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The Economic Consequences of one-third Co-determination
in German Supervisory Boards:
First Evidence for the Service Sector from a New Source of
Enterprise Data

by
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The Economic Consequences of one-third Co-determination in German Supervisory Boards: First Evidence for the Service Sector from a New Source of Enterprise Data[*]

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There remains great uncertainty about the economic consequences of co-determination in German supervisory boards. Because employee representation on company boards is mandatory, depending on the legal form and size of the company, a direct comparison of those companies that apply co-determination and those that do not has not yet been possible. However, based on a new kind of combined data set, this paper conducts such a direct comparison, leading to more reliable results about the economic consequences of workers' participation on two core performance indicators: productivity and profitability. Accordingly, the existence of a co-determined supervisory board seems to positively affect productivity, but not profitability.

Key words: co-determination, board-level employee representation, Germany
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1. Introduction

Since their first introduction in the fifties, the German co-determination laws have been highly controversial. Especially in the question of implementing workers' participation rights in common legal forms within the European Union, the debate about their consequences has become very heated. As yet, no final determination has been made as to whether the institution brings with it economic advantages for companies, so researchers continue to disagree about the advantages and disadvantages of co-determination. While advocates emphasize the activating and motivating effects of co-determination, opponents fear loss of efficiency.

Several researchers[1] have tried to analyze the possible economic effects of the German co-determination legislation. Most studies have compared companies that fall into the scope of the three different co-determination acts. Since the extent to which the laws can be applied depends on the size of a company, these studies have mainly contrasted big corporations with smaller ones, but such a comparison necessarily entails irregularities. In addition, a lack of meaningful data and adequate econometric methods has impeded research.

The present study advances the state of research in several ways. According to the 2004 Third Part Act, companies with 500-2000 employees must establish a supervisory board and assign a third of the seats on the board to employees. However, previous investigations have shown that, contrary to the law, about half of limited liability companies with 500-2000 employees in the western German service sector have not established a supervisory board (Boneberg, 2009a), so there is no co-determination at the enterprise level in the companies' boards. This means that there are companies of the same size, same legal form and active in the same sector which fall into the scope of the German 2004 Co-determination Act due to their size, but differ mainly in the existence or non-existence of a supervisory board. By comparing the economic performance of these firms, more accurate evidence of the economic consequences of the German 2004 Co-determination Act can be provided.

The data base originates from two sources: initial information was collected from the Hoppenstedt Database, a commercial database that provides information on the size, age, legal form and ownership structure of all German companies that employ more than 200 people and/or have more than 20 m Euro in sales volume per year. Because facts on the

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[1] See section four for further details.

presence or absence of a supervisory board were not available for all companies from this data source, missing data were collected via telephone calls. However, in order to analyze the economic consequences of the 2004 Co-determination Act, details about productivity and profitability of the observed firms are also needed, and these are obtained from official German statistics. By merging the information from the Hoppenstedt Database and the official statistics, the performance of companies that have a supervisory board and those that do not can be compared.

This paper examines the effects of the existence of a supervisory board on two core performance indicators: productivity and profitability. Because of their size, all observed firms fall into the scope of the 2004 Co-determination Act. Due to its increasing relevance, the paper focuses on the western German service sector. While one-third co-determination at the supervisory board level is neither positively nor negatively related to the two indicators for limited liability western Germany manufacturing firms (see Wagner, 2009), the results in the service sector differ.

The remainder of the paper is organized as follows: First, the legal and theoretical backgrounds are outlined. Next, an overview of the existing empirical studies is given, followed by data description and the empirical results. Finally, the results are discussed and a conclusion is drawn.

2. Legal background

In Germany, employee representation is provided at two levels. Workers' participation at the establishment level refers to the works council (Betriebsrat), where employees participate in operational decisions, such as those related to lay-offs. It is the task of the works council to represent the employees' interests with management. Employee representation is also required at the enterprise level, where workers participate in corporate planning and decision-making processes relevant to the company as a whole (see Junker, 2006: 442 f.). This level of participation is implemented in the supervisory board, on which employees receive a certain number of seats and votes, depending on the legal structure and size of the company. The mission of the supervisory board is primarily to oversee and control the management of the company. In corporations, the chief executive is appointed by the supervisory board, but this is not the case in limited liability companies. Because of the resulting weak position of

supervisory boards in limited liability companies, Fuchs and Köstler (2005: 35 f.) denote them as solely informational organs.

Since 1976, three laws have been implemented that regulate workers' participation on supervisory boards: The Montan Co-determination Act (Montan-Mitbestimmungsgesetz), the 1976 Co-determination Act (Mitbestimmungsgesetz (MitbestG)) and the 2004 Third Part Act (Drittelbeteiligungsgesetz (DrittelbG)). All companies examined in the present analysis fall into the scope of the 2004 Third Part Act, which applies to firms that usually employ 500-2000 workers, whether the firms are corporations (AGs), partnerships limited by shares (KGaA), limited liability companies (GmbHs), mutual insurance associations (VVaG), or cooperative, industrial and provident societies (§ 1 DrittelbG) (The working time stipulated by contract is of no relevance when determining company size). The law assigns a third of the seats on the company's board to the employees (§ 4 I DrittelbG). In contrast to the other co-determination laws, the 2004 Third Part Act does not dictate an exact number of board members, so the provisions of the stock corporation law—which prescribe a board size of at least three members, and thereafter a number divisible by three (§ 95 S. 1, 3 Aktien-Gesetz (AktG))—are implemented. The 2004 Third Part Act is applied when no statutory regulation indicates that the scope of another co-determination law is more favorable to workers (§ 1 II 1 No. 1 DrittelbG). The provisions of the 2004 Third Part Act are mandatory, so they cannot be changed by statute or by collective bargaining agreements (see Oetker, 2007: 1836).

Co-determination at the enterprise level is governed by all three laws. The Montan Co-determination Act, which applies to companies in the coal and steel industry that have more than 1,000 employees, provides equal representation for employees on the company's supervisory board. In addition, a representative of the employees' side can operate as a worker director on the board (see Junker, 2006: 452 f. See also Niedenhoff, 2005: 382 ff; Fuchs & Koestler, 2005: 20). Companies that regularly engage at least 2000 employees fall into the scope of the 1976 Co-determination Act, which also provides equal representation on the supervisory board. However, because of the tie-breaking vote of the chairman, who generally sides with the shareholders, the law actually provides "quasi-parity" (see Donges et al., 2007: 15f.). Only one of the three laws applies to any one company. The provisions of the Montan Co-determination Act have priority (§ 1 II MitbestG), and the 1976 Co-determination Act takes precedence over the 2004 Third Part Act (§ 1 III MitbestG).

3. Theoretical framework

This section outlines the theoretical background concerning the economic consequences of workers' participation. Among economists, there are generally two points of view on the potential effects of co-determination: the Property Rights approach and the Participation Theory approach.

The Property Rights approach

The supporters of the Property Rights approach, such as Furubotn (1985; 1988) and Pejovich (1978; 1990), argue that legal co-determination regulations have primarily negative effects on a company. In their opinion, participation rights reduce the residual decision rights of the owners, which results in less efficient or at least delayed decisions, as well as in delays in the planning and innovation process. In the opinion of Pejovich (1978), shareholders must be able to influence managerial decisions or their willingness to invest capital in the enterprise will decrease. Pejovich (1990: 69) contends that participation rights influence the relationship among employers, shareholders and employees, but that they also alter the roles between risk carrier and benefactor, leading to conflicts of interest that impede efficient solutions. The separation of the position of risk carrier and that of decision-maker has negative impacts on the company's efficiency (see Kraft & Stank, 2004: 428). In this context, Pejovich (1990: 69) argues, "Co-determination shifts the responsibility for decisions to a group of people who are not at all affected by the consequences of the decisions" such that shareholders and employees benefit from successful investments, while the consequences of unsuccessful investments fall to the owners alone. Consequently, the owners see lower productivity for their investments and lower incomes, partly because the employees use their increasing influence to participate in the business's profits (Renaud, 2007: 691). Pejovich (1976: 18 ff.) points out that the planning horizon and risk tolerance of equity holders, employers and workers varies, resulting in a strong potential for conflict that shareholders can rarely decide in their own interest because of the participation regulations. Instead, the workers are able to maximize their own utility while the shareholders are not.

The Principal Agent theory is often used in argumentation against workers' participation. According to this theory, owners transfer their decision-making rights to the management with the mandate to implement decisions based on their best interests. However, the employees' right to participate in decisions at the enterprise level endangers the protection of these interests with the result that the shareholder may not feel well represented. As Weizsäcker (1983: 146) observes, "A company's ability to respond flexibly to changing

conditions, to take advantage of innovation opportunities, to balance risks against opportunities, is heavily influenced by its internal organization and decision-making structure. [...] Participation rights divide the decision-making rights in a company and therefore lead to a de facto reduction of its decision-making and coordinating power. "

Participation Theory
Adherents of the Participation Theory argue that the benefits of co-determination rights exceed the disadvantages. As the potential conflict that generally defines the relationship between employer and employee eases, satisfaction on both sides increases, and productivity and the acceptance of innovations are augmented (Kraft & Stank, 2004: 430).

Hirshman (1970) as well as Freeman and Medoff (1984: 94) state that participation rights reduce the labor turnover rate, backing their argument with the exit-voice approach, which traces back to Hirshman (1970: 77ff.). This approach assumes that the collective pooling of interests, such as those in trade unions or works councils (voice), helps prevent employees from leaving the company or from reduced performance and motivation that may be due to dissatisfaction (exit). Workers' participation rights help to retain employees because employees generally prefer dialogue to quitting (Freeman & Medoff, 1984: 8). This advantage benefits the employer as the company avoids high turnover costs for reappointments or wage payment with absence of consideration (Dilger, 2002: 68 ff.).

Levine and Tyson (1990: 185 ff.) show two effects from workers' participation in decision-making: On one hand, such involvement increases employees' operational readiness and motivation to work. On the other hand, workers' participation rights lead to an activation of knowledge and a better flow of information. Both effects impact productivity positively, raising the efficiency and profitability of the firm. Levine and Tyson also contend that workers' participation enhances their confidence in both the company and the management, leading to a stronger identification with the corporate objectives (Levine & Tyson, 1990: 187 f.).

Advocates of this point of view also explain that, since even the most detailed contracts can not be explicit on every potentiality (Hart, 1995: 23 ff.), opportunistic behavior or the emergence of an internal prisoners' dilemma may occur. Both, employers and employees have incentives to deviate from their contractual obligations, so mistrust results. Participation rights

can lead to long-ranging employment-employee contracts and support cooperative interaction within the company (Dilger, 2002: 55 f.).

Freeman and Lazear (1995: 29) find something true in both lines of argument. They argue that co-determination on the employees' side leads to increased motivation, willingness to invest in firm-specific skills, and acceptance of innovations, all of which increase productivity. At the same time, the workers' bargaining power increases, along with their demands for a greater share in a company's rent. Thus, co-determination affects not only distribution, but also the amount of joint surplus.

4. Empirical evidence

Many publications have dealt with the effects of co-determination at the enterprise level.[2] The empirical literature has focused on the analysis of changes in productivity, and recently released papers have examined co-determination's potential effects on shareholder value and profitability. One study analyzed a possible impact on innovation activities of a company, and two others have dealt with potential consequences to a firm's employment level. In the course of the investigations of co-determined firms and non-codetermined firms, the business metrics of companies that fall into the scope of various co-determination acts have been compared. However, there have been no long-term studies on the effects of co-determination (see Renaud, 2007: 693), and in all studies the existence of the supervisory board has been assumed.[3]

The studies that have analyzed the potential impacts of co-determination on productivity have reached conflicting conclusions. While some have not found any effects, others have identified positive relationships between co-determination and productivity (FitzRoy & Kraft, 2005; Renaud, 2007), and others negative relationships (Gurdon & Rai, 1990; FitzRoy & Kraft, 1993). Svejnar (1982) and Wagner (2009) found no significant impact on productivity. The results of studies dealing with potential impacts on profitability also vary: while Gurdon and Rai (1990) identified negative effects of co-determination at the enterprise level, FritzRoy and Kraft (1993) found positive consequences for profitability, and Wagner (2009) found no effect on profitability for firms in the industrial sector. As to possible effects on stock prices, the results of extant studies provide a more uniform picture: Benelli et al. (1987), Baums and

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[2] See Addison and Schnabel (2009) for a detailed overview.
[3] Only one study (Wagner, 2009) obviously differs in its approach. It follows the same idea the present study does, using the industrial sector.

Frick (1999), Vitols (2006) and Frick and Bermig (2009) found no significant effects, and Schmid and Seger (1998) and Gorton and Schmid (2004) calculated a negative impact.

The varying results show that no clear conclusions on the impact of co-determination at the enterprise level can yet be drawn. Moreover, a direct comparison of the extant work is difficult to make because of the different methods and data used. Because of their improved methodology, Vitols (2005: 26) considers the results of recent investigations more reliable, as some of the older studies must be regarded with reservations because of their methodologies. (For additional details, interpretations and criticisms, see Baums and Frick, 1996: 5; Donges et al., 2007: 36 ff; Renaud, 2007: 693 ff; Sadowksi et al., 2000: 17 f.). Taken together, the extant work on the subject makes it clear that, since the existing studies are neither numerous nor definite, the influence of co-determination cannot yet be assumed (see Kraft, 2006: 710). Sadowski et al. (2000: 18) summarize the issue: "All in all the studies at hand suggest that the question of potential effects of participation rights in supervisory boards so far is not empirically resolved." The current study takes another approach to the investigation of potential impacts of co-determination, as discussed in the empirical part of the paper.

5. Data and methodological remarks

Initial information for the data base for the present study was collected from the Hoppenstedt Database, a commercial database that provides information on the size, age, legal form and ownership structure of all German companies that employ more than 200 people and/or have more than 20 m in Euro sales volume per year. Information about the existence and allocation of staff on the supervisory board is also usually included in this database, although this information is not available for every company. Missing data were collected via telephone calls. (For detailed data specification and additional information regarding the detailed process of data collection, see Boneberg, 2009a.)

The information about productivity and profitability required to analyze the economic consequences of the 2004 Co-determination Act was obtained from the official business services statistics (Strukturerhebung im Dienstleistungsbereich) set up by the German Federal Statistical Office and the statistical offices of the Federal States (Länder). These statistics include, among other data, information on companies' economic sector, the number of employees (not including temporary workers), total turnover, subsidies, salaries and wages of a company. The European Union first collected these statistics for the year 2000. The data

covers the enterprises and professions (Freie Berufe) of the NACE divisions I (transport, storage and communication) and K (real estate, renting and business activities) with an annual turnover of at least €17,500. In order to assign the enterprises, a stratified random sample is employed. The stratification is based on the federal states, 4-digit industries, and 12 size ranges (in terms of turnover or employees). While the data is generally confidential, it can be utilized by researchers on a contractual basis via controlled remote data access inside the research data centres of the German Statistical Offices. (For details, see Zühlke et al., 2004.) Additional information about the German business services statistics panel can be found in Vogel (2009).

Merging the information form the Hoppenstedt Database and the official statistics makes possible an examination of potential consequences for productivity and profitability of companies with and without supervisory boards. Merging was done using information about the register number and register court of the trade register (Handelsregisternummer und Handelsregistergericht) for an enterprise. This information is available in both the Hoppenstedt data base and in the official register of enterprises (Unternehmensregister) that was linked with the business services statistics data.

The current study uses the results of the 2006 business services statistics; however, profitability and productivity can only be determined as proxies because the data set does not include any information on a company's capital stock or the sum of assets or equity. Therefore, it is not possible to compose profit indicators like return on assets or return on equity. Consequently, profitability is measured as turnover profitability, defined as the rate of return generated as gross firm surplus[4] divided by total sales, minus net change of inventories. Productivity is measured as value added per employee and, for a further robustness check, as turnover per employee. The number of employees is based on the number of employed persons and not on full-time equivalents, since full-time equivalents is not included in the dataset. However, this fact does not pose a problem because the 2004 Third Part Act does not differentiate companies on the basis of full-time equivalents anyway.

The initial data set used in previous investigations contained 500 companies (see Boneberg, 2009a). The present study includes only 173 companies because only these firms are in both the Hoppenstedt Database and the official statistics. The official business services statistics

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[4] The definition applied here is in line with the denotation of the European Commission (1998): gross value added at factor costs, minus gross wages and salaries, minus costs for social insurance paid by the firm.

comprises solely companies active in sectors I and K, while the Hoppenstedt data collection also contains firms from other branches.

6. Empirical investigation

This section undertakes the empirical investigation by, first, running two different mean tests and, second, running different OLS-estimations. 80 of the companies in the sample have a supervisory board, and 93 do not (table 1).

[Table 1 near here]

Table 2 reports the results of a t-test on mean differences. For productivity, the difference in mean value is statistically significant at a 95% level, so companies with a co-determined supervisory board are, on average, more productive than those without one. The t-test for the value added per employee confirms the result. The outcome for profitability, on the other hand, is not statistically significant. Since the t-test provides information on only one moment of the productivity or profitability distribution, it is useful to apply the Kolmogorov-Smirnov test as well. This test provides information on any difference in the whole distribution of productivity and profitability for companies with and without supervisory boards. (For more details concerning this test and its application, see Delgado et al., 2002.) According to the Kolmogorov-Smirnov test, both the two productivity distributions and the two profitability distributions differ for firms with and without workers' participation at the enterprise level. Apparently, firms with a co-determined supervisory board are, on average, significantly more productive than companies without a supervisory board. In contrast, companies with workers' participation at the enterprise level seem to have a significantly lower rent than those that do not.

[Table 2 near here]

In the next step several OLS-estimations are run, the results of which are shown in table 3. Models one and four report the outcome for simple regressions. Here, the variables profitability and the logarithm of the value added per employee are regressed on a dummy variable reflecting the existence or non-existence of a supervisory board. For productivity the R^2 demonstrates that 18 percent of the variance can be explained by the existence or non-existence of a supervisory board. Furthermore, at a significance level of one percent,

companies with supervisory boards are 116 percent[5] more productive than firms without them. Looking at the results for profitability, only one percent of the variance can be explained by the presence or absence of a supervisory board. The regression coefficient of the dummy variable that indicates the presence or absence of a supervisory board is not statistically significant.

[Table 3 near here]

In models two and five the regressions are augmented by 1-digit industry dummies[6] that indicate the sector in which a company is active. Hence, these variables test for industry-specific structural differences and shocks (e.g., the extent of competition, technology of production and fluctuations in demand, and production costs). The industrial sector is significantly correlated to the value added per employee; according to the model, productivity is 43 per cent higher in companies with supervisory boards than in those without. In addition, value added per employee is 125 percent higher in sector I, and 177 percent higher in sector K70-73, compared to companies active in sector K74. However, the coefficients are not statistically significant for profitability.

For a robustness check, models two and five are augmented by additional control variables. First, two variables indicating company size—number of employees and the square of the number of employees—are integrated. Firm size seems to influence whether the firm has a supervisory board (see Boneberg 2009a and the descriptive statistics in table 5) and may influence productivity and profitability as well. Second, a variable reporting subsidies per employee received by an enterprise is contained in the estimation. In the official business services statistics, subsidies per employee are defined as any payments received from local, regional, federal or European authorities, without consideration, in order to lower production costs and/or prices of the goods produced and/ or to guarantee sufficient payments for factors of production. Therefore, subsidies should be higher in firms with lower productivity and profitability. Finally, two additional dummies are included indicating whether a firm is family-owned (and furthermore co-determined at the enterprise level). Since an earlier study by this author has shown that the probability of family-owned firms' having a supervisory

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[5] To facilitate interpretation, all estimated coefficients have been transformed by $100 \, (\exp(\beta) -1)$.
[6] The official business services statistics are comprised only of companies that act in branches I and K. Usually, 5-digit industry identifiers are reported; however, because of the small sample size and the resulting insufficient number of enterprises in single sectors, only 1-digit dummies could be generated for the present study while still preserving confidentiality.

board is lower than that for companies with different ownership structures (see Boneberg 2009a), and since family-owned firms are often said to attach greater importance to lasting continuity than to making profits in the short run, the integration of those two dummies may be of value.

To begin with model three, apart from the subsidies per employee, all other variables included in the estimation are apparently correlated to the value added per employee. Value added per employee is 36 percent higher in companies with supervisory boards than in those without. The industrial sector relates significantly to the value added per employee, which is 105 percent higher in sector I, and 166 percent higher in sectors K70-73 than in sector K74. Moreover, at a significance level of 99 percent, productivity is 42 percent smaller in family-owned firms. The coefficients of the number of employees and its squared value are significant, but small; while an additional worker reduces the value added per employee, according to the squared value, this rate diminishes to a minimum firm size of around 7,317 employees, a firm size irrelevant for the present study. The marginal effect of an additional worker on value added per employee for companies that employ between 550 and 2000 workers amounts to 0.02 percent. Looking at the coefficients in model six, only subsidies per employee relate to profitability and the relationship is negative. No other variables are statistically significant at any conventional error level.

The results show that productivity is higher in co-determined firms than in not-co-determined firms, so it could be argued that profitability should also be higher in these firms. However, the results indicate the opposite. One possible explanation is that the employees are able to demand higher wages because of their higher productivity, and such demand negatively impacts a company's profitability. Thus, it could be worth examining whether the presence of a co-determined supervisory board is linked to the wage levels of a company. The results of the t-tests and the OLS-estimations are presented in tables 2 and 4, respectively.

[Table 4 near here]

Both t-tests and the OLS estimates suggest a positive relationship between wage level and the presence of a co-determined supervisory board. According to the R^2 of model seven, 27 percent of the variance in wages can be explained by the presence or absence of a supervisory board; on a significance level of 99 percent, the wages are ceteris paribus higher in companies

with supervisory boards than in companies without them. Running OLS-estimations with the same explanatory variables as before indicates that this relationship is constant. All together it appears that companies with co-determined supervisory boards tend not only to be more productive, but also to pay higher wages. This finding might explain why profitability does not increase as one would expect.

7. Discussion

Because of the very small sample size, it is not the aim of this study to provide comprehensive explanations, but only to compare percentage differentials concerning several control variables. Bartelsman and Doms (2000: 585f.) point to the difficulty of explaining productivity differences and, in this context Griliches and Mairesse (1990: 221) say, "The simple production function model, even when augmented by additional variables and further nonlinear terms, is at best just an approximation to a much more complex and changing reality at the firm, product, and factory floor level." The same is true for profitability.

The results of both the t-test and the regression models indicate that productivity per employee is, on average, significantly higher in companies with supervisory boards than in companies without them. On the other hand, at least the Kolmogorov-Smirnov test reports lower profitability in companies with supervisory boards than in those without them. Summing up, then, productivity appears to be higher and profitability likely lower in corporations that have a co-determined supervisory board. This result is congruent with the idea of Freeman and Lazear (1995), who claim that worker participation raises productivity as the employees put more effort into their work, but lowers profitability as highly productive workers exert more influence on the distribution of a company's rent.

The branch of industry is apparently significantly correlated to productivity per employee. Compared to companies active in K74 (entries such as consultancy, accounting, cleaning companies and call center), firms in branches I (transport, storage and communication) and K (real estate, renting and business activities) achieve greater productivity per employee. Furthermore, family-owned companies tend to achieve less value added per employee, a surprising result since these firms are thought to be especially good at motivating their workers. Subsidies per employee are, on average, negatively related to rent, a reasonable finding since corporations with little profitability tend to receive more subsidies.

The present study indicates that the presence of a supervisory board with co-determination relates positively to productivity and wages, but not or only to a small degree to profitability. However, some limitations may constrain the reliability and generalizability of the results. First, the study is based on cross-sectional data. Even though the official business services statistics used here comprises panel data, its advantages cannot be used in the present investigation because whether a firm has a supervisory board does –by construction- not change over time. So studying any fixed effects in order to control for unobserved heterogeneity at the firm level is not possible. Heterogeneity can be caused by differences in management quality, which may be influenced by the presence or absence of a supervisory board. This correlation leads to biased estimates of the co-determination coefficient. Since it is not known whether management performance is better or worse in companies with supervisory boards, the direction of the bias is indeterminate.

Second, investigating causal effects on firm performance is not possible because of the special kind of data used here. In the model at hand, the presence or absence of a supervisory board is exogenously determined and fixed, so its status does not change in the course of time. In consequence, working out treatment effects by dividing the firms into those that have been given the treatment (companies with a supervisory board) and those that have not (companies without a supervisory board) is not possible.[7]

Finally, a problem arises from controlling for firms' self-selection into co-determination. In the present study whether a firm has a supervisory board or not is assumed as a given. However, the owners or managers of a company may decide to implement a co-determined supervisory board because they anticipate positive effects on firm performance. To determine if this is the case, a variable reflecting the decision in favour or against a supervisory board is needed that is not related to productivity or profitability. Because no such variable is present, an investigation of this kind is not practicable.

Although the study has limitations, the paper provides important evidence on the economic consequences of co-determination. The special kind of data appears to be more reliable because it facilitates a direct comparison of firms with and without co-determination at the enterprise level. The study shows that co-determination at the enterprise level is at least not negatively related to the two core performance indicators of productivity and profitability but

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[7] See Wagner (2007) for an example of how to design an empirical study of that kind.

indicates that productivity is positively affected by the presence of such an institution. This outcome is in line with the results of most recent studies; Wagner (2009) as well as Frick and Bermig (2009) find no positive or negative economic effects of co-determination on a company's productivity and profitability.

Considering the research design and methodology of the present study, its findings are not surprising. As explained in section two, the position of the supervisory board in limited liability companies is especially weak. In addition, the companies observed in this empirical investigation fall only into the scope of the 2004 Third Part Act, so employees hold only a third of the seats on the supervisory board. In consequence, the employer always can decide in favor of his own ideas. This fact might be of special interest when it comes to the distribution of rents. Even if a co-determined supervisory board is implemented, it cannot automatically influence the actions of the management, which is why the rent level in the present study may not be affected by the existence of a co-determined supervisory board. For their part, the workers may feel more motivated by their participation rights to improve productivity. The increased employee satisfaction, as well as the implementation of democratic principles in the economic system, can, depending on the values and ambitions of society, lead to an improvement in social welfare. All together, the results of the present study suggest that the controversial debate about co-determination regulations in Germany and their implementation in common legal forms within the European Union is overstated.

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Tables

Table 1: Frequencies of firms with/ without supervisory boards

Supervisory Board	Frequencies	Percent
0	93	53.76
1	80	46.24
Total	**173**	100

Table 2: Differences in mean of companies with/ without supervisory boards

	Codetermined firms	Non-codetermined firms	t-test on mean differences	Kolmogorov-Smirnov-Test (p-Values)	
	Mean (Standard deviation)	Mean (Standard deviation)	(p-Values)	Codetermined firms	Non-codetermined firms
Value added per employee (€)	73,743 (96,741)	43,646 (54,377)	0.01	0.886	0.000
Profitability (%)	-.033 (1.166)	0.126 (0.135)	0.19	0.015	0.619
Wages per employee (€)	40,686 (16,334)	25,585 (21,409)	0.00	0.914	0.000
Number of Enterprises	80	93			

Table 3: Regression results for the enterprise performance of codetermined and not-codetermined firms on board level

Exogenous Variable	Performance indicator					
	Logarithm of Productivity (Value added per Employee in €)			Profitability (%)		
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Codetermination[*]	0.77 (0.000)	0.36 (0.006)	0.31 (0.022)	-0.16 (0.193)	-0.18 (0.190)	-0.15 (0.291)
Number of employees			-0.3 e-03 (0.047)			0.2 e-03 (0.156)
Number of employees squared			2.05 e-08 (0.056)			-1.31 e-08 (0.239)
Subsidies per employee (€)			-4.2 e-07 (0.936)			-0.3 e-04 (0.000)
Familiy-owned enterprise[*]			-0.55 (0.002)			0.05 (0.758)
Familiy-owned and codetermined enterprise[*]			-[**]			-[**]
I[*]		0.81 (0.000)	0.72 (0.000)		0.13 (0.384)	0.16 (0.278)
K 70-73[*]		1.02 (0.000)	0.98 (0.000)		-0.11 (0.574)	0.13 (0.466)
Constant	10.22 (0.000)	10.01 (0.000)	10.36 (0.000)	0.13 (0.129)	0.11 (0.213)	-0.07 (0.623)
R-squared	0.179	0.365	0.413	0.01	0.02	0.17
Number of Enterprises[***]	170	170	170	173	173	173

Terms in brackets report the p-value.
[*] Dummy-variable: 1 = yes, 0 = no. Reference category for industry dummies = K 74.
[**] For confidentiality reasons these values were dropped by the FDZ.
[***] Due to single computations handed in to the FDZ at a later state, unfortunately three cases were ex post dropped by the FDZ for confidentiality reasons.

Table 4: Regression results for the wage level of co-determined and not-co-determined firms on board level

Exogenous Variable	Performance indicator		
	Logarithm of wage		
	Model (7)	Model (8)	Model (9)
Codetermination[*]	0.68 (0.000)	0.44 (0.000)	0.42 (0.000)
Number of employees			-0.2 e-03 (0.069)
Number of employees squared			1.49 e-08 (0.105)
Subsidies per employee (€)			-4.26 e-06 (0.347)
Familiy-owned enterprise[*]			-0.42 (0.005)
Familiy-owned and codetermined enterprise[*]			-[**]
I[*]		0.46 (0.000)	0.38 (0.001)
K 70-73[*]		0.63 (0.000)	0.63 (0.000)
Constant	9.84 (0.000)	9.72 (0.000)	10.00 (0.000)
R-squared	0.206	0.305	0.351
Number of Enterprises[***]	173	173	173

Terms in brackets report the p-value.

[*] Dummy-variable: 1 = yes, 0 = no. Reference category for industry dummies = K 74.

[**] For confidentiality reasons these values were dropped by the FDZ.

[***] Due to single computations handed in to the FDZ at a later state, unfortunately three cases were ex post dropped by the FDZ for confidentiality reasons.

Table 5a: Descriptive statistics for variables included in the regressions of table 3
Part 1: Profitability

Variable	All companies		Codetermined Companies		Not-codetermined companies	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Profitability (%)	0.07	0.80	-0.01	1.18	0.13	0.14
Codetermination[*]	0.45	0.5	1	0	0	0
Number of employees	916.78	1,111	966.78	420.54	875.39	1,456
Number of employees squared	2,068,138	1.48 e+07	1,109,216	982,057	2,862,085	2.01 e+07
Subsidies per employee (in €)	1755.72	10,960	3,783	15,930	12.19	34.57
Familiy-owned enterprise[*]	0.15	0.36	0	0	0.27	0.45
Familiy-owned and codetermined enterprise[*]	0	0	0	0	0	0
I[*]	0.31	0.46	0.46	0.50	0.17	0.38
K 70-73[*]	0.15	0.36	0.24	0.43	0.08	0.27
Number of enterprises	173		80		93	

[*] Dummy-variable: 1 = yes, 0 = no. Reference category for industry dummies = K 74.

Table 5b: Descriptive statistics for variables included in the regressions of table 3
Part 2: Value added per employee

Variable	All companies		Codetermined Companies		Not-codetermined companies	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Value added per employee (€)	59,322	77,598	78,256	95,639	43,646	54,377
Codetermination[*]	0.45	0.5	1	0	0	0
Number of employees	916.78	1111.27	966.78	420.54	875.39	1455.53
Number of employees squared	2,068,138	1.48 e+07	1,109,216	982,057	2,862,085	2.01e+07
Subsidies per employee (in €)	-[**]	-[**]	-[**]	-[**]	12.19	34.57
Familiy-owned enterprise[*]	0.15	0.36	-[**]	-[**]	0.27	0.45
Familiy-owned and codetermined enterprise[*]	0	0	0	0	0	0
I[*]	-[**]	-[**]	-[**]	-[**]	0.17	0.38
K 70-73[*]	-[**]	-[**]	-[**]	-[**]	0.08	0.27
Number of enterprises	170		77		93	

[*] Dummy-variable: 1 = yes, 0 = no. Reference category for industry dummies = K 74.
[**] For confidentiality reasons these values were dropped by the FDZ.

Table 6: Descriptive statistics for variables included in the regressions of table 4

	All companies		Codetermined Companies		Not-codetermined companies	
Variable	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**
Wage (€)	32,312	20,438	40,436	15,867	25,585	21,409
Codetermination[*]	0.45	0.5	1	0	0	0
Number of employees	916.78	1111.27	966.78	420.54	875.39	1455.53
Number of employees squared	2,068,138	1.48 e+07	1,109,216	982,057	2,862,085	2.01 e+07
Subsidies per employee (in €)	-[**]	-[**]	-[**]	-[**]	12.19	34.57
Familiy-owned enterprise[*]	0.15	0.36	0	0	0.27	0.45
Familiy-owned and codetermined enterprise[*]	0	0	0	0	0	0
I[*]	-[**]	-[**]	-[**]	-[**]	0.17	0.38
K 70-73[*]	-[**]	-[**]	-[**]	-[**]	0.08	0.27
Number of enterprises	170		77		93	

[*] Dummy-variable: 1 = yes, 0 = no. Reference category for industry dummies = K 74.
[**] For confidentiality reasons these values were dropped by the FDZ.

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