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CORPORATE GOVERNANCE, ENTRENCHED LABOR, AND ECONOMIC GROWTH

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ABSTRACT

The German system of codetermination contributes to the entrenchment of labor. We show in a two-period model of project choice that entrenched labor leads to underinvestment and overstaffing. We provide empirical evidence that German firms subject to codetermination with equal representation of workers on supervisory boards during 1989-93 were, on average, overstaffed. In addition, the fraction of employees in codetermined firms has decreased over time. The expanded reach of codetermination during the mid-1970s therefore may have contributed to the deterioration of German economic growth performance beginning at about that time through underinvestment, overstaffing, and costly migration of business activity away from firms subject to codetermination.

Keywords: Codetermination, corporate governance, economic growth

JEL classification: G32, G38

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CORPORATE GOVERNANCE, ENTRENCHED LABOR, AND ECONOMIC GROWTH

The German system of worker codetermination (*Mitbestimmung*) dates from the early 1950s, although its social, political, and economic roots reach far back into the 19th century (*Kommission Mitbestimmung* (Codetermination Committee), 1998, p. 29). The system of codetermination was greatly expanded during the 1970s (*Kommission Mitbestimmung*, 1998, p. 21). Most importantly, the 1976 Codetermination Act extended to a large number of firms the right of employees to hold one half of the seats on the firm's supervisory board. The supervisory board is the external (non-executive) board that must approve all major financing and investment decisions proposed by the (internal) management board.

Codetermination is not the only form of legal protection enjoyed by German workers, but it alone provides workers with guaranteed access to large firms' supervisory boards. Although worker representatives on supervisory boards cannot outvote shareholder-elected board members, their presence increases employees' public visibility and, in extreme cases, allows them to create procedural delays. For example, drawn-out consultations—"logrolling"—could stall restructuring efforts or inhibit takeover negotiations.

We analyze a two-period model of a firm facing an investment decision in each period. The context is an economy with legally entrenched labor. The firm faces either high or low demand for its product in the first period and similarly it will face either high or low demand in the future (independent of the first-period state of demand). The firm does not know the second-period demand conditions when deciding on the scale of first-period operations. That is, the firm must make an investment decision in the first period, knowing that hiring decisions are asymmetric in that incumbent labor in the second period does not oppose adding employees but might oppose layoffs.

Entrenched labor creates a hold-up problem. That is, shareholders may suffer a loss in the second period because labor cannot be dismissed easily even though demand for the firm's product is low. Anticipating this, firms' decisions may deviate from the first-best efficient allocation of resources in the first period. We model the hold-up problem by introducing entrenched labor and uncertainty in the future demand conditions facing the firm. It turns out that if initial demand conditions are strong, depending on the firm's technology and project profitability, the firm either underinvests in the first period or is overstaffed in the second period, on average. That is, in a cross section of firms, codetermination causes underinvestment and overstaffing.

To investigate the model's prediction that codetermined firms tend to be overstaffed, we examine wage and staffing levels in a large dataset covering 250 German firms during the 1989-93 period, about one half of which were subject to so-called 1976 codetermination (equal representation of workers on supervisory boards). We find that average wage levels (standardized by sales per employee) are not unusual for equal-representation firms. However, staffing levels (again adjusted by sales) are indeed significantly higher on average for codetermined firms. This is consistent with the model's prediction.

Over time, economic activity may migrate away from firms that face legislative constraints, such as labor entrenched by codetermination (Jensen and Meckling, 1979). If codetermination added value to the firm, codetermination would emerge as a Coase solution in a bargaining process between shareholders and labor. The fact that structures like codetermination have not been adopted by firms that were not required to do so indicates that its stipulations represent binding constraints on action. The loss of efficiency arising from codetermination that is imposed on firms presumably makes them grow more slowly than firms not subject to its rules, or to shrink outright. The Codetermination Commission found that the "codetermination-free zone" of the German economy indeed has grown over time, consistent with Jensen and

Meckling's prediction (*Kommission Mitbestimmung*, 1998, p. 27). German firms subject to codetermination also might represent attractive takeover targets for foreign firms if, by transferring legal jurisdictions, some of the target firm's operations or decision-making could escape the reach of the codetermination laws, releasing latent economic value.

The presence of underinvestment and overstaffing problems in codetermined firms, together with inefficiency-induced migration of economic activity away from firms subject to codetermination, may be sufficient to detract from overall economic performance. The growth performance of the German economy deteriorated noticeably beginning in the 1970s in comparison with the United States and Japan, although it is not obvious what caused the deterioration. Our results suggest that entrenched labor is a plausible candidate to explain at least part of Germany's slow economic growth in recent decades.

CORPORATE GOVERNANCE IN GERMANY

Several features of the German corporate world are noteworthy. Like other countries on the European continent, Germany's equity market capitalization is low relative to GDP. Bank lending is a more important source of external finance in Germany than in some other advanced economies. Exchange-listed companies exhibit highly concentrated ownership structures and high family ownership (see Franks and Mayer, 2000).

Worker codetermination is another important characteristic of German corporate governance, giving a strong role to labor representatives in corporate decision-making. Workers in firms with more than five permanent employees have the right to form a works council, which has far-reaching power on shop-floor issues concerning operations, health and safety, to name but a few. Corporations with more than 500 permanent employees are subject to codetermination at the supervisory board level. One third of the seats on the supervisory board go to labor representatives. Corporations with more than 2,000 employees must allocate one half of board

seats to labor representatives. The chairman, who is generally a shareholder representative, controls a tie-breaking vote.

A MODEL OF ENTRENCHED LABOR

We study a representative firm's investment decisions in a two-period model that incorporates entrenched labor. The model draws inspiration from Hart (1995) and Myers (2000), both of whom abstract from many features of actual firms in order to highlight critical aspects of corporate governance. Our focus in this paper is how the bargaining power of labor at the beginning of the second period, together with uncertainty about future demand conditions, can create a hold-up problem. We show that the hold-up problem affects the firm's first-period choice of investment intensity and its second-period staffing levels.

The firm is a contract between two groups of people, the shareholders (owners) and labor (workers). We assume that each group acts in a coordinated manner to further its own interests; there are no conflicts within either group. The shareholders purchase operating assets and hire labor, creating the firm. The firm produces a single product ("widgets," which are the output of the firm's single "project"). The firm may operate either at large or small scale in either period by investing more or less in physical capital and hiring more or fewer workers, respectively, as described further below.

At the beginning of each period, demand for widgets during that period becomes known. Demand for widgets is either high or low. If demand is low and the project is operated at large scale, there is surplus output, which cannot be sold for any positive price. If demand is high in the first period, the shareholders pay K_h to buy the operating assets. If demand is low, the required initial investment is K_l ($K_l < K_h$). The labor input of the firm, L, is determined by a *Leontief* production technology, $L = \alpha \cdot K$, where L is the number of employees. The desired number of workers are offered contracts on a "take-it-or-leave-it" basis and all other workers

remain outside the firm with no bargaining power or influence on the firm's actions. We assume the employees work a fixed number of hours, which, along with the wage, $\overline{w}$, is determined outside the model. These assumptions are meant to resemble Germany's collective wage bargaining arrangement (*Flächentarifvertrag*), which determines wages and standard weekly work hours. For simplicity, we assume that the wage is fixed for two periods: $\overline{w} = \overline{w}_0 = \overline{w}_1$. Figure 1 illustrates the timing of important decisions in the model.

[Figure 1]

The only uncertainty in the model is whether demand for the widget in the second period will be high or low. If demand in the second period is high, the firm's profit is maximized by operating at large scale, ($K = K_h$, $L = \alpha \cdot K_h$), whereas if second-period demand is low, the optimal scale is small ($K = K_l$, $L = \alpha \cdot K_l$). For simplicity, we assume capital does not depreciate. Given optimal choice of physical capital and labor, the shareholders' end-of-period return after paying wages of $w \cdot \alpha \cdot K$ turns out to be $(1+\kappa) \cdot r \cdot K$, where r is the marginal opportunity cost of capital and κ is the project's value added per unit of capital, or profitability.

Given *ex ante* uncertainty about second-period demand and the possibility of adjusting production capacity (and labor input) at that time, there may be surplus (net income) over which the shareholders and labor can bargain. This is the essence of the hold-up problem: labor may be in a position to extract some or all of the surplus of the firm at the beginning of the second period. We first discuss the case in which shareholders possess all bargaining power and then the case in which labor has all the bargaining power. Our interest is in the implications of labor bargaining power for employment and investment.

Shareholders possess all bargaining power in the second period

We begin by assuming that shareholders possess all bargaining power at the beginning of period two, when uncertainty is resolved and recontracting can occur. In other words, labor is not

entrenched and must accept any "take-it-or-leave-it" offer from shareholders. At t_0, the beginning of the first period, first-period demand for widgets is revealed to all. If demand is low, the shareholders invest the amount $K_{l,0}$ to build the operating assets and hire the amount of labor determined by the *Leontief* technology, $\alpha \cdot K_{l,0}$. This implies a wage bill at the end of the first period equal to $\overline{w} \cdot \alpha \cdot K_{l,0}$. At t_1, the beginning of the second period, the firm learns second-period demand for widgets. If demand remains low, the firm operates exactly as it did during the first period. The operating assets are liquidated and labor retires at the end of the second period. If, on the other hand, demand is high during the second period (after being low during the first period), shareholders invest the additional amount $K_h - K_l$ at t_1 and hire additional employees numbering $\alpha \cdot (K_h - K_l)$.

Now consider sequences in which demand is high in the first period. If demand is high during the second period, as well, the firm continues operating at large scale. If demand turns out to be low during the second period, then the firm at t_1 liquidates capital in the amount $K_h - K_l$ and lays off workers numbering $\alpha \cdot (K_h - K_l)$. Because workers have no bargaining power, they have no influence on the project size chosen at the beginning of the second period or on the level of employment. Thus, there is no path dependency in the model because the firm's project choice at the beginning of the first period has no bearing on investment at the beginning of the second period.

Labor possesses all bargaining power in the second period

Now suppose labor is entrenched. In our model, this means that workers make a "take-it-or-leave-it" offer to shareholders at t_1, the beginning of the second period. The bargaining power of labor at t_1 is limited in several ways. First, shareholders generally have the right to liquidate the firm at t_1 and invest the proceeds, K, at the opportunity cost (the return on

an outside investment) during the second period. We assume the shareholders cannot liquidate the firm at t_1 and immediately reestablish it with a new workforce. If shareholders could undertake such sham reorganizations, labor of course would have no bargaining power.

Second, labor's bargaining power extends only to matters that are negotiable. We assume the wage rate and hours of work are determined outside the model through an industry-wide collective bargaining agreement, so the only negotiable matter is second-period layoffs. Incumbent workers are represented on the supervisory board (rather than potential new workers), so the only time labor uses its bargaining power is when shareholders want to downsize. If demand for the widget in the second period remains unchanged (at either the high or low level), the shareholders propose no changes and consequently there are no negotiations. Similarly, when demand increases from low to high, labor has no incentive to resist expansion because the newly hired workforce does not affect the income of the incumbents. Bargaining occurs only when demand drops from high to low because firm's profit-maximizing workforce drops by the amount $\alpha \cdot (K_h - K_l)$ to the reduced level of $\alpha \cdot K_l$.

We assume that labor suffers a loss if laid off; otherwise, labor has no incentive to bargain. The loss might be due to switching costs or lack of alternative employment at the same wage. For instance, employed labor might earn a premium over the alternatives of early retirement or unemployment compensation. We assume the loss suffered by labor from being laid off equals a fraction η of the current wage, $\overline{w}$. Thus, if the workforce adjusts to the optimal level at t_1 in response to a drop in demand for the widget, the loss to labor amounts to $\eta \cdot \overline{w} \cdot \alpha \cdot (K_h - K_l)$ (in terms of t_2 values). Note that, in a competitive labor market, η would equal zero—labor loses nothing from being laid off. In competitive markets, labor would be fully insured against losses in income either through unemployment insurance or, as approximated by the United States, through a robust job market in which laid-off workers quickly find new jobs

paying the worker's marginal product. Labor has no use for bargaining power in a competitive market, so it is no surprise that the United States has neither codetermination nor entrenched labor.

The value at t_2 of labor income lost by being laid off, $\eta \cdot \overline{w} \cdot \alpha \cdot (K_h - K_l)$, is the maximum amount labor can credibly bargaining over. The value at t_2 of net income (income in excess of opportunity cost of capital) to the firm is $\kappa \cdot r \cdot K_l$, which puts a limit on the amount labor can extract from shareholders. Thus, the maximum amount labor can gain from bargaining at t_1 (expressed in terms of t_2 values) is:

$$\text{Min}\{\kappa \cdot r \cdot K_l \ , \ \eta \cdot \overline{w} \cdot \alpha \cdot (K_h - K_l)\}.$$

Note that this amount might not be enough to maintain the workforce at the high-demand level in a second-period low-demand state. All else equal, the more profitable a project is (the higher κ is), the more likely labor can extract a sufficient amount from shareholders to keep all workers employed. At the same time, the more profitable a project is, the more likely the shareholders' second-period net income will not be exhausted by wage payments.

In the case where labor has (some or all) bargaining power and demand is high in the first period, running the firm at large scale during the first period is not necessarily optimal. To see this, consider what will happen if demand drops to the low level in the second period. Labor will use its bargaining power to extract part or all of the firm's second-period net income, $\kappa \cdot r \cdot K_l$ (expressed in t_2 terms).

Suppose the firm is a listed stock corporation whose investors are diversified and who make investment decisions in a risk-neutral manner. This means that the shareholders simply maximize expected final (t_2) wealth. Let π be the probability that demand falls to the low level during the second period. The value added during the first period is invested outside the firm at

the opportunity cost, *r*. If shareholders choose to operate at small scale during the first period, their expected final wealth at t_2 will be:

$$E[W^{h,l}] = (1+\kappa)\cdot r\cdot K_l\cdot(1+r) + r\cdot(K_h - K_l)\cdot(1+r)$$
$$+\pi\cdot[(1+\kappa)\cdot(1+r)\cdot K_l + (1+r)\cdot(K_h - K_l)]$$
$$+(1-\pi)\cdot(1+\kappa)\cdot(1+r)\cdot K_h,$$

where the shareholders' wealth at the outset is K_h. If, on the other hand, shareholders choose to operate at large scale during the first period, their expected final wealth (at t_2) is:

$$E[W^{h,h}] = (1+\kappa)\cdot r\cdot K_h\cdot(1+r)$$
$$+\pi\cdot[(1+\kappa)\cdot(1+r)\cdot K_l + (1+r)\cdot(K_h - K_l)]$$
$$-\pi\cdot\text{Min}\{\kappa\cdot r\cdot K_l\ ,\ \eta\cdot\overline{w}\cdot\alpha\cdot(K_h - K_l)\}$$
$$+(1-\pi)\cdot(1+\kappa)\cdot(1+r)\cdot K_h.$$

The difference in expected final wealth between operating the firm at small scale and large scale, respectively, is:

$$E[W^{h,l}] - E[W^{h,h}] = -\kappa\cdot r\cdot(K_h - K_l)\cdot(1+r)$$
$$+\pi\cdot\text{Min}\{\kappa\cdot r\cdot K_l\ ,\ \eta\cdot\overline{w}\cdot\alpha\cdot(K_h - K_l)\}$$

Clearly, the shareholders will underinvest in the first period—i.e., choose to run the project at small scale in spite of high first-period demand—if (and only if) $E[W^{h,l}] - E[W^{h,h}] > 0$. On the other hand, for $E[W^{h,l}] - E[W^{h,h}] \le 0$, the shareholders will operate during the first period at large scale. They then are faced with the risk (with probability π) that the firm will be

overstaffed during the second period by the amount $\text{Min}\{\frac{\kappa \cdot r \cdot K_l}{\overline{w}}\ ,\ \eta \cdot \alpha \cdot (K_h - K_l)\}$. These considerations lead to the following two testable hypotheses:

Hypothesis 1

Codetermined firms tend to underinvest.

Hypothesis 2

Codetermined firms tend to be overstaffed.

We provide numerical examples in the next section to illustrate the general conclusions stated here. The following section discusses empirical evidence that bears on these questions.

NUMERICAL EXAMPLES

The examples illustrate the firm's choice of investment scale at t_0, the beginning of the first period, in the case of high first-period demand; the case of low first-period demand is trivial. We assume the following values: $K_h = 100;\ K_l = 80;\ r = 0.1; \eta = 0.2;\ \alpha = 0.25; \overline{w} = 1;$ $\pi = 0.5$. We consider in turn high and low values for the profitability of the project: $\kappa = 0.1$ or 0.3.

For low profitability ($\kappa = 0.1$), the difference in expected final wealth between running the project at small scale and running it at large scale during the first period equals:

$$E[W^{h,l}] - E[W^{h,h}] = -0.22 + 0.5 \cdot \text{Min}\{0.8;1\} = 0.18$$

Clearly, the firm will choose to run the project at small scale, which implies underinvestment in the first period by the amount $K_h - K_l = 20$. There is no overstaffing during the second period, because no layoffs ever would be needed. The loss to the shareholders (valued at t_2)—which also is the loss in social welfare—amounts to $\kappa \cdot r \cdot (K_h - K_l) = 0.2$.

If on the other hand the profitability of the project is high ($\kappa = 0.3$), the difference in expected final wealth resulting from small-scale operation during the first period instead of large-scale operation is:

$$E[W^{h,l}] - E[W^{h,h}] = -0.66 + 0.5 \cdot \text{Min}\{2.4;1\} = -0.16$$

In this high-profitability case, the firm chooses to run the project at large scale during the first period despite the existence of entrenched labor and the rational expectation of a hold-up problem if second-period demand is low. No underinvestment occurs, but the firm is overstaffed on average during the second period. There are no layoffs; the firm operates with the maximum amount of excess labor because its operations are highly profitable. The loss to the shareholders (valued at t_2) equals $\overline{w} \cdot \alpha \cdot (K_h - K_l) = 5$. There is no loss to society, because the wealth extracted by labor comes from shareholders (i.e., it is producer surplus).

The two foregoing examples illustrate cases of underinvestment and overstaffing, respectively. Underinvestment always creates a loss to society, while overstaffing never does. Overstaffing is simply a wealth transfer from the shareholders to labor and has no efficiency implications.

EMPIRICAL EVIDENCE

Gorton and Schmid (2000) show that equal representation, when compared to one-third representation, reduces stock market (i.e., equity) value by 27 percent. Using a different methodology and a different sample, FitzRoy and Kraft (1993) found in an early study that equal representation depresses a typical firm's value added by 19.7 percent.[1] These studies indicate that equal representation places a drag on the performance of German corporations. Removing equal representation requirements presumably would add value.

Overstaffing

Little evidence has been presented to date that explains the reasons why equal representation (in comparison to one-third representation) depresses corporate performance. A 1998 report by the bipartisan Codetermination Committee (*Kommission Mitbestimmung)* offers insights into how labor uses its power, and how this might affect firms' performance. One of the topics highlighted by the report is the so-called employment-preserving role of codetermination (Chapter 6, Section 25). In order to preserve its influence on the firm, labor seeks to maintain a high share in total input costs.

Table 1 presents regression results that shed light on the impact of equal representation (compared to one-third representation) on wages and employment at the firm level. These previously unpublished results use the data set from Gorton and Schmid (2000). This data set comprises the 250 largest traded German corporations at the end of 1993, covering the period 1989-1993. About half the companies in the data set are subject to equal representation, while the remainder have one-third representation.

[Table 1]

The regression results do *not* support the hypothesis that the average wage at companies with equal representation is higher than at companies with one-third representation (Table 1, column 1). This is in line with the separation of codetermination and collective wage bargaining documented in *Kommission Mitbestimmung* (1998, chapter 7, section 6). Given the absence of a significant difference in average wage levels across codetermination regimes, the 42 percent difference in the wage bill-to-sales ratio indicated in our second regression (Table 1, column 2) therefore implies that companies with equal representation are overstaffed. This 42 percent difference in the wage bill corresponds to a 33 percent higher employee count when normalized by sales (Table 1, column 3).

Migration of business activity away from codetermined firms

A rational response by shareholders facing entrenched labor in codetermined firms in a repeated game would be to shift business activity gradually to corporate and other business forms subject to less intrusive legislation. As Table 2 reports, precisely this has occurred in Germany during recent decades. The fraction of total private-sector employment accounted for by firms subject to "twin codetermination"—both shop-level and supervisory board-level codetermination—stood at 30.5 percent in 1984, according to the *Kommission Mitbestimmung*. By the mid-1990s, this fraction had shrunk to 24.5 percent. Conversely, the fraction of total private employment in the "codetermination-free zone" of the economy increased from 50.6 percent to 60.5 percent. A similar pattern played out across the economy as a whole, as panel B of Table 2 confirms.

[Table 2]

Cross-border acquisitions are a way of watering down the effects of codetermination and thereby increasing the value of the firm. As *Kommission Mitbestimmung* (1998, Chapter 6, Section 23, Paragraph 7) reports, coordination problems among the labor representatives of the various subsidiaries and the top tier (the parent firm) within groups of firms (concerns) substantially weaken the power of labor. Thus, German corporations may be attractive cross-border takeover targets if for no other reason than the potential to release latent value that is pent up by codetermination-driven overstaffing. The merger of Hoechst AG of Germany and Rhône-Poulenc S.A. of France into Aventis S.A. in December 1999 is a case in point. Aventis S.A. is headquartered in Strasbourg, France. While the German subsidiary, Hoechst AG, is still subject to equal representation, top-tier decision-making happens at Aventis S.A., which is out of the reach of German codetermination laws.

A final strand of evidence regarding the deleterious effects of entrenched labor on economic performance comes from aggregate output statistics. While it might appear heroic to assert a single cause of differences in growth rates across countries, it is noteworthy that growth rates of real GDP slowed substantially in Germany after the enactment of the 1976 Codetermination Act. Figure 2 shows that, during the period 1960-1975, real GDP in Germany and the United States grew at nearly the same average annual rate. Germany grew during this period at an annual rate of 3.46 percent, while the United States grew at an annual rate of 3.44 percent. During the period 1976-1989—which ends before the German reunification in 1990—the United States grew at an annual rate of 3.08 percent while Germany grew at an average rate of only 2.00 percent. After a temporary pickup in growth in the wake of reunification, Germany slipped back onto a growth path that falls short of U.S. growth by a wide margin.

[Figure 2]

Taken together, these disparate pieces of evidence are consistent with the hypotheses that codetermination increases labor entrenchment; entrenchment induces shareholder responses; and employer adjustments to entrenched labor may exert a significant drag on economic growth. These adjustments include underinvestment and avoidance of corporate forms subject to restrictive codetermination laws, both of which are likely to reduce an economy's growth potential.

CONCLUSIONS

The German corporate governance environment is unusual in several ways. The system of codetermination is an important fact of German corporate life that is both well established and likely to elicit responses from shareholders. Our simple two-period model of investment and employment highlights the potential for entrenched labor to exert meaningful effects on firm decision-making. In particular, codetermined firms can be expected on average to underinvest

relative to the levels that otherwise would be observed, and one would expect them to be overstaffed on average. We provide new empirical evidence that demonstrates the second of these predictions. The end result of entrenched labor may be to reduce the long-run growth potential of the German economy.

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[1] Let β be the regression coefficient of a 0/1 variable, then the change in the dependent variable as a result of a switch of this indicator variable from zero to one amounts to: $e^{\beta} - 1$. For details see Halvorsen and Palmquist (1980). Based on the regression coefficients presented by FitzRoy and Kraft (1993, Table 2), the aforementioned decrease of 19.7% is thus calculated as follows: $e^{0.13} - e^{-0.06}$.

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Table 1

Employment, compensation, and equal representation. The data set comprises the largest 250 traded German corporations by assets as of end of fiscal year 1993. Observations are from the period 1989-1993. Subsidiaries are not consolidated. The panel is unbalanced due to missing observations. For details on the data set see Gorton and Schmid (2000). The wage bill is in 1991 Deutsche marks and includes pension contributions. Sales are in 1991 Deutsche marks. Numbers of employees generally are as of end of fiscal year; for a few companies it is fiscal-year averages. *Equal representation*: Equal to 1 if there is equal representation on the supervisory board, 0 otherwise. *Firm size*: (Log of) stock market capitalization (as of the end of the calendar year that ends before the respective fiscal year). *Insiders*: Fraction of equity control rights held by management, other employees, or families. *Banks*: Fraction of equity control rights held by domestic banks. *Government*: Fraction of equity control rights held by domestic government entities. *Largest shareholder*: Maximum fraction of equity control rights held by a single shareholder. *ISIC*: Industry affiliation based on International Standard Industrial Classification (United Nations, 1990) where category D (manufacturing) serves as the *numeraire* industry. Sample years are represented by indicator variables where 1993 serves as the *numeraire* year. Standard errors are corrected following Newey-West (1987); *t*-statistics significance levels (in two-tailed tests): * denotes 10% level, ** denotes 5% level, and *** denotes 1% level. The effect of equal representation is the product of the regression coefficient of the interaction term *Equal representation* × *Firm size* (if significant), and the median value of firm size in the sub-sample of companies with equal representation.

Dependent Variable	(1) Log Ratio of Wage Bill to Number of Employees		(2) Log Ratio of Wage Bill to Sales		(3) Log Ratio of Number of Employees to Sales	
Explanatory Variable	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
Equal representation × Firm size	$3.772 \cdot 10^{-3}$	1.030	$2.039 \cdot 10^{-2}$	4.495***	$1.592 \cdot 10^{-2}$	3.361***
Firm size	$1.078 \cdot 10^{-1}$	4.543***	$1.157 \cdot 10^{-2}$	0.295	$-4.527 \cdot 10^{-2}$	-1.089
Insiders	$1.765 \cdot 10^{-2}$	0.146	$1.782 \cdot 10^{-1}$	1.238	$1.837 \cdot 10^{-1}$	1.289
Banks	$4.919 \cdot 10^{-2}$	0.223	$7.639 \cdot 10^{-1}$	2.135**	$6.686 \cdot 10^{-1}$	2.875***
Government	$-1.574 \cdot 10^{-2}$	-0.208	$-4.738 \cdot 10^{-2}$	-0.315	$-1.091 \cdot 10^{-1}$	-0.652
Largest shareholder	$6.925 \cdot 10^{-2}$	0.598	$5.646 \cdot 10^{-2}$	0.356	$-8.581 \cdot 10^{-2}$	-0.498
ISIC A	$-3.456 \cdot 10^{-2}$	-0.480	$1.889 \cdot 10^{-1}$	1.758*	$1.842 \cdot 10^{-1}$	1.915*
ISIC C	$1.159 \cdot 10^{-1}$	1.366	$7.226 \cdot 10^{-1}$	4.402***	$6.234 \cdot 10^{-1}$	3.317***
ISIC E	$1.658 \cdot 10^{-1}$	2.659***	$-3.968 \cdot 10^{-1}$	-3.939***	$-5.684 \cdot 10^{-1}$	-5.241***
ISIC F	$-1.591 \cdot 10^{-1}$	-1.273	$6.362 \cdot 10^{-3}$	0.073	$6.965 \cdot 10^{-2}$	0.596
ISIC G	$-2.425 \cdot 10^{-1}$	-2.180**	$-6.724 \cdot 10^{-1}$	-5.131***	$-3.145 \cdot 10^{-1}$	-2.631***
ISIC H	$-4.533 \cdot 10^{-1}$	-5.605***	$6.518 \cdot 10^{-1}$	4.944***	1.114	9.690***
ISIC I	$4.554 \cdot 10^{-2}$	0.788	$-7.177 \cdot 10^{-2}$	-0.317	$-1.556 \cdot 10^{-1}$	-0.703
ISIC K	$3.260 \cdot 10^{-1}$	3.451***	$-1.669 \cdot 10^{-1}$	-0.406	$-4.593 \cdot 10^{-1}$	-1.250
ISIC N	$-2.314 \cdot 10^{-1}$	-2.891***	$5.998 \cdot 10^{-1}$	5.274***	$7.200 \cdot 10^{-1}$	6.438***
1992	$-9.095 \cdot 10^{-2}$	-2.179**	$-1.346 \cdot 10^{-2}$	-0.176	$5.580 \cdot 10^{-2}$	0.729
1991	$-2.382 \cdot 10^{-1}$	-3.712***	$3.038 \cdot 10^{-2}$	0.407	$1.710 \cdot 10^{-1}$	2.319**
1990	$-3.004 \cdot 10^{-1}$	-4.181***	$-8.384 \cdot 10^{-3}$	-0.084	$1.992 \cdot 10^{-1}$	1.986**
1989	$-3.251 \cdot 10^{-1}$	-4.667***	$-5.871 \cdot 10^{-2}$	-0.682	$1.461 \cdot 10^{-1}$	1.705*
Constant	2.308	5.091***	-1.939	-2.580***	-5.112	-6.402***
F-statistic	5.740***		7.987***		7.568***	
R^2 adj.	0.093		0.139		0.134	
Effect of equal representation	---		0.420		0.328	
Number of observations	858		798		783	

Table 2

Fraction of employees by codetermination type. Employees fall into the category of so-called twin codetermination if their employers have both works councils (codetermination on the shop-floor level) and equal representation on the supervisory board. Equal representation on the supervisory board may result from the 1951 *Montan* Codetermination Act or the 1976 Codetermination Act. Employees are assigned to the so-called single codetermination regime if their employers have works councils but are not subject to equal representation on the supervisory board. Companies without equal representation on the supervisory board may be subject to 1/3 codetermination according to the 1976 Codetermination Act or have no labor representation on the supervisory board. Employees are assigned to a regime of no codetermination if their employers have neither works councils nor equal representation on the supervisory board. The public sector generally has representation on the shop-floor level, but supervisory boards do not exist. Media companies and many nonprofit organizations are exempt from codetermination due to the constitutional freedoms of expression and faith. The terms twin and single codetermination were taken from *Kommission Mitbestimmung* (1998), who compiled the numbers. *Kommission Mitbestimmung* calculated the numbers from data that originate from multiple sources and years, which explains the choice of the reference year 1994/96.

Percentage Fractions of Employees by Codetermination Type		
Panel A: Private Sector		
Codetermination Type	1984	1994/96
Twin Codetermination	30.5	24.5
Single Codetermination	18.9	15.0
No Codetermination	50.6	60.5
Total (Percent)	100	100
Panel B: Whole Economy (Private, Public, and Nonprofit Sectors)		
Codetermination Type	1984	1994/96
Twin Codetermination	22.2	18.2
Single Codetermination	40.8	36.9
No Codetermination	37.0	44.9
Total (Percent)	100	100

Figure 1

Timeline of Firm Decision-Making

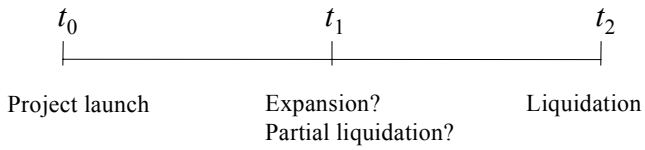
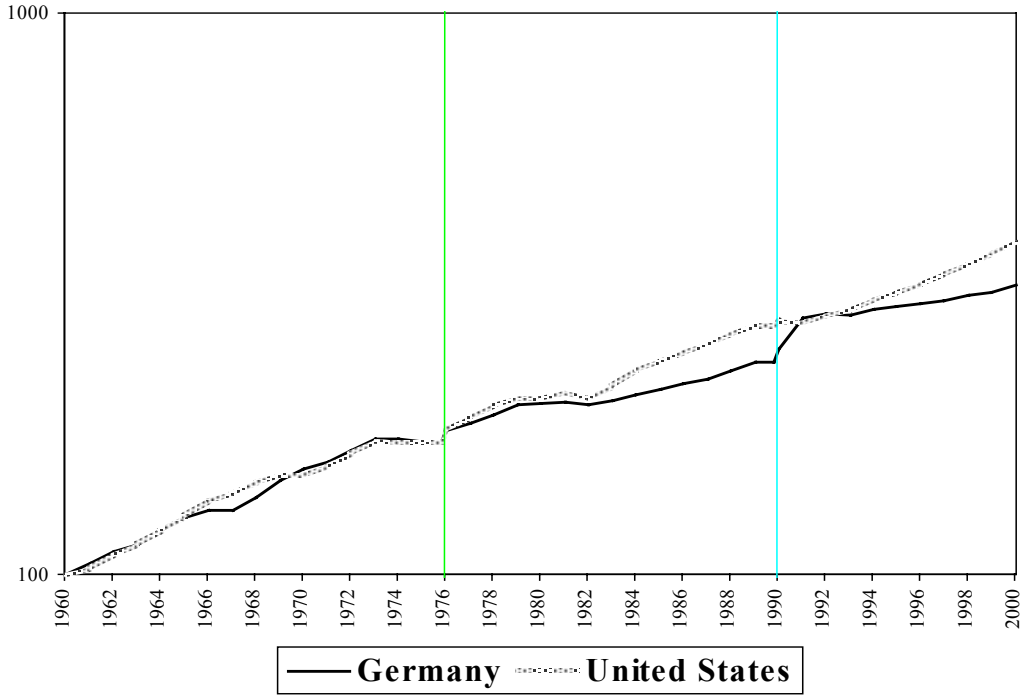


Figure 2

Real Growth: Germany and the United States in Comparison



Real GDP: annual observations; United States: GDP in billions of chained 1996 US$; Germany: GDP at constant prices (1995=100); rebased to 100 in 1960; Source: IMF.