machines), rather than rent or lease, perhaps consistent with longer-term investments.

For outsourcing to explain the capital intensity, the marginal task not outsourced in shared governance would need to be substantially more capital-intensive than the average task rather than following the pattern of outsourcing of labor-intensive tasks (Goldschmidt and Schmieder, 2017). We can directly test for this outsourcing channel by drawing on our matched employer-employee data and classifying occupations associated with outsourcing in Germany (e.g., Goldschmidt and Schmieder, 2017) (cleaning, food services). This result is reported in column 7 of Table 5, where we dissect the skill distribution of the workforce. While not precisely estimated (t-statistics of around 0.5-1.0), the share of such labor-intensive outsourceable occupations exhibits positive point estimates, thereby if anything pointing to less rather than more of such labor-intensive outsourcing out of shared governance firms.

Skill Structure In the remaining columns of Table 5, we study the effects of shared governance on the skill and occupational structure of the firms.

In columns 1 through 3, we find some evidence for a shift from lower-skilled into higher skilled worker groups, perhaps consistent with a labor-complementing capital interpretation. The analysis distinguishes (i) low-skilled workers with no vocational training (in baseline making up 13% of the workforce of shareholder corporations); (ii) medium-skilled workers with a

[28] In unreported results, we also generated a capital-intensity index at the occupation level, finding positive but very noisy support for the channel in that design.

finished school degree and a vocational qualification (baseline of 59%); and (iii) high-skilled workers with a degree from a university or university of applied sciences (*Fachhochschule*) (baseline of 26%). We find evidence that shared governance lowers the share of low-skilled workers by about 1.5 to 1.8 percentage points, implying a 10 to 15% reduction. The effects are marginally significant ($p < 0.10$) in the specifications without industry effects and significant at the 5%-level when we add industry or industry-year effects. Our estimates also allow us to rule out effects larger in magnitude than -3.6 percentage points. The pattern of effects for the other skill groups suggests that the decreased share of low-skilled workers is offset by a roughly equal increase in high-skilled workers, although the effects are less precisely estimated.[29]

Occupational Structure We next analyze the occupation structure in columns 4-6 of Table 5. We study occupations following the Blossfeld (1987) categorization of occupations, which is commonly used to classify occupations in the German labor market. We find positive point estimates consistent with shifts towards skilled manual labor (consisting of the Blossfeld categories of qualified manual occupations, technicians and engineers) perhaps further consistent with a more capital intensive production, although the confidence intervals for each specification include zero.

Tenure and Separations Finally, in Table 6, we report effects of shared governance on tenure and separation rates. Columns 1 and 2 report negative effects of around half a year of tenure in a given cross section of workers (off a baseline of 7.5), which is marginally significant, and around a 6% effect in logs, which is less precisely estimated. These results are perhaps surprising with basic intuitions that more capital or more skills should result in longer tenure (Oi, 1962) or the idea that giving workers voice may reduce exit (Hirschman, 1970; Freeman, 1980). Zooming into year-to-year separation rates, we find a small and statistically insignificant effect of 1 to 2 percentage points off a baseline of 0.20 in column 3.[30] In columns 3-5, we separately study separation rates by tenure, and document a negative and economically large reduction in separation rates among higher-tenured workers (.2 percentage points of a 1.6 base), which is marginally significant, whereas the decomposition reveals low-tenure workers to have slightly higher separation rates. In our sample, average tenure is high (7-8 years). This pattern, though imprecisely estimated, may be consistent with insider/outside dynamics (Lindbeck and Snower, 1989) or with higher-tenured workers' skills

[29] In unreported results, we also find that shared governance does not appear to affect share of current apprentices (workers in vocational training) in total employment.

[30] This result, with wide confidence intervals, would be in contrast to a view by which employees on the board may induce a capital structure that lowers risk of large swings in labor employment and layoff risk (consistent with evidence by Kim, Maug, and Schneider (2018)).

being complemented by the capital boost. Given that tenure can serve as a measure of job quality, the absence of positive effects may suggest that shared governance does not measurably increase retention and perhaps job valuation by employees.

We therefore conclude that, overall, shared governance appears to raise capital intensity without negative effects on employment, pointing towards scale increases and a technological shift to capital intensity in production. Jointly considering our (imprecisley estimated) results on skill composition with the strong positive effects on fixed assets, one consistent interpretation works through capital/skill complementarity, specifically between long-term assets, e.g., machines and equipment, and workers with vocational training compared to unskilled workers. Since shared governance jointly affects these outcomes in our research design, we cannot separately disentangle whether worker participation in firm governance affects the skill composition through its effects on long-term capital, or vice versa, or whether there are separate, direct effects of the institution on these outcomes.

7 Dividing the Pie: Wages, Rent-Sharing, Profitability and External Finance

Lastly, we study the division of income generated by the firms, between labor and capital, and within each factor. We start with wages, as wage increases are the transmission mechanism through which hold-up discourages capital investments, whereby labor grabs a larger share of the value-added pie once sunk capital is installed, as well as an important outcome variable in its own right. We investigate the effect on wages drawing on the Orbis-ADIAB administrative data. In contrast to the hold-up view, we do not find wage increases (or decreases) or increased rent sharing – consistent with and in fact rationalizing our first key finding that capital formation is not curbed in shared governance firms. We then turn to capital income, studying profitability as well as other financial outcomes, in particular proxies for external finance capacity and firms' debt structure.

7.1 Wages and Wage Structure

We start with studying average wages, as well as its distribution as worker representation has been hypothesized to compress wages and reduce inequality inside the firm (see, e.g., Freeman and Medoff, 1984, p. 82-85), perhaps also indirectly affected by informal norm establishment as in the case of unions (see, e.g., DiNardo, Hallock, and Pischke, 2000; Western and Rosenfeld, 2011).

Average Wages We start with wage effects of shared governance, and report results in Table 7. We first investigate effects on log mean wages at the firm level and find point estimates ranging between 0.03 and 0.05 with standard errors of 0.04. The confidence intervals include zero and allow us to reject effects on mean wages larger than 0.12.

AKM Firm Fixed Effects Next, we analyze firm pay premia drawn from Abowd, Kramarz, and Margolis (1999) specifications with worker and firm effects. By drawing on a wage measure that has been residualized by worker effects, we can study wages net of worker selections which is particularly important as we documented composition effects. Concretely, we draw on the firm effects estimated in Card, Heining, and Kline (2013) for the time period between 1990 and 2009 and aggregate them up to the firm level by weighting establishments according to their average employment in the time window. We find a 0.008 effect of shared governance on the firm premium with standard errors of 0.02, allowing us to rule out that firm pay premia increased by more than 0.04.

Wage Structure We also analyze the wage structure as the absence of effects on averages wages or pay premia may shroud wage compression effects (see, e.g., Freeman and Medoff, 1984, p. 82-85). We study wages at the 25th, 50th, and 75th percentile at the firm level through an employment-weighted aggregating across establishments of a firm. We report outcomes in columns 3 through 5 of Table 7 and find similar point estimates across the same percentiles, ranging from 0.03 in the specification without controls to about 0.045 in the specifications with indusry-year effects. The estimates thus do not indicate any effect on pay compression. As an additional measure of pay compression, we also investigate whether shared governance affects the share of wages above the social security earnings cap. About 13% of workers in post-reform-incorporated shareholder corporations have earnings above the social security earnings cap. We find that the share is not affected, with a point estimate of 0.009 and a standard error of 0.014 allowing us to reject increases above 0.036. All in all, we find no evidence for wage compression based on the administrative data.

Executive Pay Executive pay is a firm outcome over which the supervisory board has direct formal control. In a final step, we source a dataset on executive compensation collected by Kienbaum Consulting, a leading consulting firm for human resources and executive search and compensation, covering 4,055 German firms.[31] The data feature information from 2000 to 2015 and we match firms based on string similarity and by hand to the Bureau van Dijk

[31] We thank Sebastian Pacher and the Kienbaum Consulting AG for the kind provision of the executive compensation data. See Dyballa and Kraft (2015) for cross-sectional evidence based on Kienbaum data showing that codetermination increases performance-based components of compensation.

Orbis data. This allows us to consider executive compensation as an outcome measure, even though the analysis is limited by the fact that only few firms were incorporated around the reform cutoff. For the analysis, we extend the horizon to a four-year window around the reform cutoff so that we capture 188 matched firms. We calculate the log average executive compensation and find a point estimate of -0.017; due to the wide standard errors of 0.121 we cannot rule out large or small effects on executive wages, similarly for a measure of executive payroll in total payroll (where our sample further shrinks, and we winsorize at 5% due to outliers).

7.2 Rent Sharing

We explore rent sharing by assessing whether the relationship between firm-level productivity and firm-level wages differs between firms with and without shared governance. This concept essentially uses cross-sectional variation to provide an estimate of the degree to which labor receives idiosyncratic firm-level productivity differences, perhaps reflecting investment, product market rents or efficiency differences. It therefore also provides one direct measure of the very mechanism by which hold-up occurs.

Here, we study persistent productivity differences across firms and relate them to AKM firm effects (as in Card et al., 2018, Table 4), which we aggregate across establishments. Since we study AKM firm premia as outcome variables, our rent-sharing estimates will not mechanically reflect compositional changes in the workforce. Importantly, the rent sharing elasticities will reflect a different concept from our measured decline in the labor share insofar as the rent sharing coefficient measures the relationship between wages at a particular firm (adjusted for composition and estimated off movers) and cross-sectional dispersion in value added per worker within a given firm group (where value added per worker increases in the treatment group without a tantamount increase in wages, pushing down the labor share).

In Figure 7, panel (a), we first plot the relationship in the whole sample independent of legal form and incorporation date. We find a slope of 0.088 (SE 0.004), implying that a 10% increase in value-added per worker is associated with a 0.88% increase in wages. While no previous worker-and-firm-level rent-sharing estimates for Germany have been reported in the literature, the elasticity is similar to what has been documented in other countries (Card et al., 2018; Jäger et al., 2018).

We next dissect the rent-sharing elasticity in panel (b) and find no detectable difference in rent-sharing induced by shared governance. That is, we find a DiD estimate of 0.002 (SE 0.024), indicating that we can rule out increases in the rent-sharing elasticity of more than 0.05. The DiD estimate is the coefficient on the interaction between value added per worker and an indicator for shareholder corporations incorporated before August 10, 1994 in a model

where we also include base effects of value added interacted with cohort and legal form and base effects for these two indicators as well. In conclusion, we find no evidence for workers capturing a larger part of value added per worker when they have board representation – consistent and perhaps underlying in the first place the absence of hold-up patterns in capital formation.

7.3 Profitability and External Finance

We close our distributional analysis with the effect of shared governance on profits (our measure of the income of owners) as well as potential effects on sources of external finance more generally, studying debt and its costs and proxies for external finance capacity and constraints.

Profitability The long-standing debate about the appropriateness of shared governance has centered around profitability: by the influential argument by Jensen and Meckling (1979), firm owners would adopt shared governance voluntarily if it were profitable. We consider three measures of profitability: EBITDA over revenue (the "profit margin"), and two "return on assets" measures: EBIT/equity and EBIT/total assets ratios. EBITDA referes to earnings before interest, tax, depreciation and amortization while EBIT refers to earnings before interest and taxation.

We report results in Table 8 and find mixed effects on these profitability measures. We find a reduction in the profit margin by 4-5 percentage points if computed as a ratio over revenue, and an order of magnitude smaller if over total assets insignificant in all but one of these 16 specifications. When measured as a return on equity, the effects are very positive, around 0.2, but again insignificant. Throughout, EBIT – which ignores depreciation – yields more positive effects than EBITDA, consistent with the larger capital stock and associated depreciation.

Overall, we conclude that we do not find consistent evidence for shared governance to lower shareholder profits. While it would be interesting to measure market values and actual dividend payments, we cannot comprehensively study in our sample of firms that are not typically publicly traded how these profits are distributed to shareholders rather than for example kept and reinvested in the firm.

Debt Structure and Leverage In Table 9 we report effects on various financial outcomes. Here we find negative (yet imprecisely estimated) debt to asset ratios. Most importantly, we find a significantly negative effect of the average cost of debt, measured as interest payment over face value of debt, of 4-5 percentage points (baseline of 0.1 to 0.16 in the control firms),

which is stable and significant across most specifications except for one. This result suggests that external finance suppliers do not charge shared governance firms a premium – although we also document no increase in leverage (and only an insignificantly negative decrease in liabilities over total assets, again probably largely driven by an increase in assets as we documented rather than a decrease in debt). Together, the findings are consistent with shared governance firms perhaps running less risky operations (as perhaps preferred by labor representatives), or higher collateral levels as suggested by the positive effects on overall assets.

Liquid Assets In colum 5 of Table 9, we also check whether owners leave liquid assets in the firm, perhaps as an indication of a potential severity of free cash flow problems. We find an imprecisely estimated shift from cash (over total assets), perhaps reflecting the shift from liquid to fixed assets or owners being less willing to store cash inside the firm (rather than in illiquid, fixed assets).[32]

Indicators of Debt Capacity and Financial Constraints We next consider measures of financial constraints, debt capacity and distress, in Table 10. We consider five variables, the construction of which we describe in Appendix Section A.3, building in part on Hillegeist et al. (2004) and Farre-Mensa and Ljungqvist (2016). These indices take as arguments standard firm-level accounting variables and generate a scalar measure representing risk or constraints.[33] Within each year-by-firm-type cell (i.e. shareholder corporation vs. limited liability company), we generate indicators for each index in our baseline sample, having one indicate above-median values of risk of distress or financial constraints. The coefficients therefore correspond to probability effects on entering the top half of the score distribution (i.e. higher distress or constraint risk). In Panel A, we present these regressions on the median-cut indicator variables. In Panel B, we further probe an alternative cutoff of the top 20% rather than the top 50%.

In Table 10 Panel A for the median cutoff, we find slightly positive effects on the order of 0.03–0.04 of shared governance for the HP index, and the z-scores of around 0.10. The KZ index and o-scores are essentially zero or slightly negative. The WW index yields a positive effect that is initially significant but goes towards an insignificant zero with industry fixed

[32]Our results are consistent with Redeker (2019) who finds a reduction in cash-holding when firms cross the 2000-employee threshold requiring them to adop parity codetermination.

[33]For financial constraints, we consider the Whited-Wu index (Whited and Wu, 2006), the Kaplan-Zingales index (Kaplan and Zingales, 1997), and the HP index (Hadlock and Pierce, 2010). For bankruptcy and financial distress risk, we use the Altman z-score (Altman et al., 2000), where we present version of the model that extends to private firms and comprehensively applies to our firm data and we further distinguish two versions, as well as the o-score (Ohlson, 1980).

effects. The results in Panel B, where we impose a stricter definition of the top 20% of the score for the indicator rather than the top 50%, yield a similar picture, while the four-variable variant falls back towards zero. Here, the WW and HP indices interestingly turn significant with 0.07-0.11 point estimates.

There are two interpretations for this result. Either the firms are indeed riskier from the perspective of external finance. Alternatively, taken together with the previous results on similar realized leverage and indeed *lower* cost of debt, the standard indicators used here may perhaps indicate that the shared governance firms are indeed perceived as safer by capital markets than by the indices.

8 Conclusion

We have studied a natural experiment in form of a reform that mandated worker representation on supervisory boards for some cohorts of corporations while abolishing it for their slightly younger peers. The context is Germany, which has a long history of mandating at least a third of workers on shareholder corporation's supervisory boards, but which abolished this requirement sharply in most new shareholder corporations incorporated after August 10, 1994. The discontinuity generated by the reform lends itself to a difference-in-differences design, comparing firms incorporated right before and right after the threshold. This quasi-experiment has provided a credibly identified empirical answer to the long-standing debate on how expanding worker voice and formal authority in corporate decisions may effect firm and worker outcomes.

Our core results are that shared governance is associated with an increase in capital formation and a shift towards more capital intensive production – sharply contradicting the predicted disinvestment following hold-up and agency cost views of shared governance (see, e.g., Grout, 1984; Jensen and Meckling, 1979). At the same time, we do not find that installing worker representatives in German supervisory boards increased wages in these firms, nor did it lead to more rent sharing. The wage moderation accompanying increased worker power is consistent with and may in fact rationalize our first key finding that capital formation is not curbed.

While the evidence is inconsistent with hold-up mechanisms at play, we close by speculating that shared governance may crowd in investment by facilitating cooperation between the firm and its workforce, perhaps by institutionalizing communication and repeated interactions. This reading of worker representation as a cooperative institution that helps overcome coordination issues could hence rationalize our findings (Lancaster, 1973; Van der Ploeg, 1987; Addison et al., 2007), including through channels such as improved information flows

(Hirschman, 1970; Freeman and Medoff, 1984; Freeman and Lazear, 1995) or foster long-term employment relationships and the enforcement of implicit contracts (Malcomson, 1983; Hogan, 2001). These mechanisms appear in anecdotal evidence as well as stated objectives of worker representatives, for example:

> shared governance per se opposes short-term shareholder interests. The focus is on the long-term safeguarding of the company through investments and innovations with participation of the employees[34]
>
> Berthold Huber, 2004, VP of IG Metall (Metalworker's Union) at the time Worker Board Representative, Deputy Chairman Siemens

While we do not provide direct evidence adjudicating between these specific channels, we have documented a sharp rejection of the canonical hold-up view, which at least in the context of this institution and this reform, failed to hold up.

We close with some reflections on the institutional context of our experiment. Our cohort-based difference-in-differences design assigns a permanent corporate governance regime from firm entry onward, addressing the longer-run institutional scenario rather than an alternative experiment that would impose shared governance onto already-existing companies. The effects of such reforms without grandfathering may differ from ours. Moreover, our experiment occurred in the shadow of and perhaps interacted with existing establishment-level worker participation through works councils, an institution with a long history in Germany and the second lever of shared governance. On the one hand, the interaction may increase effects of shared corporate governance through information sharing or by providing the worker-supervisors with leverage beyond their vote and voice on the board. On the other hand, the incremental effect of supervisory board seats may duplicate some channels by which works councils already affect firm outcomes.

One may be tempted to conclude that the absence of evidence of rent-extraction resulting from the inclusion of workers on corporate boards may be due to "responsible" or moderate unions in the German context. Perhaps, however, it is the very institution of shared governance and minority participation of workers in corporate boards that may facilitate cooperative labor relations (Thelen, 1991) or even tame labor. In particular, radical labor representatives with demands perceived as excessive could always be outvoted by shareholders since the capital side generally still holds a majority of board seats. Thus, in order to exert influence, labor representatives may have to be moderates in order to successfully build

[34]Source: Frankfurter Allgemeine Zeitung, November 15, 2004, Nr. 267, p. 13, English translation by authors.

coalitions with the shareholder representatives. As a consequence, shared governance may be one root cause of the cooperative labor relations in Germany.

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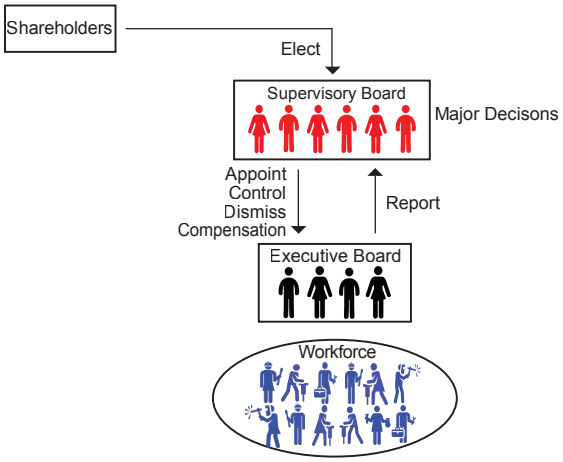
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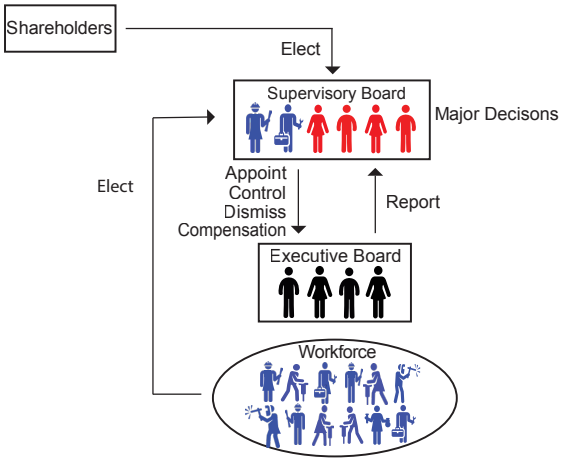
Figures

Figure 1: Corporate Governance and Worker Representation on Supervisory Board

(a) No Worker Representation on Supervisory Board



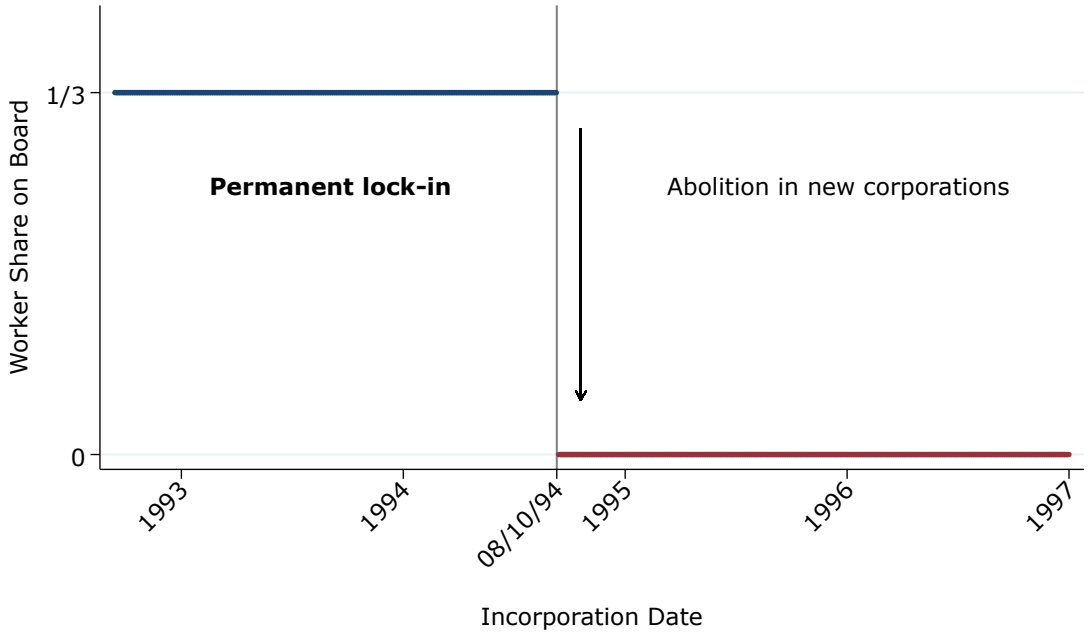
(b) One-Third Worker Representatives on Supervisory Board



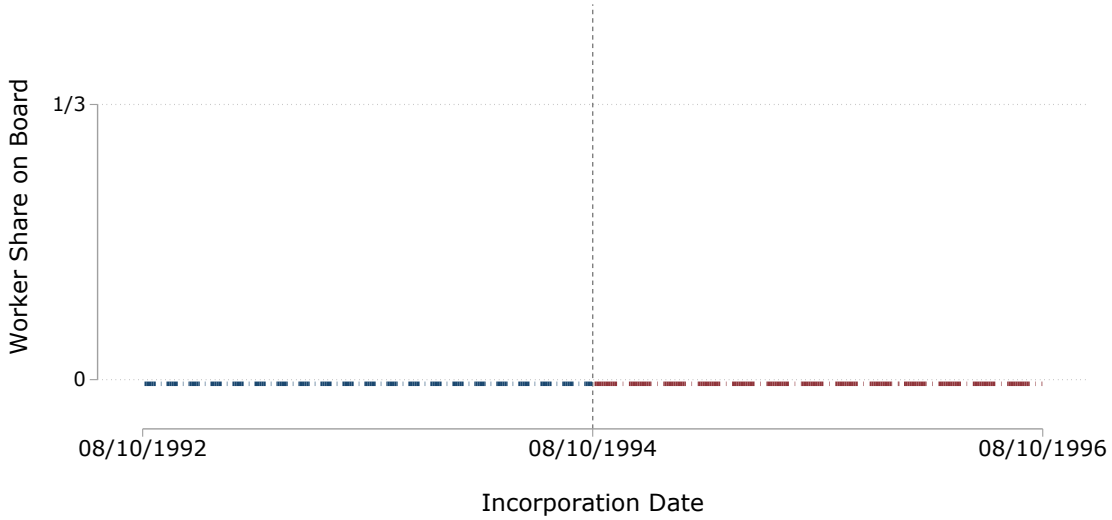
Note: The figures illustrate the supervisory board composition and election process in German corporations with and without worker-elected supervisory board directors. Shareholder corporations incorporated after August 10, 1994 as well as family firms have no worker representatives on the supervisory board, as illustrated in panel (a), unless they regularly employ more than 500 workers. Shareholder corporations incorporated before August 10, 1994 have one-third worker representatives on the supervisory board, as illustrated in panel (b), even when the employ fewer than 500 workers. Regardless of incorporation date or family ownership, firms between 500 and 2000 employees are mandated to have one-third worker-elected directors and firms with more than 2000 employees have equal representation of worker and shareholder representatives on the supervisory board.

Figure 2: Shared Governance on Supervisory Board by Incorporation Date

(a) Shareholder Corporations



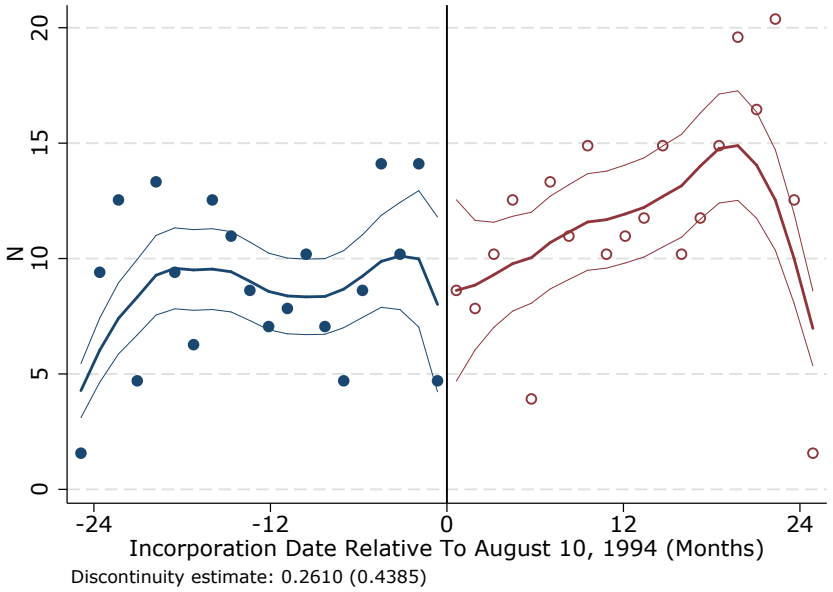
(b) Non-Shareholder Corporations



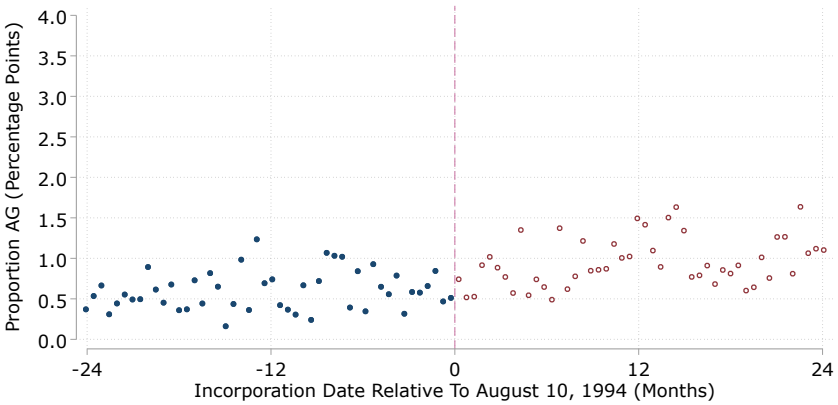
Note: The figure illustrates the mandates for shared governance by incorporation date in corporations with fewer than 501 employees (see Table 1 and Appendix Figure B.1 for rules for larger firms). Shareholder corporations incorporated before August 10, 1994 are mandated to have one-third worker representation on the supervisory board. Family firms with fewer than 500 employees are exempt from shared governance unless they reach 500 employees. Shareholder corporations incorporated after August 10, 1994 cannot have workers on the supervisory board if they have less than 501 employees. The rules for non-shareholder corporations follow those for shareholder corporations incorporated after August 10, 1994, and were not changed as part of the reform.

Figure 3: Frequency of Incorporation Around Reform Cutoff Date and Selection Into Shareholder Corporation Status

(a) Frequency of Incorporation and McCrary (2008) Test (Sample: Shareholder Corporations)

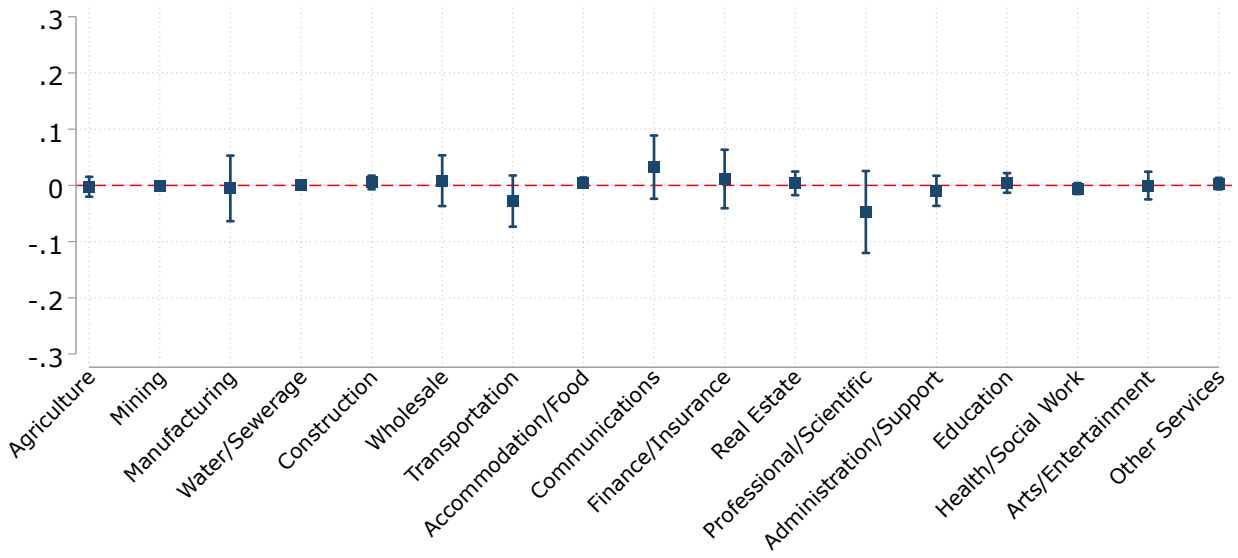


(b) Selection Into Shareholder Corporation Status



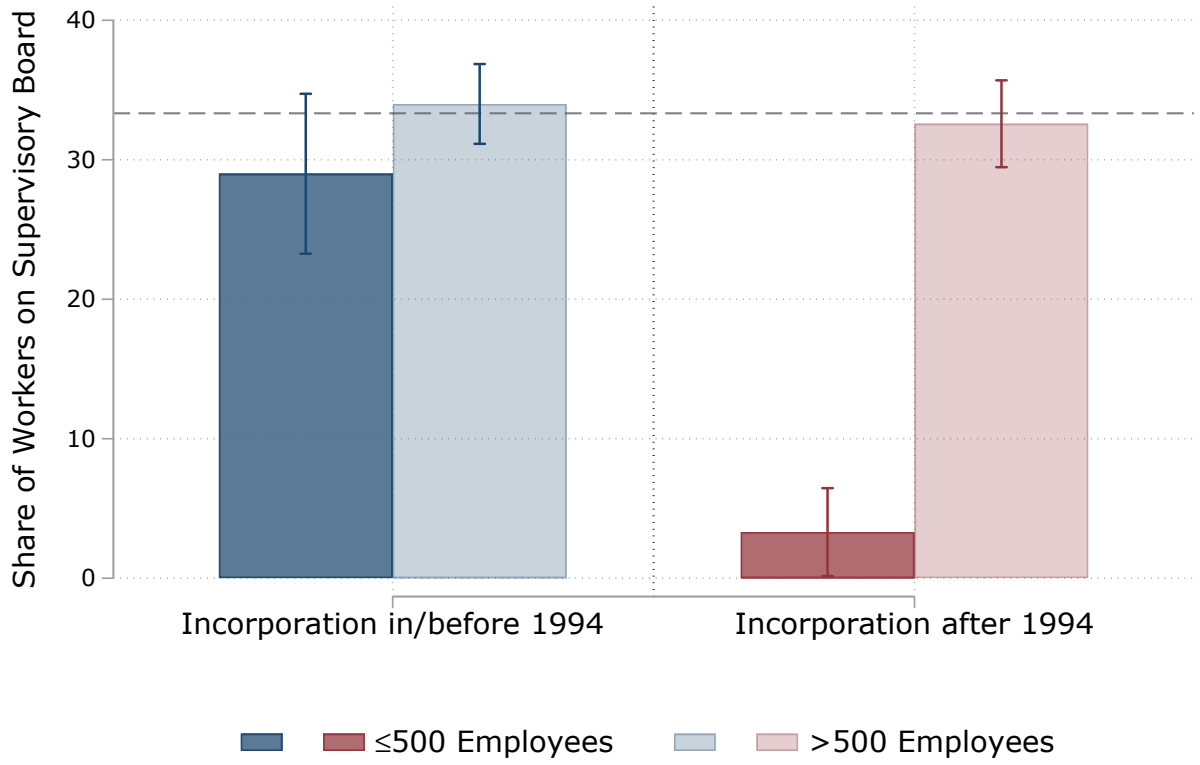
Note: Drawing on data from the Mannheim Enterprise Panel, panel (a) plots the frequency of the incorporation of shareholder corporations around the August 10, 1994 cutoff date which has been normalized to zero. The mandate for shared governance was relaxed for shareholder corporations incorporated after the cutoff date. The figure also reports the result of the McCrary (2008) test for a jump in the density at the discontinuity. Panel (b) visualizes the selection into shareholder corporation status around the reform. Specifically, it plots the average of an indicator function for shareholder corporation status in a sample of all corporations by incorporation date based on Bureau van Dijk data.

Figure 4: Balance of Industry Composition



Note: The figure plots difference-in-differences coefficients and associated 95% confidence intervals for specifications as in (2). Each coefficient is from a specification using an indicator for the respective industry as an outcome variable and can be interpreted as the effect of shared governance on the share of shareholder corporations incorporating in that industry (relative to non-shareholder corporations). We use NACE Rev. 2 Classification 1 industry designations. An F-test of joint significance shows no statistically significant compositional changes ($p = 0.91$). See Appendix Table C.1 for the differences-in-differences estimates for this figure and additional specifications with quarter-of-incorporation fixed effects.

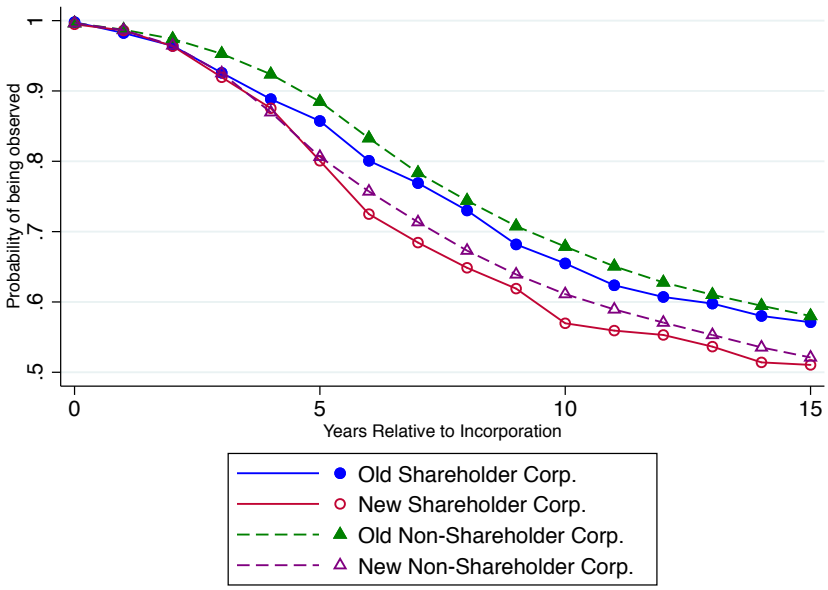
Figure 5: Share of Workers on the Supervisory Board



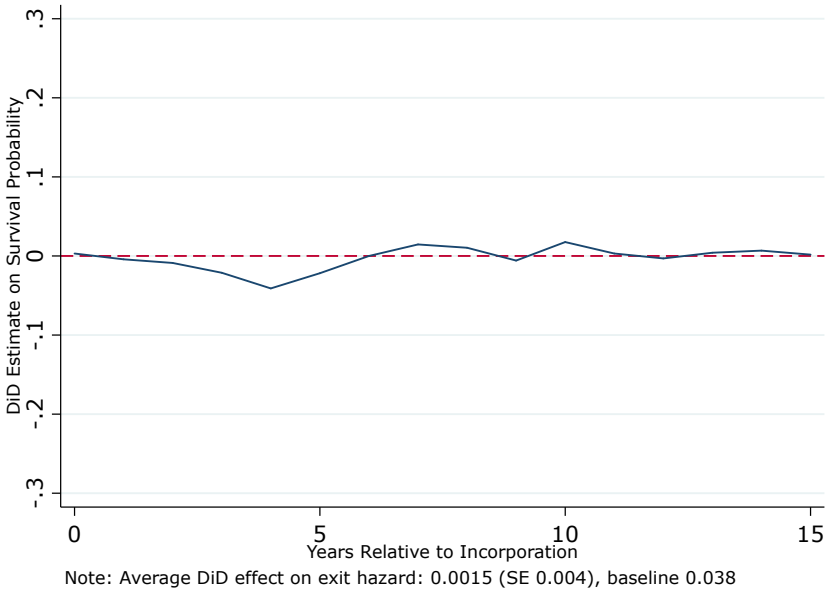
Note: The figure shows the share of workers on the supervisory board of shareholder corporations based on data from the Hoppenstedt Aktienführer. We restrict the sample to shareholder corporations founded between 1989 and 1999 for which board composition data and the incorporation year is reported. The two columns on the left report statistics for corporations with at most 500 employees, the two columns on the right for those with more than 500 employees. The navy-colored bars represent corporations incorporated during or before 1994, the maroon-colored bars represent corporations incorporated during or after 1995. The dashed horizontal line at 33.33% indicates the mandated worker share under one-third codetermination.

Figure 6: Firm Survival Shares by Incorporation Date and Corporation Type

(a) Levels by Group



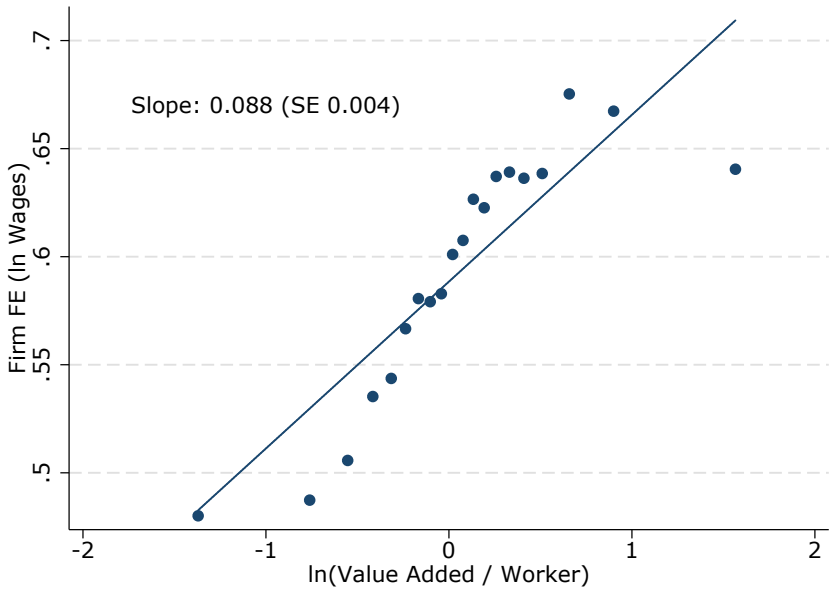
(b) difference-in-differences Estimate on Survival by Firm Age



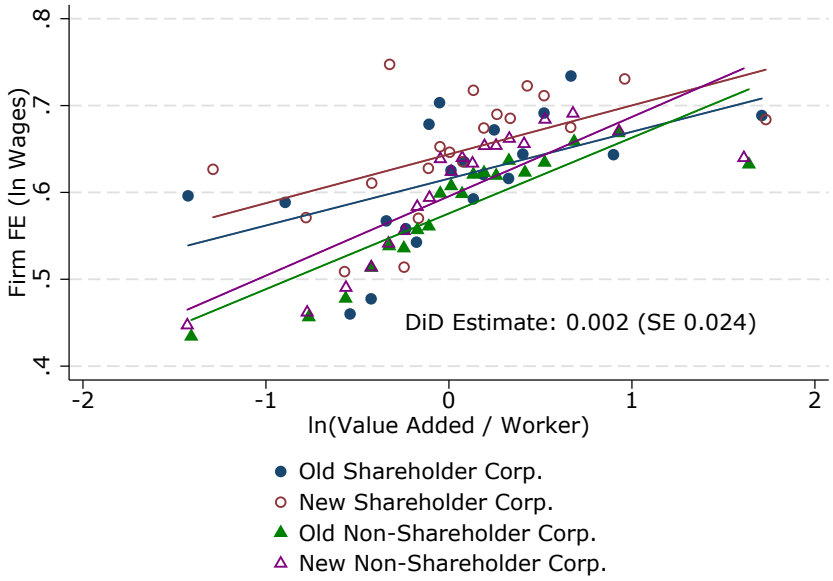
Note: The figure is based on the Mannheim Enterprise Panel, ZEW, Mannheim. Panel (a) shows firm survival probabilities of firms incorporated within a two-year window of August 10, 1994 separately for firms incorporated before or after the cutoff date and for shareholder and non-shareholder corporations. The running variable is time since incorporation in years. Panel (b) shows differences: old minus new shareholder corporations, minus the difference among non-shareholder corporations.

Figure 7: Rent-Sharing: Changes in Value-Added per Worker and Wages

(a) Rent-Sharing



(b) Rent-Sharing By Legal Form and Incorporation Date



Note: The figure is based on the Orbis-ADIAB data and shows a binned scatter plot of firm's AKM pay premia plotted against ln(Value Added per Worker).

Tables

Table 1: Codetermination Rules: Share of Worker Representatives on Supervisory Board

	Shareholder Corporations		Non-Shareholder Corporations	
Firm Size	Incorporated		Incorporated	
	before 08/10/1994	on/after 08/10/1994	before 08/10/1994	on/after 08/10/1994
1 to 500	**1/3**	**0**	**0**	**0**
501 to 2000	1/3		1/3	
2000 to ∞	$1/2^*$		$1/2^*$	

Note: The table documents the mandated share of worker representatives on the supervisory board by firm size, legal form, and incorporation date. For firms above 2000 employees, workers have 1/2 of the supervisory board seats although the chairperson, typically a shareholder representative, can break ties. In the mining, coal and steel industry, there is complete parity on the supervisory board between worker and shareholder representatives without tie-breaking by the chair. Shareholder corporations wholly owned by a family are exempt from the lock-in for smaller corporations incorporated before August 10, 1994.

Table 2: Effect of Shared Governance on Board Composition

	𝟙(Women > 0)	Share Women	𝟙(PhD/Profs > 0)	Share PhD/Profs	𝟙(Nobility > 0)	Share Nobility
			Panel A: Supervisory Board			
Diff-in-Diff	0.145**	0.051*	0.014	-0.032	-0.051*	-0.017**
	(0.070)	(0.028)	(0.071)	(0.031)	(0.027)	(0.007)
DiD	0.145**	0.045	0.040	-0.028	-0.052*	-0.017**
Industry FE	(0.073)	(0.030)	(0.074)	(0.033)	(0.029)	(0.007)
Control Mean: Sh. Corp.	0.352	0.128	0.564	0.228	0.087	0.024
″, Non-Sh. Corp.	0.614	0.179	0.552	0.137	0.035	0.006
N, Firm-Years	832	832	832	832	832	832
N, Sh. Corp.	351	351	351	351	351	351
N, Non-Sh. Corp.	481	481	481	481	481	481
			Panel B: Executive Board			
Diff-in-Diff	0.052	0.004	0.076*	0.027	-0.037**	-0.002*
	(0.051)	(0.021)	(0.046)	(0.017)	(0.015)	(0.001)
DiD	0.059	0.005	0.080*	0.027	-0.035**	-0.002*
Industry FE	(0.051)	(0.021)	(0.045)	(0.017)	(0.015)	(0.001)
Control Mean: Sh. Corp.	0.603	0.166	0.314	0.072	0.056	0.004
″, Non-Sh. Corp.	0.433	0.194	0.076	0.027	0.012	0.001
N, Firm-Years	34084	34084	34084	34084	34084	34084
N, Sh. Corp.	397	397	397	397	397	397
N, Non-Sh. Corp.	33687	33687	33687	33687	33687	33687

Note: The table reports the effect of shared governance on the outcomes reported in each column. We report the results of DiD specifications as in (2). The sample is restricted to shareholder corporations (*Aktiengesellschaften*) and non-shareholder corporations (*GmbHs*) with 10 or more employees incorporated within two years of the reform date of August 10, 1994. We use 2-digit NACE designations for industry fixed effects. See Appendix Section A for more information on the sample construction and Appendix Figure B.5 for the specification with industry fixed effects at additional bandwidths. Standard errors are clustered at the firm level are reported in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Effect of Shared Governance on Scale

	Log Rev	Log Value Add.	Log Emp	Log Emp (IAB)	𝟙(Emp > 500)	𝟙(Emp> 500) (IAB)	Log Fixed A.	Log Tang. A.	Log Materials
Diff-in-Diff	0.767***	0.141	0.188	0.081	0.014	-0.019	0.507**	0.325	-0.695
	(0.284)	(0.214)	(0.127)	(0.119)	(0.031)	(0.023)	(0.212)	(0.240)	(0.499)
DiD	-0.001	0.077	0.152	0.083	0.012	-0.019	0.494**	0.311	-1.004**
Year FE	(0.198)	(0.199)	(0.125)	(0.119)	(0.031)	(0.023)	(0.217)	(0.237)	(0.471)
DiD	0.524*	0.167	0.156	0.062	0.011	-0.020	0.508***	0.305	-0.425
Industry FE	(0.285)	(0.218)	(0.126)	(0.116)	(0.032)	(0.022)	(0.196)	(0.221)	(0.444)
DiD	-0.013	0.143	0.094	0.063	0.005	-0.020	0.534***	0.338	-0.723*
Industry-Year FE	(0.184)	(0.186)	(0.120)	(0.116)	(0.031)	(0.022)	(0.199)	(0.208)	(0.413)
Ctr. Mean: Sh. C.	13.783	14.955	4.259	4.025	0.138	0.119	13.666	12.541	14.651
″, Non-Sh. Corp.	11.010	14.840	3.387	3.347	0.024	0.021	12.553	12.254	14.698
N, Firm-Years	223032	43830	300129	154963	300129	154963	122744	121052	24974
N, Sh. Corp.	583	277	681	380	681	380	402	402	183
N, Non-Sh. Corp.	42142	8811	47859	24095	47859	24095	25866	25638	6358

Note: The table reports the effect of shared governance on the outcomes related to firm scale. We report the results of DiD specifications as in (2). The sample is restricted to shareholder corporations (*Aktiengesellschaften*) and non-shareholder corporations (*GmbHs*) with 10 or more employees incorporated within two years of the reform date of August 10, 1994. We use 2-digit NACE designations for industry fixed effects. Non-indicator outcomes are winsorized at the 1% level by year. See Appendix Section A for more information on the sample construction and Appendix Figure B.6 for the specification with industry-year fixed effects at additional bandwidths. Standard errors clustered at the firm level are reported in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Effect of Shared Governance on Productivity and Capital Intensity

	Value Add. per Emp	Log VA per Emp	Fixed A. per Emp	Log Fixed A. per Emp	Log TFP (Fixed A.)	Capital Share	Value Added /Revenue
Diff-in-Diff	24.503**	0.141	62.295***	0.384**	0.001	0.058*	0.120**
	(10.021)	(0.234)	(24.059)	(0.192)	(0.266)	(0.030)	(0.058)
DiD	24.726**	0.113	62.687***	0.416**	0.004	0.058*	0.121**
Year FE	(10.203)	(0.158)	(24.305)	(0.180)	(0.214)	(0.030)	(0.056)
DiD	28.906***	0.196	64.359***	0.401**	-0.036	0.068**	0.124**
Industry FE	(9.633)	(0.223)	(22.333)	(0.184)	(0.170)	(0.027)	(0.052)
DiD	33.161***	0.187	65.839***	0.475***	-0.029	0.071***	0.129*
Industry-Year FE	(10.793)	(0.126)	(23.558)	(0.163)	(0.104)	(0.027)	(0.071)
Control Mean: Sh. Corp.	76.405	9.885	97.998	9.163	6.799	0.298	0.409
″, Non-Sh. Corp.	64.272	10.445	34.880	8.981	7.638	0.248	0.372
N, Firm-Years	44415	43830	123993	122744	41859	42825	30888
N, Sh. Corp.	280	277	402	402	270	278	257
N, Non-Sh. Corp.	8867	8811	26106	25866	8282	8690	7539

Note: The table reports the effect of shared governance on the outcomes related to productivity and capital intensity. We report the results of DiD specifications as in (2). The sample is restricted to shareholder corporations (*Aktiengesellschaften*) and non-shareholder corporations (*GmbHs*) with 10 or more employees incorporated within two years of the reform date of August 10, 1994. We use 2-digit NACE designations for industry fixed effects. Non-indicator outcomes are winsorized at the 1% level by year. See Appendix Section A for more information on the sample construction and Appendix Figure B.7 for the specification with industry-year fixed effects at additional bandwidths. Standard errors are clustered at the firm level are reported in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Effect of Shared Governance on Skill Structure (Matched Employer-Employee Data)

	Low-Skilled %	Med-Skilled %	High-Skilled %	% Qualified Manual	Qualified Service	All Managers	Outsource-able (FSCL)
Diff-in-Diff	-0.015*	0.002	0.016	0.038	0.005	-0.008	0.085
	(0.009)	(0.023)	(0.024)	(0.025)	(0.006)	(0.010)	(0.145)
DiD	-0.015*	0.002	0.016	0.039	0.005	-0.008	0.082
Year FE	(0.009)	(0.023)	(0.024)	(0.025)	(0.006)	(0.010)	(0.145)
DiD	-0.017**	-0.002	0.023	0.026	0.005	-0.007	0.138
Industry FE	(0.009)	(0.020)	(0.021)	(0.022)	(0.006)	(0.010)	(0.130)
DiD	-0.018**	-0.002	0.023	0.026	0.005	-0.007	0.136
Industry-Year FE	(0.009)	(0.020)	(0.021)	(0.022)	(0.006)	(0.010)	(0.130)
Ctr. Mean: Sh. C.	0.127	0.593	0.261	0.171	0.041	0.085	-3.582
″, Non-Sh. Corp.	0.116	0.729	0.126	0.261	0.026	0.032	-2.320
N, Firm-Years	154963	154963	154963	154963	154963	154963	88659
N, Sh. Corp.	380	380	380	380	380	380	275
N, Non-Sh. Corp.	24095	24095	24095	24095	24095	24095	16544

Note: The table reports the effect of shared governance on the skill structure of firms. We consider (i) low-skilled workers with no vocational training, (ii) medium-skilled worker with a finished school degree and a vocational qualification, and (iii) high-skilled workers with a university degree and report the results of DiD specifications as in (2). The sample is restricted to shareholder corporations (*Aktiengesellschaften*) and non-shareholder corporations (*GmbHs*) with 10 or more employees incorporated within two years of the reform date of August 10, 1994. We use 2-digit NACE designations for industry fixed effects. See Appendix Section A for more information on the sample construction and Appendix Figure B.8 for the specification with industry-year fixed effects at additional bandwidths. Standard errors clustered at the firm level are reported in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Effect of Shared Governance on Tenure (Matched Employer-Employee Data)

		Log	Separations			
	Tenure	Tenure	All	<4 Yrs Tenure	4-9 Yrs Tenure	>9 Yrs Tenure
Diff-in-Diff	-0.488*	-0.062	0.016	0.014	0.003	-0.003*
	(0.274)	(0.039)	(0.010)	(0.009)	(0.003)	(0.001)
DiD	-0.482*	-0.061	0.015	0.014	0.003	-0.002*
Year FE	(0.273)	(0.039)	(0.010)	(0.009)	(0.003)	(0.001)
DiD	-0.465*	-0.060	0.013	0.012	0.003	-0.002*
Industry FE	(0.254)	(0.037)	(0.010)	(0.009)	(0.003)	(0.001)
DiD	-0.462*	-0.059	0.013	0.012	0.003	-0.002*
Industry-Year FE	(0.254)	(0.036)	(0.010)	(0.009)	(0.003)	(0.001)
Control Mean: Sh. Corp.	7.464	7.836	0.201	0.141	0.045	0.016
″, Non-Sh. Corp.	8.100	7.904	0.184	0.128	0.040	0.014
N, Firm-Years	154963	154963	135083	135083	135083	135083
N, Sh. Corp.	380	380	372	372	372	372
N, Non-Sh. Corp.	24095	24095	23609	23609	23609	23609

Note: The table reports the effect of shared governance on worker tenure at firms. We consider (i) low-skilled workers with no vocational training, (ii) medium-skilled worker with a finished school degree and a vocational qualification, and (iii) high-skilled workers with a university degree and report the results of DiD specifications as in (2). The sample is restricted to shareholder corporations (*Aktiengesellschaften*) and non-shareholder corporations (*GmbHs*) with 10 or more employees incorporated within two years of the reform date of August 10, 1994. We use 2-digit NACE designations for industry fixed effects. See Appendix Section A for more information on the sample construction and Appendix Section A for more information on the sample construction and Appendix Figure B.9 for the specification with industry-year fixed effects at additional bandwidths. Standard errors clustered at the firm level are reported in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Effect of Shared Governance on Wages

	Log Mean Wage	AKM Firm Effects	Log Wage, 25th Pct	Log Med. Wage	Log Wage, 75th Pct	% Above SS Maximum	Log Avg. Exec Pay	Exec Pay /Wage Bill
Diff-in-Diff	0.034	-0.002	0.029	0.026	0.028	0.005		
	(0.040)	(0.020)	(0.037)	(0.037)	(0.035)	(0.014)		
DiD	0.036	-0.001	0.031	0.028	0.030	0.005		
Year FE	(0.040)	(0.020)	(0.037)	(0.037)	(0.035)	(0.014)		
DiD	0.050	0.006	0.045	0.040	0.041	0.009		
Industry FE	(0.039)	(0.021)	(0.036)	(0.037)	(0.035)	(0.014)		
DiD	0.052	0.008	0.047	0.042	0.043	0.009		
Industry-Year FE	(0.039)	(0.021)	(0.036)	(0.037)	(0.035)	(0.014)		
Difference (Sh. Corp.)							-0.017	0.076
							(0.121)	(0.068)
Control Mean: Sh. Corp.	4.712	0.528	4.400	4.618	4.833	0.129	5.914	0.077
″, Non-Sh. Corp.	4.379	0.425	4.149	4.315	4.488	0.039		
N, Firm-Years	153402	45104	153402	153402	153402	154963	1161	371
N, Sh. Corp.	380	311	380	380	380	380	188	55
N, Non-Sh. Corp.	23936	16366	23936	23936	23936	24095	0	0

Note: The table reports the effect of shared governance on wages. We report the results of DiD specifications as in (2). The sample is restricted to shareholder corporations (*Aktiengesellschaften*) and non-shareholder corporations (*GmbHs*) with 10 or more employees incorporated within two years of the reform date of August 10, 1994. We use 2-digit NACE designations for industry fixed effects. Results for executive pay are based on the set of firms that we were able to match between the Kienbaum dataset and the Bureau van Dijk datasets (see Section 7.1), and we report the simple difference of shareholder corporations incorporated after vs. before August 10, 1994, instead of difference-in-differences estimates. In the last column, we winsorize Total Executive Pay / Total Wage Bill at the 5% level, instead of the 1% level, because of extreme outliers. All other outcomes are winsorized at the 1% level by year. See Appendix Section A for more information on the sample construction and Appendix Figure B.11 for specifications at additional bandwidths. Standard errors are clustered at the firm level are reported in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Effect of Shared Governance on Profitability

	EBITDA /Rev	EBIT /Rev	EBITDA /Equity	EBIT /Equity	EBITDA /Total A.	EBIT /Total A.
Diff-in-Diff	-0.040	-0.050	0.207	0.074	-0.0002	-0.006
	(0.028)	(0.032)	(0.191)	(0.157)	(0.018)	(0.018)
DiD	-0.037	-0.048	0.242	0.081	0.0003	-0.006
Year FE	(0.028)	(0.031)	(0.195)	(0.158)	(0.018)	(0.017)
DiD	-0.039	-0.050	0.245	0.131	-0.001	-0.003
Industry FE	(0.028)	(0.031)	(0.210)	(0.167)	(0.018)	(0.017)
DiD	-0.038	-0.050*	0.177	0.029	-0.003	-0.004
Industry-Year FE	(0.026)	(0.029)	(0.223)	(0.166)	(0.018)	(0.017)
Control Mean: Sh. Corp.	0.014	-0.027	0.258	0.098	0.084	0.051
″, Non-Sh. Corp.	0.070	0.035	1.605	0.934	0.136	0.089
N, Firm-Years	31139	30942	41144	40902	43481	43212
N, Sh. Corp.	262	262	277	276	284	283
N, Non-Sh. Corp.	7523	7509	8263	8247	8781	8763

Note: The table reports the effect of shared governance on profitability. We report the results of DiD specifications as in (2). The sample is restricted to shareholder corporations (*Aktiengesellschaften*) and non-shareholder corporations (*GmbHs*) with 10 or more employees incorporated within two years of the reform date of August 10, 1994. We use 2-digit NACE designations for industry fixed effects. Outcomes are winsorized at the 1% level by year. See Appendix Section A for more information on the sample construction and Appendix Figure B.10 for the specification with industry-year fixed effects at additional bandwidths. Standard errors clustered at the firm level are reported in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Effect of Shared Governance on Capital Structure, Leverage, and Cost of Debt

	Liabilites /Total A.	Leverage	Cost of Debt	Long-Term Debt /Total Debt	Cash /Total A.
Diff-in-Diff	-0.021	0.001	-0.048*	0.004	-0.027
	(0.024)	(0.028)	(0.028)	(0.036)	(0.019)
DiD	-0.022	0.005	-0.050*	-0.002	-0.025
Year FE	(0.024)	(0.028)	(0.027)	(0.035)	(0.018)
DiD	-0.020	-0.007	-0.040	-0.006	-0.027
Industry FE	(0.023)	(0.028)	(0.026)	(0.035)	(0.017)
DiD	-0.018	-0.001	-0.052**	-0.007	-0.027
Industry-Year FE	(0.024)	(0.028)	(0.025)	(0.035)	(0.017)
Control Mean: Sh. Corp.	0.571	0.277	0.167	0.733	0.179
″, Non-Sh. Corp.	0.661	0.366	0.111	0.828	0.162
N, Firm-Years	123834	73669	26365	53261	121804
N, Sh. Corp.	402	368	246	324	403
N, Non-Sh. Corp.	26096	20479	6664	16351	25815

Note: The table reports the effect of shared governance on capital structure, leverage, and the cost of debt. We report the results of DiD specifications as in (2). The sample is restricted to shareholder corporations (*Aktiengesellschaften*) and non-shareholder corporations (*GmbHs*) with 10 or more employees incorpWe use 2-digit NACE designations for industry fixed effects. orated within two years of the reform date of August 10, 1994. All outcomes are winsorized at the 1% level by year See Appendix Section A for more information on the sample construction and Appendix Figure B.12 for specifications at additional bandwidths. Standard errors clustered at the firm level are reported in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Effect of Shared Governance on Indices Predicting Financial Constraints and Distress

	HP Index	KZ Index	Z Score, 5 Vars	Z Score, 4 Vars	O Score	WW Score
			Panel A: 𝟙(Above Median)			
Diff-in-Diff	0.026	0.004	0.099*	0.092*	-0.007	0.140*
	(0.041)	(0.059)	(0.059)	(0.051)	(0.056)	(0.077)
DiD	0.026	0.003	0.098*	0.092*	-0.007	0.140*
Year FE	(0.041)	(0.059)	(0.059)	(0.051)	(0.056)	(0.078)
DiD	0.032	-0.010	0.093*	0.071	-0.018	0.059
Industry FE	(0.039)	(0.054)	(0.054)	(0.050)	(0.054)	(0.056)
DiD	0.034	-0.002	0.101*	0.082	-0.025	0.040
Industry-Year FE	(0.040)	(0.055)	(0.055)	(0.051)	(0.056)	(0.057)
Control Mean: Post-Reform Sh. Corp.	0.502	0.488	0.461	0.468	0.519	0.442
″, Non-Sh. Corp.	0.513	0.484	0.507	0.511	0.513	0.506
N, Firm-Years	124032	31215	29863	41453	31546	21572
N, Sh. Corp.	403	265	254	273	255	242
N, Non-Sh. Corp.	26110	7332	7310	8535	7013	6233
			Panel B: 𝟙(Above 80th Percentile)			
Diff-in-Diff	0.097***	-0.009	0.110**	0.017	0.042	0.116**
	(0.036)	(0.041)	(0.044)	(0.041)	(0.039)	(0.056)
DiD	0.096***	-0.010	0.110**	0.017	0.041	0.115**
Year FE	(0.036)	(0.042)	(0.044)	(0.041)	(0.039)	(0.056)
DiD	0.103***	-0.007	0.123***	0.011	0.029	0.082**
Industry FE	(0.034)	(0.041)	(0.041)	(0.041)	(0.037)	(0.039)
DiD	0.105***	-0.002	0.124***	0.009	0.033	0.065*
Industry-Year FE	(0.035)	(0.042)	(0.042)	(0.041)	(0.037)	(0.037)
Control Mean: Post-Reform Sh. Corp.	0.168	0.206	0.152	0.206	0.193	0.154
″, Non-Sh. Corp.	0.211	0.196	0.200	0.210	0.209	0.203
N, Firm-Years	124032	31215	29863	41453	31546	21572
N, Sh. Corp.	403	265	254	273	255	242
N, Non-Sh. Corp.	26110	7332	7310	8535	7013	6233

Note: The table reports the effect of shared governance financial distress risk—the Altman z-score (Altman et al., 2000), and the Ohlson o-score (Ohlson, 1980)—and financial constraints—the WW index (Whited and Wu, 2006), the KZ index (Kaplan and Zingales, 1997), and the HP index (Hadlock and Pierce, 2010). See Appendix Section A.3 on the construction of the indices. The indices are split into binary indicators by median (Panel A) or 80th pctile (Panel B) in our baseline sample in a year-by-legal-form cell, with 1 indicating higher risk or constraints. We report the results of DiD specifications as in (2). The sample is restricted to corporations incorporated within two years of the reform date of August 10, 1994. See Appendix Section A for details on the sample construction. Standard errors clustered at the firm level are in parentheses. Stars denote statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Online Appendix of:
Workers in the Board Room:
Causal Effects of Shared Governance

A Data Appendix

A.1 Dataset Construction

A.1.1 Versions of Bureau van Dijk Orbis Data

To construct the most comprehensive dataset of firms' financial information, we draw on several versions of the Bureau van Dijk Orbis dataset. **Bureau van Dijk WRDS** datasets are the Orbis datasets pulled from Wharton Research Data Services. **Orbis Historical** datasets have information on additional firms beyond those still included in the BvD data. **EBDC** datasets also have information on firms beyond the 10 years available from BvD and are based on data by the LMU-ifo Economics Business Data Center (EBDC). **Dafne** is a database by Bureau van Dijk with additional information on German firms. Specifically, we draw on the following datasets:

1. **Orbis Historical, legal information**, which contains date of incorporation and corporation type,
2. **Orbis Historical, contact information**, which contains firm location,
3. **Orbis Historical, industry classification**, which contains various industry classifications, including NACE Rev. 2,
4. **Orbis Historical, financial information**, which contains data from income statements and balance sheets,
5. **Bureau van Dijk WRDS, industry classification**, which contains various industry classifications, including NACE Rev. 2,
6. **Bureau van Dijk WRDS, managers**, which contains information on members of supervisory and executive boards,
7. **Bureau van Dijk WRDS, ownership**, which contains information on shareholders and ultimate owners,

8. **EBDC, financial and contact information**, which contains the date of incorporation, corporation type, industry classifications, and information from income statements and balance sheets.

9. **Dafne, trade register entry information**, which contains the date of the firm's first entry into the German Trade Register (*Handelregister*) in the Dafne dataset.

A.1.2 Preparing the Financial Datasets

We begin by identifying the ID numbers of firms incorporated from 1990 through 1999 in both the Orbis Historical and EBDC financial datasets.

We then de-duplicate the financial data for these firms so that there is one observation per year for each firm:

1. Unconsolidated reports take precedence over consolidated reports.

2. If the firm-year has an unconsolidated statement with a consolidated companion (consolidation code: U2) and an unconsolidated statement without a consolidated companion (consolidation code: U1), take the latter.

3. If there are two unconsolidated statements of the same type, take the one that is filed as an annual report.

4. If there are still duplicates within firm-year, take the statement with the latest date in the year.

For the Orbis Historical financial data, we then merge the Orbis Historical and Bureau van Dijk WRDS industry classification files using the BvD ID, specifically the NACE Rev. 2 designations. If the industry classification is missing from the Orbis Historical file, we fill it in with the Bureau van Dijk WRDS file.

A.1.3 Merging Orbis Historical and EBDC Financial Datasets

We then merge the Orbis Historical and EBDC financial data at the firm-year level. If a firm-year observation exists in both files and has non-missing information in both, we prioritize the (larger and more filled) Orbis Historical data.

For the industry classifications, this then means that our order of priority for industry classification is Orbis Historical, Bureau van Dijk WRDS, and then EBDC.

A.1.4 Incorporation Date Adjustment

Some firms have different incorporation dates in the Orbis Historical and EBDC datasets. In this case, we take the earlier incorporation date.

The 1994 reform of the Corporation Law stipulates that the incorporation date relevant to the worker representation mandate is the date of entry into the German Trade Register (*Handelsregister*). In the 1990s, the firm's date of trade register entry could regularly be up to a few months after the establishment date of its charter (*Feststellung der Satzung*).

To use the most accurate legally relevant incorporation date, we replace the incorporation date in the Orbis Historical/EBDC datasets with the date of first trade register entry from the Dafne dataset if the date of first trade register entry is within one year (365 days) of the firm's assigned incorporation date. If the Dafne date is more than a year before or after the incorporation date in the Orbis Historical/EBDC datasets, we assume that the first trade register entry date reported in the Dafne dataset is not the true first entry date.

A.1.5 Board Composition Data

We use information on board composition from the Bureau van Dijk WRDS dataset, which is a cross section from 2018 at the individual-position-firm level. We have access to a similar dataset from Orbis Historical, but there were fewer firms and observations were often unfilled. After isolating firms incorporated in the 1990s, we take the following steps to adjust the data to the firm level:

1. We label any position with the words "Aufsichtsrat" or "Supervisory Board" as a supervisory board position. Individuals with both supervisory and non-supervisory positions make up only 0.15% of the data and are dropped. We can then aggregate the data to the firm-individual level, where each individual is either supervisory or non-supervisory.

2. We calculate **tenure** as the number of years between the individual's earliest appointment date and 2018.

3. We calculate **size** as the number of individuals in supervisory and non-supervisory positions.

4. We label individuals as **a PhD/professor** if their name contains "Prof", "Professor", "Doktor", or "Dr."

5. We label **aristocratic names** as those with "von", "Graf", "Baron", "Freiherr", or "zu".

6. We identify **gender** from a gender indicator in the dataset.

7. We then are able to aggregate to the firm level and thereby measure shares and presence of various groups in supervisory and non-supervisory boards.

A.1.6 Ownership Data

We use information on ownership, i.e. shareholders, from the Bureau van Dijk WRDS dataset, which is a cross section from 2018 at the shareholder-firm level. After isolating firms incorporated in the 1990s, we take the following steps to adjust the data to the firm level:

1. A variable contains the share that each shareholder owns in the firm. We convert the non-numerical designations:

   - We remove the symbols >, <, and ±.
   - We convert the following designations to 100%:
     - GP (general partner)
     - WO (wholly owned)
     - VE (vessel), which does not appear in our ownership file
     - T (sole trader)
     - FC (foreign company), i.e. marking a foreign firm
     - BR (branch, e.g. of a foreign firm)
   - We convert "NG" (negligible) to 0.01%.
   - We convert "MO" (majority-owned) and "CQP1" (50% + 1 share) to 50.01%.

2. We identify **state shareholders** as those with shareholder type S (public authorities, states, governments) or those with "KfW Bankengruppe" in their name. The KfW is a German state-owned development bank. We consider the total share owned by these shareholders as the **proportion state-owned** in the firm.

3. We define family ownership in two ways:

   (a) If there is only one shareholder, and that shareholder is of shareholder type I (one or more known individuals or families), then the firm is defined as fully family-owned.

(b) Take the last name of all shareholders of shareholder type I (one or more known individuals or families). In practice, this is the last word of the shareholder name, since this is either an individual's last name or the family name only (e.g. "Familie Porsche"). Sum the shares owned by each last name for each firm. If a firm has at least 99.99% of all shares owned by one last name, then we designate it as fully family-owned. If it has at least 50% of all shares owned by one last name, we designate it as partially family-owned.

4. We then sum all shares owned by the state and by individuals, aggregating to the firm level.

A.1.7 Orbis-ADIAB

We separately draw on Orbis-ADIAB data from IAB which is never merged by us with outside data.

For this project we use the Orbis-ADIAB data which is compiled from three different data sets. For the Orbis-ADIAB data, an extract on German firms from the Orbis databse is linked in a first step with establishment level information for the Establishment-History-Panel (Betriebs-Historik-Panel (BHP) reference). In a second step, worker level information from the Integrated Employment Biographies (IEB) database are added.

Establishment-History-Panel (BHP) Data The Establishment History Panel (Betriebs-Historik-Panel, BHP) data contains aggregations of individual social security records by Establishment ID. It is composed of composed of cross-sectional datasets since 1975 for West-Germany and 1991 for East Germany. Every cross section contains all establishments in Germany with at least one employee subject to social security on June 30th. Since 1999, also establishments consisting solely of one marginal part-time employee are included. The BHP data contains information about the branch of industry and the location of the establishment. Furthermore, there is the number of employees liable to social security per establishment, as well as marginal part-time employees (since 1999), both in total and broken down by gender, age, occupational status, and qualification, among others.

Integrated Employment Biographies (IEB) Database Administrative records on employees stem from the notification process to the social security institutions in Germany as well as from internal processes of the German Federal Employment Agency. Every employer in Germany is obliged to submit at least once a year a notification on each of his employees to the social security institutions. Information submitted includes daily exact information on

the begin and the end of employment, gender, educational attainment, (qualitative) information on full- or part-time work, occupation, place of residence, and the gross wages paid to the employee for the covered period, among others. If an employee is continuously employed all year, the registered begin and end dates of employment are January 1st and December 31st.

Individual information on employment is amended by administrative records generated in the processes of the German labor administration. In particular, the additional information include the periods of unemployment benefit receipt according to the German Social Code II and III, the periods of job search as registered by BA and the participation in labor market programs and training schemes. As the social security records, this information is available on a daily basis, too. IAB combines the social security records as well as the other administrative data creating so-called employment biographies for every individual. Thus, as long as an individual is subject to social security contributions, recipient of unemployment benefits, a registered job-seeker, or a participant in labor market programs, it may be followed over time. The resulting database is called the Integrated Employment Biographies (IEB). However, for the Orbis-ADIAB database, IEB worker level information is restricted to employment and benefit receipt spell according to the German Social Code III and the years 1990 to 2014 only.

Linking the Data In a first step, a link between the establishment level information from the BHP database and the company information stored in the Orbis database was established. For this purpose, a total of 1,948,778 companies with reference to January 30th, 2014 were extracted from the Orbis database. By applying records linkage techniques, a link between 535,129 BvD company identifier and at least one establishment identifier from the BHP database could be established successfully. Based on the resulting BvD id-establishment id crosswalk was used it was possible to retrospectively add both additional waves of the BHP and Orbis data. At this point it is important to understand that this BvD id-establishment id crosswalk exists only for one point in time (2014). As a consequence, the corporate structure of 2014 is retained when adding additional waves from the BHP or Orbis database which dates back before the year 2014. For example, company C owned establishments A and B in 2014 and it was possible to successfully establish a crosswalk between A and B's establishment identifiers and C's BvD ID. However, in 2003 establishment already existed but was not owned by company C yet. Such a situation would be recorded incorrectly in the Orbis-ADIAB data since C's corporate structure of 2014 would be extrapolated to the past, i.e. establishment B would be observed as owned by company C in 2003. Contrarily, if establishment D was owned by company C in 2005 but was sold in 2007, this temporary

ownership is not reflected in the Orbis-ADIAB data as well. In context of the Orbis-ADIAB data, another aspect should be kept in mind. It is only possible for the period between 2006 and 2014 to observe company both company and establishment level information from the Orbis and BHP database parallelly. This results from the fact that different timespans are covered by both databases. The third component of the Orbis-ADIAB data are worker level information from IAB's Integrated Employment Biographies (IEB). Records from the IEB database may be linked to the Orbis company level information through the establishment id contained in both the IEB records and the BHP data.

Preparation of the Linked Data For the preparation of our final analysis data, we start with the Orbis component of the Orbis-ADIAB data.

1. We exclude all firms with an incorporation date before December 31, 1989. We keep the most recent incorporation date in case there are multiple entries per firm identifier.

2. Our version of the data includes two variables for the incorporation date. One only including the year of incorporation and the other with detailed information on this date. The detailed variable was extracted from a more recent version of the Orbis database. We restrict to cases in which the year of incorporation in the more recent and detail variable matches with the year information in the less detailed version of this variable.

3. Establishment level information from the BHP data starting as of 1990 is merged.

4. Since most variables in the Orbis data are only populated as of 2006 we replace variables stemming from Orbis with for the period 1990 to 2005 with the earliest observation available in the Orbis data.

5. We remove a couple of large and dominating firms from our sample. Moreover, we remove firms operating in the following industries:

    - Electricity, Gas, Steam and Air Conditioning Supply, Water Supply; Sewerage, Waste Management and Remediation Activities
    - Public Administration
    - Activities of Households as Employers
    - Activities of Extraterritorial Organizations and Bodies Rail Transportation

6. Adding in- and outflows of establishments from the BHP data.

7. Collapse all information stemming from the BHP data to the firm level (by BvD id). We use weighted averages to aggregate establishment median and mean wage information to aggregate on the firm level. Weights are based on the share of workers in the establishment relative to total workers in the firm.

8. Adding Establishment FE from Card Heining Kline. We use weighted averages to aggregate this effects to the firm level.

9. We construct several variables from the individual worker data. For this, we drop any spells from the worker data with a wage of less than 1 Euro per day. We also exclude spells indicating single or lump-sum payments.

10. In order to form occupational groups we rely on the classification introduced by Blossfeld (1987).

11. Shock variables are created on the basis of the (firm-level) aggregates of the BHP data.

A.2 Sample Construction

We then construct our analysis sample from the merged dataset.

A.2.1 Corporation Type

Before cleaning, we keep all firms ever labeled as one of the following corporation types:

Shareholder corporations

- *Aktiengesellschaft* (Public limited company)
- *KGaA* (Limited partnership by shares)
- *GmbH & Co. KGaA* (Limited liability company and partnership by shares)

Non-shareholder corporations

- *GmbH* (Limited liability company)
- *GmbH & Co. KG* (Limited liability company and partnership)

Our standard analysis sample uses all observations where firms are labeled as one of these corporation types, but we keep all observations for all firms labeled as one of these corporations in their earliest observation and at their earliest (pre-trade register entry adjustment) incorporation date.

A.2.2 Sample Cleaning Procedure

After adding the board composition and ownership datasets, we construct our sample as described below, largely following the procedures in Gopinath et al. (2017) where applicable to our dataset.

1. Drop if number of months is less than 12 or observation year precedes incorporation year
2. Set total assets to missing if zero or negative
3. Set operating revenues to missing if zero or negative
4. Set employment to missing if negative
5. set employment to missing if greater than 2 million
6. set sales to missing if negative
7. set tangible assets to missing if negative
8. Generate the following ratios from BvD variables and set the variables in the numerator to missing if less than 0.999 or greater than 1.001, i.e. if the sum is more than 0.1% away from the composite value.
   (a) (Tangible assets + Intangible assets + Other fixed assets) / Fixed assets
   (b) (Stocks + Debtors + Other current assets) / Current assets
   (c) (Fixed assets + Current assets) / Total assets
   (d) (Capital + Other shareholders' funds) / Shareholders' funds
   (e) (Long-term debt + Other non-current liabilities) / Non-current liabilities
   (f) (Loans + Creditors + Other current liabilities) / Current liabilities
   (g) (Non-current liabilities + Current liabilities + Shareholders' funds) / Total shareholders' funds and liabilities
   (h) (EBIT + Depreciation) / EBITDA
9. Set shareholders' funds, total shareholders' funds and liabilities to missing if Total shareholders' funds and liabilities less than Shareholder's funds
10. Generate the following ratio and set all variables in construction to missing if less than 0.9 or greater than 1.1

(a) (Total shareholders' funds and liabilities - Shareholders' funds) / (Current liabilities + Non-current liabilities)

(b) (Total assets - Current liabilities - Non-current liabilities) / Shareholders' funds

11. Set to missing if any of the following is negative:

    (a) Current liabilities

    (b) Non-current liabilities

    (c) Current assets

    (d) Loans

    (e) Creditors

    (f) Other current liabilities

    (g) Long-term debts

12. Set long-term debts and liability variables to missing if long-term debts are larger than total liabilities (Current liabilities + Non-current liabilities)

13. Set to missing if wage bill is negative or zero

14. Set to missing if intangible assets are negative

15. Set to missing if tangible assets are zero or missing

16. Set to missing tangible assets if tangible assets are larger than total assets

17. Set to missing if depreciation is negative

18. Construct operating expenses by subtracting EBIT from Operating revenue. Set operating revenue and EBIT to missing if this value is negative or at or above the 99th percentile.

19. Set PLAT and Extraordinary P/L to missing if Extraordinary P/L is exactly equal to PLAT

20. Generate the following ratios and set variables in the construction to missing if it's less than the 0.1th percentile or 99.9th percentile

    (a) Capital / Wage bill

    (b) Tangible assets / Shareholders' funds

(c) Total assets / Shareholders' funds

21. Set to missing if Shareholders' funds are negative
22. Set other shareholders' funds to missing if Other shareholders' funds is less than the 0.1th percentile
23. Set operating revenue and material costs to missing if operating revenue - material costs are negative
24. Generate the following ratio and set variables in construction to missing if it's less than the 1st percentile or larger than 1.1

    (a) Wage bill / (Operating revenue - Material costs)

25. Set current liabilities, non-current liabilities, long-term debts, and laons to missing if the fraction of total liabilities (Current liabilities + Non-current liabilities) composed of debt (Long-term debt + Loans) is greater than 0% but no more than 1%.

A.2.3 Dropped Firms/Industries

After cleaning and variable construction, we drop the following industries:

- Electricity, gas, steam and air conditioning supply (NACE 35)
- Water collection, treatment and supply (NACE 36)
- Sewerage (NACE 37)
- Waste collection, treatment and disposal activities; materials recovery (NACE 38)
- Passenger and freight rail transport (NACE 491 and 492)
- Public administration and defence; compulsory social security (NACE 84)
- Activities of membership organisations (NACE 94)
- Activities of households as employers of domestic personnel (NACE 97)
- Undifferentiated goods-and services-producing activities of private households for own use (NACE 98)
- Activities of extraterritorial organisations and bodies (NACE 99)

We then drop firms with 100% state ownership as well as Deutsche Telekom, Deutsche Bahn, and Deutsche Post DHL, as well as the subsidiaries of these firms that we can identify in the data.

A.3 Variable Construction

A.3.1 Financial Variables

After cleaning, we construct the following financial variables.

- Debt = Loans + Long-term Debt
- Non-Debt Liabilities = Current Liabilities + Non-Current Liabilities - Debt
- Labor Share = $\frac{\text{Wage Bill}}{\text{Value Added}}$
- Net Cash Flow from Financial Activities

$$= \frac{\text{1-Year Change in Capital} + \text{1-Year Change in Debt}}{\text{Total Assets}}$$

- Cost of Debt = $\frac{\text{Interest Paid}}{\text{Debt}}$
- Leverage = $\frac{\text{Debt}}{\text{Debt+Shareholders' funds}}$
- KZ Index
$= -1.001909(\frac{\text{Profit after Tax (before Extraordinary Items) + Depreciation}}{\text{Lagged Tangible Fixed Assets}})$
$+ 0.2826389(\frac{\text{Total Assets - Capital + Market Value of Equity}}{\text{Total Assets}})$
$+ 3.139193(\frac{\text{Long Term Debt + Current Loans}}{\text{Long Term Debt + Current Loans + Capital/Shareholder Fund}})$
$- 39.3678(\frac{\text{Dividends}}{\text{Lagged Tangible Fixed Assets}})$
$- 3.139193(\frac{\text{Cash}}{\text{Lagged Tangible Fixed Assets}})$
- HP Index = -0.737(Log (Inflation Adjusted) Total Assets)
$+0.043$(Log (Inflation Adjusted) Total Assets)$^2 - 0.040$(Yeas since Incorporation as AG)
- WW Index
$= -0.091(\frac{\text{Profit after Tax (before Extraordinary Items) + Depreciation}}{\text{Total Assets}})$
$- 0.062$(Dummy for positive Dividend)
$+ 0.021(\frac{\text{Long Term Debt}}{\text{Total Assets}})$
$- 0.044$(Log Total Assets)
$+0.103$(Average Industry (similar to 3 digit SIC) Growth in $\frac{\text{Turnover - Lagged Turnover}}{\text{Lagged Turnover}}$)
$- 0.035(\frac{\text{Turnover - Lagged Turnover}}{\text{Lagged Turnover}})$

- Z-Score for Public Firms
$$= 0.012(\frac{\text{Working Capital}}{\text{Total Assets}})$$
$$+ 0.014(\frac{\text{Other Shareholders Funds}}{\text{Total Assets}})$$
$$+ 0.033(\frac{\text{EBIT}}{\text{Total Assets}})$$
$$+ 0.006(\frac{\text{Market Value of Equity}}{\text{Total Shareholder Funds and Liabilities - Shareholders Funds}})$$
$$+ 0.999(\frac{\text{Turnover}}{\text{Total Assets}})$$

- Z-Score for Private Firms
$$= 0.717(\frac{\text{Working Capital}}{\text{Total Assets}})$$
$$+ 0.847(\frac{\text{Other Shareholders Funds}}{\text{Total Assets}})$$
$$+ 3.107(\frac{\text{EBIT}}{\text{Total Assets}})$$
$$+ 0.420(\frac{\text{Shareholders Funds}}{\text{Total Shareholder Funds and Liabilities - Shareholders Funds}})$$
$$+ 0.998(\frac{\text{Turnover}}{\text{Total Assets}})$$

- Z-Score four variable for Private Firms
$$= 3.25 + 6.56(\frac{\text{Working Capital}}{\text{Total Assets}})$$
$$+ 3.26(\frac{\text{Other Shareholders Funds}}{\text{Total Assets}})$$
$$+ 6.72(\frac{\text{EBIT}}{\text{Total Assets}})$$
$$+ 1.05(\frac{\text{Shareholders Funds}}{\text{Total Shareholder Funds and Liabilities - Shareholders Funds}})$$

- O-Score
$$= -1.32$$
$$- 0.407(\text{Log (Inflation Adjusted) Total Assets})$$
$$+ 6.03(\frac{\text{Total Shareholder Funds and Liabilities - Shareholders Funds}}{\text{Total Assets}})$$
$$- 1.43(\frac{\text{Working Capital}}{\text{Total Assets}})$$
$$+ 0.0757(\frac{\text{Current Liabilities}}{\text{Current Assets}})$$
$$- 2.37(\frac{\text{Profit (Loss) for Period}}{\text{Total Assets}})$$
$$- 1.83(\frac{\text{Profit before Taxes + Depreciation}}{\text{Total Shareholder Funds and Liabilities - Shareholders Funds}})$$
$$+0.285(\text{Indicator for (Lagged Profit for Period + Two Period Ago Profit for Period)} < 0)$$
$$-1.72(\text{Indicator for (Total Shareholder Funds and Liabilities - Shareholders Funds)} > \text{Total Assets})$$
$$- 0.521(\frac{\text{Profit for Period - Lagged Profit for Period}}{\text{Abs(Profit for Period) + Abs(Lagged Profit for Period)}})$$

- Dummy Low Reserves $= \mathbb{1}_{\{\text{Other Shareholders Funds} < 0.1 * \text{Capital}\}}$
- Dummy Negative Profit $= \mathbb{1}\{\text{Profit for Period} < 0\}$
- Dummy RE more than 1/2 CE $= \mathbb{1}\{\text{Other Shareholders Funds} \geq 0.5 * \text{Capital}\}$
- Retained Profit Share$_t = \dfrac{\text{Other Shareholders Funds}_{t+1} - \text{Other Shareholders Funds}_t}{\text{Profit for Period}_t}$
- Retained Profit Share Excluding Profits$_t$
  $= \dfrac{\text{Other Shareholders Funds}_{t+1} - \text{P/L for Period}_{t+1} - \text{Other Shareholders Funds}_t + \text{P/L for Period}_t}{\text{P/L for Period}_t}$
- Retained Earnings$_t = \dfrac{\text{Other Shareholders Funds}_t}{\text{Total Assets}_t}$
- Average Debt Maturity$_t = \dfrac{\text{Long Term Debt}_t + \text{Loans}_t}{\text{Loans}_t}$

A.3.2 TFP Construction

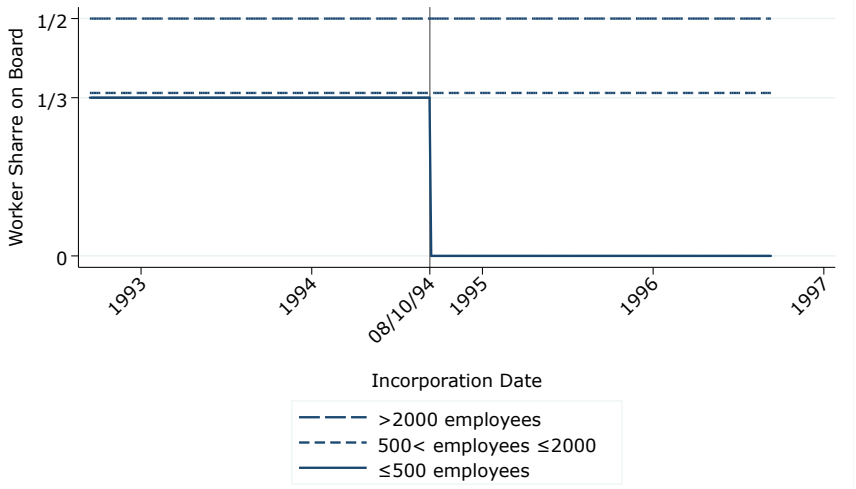
To investigate TFP outcomes, we keep all observations in the sample between 2005 and 2015 with non-missing industry classification and where both wage bill and value-added are observed. We then calculate industry-specific labor shares:

1. For each 2-digit NACE industry j and year t, we calculate the total wage bill and total value-added and divide the first by the second. Call this α_{jt}.
2. Within j, we replace any $\alpha_{jt} \geq 1$ with the highest α_{jt} among all t that is less than 1.
3. We calculate the industry-specific average share α_j across all years t.
4. We then merge these industry-specific values back into the sample and calculate two versions of TFP for every firm i of industry j and year t:
   (a) $\text{TFP}_{it}^{\text{Fixed A.}} =$
   $\log(\text{Value Added}_{it}) - \alpha_j \log(\text{Employment}_{it}) - (1 - \alpha_j) \log(\text{Fixed Assets}_{it})$
   (b) $\text{TFP}_{it}^{\text{Tangible A.}} =$
   $\log(\text{Value Added}_{it}) - \alpha_j \log(\text{Employment}_{it}) - (1 - \alpha_j) \log(\text{Tangible Fixed Assets}_{it})$

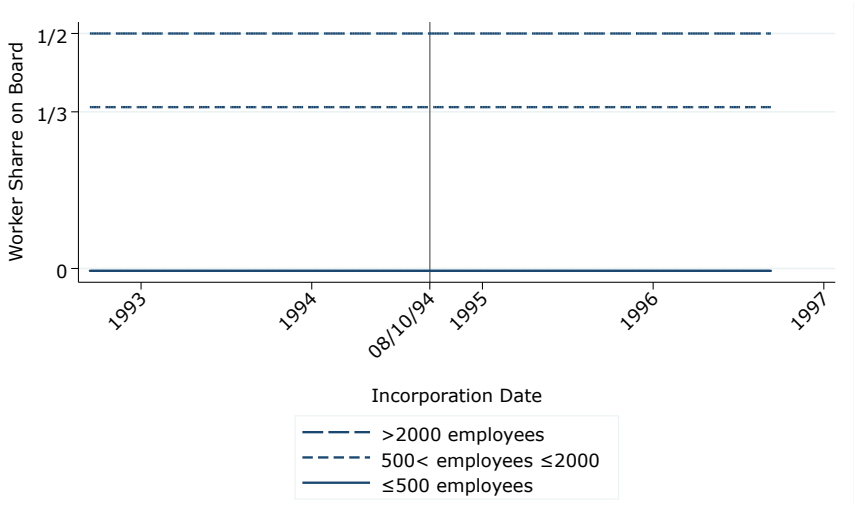
B Additional Figures

Figure B.1: Shared Governance on Supervisory Board by Incorporation Date

(a) Shareholder Corporations



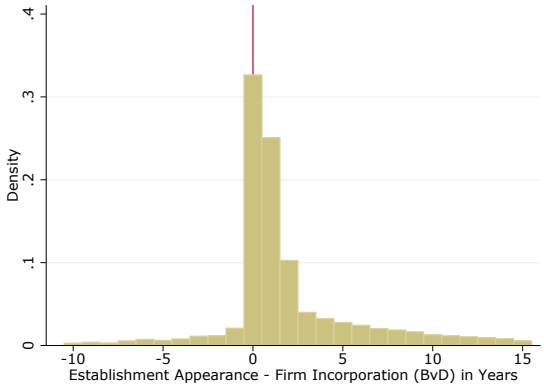
(b) Non-Shareholder Corporations



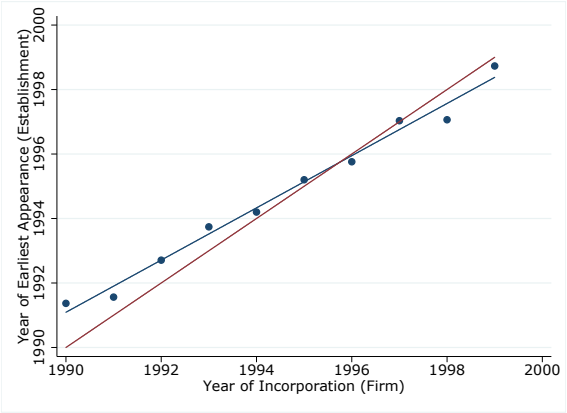
Note: The figure illustrates the mandates for shared governance by incorporation date. Shareholder corporations incorporated before August 10, 1994 are mandated to have one-third worker representation on the supervisory board and parity if they have more than 2000 employees. Family firms with fewer than 500 employees are exempt from shared governance unless they reach 500 employees. Shareholder corporations incorporated after August 10, 1994 cannot have workers on the supervisory board if they have fewer than 500 employees and are mandated to have one-third worker representation on the supervisory board between 500 and 2000 employees and parity if they have more than 2000 employees. The rules for non-shareholder corporations follow those for shareholder corporations incorporated after August 10, 1994.

Figure B.2: Validation Exercises in Administrative Data

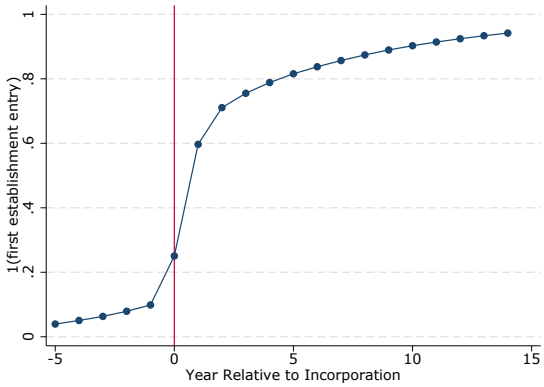
(a) Histogram of First Appearance Date of Establishments - Firms' Incorporation Dates



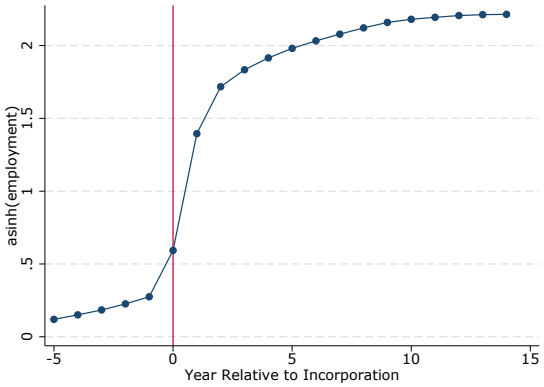
(b) First Appearance Date of Establishments Plotted Against Firms' Incorporation Dates



(c) Establishment Entry Around Incorporation

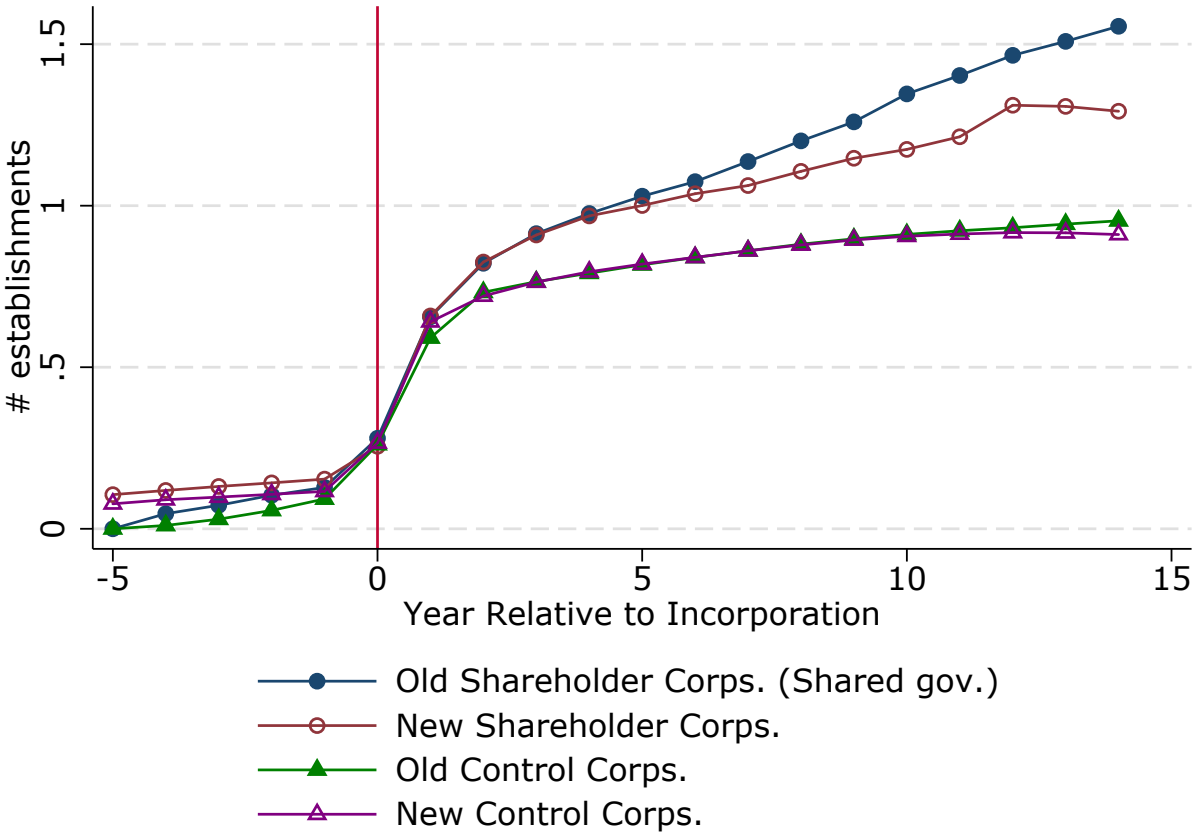


(d) Employment (arcinsh) Around Incorporation



Note: The figure is based on the Orbis-ADIAB data and shows data for firms incorporated in the 1990s. Panel (a) plots a histogram of the difference between the first appearance of an establishment associated with a firm and that firm's incorporation date. Panel (b) shows the average date of the first appearance of an establishment by firm's incorporation date. Panel (c) plots an indicator for the existence of an associated establishment in the administrative data around a firm's legal incorporation date. Panel (d) plots employment (arcinsh) in the administrative data around a firm's legal incorporation date.

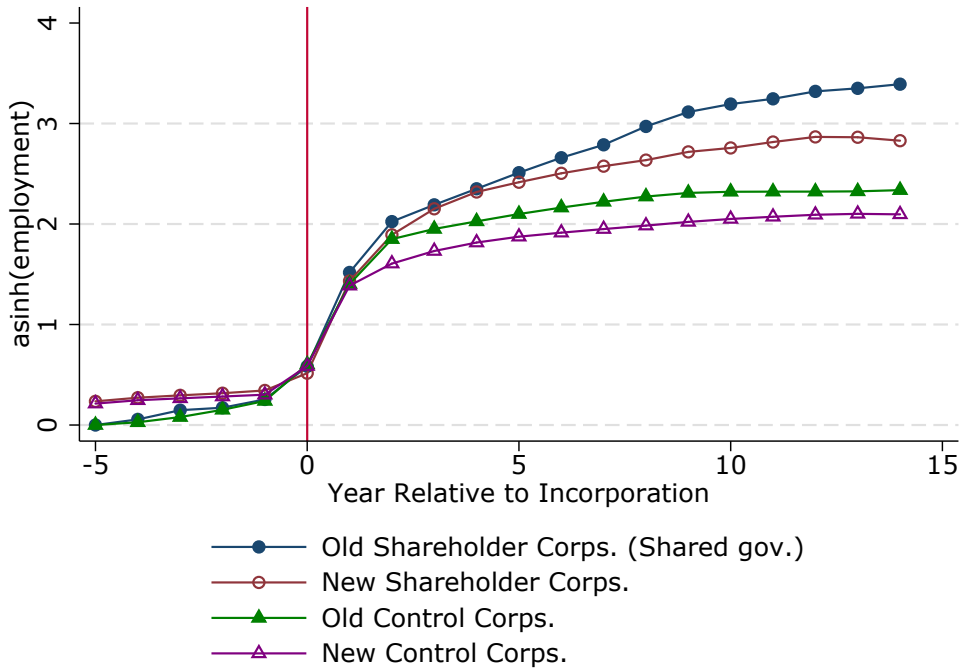
Figure B.3: Time Series of Establishments Relative to Incorporation



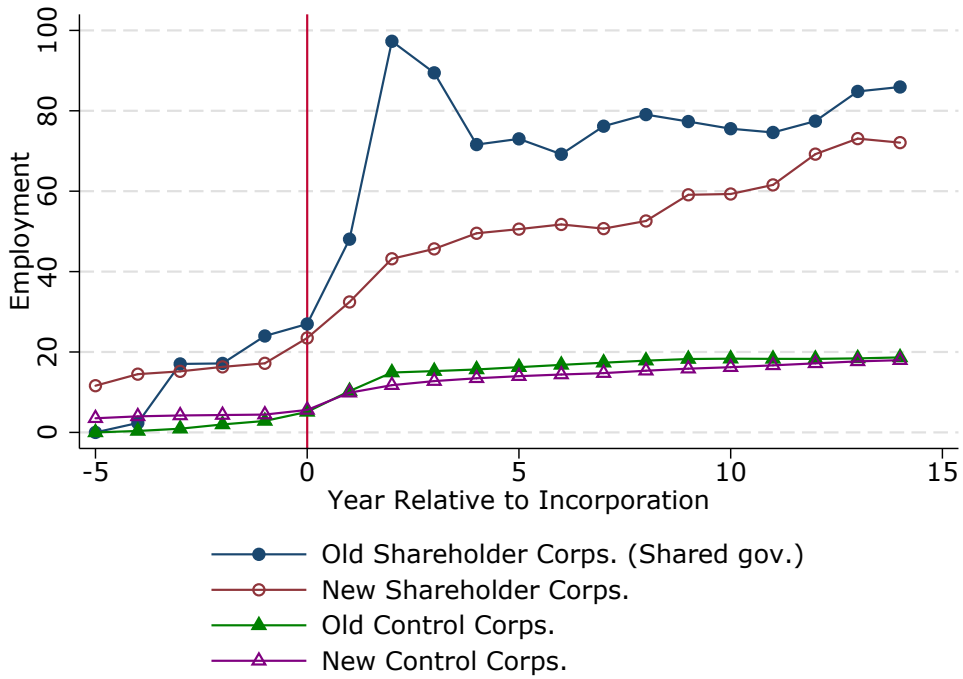
Note: The figure is based on the Orbis-ADIAB data and shows the average number of establishments for firms incorporated in the 1990s. Employment is set to zero when no establishment is observed. The navy line plots the number of establishments for shareholder corporations incorporated before August 10, 1994 and the maroon line the number for shareholder corporations incorporated after the cutoff date.

Figure B.4: Time Series of Employment Relative to Incorporation

(a) arcinsh(Employment)



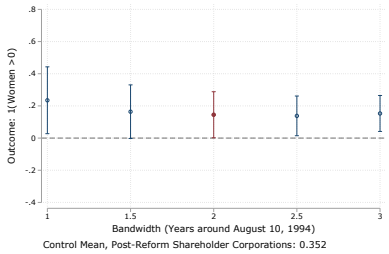
(b) Employment



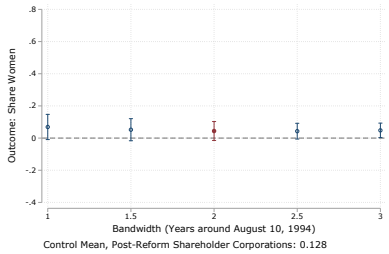
Note: The figure is based on the Orbis-ADIAB data and shows employment data for firms incorporated in the 1990s. Panels (a) and (b) plot employment as arcinsh(employment) and in levels, respectively. The navy line plots employment for shareholder corporations incorporated before August 10, 1994 and the maroon line employment for shareholder corporations incorporated after the cutoff date.

Figure B.5: Effect of Shared Governance on Supervisory Board Composition

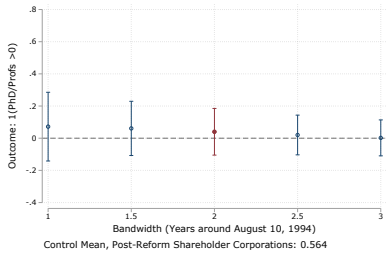
(a) 𝟙(Woman on Board)



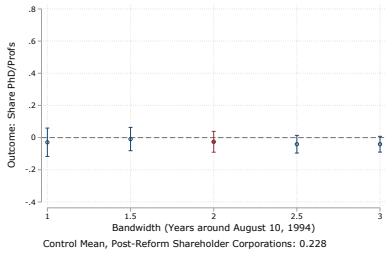
(b) % Women on Board



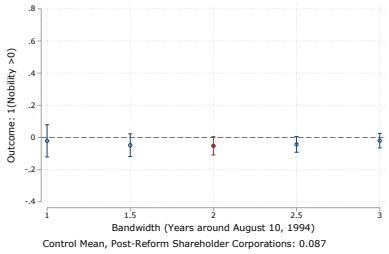
(c) 𝟙(Doctorate Holder on Board)



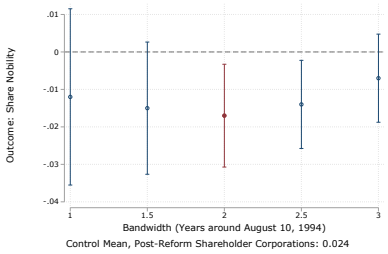
(d) % Doctorate Holder on Board



(e) 𝟙(Aristocrat on Board)



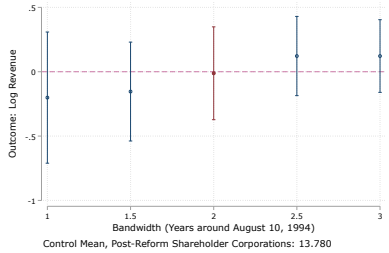
(f) % Aristocrats on Board



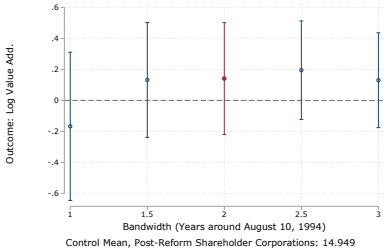
Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on supervisory board composition at different bandwidths of incorporation dates relative to August 10, 1994. All specifications include industry fixed effects. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

Figure B.6: Effect of Shared Governance on Scale

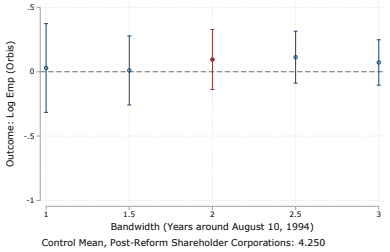
(a) Revenue (Log)



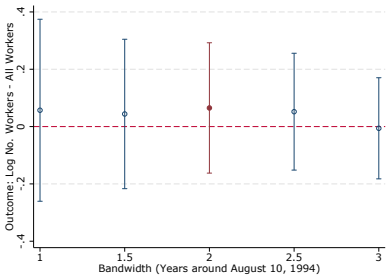
(b) Value Added (Log)



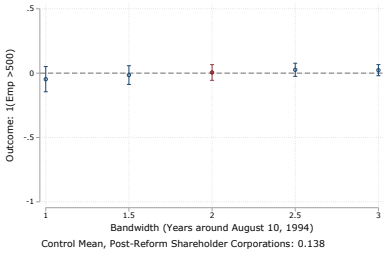
(c) Employment (Log), IAB



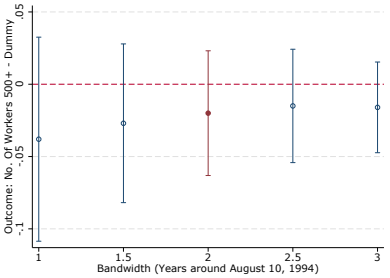
(d) Employment (Log), Orbis



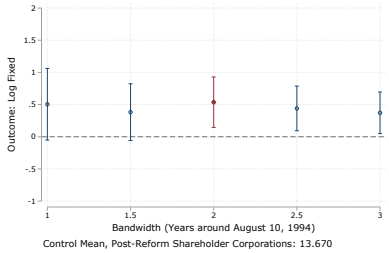
(e) $\mathbb{1}$(Employment $>$ 500), Orbis



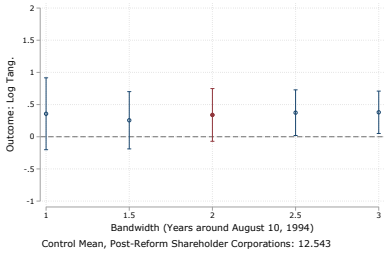
(f) $\mathbb{1}$(Employment $>$ 500), IAB



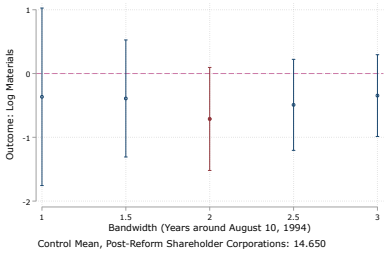
(g) Fixed Assets (Log)



(h) Tangible Assets (Log)



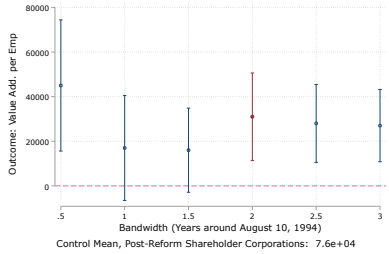
(i) Materials (Log)



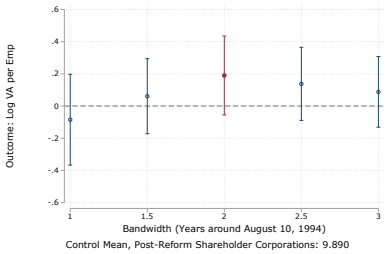
Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on firm scale at different bandwidths of incorporation dates relative to August 10, 1994. All specifications include industry-year effects. The IAB label denotes outcomes from Orbis-ADIAB data. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

Figure B.7: Effect of Shared Governance on Productivity and Capital Intensity

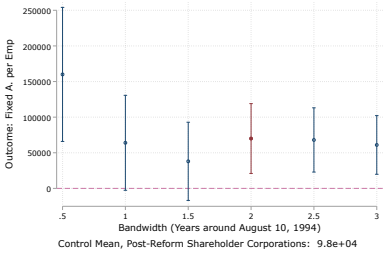
(a) Value Added per Worker



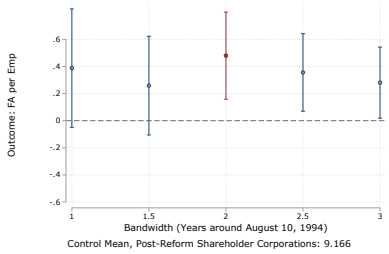
(b) Value Added per Worker (Log)



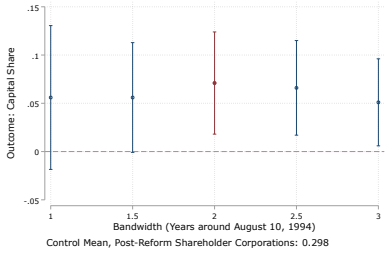
(c) Fixed Assets per Worker



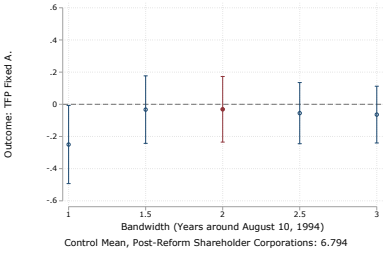
(d) Fixed Assets per Worker (Log)



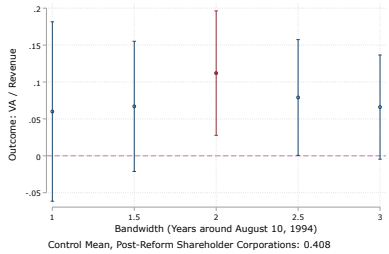
(e) Capital Share



(f) TFP (Fixed Assets)



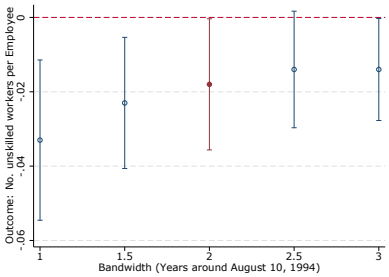
(g) Value Added / Revenue



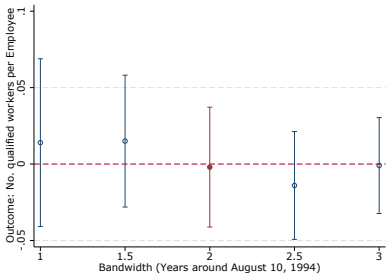
Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on productivity at different bandwidths of incorporation dates relative to August 10, 1994. All specifications include industry-year effects. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

Figure B.8: Effect of Shared Governance on Skill Structure (Matched Employer-Employee Data)

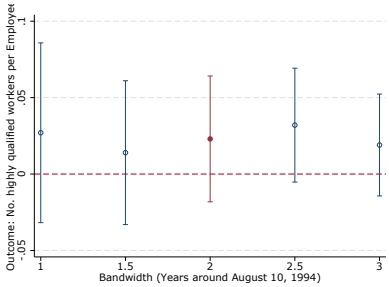
(a) Low Skilled



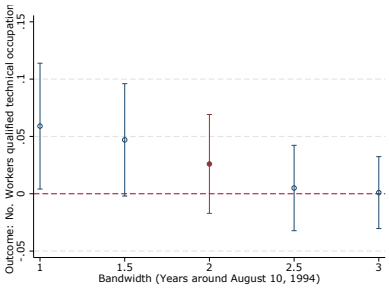
(b) Medium Skilled



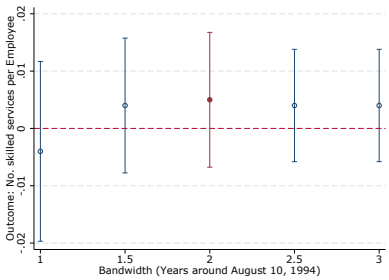
(c) High Skilled



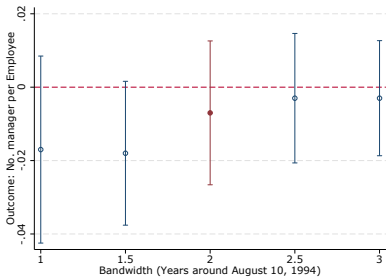
(d) Qualified Manual



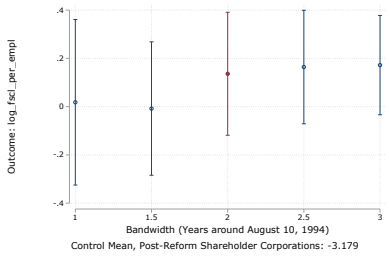
(e) Qualified Service



(f) All Managers



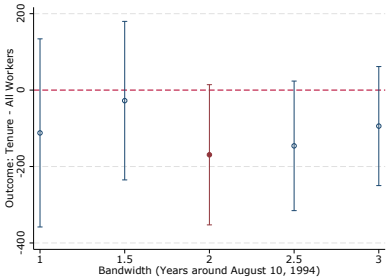
(g) Outsourceable



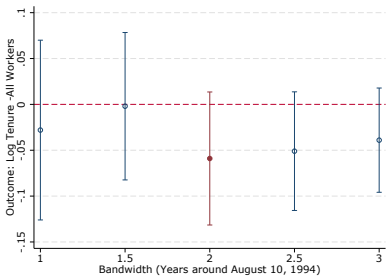
Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on skill structure at different bandwidths of incorporation dates relative to August 10, 1994. All specifications include industry-year effects. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

Figure B.9: Effect of Shared Governance on Tenure (Matched Employer-Employee Data)

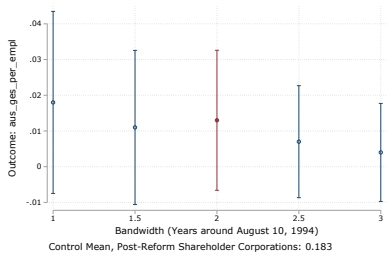
(a) Tenure



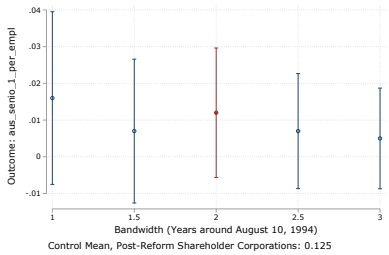
(b) Tenure (Log)



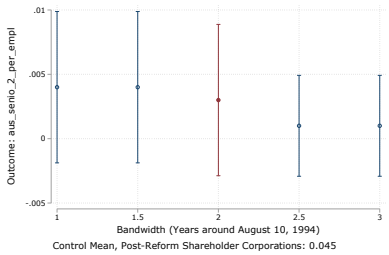
(c) Separations: All



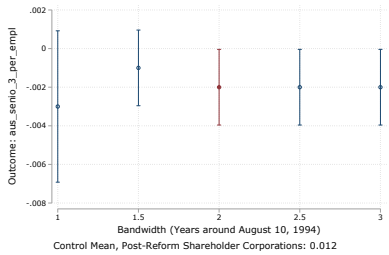
(d) Separations: < 4 Years



(e) Separations: 4-9 Years

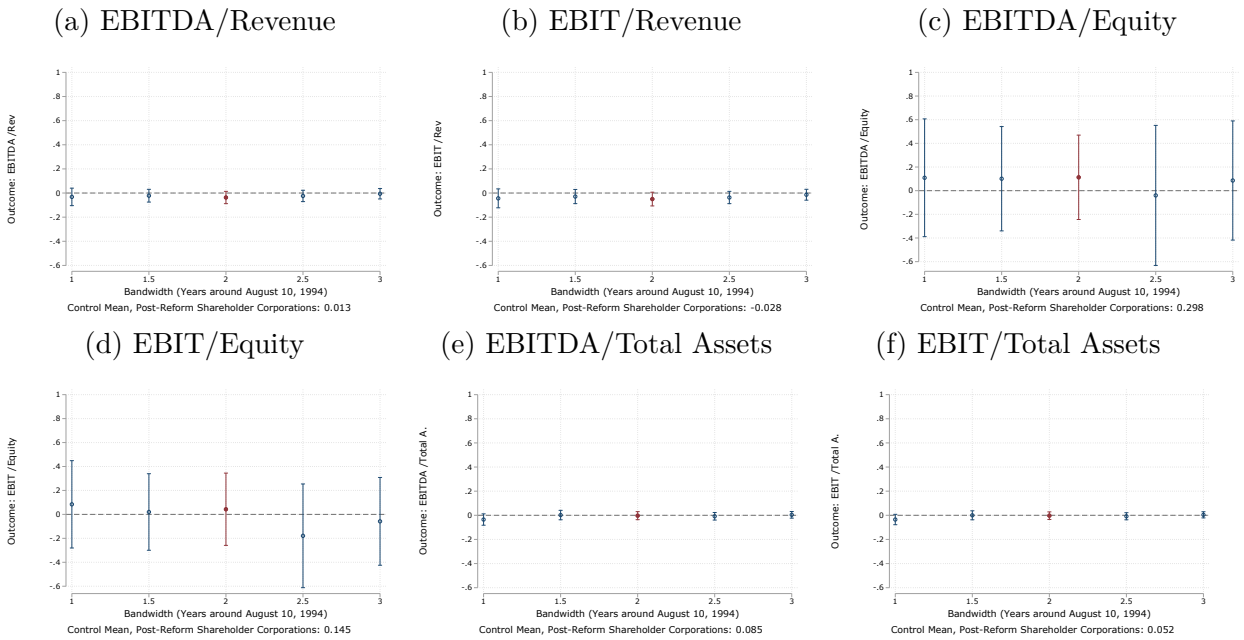


(f) Separations: 9+ Years



Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on tenure at different bandwidths of incorporation dates relative to August 10, 1994. All specifications include industry-year effects. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

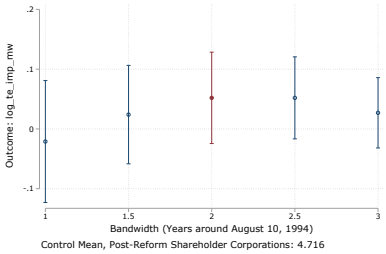
Figure B.10: Effect of Shared Governance on Profitability



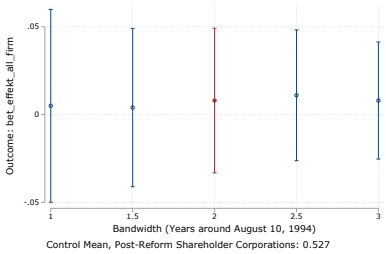
Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on profitability at different bandwidths of incorporation dates relative to August 10, 1994. All specifications include industry-year effects. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

Figure B.11: Effect of Shared Governance on Wages (Matched Employer-Employee Data)

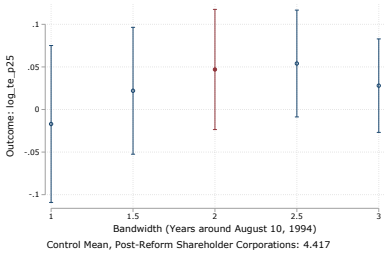
(a) Mean Wage (Log)



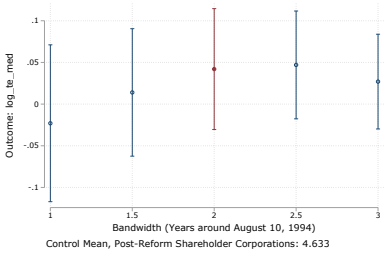
(b) AKM Firm Effects



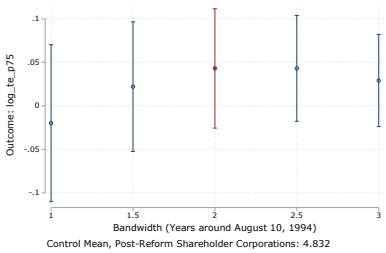
(c) Wage, 25th Pct. (Log)



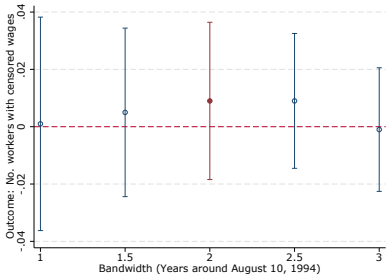
(d) Median Wage (Log)



(e) Wage, 75th Pct. (Log)



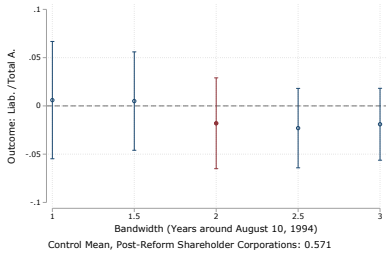
(f) Share Above Social Security Maximum



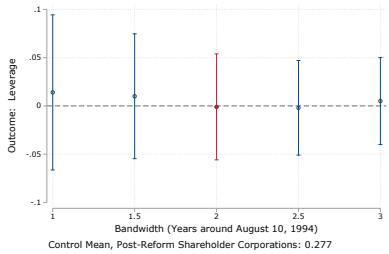
Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on wages at different bandwidths of incorporation dates relative to August 10, 1994. All specifications include industry-year effects. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

Figure B.12: Effect of Shared Governance on Capital Structure, Leverage, and Cost of Debt

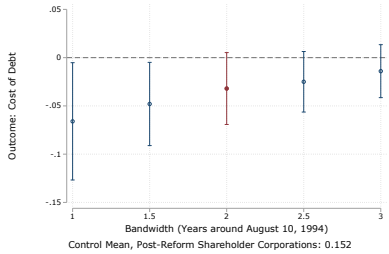
(a) Liabilities / Total Assets



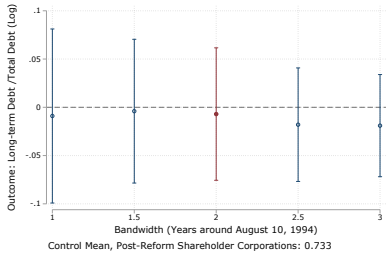
(b) Leverage



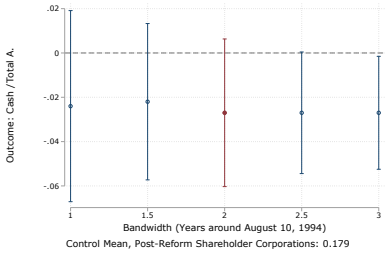
(c) Cost of Debt



(d) Long-term Debt / Total Debt



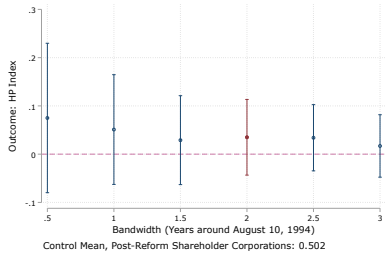
(e) Cash / Total Assets



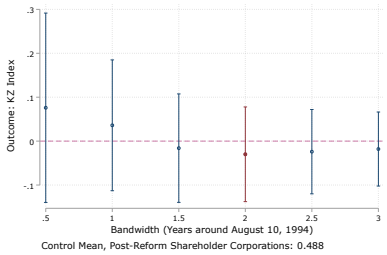
Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on capital structure, leverage, and cost of debt at different bandwidths of incorporation dates relative to August 10, 1994. All specifications include industry-year effects. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

Figure B.13: Effect of Shared Governance on Financial Distress

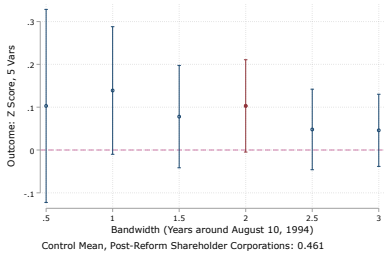
(a) HP Index



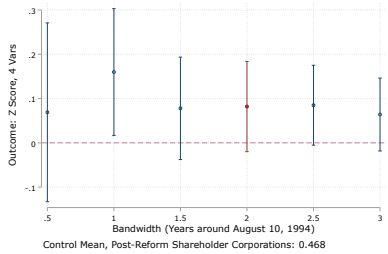
(b) KZ Index



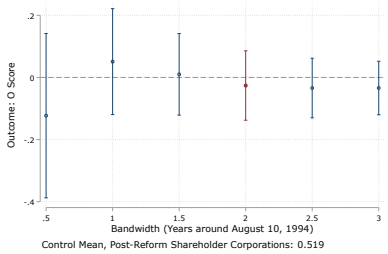
(c) Z Score, 5 Variables



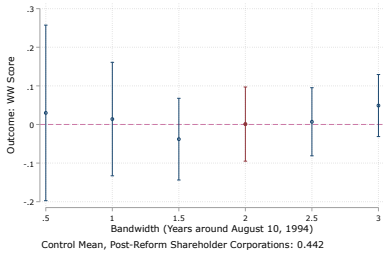
(d) Z Score, 4 Variables



(e) O Score



(f) WW Score



Note: The figure plots difference-in-discontinuity estimates of the reduced-form effect of shared governance on financial distress at different bandwidths of incorporation dates relative to August 10, 1994. As in Panel A of Appendix Table 10, all specifications refer to binary indicators by median in our baseline sample in a year-by-legal-form cell, with 1 indicating higher risk or constraints. All specifications include industry-year effects. The vertical bars denote confidence intervals based on standard errors clustered at the firm level.

C Additional Tables

Table C.1: 1994 Reform and Industry Composition of Shareholder Corporations

NACE Industry Classification	(1)	(2)	NACE Industry Classification	(1)	(2)
A: Agriculture, forestry, fishing	-0.002	-0.002	K: Financial and insurance activities	0.011	0.011
	(0.009)	(0.009)		(0.027)	(0.026)
Control Mean: Post-Reform Sh. Corp.	0.008	0.008	Control Mean: Post-Reform Sh. Corp.	0.104	0.104
″, Post-Reform Non-Sh. Corp.	0.012	0.012	″, Post-Reform Non-Sh. Corp.	0.008	0.008
B: Mining and quarrying	-0.0002	-0.0002	L: Real estate activities	0.004	0.004
	(0.0002)	(0.0002)		(0.011)	(0.011)
Control Mean: Post-Reform Sh. Corp.	0.0000	0.0000	Control Mean: Post-Reform Sh. Corp.	0.014	0.014
″, Post-Reform Non-Sh. Corp.	0.0005	0.0005	″, Post-Reform Non-Sh. Corp.	0.009	0.009
C: Manufacturing	-0.005	-0.005	M: Professional, scientific, and technical activities	-0.047	-0.047
	(0.030)	(0.030)		(0.037)	(0.037)
Control Mean: Post-Reform Sh. Corp.	0.144	0.144	Control Mean: Post-Reform Sh. Corp.	0.293	0.293
″, Post-Reform Non-Sh. Corp.	0.185	0.185	″, Post-Reform Non-Sh. Corp.	0.158	0.158
E: Water supply, sewerage, waste management/remediation	-0.0001	-0.0001	N: Administrative and support service activities	-0.010	-0.010
	(0.0001)	(0.0001)		(0.014)	(0.014)
Control Mean: Post-Reform Sh. Corp.	0.0000	0.0000	Control Mean: Post-Reform Sh. Corp.	0.034	0.034
″, Post-Reform Non-Sh. Corp.	0.0001	0.0001	″, Post-Reform Non-Sh. Corp.	0.025	0.025
F: Construction	0.005	0.005	P: Education	0.004	0.004
	(0.006)	(0.006)		(0.009)	(0.009)
Control Mean: Post-Reform Sh. Corp.	0.006	0.006	Control Mean: Post-Reform Sh. Corp.	0.014	0.014
″, Post-Reform Non-Sh. Corp.	0.041	0.041	″, Post-Reform Non-Sh. Corp.	0.032	0.032
G: Wholesale and retail trade; repair of motor vehicles	0.008	0.008	Q: Human health and social work activities	-0.006	-0.006
	(0.023)	(0.023)		(0.005)	(0.005)
Control Mean: Post-Reform Sh. Corp.	0.070	0.070	Control Mean: Post-Reform Sh. Corp.	0.008	0.008
″, Post-Reform Non-Sh. Corp.	0.188	0.188	″, Post-Reform Non-Sh. Corp.	0.013	0.013
H: Transporting and storage	-0.028	-0.028	R: Arts, entertainment, and recreation	-0.0003	-0.0002
	(0.023)	(0.023)		(0.013)	(0.013)
Control Mean: Post-Reform Sh. Corp.	0.082	0.082	Control Mean: Post-Reform Sh. Corp.	0.023	0.023
″, Post-Reform Non-Sh. Corp.	0.154	0.154	″, Post-Reform Non-Sh. Corp.	0.031	0.031
I: Accommodation and food service activities	0.005	0.005	S: Other services activities	0.003	0.003
	(0.005)	(0.005)		(0.005)	(0.005)
Control Mean: Post-Reform Sh. Corp.	0.0000	0.0000	Control Mean: Post-Reform Sh. Corp.	0.003	0.003
″, Post-Reform Non-Sh. Corp.	0.027	0.027	″, Post-Reform Non-Sh. Corp.	0.006	0.006
J: Information and communication	0.032	0.031	*N*, Firms	46521	46521
	(0.029)	(0.029)	*N*, Sh. Corp.	584	584
Control Mean: Post-Reform Sh. Corp.	0.113	0.113	*N*, Non-Sh. Corp.	45937	45937
″, Post-Reform Non-Sh. Corp.	0.051	0.051	Joint P-Value	0.858	0.846

Note: This table reports estimates of the effect of shared governance on the industry composition of shareholder corporations. Formally, we use indicators for each NACE Rev. 2 Classification 1 industry code as outcomes for DiD specifications as in equation (2). Column (1) reports the basic specification from equation (2), and column (2) includes quarter-of-incorporation fixed effects. We visually report the estimates from column (1) in Figure 4. See Appendix Section A.3 for details on the sample construction.