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Product Market Competition and the Minimum Wage

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PRELIMINARY
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Abstract

This study analyzes employers' support for the introduction of minimum wages in order to improve their competitive position. Using a unique data set consisting of 800 firms in eight industries in the German service sector, we find some evidence that high-productivity employers support minimum wages to drive low-productivity firms out of the market. Furthermore, firms in highly competitive industries tend to support a minimum wage to prevent low-wage competition from other EU member states. In addition, there is strong evidence that members of employer associations are more likely to support a minimum wage when trade unions are weak.

JEL codes: *J38, J50, L41, L80*

Keywords: *Minimum wage, product market competition, service sector.*

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1 Introduction

The economic consequences of minimum wages have been a very active field of research for at least the last two decades, both from a theoretical and an empirical perspective (Neumark and Wascher, 2008). In this context, most analyses have focused on the effects on employment. Other important economic consequences, e.g. on prices and on competition on the product market, have been rather neglected. Concerning the former, a few empirical studies have been published, Aaronson and French (2007) being an example. These studies mostly attempted to provide explanations for the possibility of neutral employment effects of a binding minimum wage as found by several empirical studies since the beginning of the 1990s (cf. Card and Krueger, 1994). If labor costs are increased equally for all employers in a given industry, then the minimum wage could be employment-neutral as higher costs are simply passed on to customers by raising product prices. This mechanism, and therefore the labour market effects of minimum wages, crucially depends upon the existence of market power of firms on the product market.

The possibility that minimum wages might be used to influence the structure of product markets has hardly been analyzed¹. In particular, firms may be able to increase profits by improving their competitive position through a high minimum wage and therefore effectively forming a cartel consisting of high productivity firms. This critically hinges upon the condition that all firms can be forced to pay the higher, entry-preventing wage. Minimum wages fulfill this condition, especially if they are collectively bargained at the industry-level, as is for example the case in Germany. Within this system, it is possible that a small (and organized) fraction of employers and employees sets wages for an entire industrial sector, thus raising barriers to entry and increasing profits.

The implications of entry-preventing minimum wages for economic policy are considerable. First, such a cartel not only reduces the number of firms operating in the market, but also the number of employees. Stated differently, the oligopolistic market emerging after the introduction of a minimum wage structure can be interpreted as another mechanism through which minimum wages are potentially harmful to employment. Second, the monopolistic rents achieved on the product market by the surviving firms are paid by the consumers. Thus, such a cartel reduces social welfare and should be prevented by antitrust

¹This idea was initially put forward by Williamson (1968), and was further developed by Haucap, Pauly, and Wey (2001).

policy. Third, the incentive of firms' and workers' associations in the more prosperous countries of the European Union to collude in order to introduce minimum wages may increase further in the future as migration from poorer (mainly Eastern European) EU member states becomes more important.

Our study is the first to provide an empirical examination of employers' attitude towards the introduction of minimum wages. Using a unique data set covering 800 firms from eight different industries in Germany, we analyze the determinants of supporting or opposing the introduction of a minimum wage. In doing so, we pay particular attention to differences in labor productivity and institutional features as determinants of the incentives of firms to raise barriers to entry.

The remainder of this paper is structured as follows. The next section gives a brief overview of the literature and discusses the theoretical background. Section 3 shortly reviews the institutional background in Germany. The econometric model, the empirical strategy and the data are described in Section 4. Section 5 contains the estimation results. The final section summarizes and concludes the discussion.

2 Theoretical Considerations

This section will discuss theoretically two separate, but interrelated explanations why employers might support a minimum wage introduction at the industrial level. First, high productivity firms can try to improve their competitive situation with the help of a minimum wage. In this case the main determinant of employers' attitude towards minimum wages is labor productivity. This argument can be made at a national as well as an international level. In the former case, high-productivity firms try to lower competitive pressures existing in the industry by forcing low-productivity firms out of the market through a cost-raising strategy. In the latter case, domestic employers are interested in introducing minimum wages in order to prevent low-wage competition from other EU member states. Second, institutional forces are expected to play a significant role, at the level of the individual firm as well as at the level of the industry.

2.1 Differences in Labor Productivity as Determinant of the Attitude towards Minimum Wages

Haucap, Pauly, and Wey (2001) argue that sector-specific minimum wage rates might induce employer associations and trade unions to employ minimum wages as barriers to entry and thereby to enforce an industry cartel. Indeed, more than 30 years earlier, Williamson (1968) already pointed out the danger of such behavior for product market competition and developed an associated theoretical framework. Williamson's (1968) work was motivated by the Supreme Court decision "United Mine Workers vs. Pennington", in which the court ruled that the labor union had violated antitrust laws when agreeing with one employer on relatively high wages that were binding for the entire industry. Williamson (1968) advances the idea that minimum wages may be used as a cost raising strategy and therefore focuses on the conditions, which induce the individual firm to establish barriers to entry by increasing wages above the competitive rate.

The single most important assumption in his model is the existence of two different production technologies; one labor-intensive (small scale operation) and the other one capital-intensive (large scale operation). Further, the capital-intensive production technology implies higher labor productivity, which in turn leads to lower average costs, at least as long as a certain quantity of units is produced. Thus, an increase in wages raises labor costs of small scale operations significantly more than labor costs of large scale operations. By imposing wage rates above the marginal revenue product of workers in low-productivity establishments, the large-scale firms can reap monopoly rents from the product market, while ensuring that a participation of small scale firms becomes unprofitable. Large-scale companies are still able to operate profitably, because the higher wage must only be paid to fewer and more productive workers. Stated differently, while the profit of large scale companies is reduced through the higher wage, this reduction is more than offset by higher prices on the product market. This trade-off is less favorable for small scale companies, which are forced to terminate operations as a result. As a consequence, large scale firms have an incentive to raise wages above the competitive level in order to establish barriers to entry, thereby establishing their oligopolistic market power.

The fact that high labor productivity is a direct consequence of a capital intensive production technology clearly shows that Williamson (1968) developed his model with the mining sector, or more generally manufacturing, in mind. In contrast, the empirical part

of this study will be dealing with the service sector. Therefore, it is crucial to analyze whether the assumption of a positive relationship between firm size (or age) and labor productivity is equally valid for the service sector. A natural starting point is the literature on the ‘firm-size wage effect’, which deals with the observation that larger firms generally pay higher wages, even after controlling for worker and firm specific characteristics. Oi and Idson (1999) advance a productivity hypothesis, which matches the line of argument of Williamson (1968): Larger firms are characterized by capital-intensive production technologies, thereby increasing the productivity of workers. In addition, Oi and Idson (1999) offer an analogous explanation for the service sector, where productivity increases with firm size due to ‘economies of massed reserves’. Because of their intangible nature, it is impossible to store service provisions. As a consequence, any service will necessarily be idle for a certain amount of time. With increasing establishment size, these time slots spent without any productive activity are reduced. Thus, even after controlling for worker-specific differences, such as their human capital endowment, there is reason to believe that labor productivity is higher in larger establishments in manufacturing and services alike².

Next to the question whether or not the firm-size wage effect is caused by differences in productivity, some previous studies question the existence of this effect in the first place. For example, Bayard and Troske (1999) show for the US that the firm-size wage effect is considerably smaller for services compared to manufacturing, and non-existing for retail. This would imply that there are few or no differences in productivity between small and large firms in the service sector. In addition, Dhawan (2001) presents evidence that small firms³ are *more* productive than large ones. The combination of higher profit rates and lower survival profitability of small firms constitutes a risk-return trade-off. The more expensive access to capital is in Dhawan’s (2001) view one reason that small firms rather operate in niche markets and are more innovative. Further, smaller establishments are characterized by higher flexibility and organizational leanness, all of which contributes to an increased

²An alternative explanation to the productivity hypothesis are behavioral explanations that draw upon efficiency-wage theories. In these frameworks, wage rates exceed the marginal productivity of labor in order to induce workers to supply higher effort levels and to deter shirking. Then, assuming an upward-sloping labor supply curve to the individual firm, caused by imperfect competition on the labor market, larger establishments need to pay higher wages in order to attract the demanded amount of labor given a certain effort level (cf. Akerlof, 1982).

³Size is defined according to the firm’s assets.

labor productivity.

Finally, firm size and firm age are often used interchangeably as indicators for labor productivity. Indeed, the firm-size wage effect may also be named firm-age wage effect, because replacing size with age usually leads to the same conclusions (Oi and Idson, 1999). However, Brown and Medoff (2003) show that firm age has no significant impact on wages, once worker characteristics such as tenure, experience, education, or occupation are controlled for. Therefore, while the worker composition of old firms might influence productivity, this is not the case for the establishment age by itself.

In conclusion, there is reason to believe that small firms are characterized by lower labor productivity than large firms, even after controlling for worker- and firm-specific characteristics. Economies of massed reserves are able to explain this observation in the service sector. Thus, following Williamson (1968), firm size is expected to have a positive influence on employers' attitudes towards a minimum wage. The same is true for firm age, insofar as increasing age implies changes in the composition of the workforce that lead to higher labor productivity. At the same time, the firm-size wage effect can also be explained assuming no differences in labor productivity. Further, previous empirical studies have indicated that this effect is significantly smaller in the service sector compared to manufacturing. Clearly, if the firm-size wage effect does not exist, there is no reason to believe that larger firms are more productive than their smaller counterparts.

2.2 The Influence of the Behavior of Trade Unions and Employer Associations

Williamson (1968) focuses on differences in production technologies as an incentive for the individual firm to use minimum wages as a barrier to entry. In this context, he simply assumes that an agreement between the union and the large firms exist to impose a uniform wage on the market or that natural pressures for wage uniformity exist. In contrast, Haucap, Pauly, and Wey (2001) simply assume that differences in labor productivity exist without specifying a particular production function and extend the model by concentrating on the motivation of trade unions and employer associations to raise wages. To that extent both studies are highly complementary to each other. Both studies also agree that in the absence of productivity differences, or if such differences are negligibly small, individual firms and employer associations will set wages at their competitive rates.

However, if labor productivity diverges significantly, employer associations will set minima exactly at the entry-preventing wage, while unions will maximize their objective function at a wage rate slightly higher. This is an important result because Haucap, Pauly, and Wey (2001) show that the employer association adopts this behavior, even if firms characterized by lower labor productivity belong to its members. Raising wage rates decreases overall industry output and employment, while employment and output of the surviving firms will increase. Further, the rise in profits of the high productivity firms more than offsets the fall in profits of the low productivity firms, thereby increasing industry-wide profits. Clearly, since total output is falling, but profits are increasing, this result is only partly due to the more productive use of labor, but mainly due to the monopoly rents achieved on the product market. As the employer association is exclusively interested in maximizing total profits of its members, it will set minimum wages at entry-preventing rates. Similarly, a labor union, which aims at maximizing total wage revenues of its members, faces two possible optimal wage rates: One with all firms operating in the market and another one with only the high-productivity companies left. The existence of differences in labor productivity determines which alternative will be optimal.

Finally, trade unions also have the option to maximize members' wage revenue by discriminating wages between firms according to productivity. More specifically, in terms of the framework at hand with two levels of labor productivity, the union could maximize its objective function by introducing two different collectively bargained wage rates, which are not extended to all uncovered employees. As Haucap, Pauly, and Wey (2001) show, whether wage discrimination is superior from the union's perspective compared to a single entry-preventing minimum wage depends on the union's power in the industry. More specifically, unions will prefer minimum wages over wage discrimination as long as the difference between union and competitive wage rates is large, and a considerable proportion of workers is not unionized.

3 Institutional Background

Germany is one of the few European countries without statutory minimum wages. This fact has remained broadly unquestioned for several decades, because effective minima existed

due to the high coverage rate of collective bargaining⁴. However, since the beginning of the 1990's, union density as well as coverage has been decreasing continuously (Kohaut and Ellguth, 2008). In reaction to this development, a debate has emerged on the 'ifs' and 'hows' of a possible minimum wage introduction. The preferred solution by politics amounts to a collectively-bargained, sectoral minimum wage. The relevant law specifies that as soon as more than 50% of the workforce of a specific industrial branch is covered by a collective agreement, the trade union and employer association have the option to apply for an extension of the wage agreement to all workers and firms, independent of their membership in the respective associations. This regulation is referred to as Posting of Workers Law (*Arbeitnehmer-Entsendegesetz*). Generally, the Federal Ministry of Labor and Social Affairs declares the collective agreement generally binding, without consulting any additional governmental bodies or institutions. Only when the application is filed for the first time, a committee consisting of three representatives of the respective labor unions and employer associations has to give its consent.

Three implications of this specific minimum wage institution are worth noting. First, minimum wages are the result of collective bargaining at the level of the individual industrial sector. Second, only few industries have introduced minimum wages up to now⁵. This low application rate can partly be attributed to the fact that the possibility to introduce minimum wages with the help of the Posting of Workers Law has only become popular recently. However, another relevant explanation is that the law imposes relatively strict requirements on the industry in order to be applicable. For example, in some industrial branches, the coverage rate is not high enough to pass the 50% hurdle. Even more importantly, the regulation requires a high degree of consensus between the employer association and the labor union in order to make an agreement generally binding. Third, each minimum wage is only in effect for the duration of the collective agreement. That is, a new collective agreement implies that the procedure to extend it to all workers in the industry has to be repeated completely.

As the discussion of the relevant theoretical frameworks has shown, the Posting of Work-

⁴Additionally, social security payments may function as effective minimum wages through their influence on reservation wages. Still, collective bargaining and minimum wages can be interpreted to serve a more similar function in the sense that they provide minimum standards in excess of social security.

⁵In December 2009, minimum wages existed for main construction, roofers, painters and varnishers, electricians, commercial cleaning, postal services, as well as mining.

ers Law offers an ideal institutional framework in order to establish a barrier to entry through the introduction of minimum wages. Most importantly, it constitutes an official, institutional framework, in which trade unions and employer associations can decide on the level of the minimum, which is then extended to all employers and employees in the industry, independently of their membership in the respective organization.

4 Empirical Strategy

4.1 Data

We collected the data used in this study through a survey of firms in eight sectors, in which a minimum wage introduction was being discussed at the time of the survey. The idea is that in such a situation the expressed opinion on a minimum wage introduction will be less idealistic, but more pragmatic and entrepreneurial. The sectors in question include wholesale, retailing, repairs, hotel and restaurant industry, personal as well as business-related services, and constructions. To ensure comparability between the establishments of one sector, the sample is constrained to specific types of firms in each industrial branch. More specifically, wholesale is represented by hardware stores, retailing by men's outfitters and florists, repairs by motor mechanics, the hotel and restaurant industry by restaurants, personal services by hairdressers, business services by security firms, and construction by plumbing. While, a large likelihood of a minimum wage introduction is a crucial criterion for the choice of these sectors, the fact that all sectors belong to trade or services is at least as important. This ensures that production is rather labor-intensive, i.e. labor cannot be easily replaced by an alternative production factor as it becomes more expensive, and provision of the service from another country is more or less impossible, i.e. services are non-tradable.

We commissioned *forsa*, a renowned institute for conducting surveys in Germany, with the data collection by the means of telephone interviews. A total of 800 interviews was completed within six weeks in February and March 2008. The response rate amounted to 39% and was achieved by contacting individual firms up to eight times. The number of firms in the survey in some industries as well as in East Germany is disproportionate to the true number of establishments existing in the population. This bias was introduced to the sample on purpose in order to prevent low observation counts for some industries and

regions characterized by a relatively small number of firms. As Table 1 shows, the sampling frame was constructed in such a manner that 40% of the firms conduct business in East Germany, while 60% are established in West Germany. Further, the original intention was to achieve an equal distribution of observations over the eight industrial branches, implying 100 observations for each sector. However, due to differences in the response rates, there are some minor deviations upwards as well as downwards (Table 1). Because of this sampling method, the observations are weighted during the estimation procedure. East and West Germany are identified as strata, while the industries represent the primary sampling units. The number of employees in each industry and region is assumed to be proportional to the number of firms and is employed as sampling weights. Overall, observations from East Germany lose importance as well as hairdressers, motor mechanics, florists, and plumbing.

Following the structure of the theoretical review, the survey includes questions concerning the attitude towards minimum wages, the level of labor productivity, and the institutional background in terms of coverage and degree of collective bargaining. The first two questions of the survey are the basis for the dependent variable. First, participants were asked whether or not they would support the introduction of a minimum wage. Second, they could express their opinion on the specific amount of 7,50 Euros per hour, which has been suggested quite often in the public debate in Germany. Only managers, who state to be in favor of a minimum wage and think that the proposed amount is appropriate or too low, are classified to be in favor of a minimum wage introduction⁶.

Three items of the questionnaire will be used for the construction of the productivity indicators. First, respondents were asked in which year their establishment was founded (firm age). Second, they indicated the firm's total turnover in the previous year. Despite the fact that this is a sensible variable, there are only 116 missing items. An third, the managers stated the number of unskilled and skilled workers employed in their firm. In this context, unskilled refers to workers without vocational training. The indicators for the institutional environment are derived from two items in the survey. First, participants stated whether they pay wages according to, in excess of, or below the collectively bargained rate applicable to their industrial branch. This item is used as a proxy for the firm's membership in an

⁶Using only the first criterion for the set-up of the dependent variable does not change the estimation results, because the majority of participants stating to be in favor of a minimum wage also agreed with the proposed level.

employer association. Clearly, the relation is more complicated, as many employers might not be officially organized, but nevertheless align their wages to the collectively bargained rate. Stated differently, not all employers paying collectively bargained wages are members in employers' associations. However, causality does run the other way insofar as all members of employer associations will pay at least the collectively bargained wage rate. The second item of interest for the construction of institutional indicators is the hourly wage of unskilled labor. Similarly to turnover, wage information is regarded as private and confidential. Therefore, only 268 participants were willing to answer this question. In order to avoid losing too much information, not all specifications include an indicator for wages (refer to Section 4.3). Finally, respondents stated the number of workers employed in the firm, separately for full-time and part-time employers. Additionally, they provided the number of hours worked per week of both types of employment. This information is used to calculate the number of full-time (or full-time equivalent) employees in each establishment. This variable is used for the construction of several indicators as discussed below.

4.2 Construction of Variables

The model includes four productivity measures: a dummy for small and young firms respectively, turnover per worker, as well as the proportion of unskilled workers in the workforce. The indicator for small firms is a dummy that takes the value one if a company's annual turnover does not exceed one million Euros⁷ (Intstitut für Mittelstandsforschung Bonn, 2002). These establishments are also referred to as 'micro' firms and make up a substantial proportion of firms not only in Germany, but in the entire European Union. The indicator 'young' is defined as a dummy variable which takes the value one if the firm is younger than or equal to six years. The specific threshold is based upon the work by Garnsey (1998), who shows that 60% of all new companies fail within the first six years. Recall from Section 2.1 that older firms are not characterized by higher labor productivity due to their age. Instead, persisting productivity differences are caused by unobserved differences in the composition of the workforce. To the extent that we are unable to observe worker characteristics, firm age is an interesting indicator for higher labor productivity caused by the composition of

⁷An alternative definition is based upon the number of workers, i.e. firms with no more than 10 employees are also classified as micro establishments. This alternative indicator has been employed in a robustness test and basically yields the same results.

the workforce.

The productivity indicators ‘young’ and ‘small’ are directly derived from the discussion of the theoretical frameworks in Section 2.1. However, other determinants of labor productivity next to firm size and age are easily imaginable. Examples include the number of unskilled workers and annual turnover. Both variables will be employed as additional indicators of labor productivity. First, the proportion of unskilled employees is derived as the ratio of the number of unskilled workers to the total number of workers. The effect on the individual firm’s attitude towards the minimum wage is expected to be positive for two reasons. Obviously, the lower human capital endowment of unskilled workers will decrease their labor productivity. In that sense, the proportion of unskilled labor can be interpreted as a direct indicator for labor productivity and is expected to exhibit a negative effect on the dependent variable. In addition, firms with a higher proportion of skilled employees might be inclined to be in favor of a minimum wage, because a minimum typically increases the wages of unskilled workers more than those of skilled workers.

The most direct measure of labor productivity available is an output/labor ratio, more specifically annual turnover per worker. As Table 2 shows, annual turnover varies strongly between the different industries, which makes identification of the relatively productive firms within each industry difficult. Therefore, a second indicator based upon turnover per worker is calculated, which gives the percentage deviation from the industry’s mean. In what follow, this indicator will be referred to as relative labor productivity.

Two different types of explanatory variables exist in the context of the institutional background, namely those at the level of the individual firm and those at the level of the industrial branch. Concerning the former the indicator ‘union wage differential’ will be employed, while the latter is represented by the ‘non-union sector’ or its two components the ‘union mark-up’ as well as the ‘non-coverage rate’. The union wage differential is constructed with the help of the dummy ‘collective bargaining’ and the wage rate paid to unskilled workers. It measures the relative deviation of the wage any specific firm pays from the average wage paid by all collectively organized firms in the respective industry. The rationale for using this indicator is that a possible minimum wage will be at the level of the collectively bargained wage rate. Thus, a positive deviation from this expected minimum wage rate will have a positive effect on the dependent variable, while the opposite can be expected for a negative deviation. Further, we expect this effect to be stronger, the larger

the deviation is. Insofar as wages are paid according to marginal productivity, the union wage differential may also be interpreted as an additional productivity measure.

The indicator ‘non-union sector’ is derived directly from the work of Haucap, Pauly, and Wey (2001) as discussed in Section 2.2. In contrast to the union wage differential, it is calculated at the level of the industrial branch, instead of the level of the individual firm. First, the union mark-up is the relative deviation of average wages paid by collectively organized employers to average wages not covered by any collective agreement. Second, the non-coverage rate amounts to the ratio of workers not covered by collective agreements to all workers in the industry. The product of the union mark-up and the non-coverage rate represents the non-union sector. Note that these three indicators are only characterized by variation between industries. The indicator itself is expected to have a negative effect on the attitude towards minimum wages, because it is a measure of the bite a minimum wage would have. In contrast, firms with unionized workers should be increasingly interested in a minimum wage, the larger the non-union sector is. Therefore, an interaction term between the non-union sector and the dummy ‘collective bargaining’ will be included. The effect of this interaction term on the dependent variable is expected to be positive.

Last but not least, product market competition will be measured by the normalized Hirschman-Herfindahl Index (HHI)⁸. The index is calculated as the sum of squared market shares, which are defined in terms of turnover. It can take values between $1/n$ and 1, where n is the number of firms operating in a market. Increasing values of the HHI imply higher market concentration, and a value of one represents a perfect monopoly with one firm holding a market share of 100%. In contrast, the minimum value of $1/n$ represents an equal distribution of turnover over all competitors. Thus, the HHI incorporates information on the number of firms competing in a market as well as on the (in)equality of the distribution of market shares (Rosenbluth, 1955). The HHI is calculated separately for each included sector at the level of city districts. This regional disaggregation is important, because in the included industries competition only takes place at the regional level and it introduces variation of the HHI within industries.

⁸The HHI is calculated and provided by the German Federal Statistical Office based on an official statistic on value-added taxes (*Umsatzsteuerstatistik*). The HHI are the only data from an external source.

4.3 The Model and the Basic Estimation Specification

Due to the binary nature of the dependent variable, a probit model is estimated employing maximum likelihood. Such a binary response model estimates the probability of a firm to support a minimum wage conditional on one or k explanatory variables.

$$P(y = 1|\mathbf{x}) = P(y = 1|x_1, x_2, \dots, x_k) \quad (1)$$

Therefore, the probit model is an extension of the linear probability model, simply imposing a different functional form, namely the normal cumulative distribution function G, on the linear binary response model. In this manner, the model ensures that the dependent variable can only take values between zero and one. It can be expressed as:

$$P(y = 1|\mathbf{x}) = G(\beta_0 + \beta_1x_1 + \dots + \beta_kx_k) = G(\beta_0 + \mathbf{x}\boldsymbol{\beta}) \quad (2)$$

with

$$G(z) = \Phi(z) \equiv \int_{-\infty}^z \phi(v)dv \quad (3)$$

where $\phi(z)$ represents the standard normal density. The nonlinearity of the probit model has important implications for the interpretation of the results. The reported coefficients (Table 5) give the marginal effect of the variables on the probability to support a minimum wage. It is important to realize that these marginal effects are calculated at the mean values of the explanatory variables. More importantly, due to the nonlinearity of the estimation function, any marginal effect is only valid for an incremental change at the mean value of the variable of interest in the case of continuous explanatory variables. For a dummy variable, the marginal effect gives the change from zero to one. In contrast to OLS estimation, one needs to be careful when interpreting estimation results and making inference about the effect of changes in the explanatory variables. We will come back to this issue in the discussion of the estimation results.

The basic model specification takes the following form:

$$\begin{aligned} P(MW = 1|\mathbf{x}) &= G(\beta_0 + \mathbf{x}\boldsymbol{\beta}) \\ &= G(\beta_0 + \beta_1\textit{Small} + \beta_2\textit{Young} + \beta_3\textit{RP} + \beta_4\textit{UL} + \beta_5\textit{UWD} \\ &\quad + \beta_6\textit{NUS} + \beta_7\textit{NUS} * \textit{CB} + \beta_8\textit{HHI} + \beta_9\textit{HHI} * \textit{RP}) \end{aligned} \quad (4)$$

MW represents the attitude towards the minimum wage, with MW=1 indicating that the firm supports an introduction. Small and Young stand for the size and age dummies re-

spectively. RP indicates relative productivity, UL unskilled labor, UWD union wage differential, NUS non-union sector, CB collective bargaining, and HHI is the abbreviation of the Hirschman-Herfindahl-Index. Note that the specification includes two interaction terms as motivated in the previous section. First, the non-union sector is interacted with the dummy for collective bargaining ($NUS * CB$), and second the HHI is interacted with the indicator for relative labor productivity based on turnover per worker ($HHI * RP$).

This basic specification will be referred to as Model 1 in what follows, while Model 2 introduces a minor modification to the specification by omitting the interaction between the HHI and relative labor productivity. This additional specification is estimated as a robustness test, because the theoretical effect of competition on the attitude towards minimum wages is rather ambiguous. Second, the two models are estimated a second time without any indicator on wages, i.e. the union wage differential. The results are presented in the lower panel of Table 5. Clearly, wages are an important variable, but their inclusion also heavily limits the number of observations as discussed in Section 4.1. Thus the specifications in the lower panel constitute a robustness test concerning the sign, magnitude and significance of the coefficients of the remaining variables of interest. Therefore, the results of these specifications will only be discussed if the exclusion of wages led to departing results.

5 Results

5.1 Descriptives

The aim of this section is to describe the data. This implies that the weights used during the estimation are not imposed when calculating the discussed summary statistics. As a consequence, when making connections between the summary statistics and the estimation results, one should keep in mind that some industrial branches are overrepresented and that the number of observations is generally biased towards East Germany. Table 2 presents the means and standard deviations of all variables of interest, separately for each sector and over all groups. Table 3 further differentiates between minimum wage supporters and opponents.

Surprisingly, the majority of firms in the survey is in favor of the minimum wage. As Table 2 shows, 77% of the interviewed managers support a minimum wage introduction and think that the discussed level is either appropriate or too low. There is some variation

between industrial branches. Plumbing and retailing are characterized by especially high support rates (91% and 88% respectively), while agreement is somewhat lower for security services (67%) and hairdressers (65%).

Table 2 shows that the majority of firms is small and that the proportion of young firms varies considerably between industries. However, for the study at hand differences between minimum wage supporters and opponents are more interesting than differences between industries. In contrast to the theoretical predictions developed in Section 2.1, Table 3 suggests that minimum wage supporters are smaller and younger than opponents. This impression is confirmed by an analysis of the individual industries for the indicator ‘young’. However, no such conclusion can be drawn for the size of firms (Table 3).

In contrast, the majority of minimum wage supporters has above average values of turnover per worker, or alternatively relative labor productivity. The only exceptions are wholesale and plumbing, where opponents perform slightly better than supporter. This observation is a first hint that differences in labor productivity are indeed a determinant of employers’ attitudes towards minimum wages. Table 2 reveals that unskilled labor is clearly more common in some industries than in others. For example, 35% and 38% of all workers are unskilled in firms operating as security services and restaurants respectively. This fraction is considerably lower among the more traditional craft occupations, such as hairdressers (3%) and plumbing (4%). In addition, especially for the industrial branches heavily relying on unskilled labor, minimum wage opponents are generally characterized by an even higher proportion of unskilled labor compared to minimum wage supporters (Table 3).

As Table 2 shows, collective bargaining is characterized by a high degree of variation between industrial branches. Among restaurants, only 50% of all firms pay wages according to collective agreements, while this proportion is highest for security services with 82%. Throughout all industries, firms paying collectively agreed wages are more likely to support a minimum wage introduction (Table 3). A quick look at Table 3 shows that the union wage differential confirms this result: it is larger (less negative) for minimum wage supporters in comparison with opponents. Interestingly, the union wage differential is on average negative for the majority of industries (Table 2). This implies that average wages are lower than the collectively bargained rate, even though the majority of firms is organized. Thus, the downward deviation in the wage distribution must be considerably larger in scale than the

deviation upwards.

Table 2 presents the values for the union mark-up as well as the non-coverage rate. Note that no standard deviation is included, because the variables are characterized by zero variation at the industry level by construction. On average, union wages are higher than free market wages in all included industries. These differences range from only 3 percentage points (security services) to mark-ups of 180 percentage points (hairdressers). Similarly, the non-coverage rate varies strongly from only 1% in security services to 62% for florists (Table 2). These two indicators determine the size of the non-union sector, which will be employed as an explanatory variable in the estimation.

The HHI varies between and within industries (Table 2). Competition is especially high for restaurants (0.21) and plumbing (0.23), while it is rather low for wholesale (0.42) and security services (0.58). Not surprisingly, those industries characterized by a large proportion of small firms, are also exposed to a high degree of competition. This impression is also supported by the correlation between the two variables as Table 4 shows. Table 3 confirms the theoretical expectation that no direct relation exists between the degree of competition and the attitude towards minimum wages. In some industries, minimum wage supporters face a more competitive environment, while the opposite is true in other sectors. However, differences are generally small. Finally, the correlation between the HHI and the non-union sector supports the idea by Stewart (1990) that low competition often occurs simultaneously on product and labor markets.

5.2 Estimation Results

Table 5 presents the estimation results for the two specifications as set up in Section 4.3. The upper panel contains the models including the union wage differential, while the lower panel excludes this variable in order to increase the number of observations.

5.2.1 Determinants of Supporting the Minimum Wage: Productivity or Institutional Differences?

Opposing the basic theoretical framework, the dummies ‘small’ and ‘young’ both exhibit a positive effect on the probability to support a minimum wage in all specifications. However, the coefficient of the dummy ‘small’ is not significant and therefore not too much inference should be drawn. In contrast, the dummy ‘young’ exhibits a highly significant and positive

effect on the dependent variable. More specifically, a firm younger than or equal to six years is 22% more likely to be in favor of the minimum wage compared to an older establishment with the same characteristics. This result confirms the impression that minimum wage supporters are younger than opponents, as suggested in the discussion of the summary statistics in Section 5.1.

For reasons of completeness, it should be mentioned that the coefficient turns insignificant and considerably drops in magnitude as soon as the union wage differential is excluded from the specifications. As table 5 shows the union wage differential has a positive influence on the dependent variable. In addition, young firms pay on average lower wages as shown by the negative and significant correlation between the two variables (Table 4). Thus, excluding the wage indicator from the model forces the coefficient of the dummy ‘young’ to account for the effect of lower wages on the probability to support a minimum wage.

Three different explanations exist for the positive effect of the dummy ‘young’ on the probability to support a minimum wage introduction. First, firm age is a poor indicator of labor productivity, or stated differently, young firms are actually characterized by a higher productivity level. From a theoretical perspective, this explanation is unlikely, because several previous studies have confirmed that the workforce composition of young firms leads to lower labor productivity (compare with Section 2.1). Additionally, the data suggest that young firms are indeed characterized by lower labor productivity, because the dummy ‘young’ is significantly and positively correlated with the proportion of unskilled employees. Further, the correlation between ‘young’ and relative labor productivity is negative, though insignificant. Second, lower labor productivity might induce minimum wage support. However, there is no theoretical reason to believe in this argument. And third, an additional factor might exist, not accounted for by our model, that leads young firms to be in favor of the minimum wage, despite their lower labor productivity. Indeed, the initial aim of the minimum wage institution in Germany constitutes a plausible motivation: To prevent competition in the domestic market from low-wage countries, especially Eastern European countries, in connection with the completion of the EU’s Single Market. This idea will be discussed in more detail in the next section together with the results of the HHI.

The coefficient of relative labor productivity has the expected positive sign, but is insignificant. Additionally, even if the effect was significant, it is small in magnitude. According to Model 1, a firm with a labor force twice as productive as the industry’s average would

only be 4% more likely to support a minimum wage. Additionally, the effect diminishes as soon as the interaction term of the HHI and relative labor productivity is excluded from the model. The effect of the proportion of unskilled labor in the workforce also appears rather small, but is highly significant at the 1% level. A firm that employs 28% unskilled labor is therefore about 2% less likely to support a minimum wage introduction compared to an establishment with 14% unskilled labor, which amounts to the sample's average. As suggested previously, this effect might be caused by the lower labor productivity of unskilled workers or by the expected increase in the wage bill. Naturally, these two effects are interrelated. However, if the proportion of unskilled labor is primarily an indicator for lower average labor productivity within an individual firm, the variable's coefficient offers direct support for the models of Williamson (1968) and Haucap, Pauly, and Wey (2001). At the same time it is intuitive that a higher proportion of unskilled workers implies a higher expected increase in the wage bill. It should be noted though that the effect of current wages paid is already controlled for by the union wage differential. Thus, the part of the wage bill that might show up in the coefficient of the proportion of unskilled workers is the expected number of workers whose wage will rise with the introduction of a minimum wage.

Not surprisingly, the union wage differential has a significantly positive effect on the probability to support a minimum wage introduction. As discussed in Section 5.1, the average wage over the entire sample is lower than the collectively bargained rate. Therefore the average union wage differential is negative at -0.38 (Table 2). Thus, a firm paying exactly the collectively bargained rate is 2.7% more likely to support the minimum wage. Given the large variation of this indicator, the effect is rather strong in magnitude. The *average* union wage differential amounts to 0.03 for minimum wage supporters and -1.51 for opponents (Table 3). Whether this relation is caused by higher productivity or higher current wages (or both) cannot be determined with the help of simple summary statistics. However, the correlation coefficients between collective bargaining and relative labor productivity or wages are both positive and statistically significant, although the correlation with wages is considerably larger in magnitude and significance (Table 4).

The size of the non-union sector has a negative effect on the individual probability to support a minimum wage. This is in line with the theoretical expectations and the discussion of the summary statistics. Firms in an industry with a non-union sector of 0.18 are 16% less likely to be in favor of a minimum wage introduction compared to firms operating in a

sector with a non-union sector of 0.9, amounting to the sample's average⁹.

At least equally interesting is the positive and highly significant coefficient of the interaction term between the non-union sector and collective bargaining. This interaction term can be interpreted as the effect of the non-union sector on the attitude towards minimum wages of those firms paying at least the collectively agreed wage rate. Similarly to the non-union sector by itself, the effect is positive and large in magnitude throughout all specifications. Once again, a non-union sector that is twice as large as the sample's average increases the probability of firms paying at least the collectively bargained wage rate to be in favor of a minimum wage by more than 18%. Thus, while the negative effect of the non-union sector can simply be explained by the size of the expected increase in the wage bill of unskilled labor, there appears to be an additional effect for firms paying wages according to collective bargaining agreements. This result can be interpreted as strong evidence for the hypothesis of Haucap, Pauly, and Wey (2001), because it implies that the incentive to introduce a minimum wage in order to lower product market competition increases with a higher proportion of workers not covered by any collective agreement and a larger the difference between collectively bargained and free market wages.

5.2.2 Product Market Competition and the Bolkestein Directive

Last but not least, the HHI exhibits a significantly negative effect on the attitude towards the minimum wage. The effect is neither large nor negligible: an increase in the HHI by 0.1 would lead to a decrease of 3.5% in the probability of being in favor of a minimum wage. Note that this result is quite stable, independently of the model specification. In contrast, the coefficient of the interaction term between the HHI and relative labor productivity is only marginally different from zero and clearly insignificant. It can therefore safely be dropped from the model. Recall from the theoretical discussion that two alternative explanations exist for the positive relation between the degree of competition and the probability to support a minimum wage. First, Stewart (1990) suggests that a low level of product market competition and a high degree of union power often occur simultaneously. Indeed this relation is confirmed in the data by the highly negative and significant correlation between the HHI and the non-union sector (Table 4). However, as has been suggested by Haucap,

⁹In the sample at hand the non-union sector takes values between 0.0002 (security services) and 0.27 (hairdressers). The standard deviation equals 0.09.

Pauly, and Wey (2001) and confirmed in the empirical analysis in this study, a small non-union sector decreases the motivation for labor unions and employer associations alike to employ minimum wages in order to improve their competitive position. Stated differently, if labor and product market are characterized by imperfect competition, there is simply no need to collude in order to establish an additional barrier to entry.

While this explanation is plausible, we would like to propose an alternative idea, which is rooted in the institutional framework of the minimum wage institution as well as Germany's membership in the European Union. The attractive feature of this thesis is that the rather weak explanatory power of the productivity indicators is explained as well. First, recall that the included industries all belong to the service sector. Second, note that the legal background for any minimum wage in Germany, the Posting of Workers Law, constitutes the national implementation of an EU directive intending to organize the temporary exchange of labor between member states as one branch of the Single Market. More specifically, the directive specifies that any employee working abroad, no matter whether his employer is domestic or foreign, must be subject to the same regulations and standards as a domestic worker employed at a domestic firm. One example of such minimum standards are minimum wages.

While the completion of the Single Market has made considerable progress in terms of the exchange of goods and labor in manufacturing as well as the construction sector, the service sector is still dominated by domestic actors. At the same time the majority of new jobs is created in the service sector (Vogt, 2005). Consequently, the European Commission is very interested in promoting the completion of the Single Market in the service sector and therefore passed an associated service directive in 2004, also known as "Bolkestein Directive". Basically, the directive lowers barriers for a service provider in one country to establish a subsidiary in another. This included the possibility to open an establishment and to staff it with workers from the firm's home country. Further, the 'country of origin principle' specifies that workers in the host country are subject to the laws and regulations of the home country, *unless these are in conflict with the Posting of Workers Law*.

The 'country of origin principle' has been heavily criticized in high wage countries such as Germany by employer associations and trade unions alike, due to the possibility of low-wage competition from other EU member states. Vogt (2005) notes in this context that, especially since the Eastward enlargement in 2004, the European Union is characterized

by large differences in average wages. Returning to the study at hand, it seems more than probable that many firms in the sample fear an increase in competition based on wages, previously unknown in the service sector. Naturally, this threat is larger in more competitive industries, which are already characterized by a large number of small firms. A minimum wage would indeed constitute a very effective barrier to entry, not for domestic low-productivity, but foreign low-wage companies. Additionally, differences in productivity in the same industry will naturally be larger between different countries than within one country. Because the Posting of Workers Law overrules the country of origin principle, a minimum wage can successfully limit competition to the domestic labor and product market. Clearly, Haucap, Pauly, and Wey (2001) and Williamson (1968) developed their theories with a domestic focus. But the unique legal and institutional features of the European Union and its Single Market require additional theoretical work as well as empirical research.

6 Conclusion

The basic question of this paper has been whether or not employers try to employ minimum wages in order to reduce the competitive pressure in their industry. The support for this hypothesis is mixed. The productivity measures, which are the central indicators from a theoretical perspective, are mostly insignificant. The proportion of unskilled labor is the only variable, for which a significant effect on the attitude towards minimum wages could be established. However, it is impossible to decide whether this effect is caused by lower labor productivity of unskilled labor or a higher expected increase of the wage bill. Thus, while this observation is not in conflict with the idea that firms are interested in introducing a barrier to entry, it also does not offer direct support.

Still, the high proportion of firms supporting a minimum wage implies that an incentive for a minimum wage introduction exists from the perspective of employers. There is no reason to believe that such a large number of companies is caring about income inequality or social fairness. Further, the estimation clearly showed that especially firms paying according to collective agreements and operating in industries with a large non-union sector are in favor of a minimum wage. This observation supports the theoretical model by Haucap, Pauly, and Wey (2001) and implies that these employers try to use the minimum wage to increase the labor costs of their rivals, thereby improving their competitive position.

While this argument applies to the domestic level, it is important to realize that new competitive pressures were introduced to the service sector through the Bolkestein Directive. Consequently, services cannot only be supplied domestically, but from anywhere within the European Union. Naturally, the physical provision takes place in the country of consumption, but employers and workers may be subject to foreign labor laws and regulations. The seemingly negative influence of firm age and the positive effect of competition on the attitude towards the minimum wage constitute some evidence that such considerations are of increasing importance for the behavior of firms.

Additionally, more empirical research is needed to develop a deeper understanding of the involved mechanisms. First, a study covering a policy change would be helpful, because such a set-up allows observing the change in central variables such as the degree of competition, the average level of productivity and the development of prices within an industry following the minimum wage introduction. Second, a data set including at least two EU-countries (one high wage and one low-wage country) would help to gain more insights into the role of the European Single Market in this context. In either case, whether the level is domestic or international, if minimum wages are employed in order to reduce competition on the product market, their implementation should be controlled by anti-trust authorities.

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Table 1: Frequency of Observations

	West		East		Total	
	No.	%	No.	%	No.	%
Hairdresser	61	7.63	51	6.38	112	14.00
Retailing	58	7.25	31	3.88	89	11.13
Security Services	66	8.25	21	2.63	87	10.88
Motor Mechanics	59	7.38	45	5.63	104	13.00
Wholesale	52	6.50	34	4.25	86	10.75
Florists	66	8.25	43	5.38	109	13.63
Plumbing	59	7.38	42	5.25	101	12.63
Restaurants	61	7.63	51	6.38	112	14.00
Total	482	60.25	318	39.75	800	100.00

Source: Own data collection. For a detailed description of the survey, refer to Section 4.1.

Table 2: Summary Statistics - Total and per Industry

	Minimum Wage (d)	Small (d)	Young (d)	Turnover/worker	Unskilled workers
Hairdresser	0.65 (0.48)	0.83 (0.38)	0.25 (0.43)	46.74 (43.15)	0.03 (0.08)
Retailing	0.91 (0.29)	0.85 (0.36)	0.09 (0.29)	189.67 (134.38)	0.14 (0.27)
Security Services	0.67 (0.47)	0.67 (0.47)	0.17 (0.38)	37.54 (37.15)	0.35 (0.42)
Motor Mechanics	0.86 (0.35)	0.87 (0.34)	0.11 (0.31)	122.33 (116.78)	0.06 (0.18)
Wholesale	0.76 (0.43)	0.29 (0.45)	0.07 (0.26)	266.58 (213.01)	0.12 (0.24)
Florists	0.67 (0.47)	0.95 (0.21)	0.19 (0.40)	90.05 (67.50)	0.11 (0.24)
Plumbing	0.88 (0.33)	0.87 (0.34)	0.11 (0.31)	106.11 (67.11)	0.04 (0.16)
Restaurants	0.78 (0.41)	0.90 (0.31)	0.32 (0.47)	76.41 (73.80)	0.38 (0.42)
Total	0.77 (0.42)	0.79 (0.41)	0.17 (0.38)	115.40 (128.52)	0.14 (0.29)

	Union wage diff.	Col. bargaining (d)	Non-coverage rate	Union mark-up	HHI
Hairdresser	-0.30 (3.78)	0.77 (0.42)	0.15	1.80	0.26 (0.05)
Retailing	-0.35 (2.49)	0.63 (0.49)	0.21	0.11	0.31 (0.15)
Security Services	-0.02 (1.91)	0.82 (0.39)	0.01	0.03	0.58 (0.22)
Motor Mechanics	-0.99 (2.06)	0.57 (0.50)	0.34	0.24	0.24 (0.05)
Wholesale	-0.31 (2.21)	0.63 (0.49)	0.18	0.11	0.42 (0.16)
Florists	-0.65 (1.65)	0.61 (0.49)	0.62	0.27	0.27 (0.12)
Plumbing	0.82 (4.61)	0.68 (0.47)	0.26	0.12	0.23 (0.05)
Restaurants	-0.84 (2.19)	0.50 (0.50)	0.22	0.47	0.21 (0.04)
Total	-0.38 (2.52)	0.65 (0.48)	0.26 (0.17)	0.43 (0.57)	0.31 (0.16)

Standard deviations in parentheses. (d) = Dummy variable: The reported means can be interpreted as proportions.

For a detailed description of the individual variables, refer to Section 4.2. No standard deviation is reported for the non-coverage rate and the union mark-up, because these indicators are constructed at the level of the industry. Relative labor productivity is omitted from the table, because the variable's mean is zero by construction. Turnover/worker is measured in 1000 Euros.

Source: Own data collection. For a detailed description of the survey, refer to Section 4.1. The HHI is obtained from the German Federal Statistical Office.

Table 3: Summary Statistics - Differences between Supporters and Opponents of the Minimum Wage

	Small (d)		Young (d)		Turnover/worker		Rel. productivity		Unskilled workers		Col. bargaining		Union wage diff.		HHI	
	<i>S</i>	<i>O</i>	<i>S</i>	<i>O</i>	<i>S</i>	<i>O</i>	<i>S</i>	<i>O</i>	<i>S</i>	<i>O</i>	<i>S</i>	<i>O</i>	<i>S</i>	<i>O</i>	<i>S</i>	<i>O</i>
Hairdresser	0.91	0.71	0.26	0.22	51.67	39.45	0.11	-0.16	0.03	0.02	0.81	0.69	0.37	-2.64	0.27	0.25
Retailing	0.85	0.88	0.11	0.00	197.04	156.99	0.04	-0.17	0.12	0.37	0.65	0.38	0.17	-2.54	0.30	0.31
Security Services	0.65	0.69	0.19	0.14	38.04	36.48	0.01	-0.03	0.34	0.39	0.84	0.75	0.44	-0.96	0.56	0.65
Motor Mechanics	0.89	0.69	0.10	0.14	125.43	112.07	0.03	-0.08	0.06	0.09	0.61	0.36	-0.51	-2.0	0.24	0.23
Wholesale	0.33	0.16	0.07	0.00	266.77	278.45	0.00	0.04	0.08	0.25	0.72	0.37	0.36	-1.41	0.40	0.44
Florists	0.95	0.96	0.24	0.11	98.71	71.61	0.10	-0.20	0.09	0.15	0.69	0.49	-0.55	-0.88	0.28	0.26
Plumbing	0.86	0.92	0.12	0.08	107.03	109.27	0.01	0.03	0.05	0.00	0.69	0.58	1.19	-3.52	0.23	0.21
Restaurants	0.91	0.85	0.31	0.38	75.70	73.09	-0.01	-0.04	0.41	0.31	0.56	0.25	-0.63	-1.47	0.21	0.21
Total	0.81	0.72	0.18	0.16	121.43	97.51	0.03	-0.08	0.14	0.19	0.69	0.52	0.03	-1.51	0.30	0.33

S= Supporter and O = Opponents. (d) = Dummy variable: The reported means can be interpreted as proportions.

For a detailed description of the individual variables, refer to Section 4.2. The non-coverage rate and the union mark-up are omitted from the table, because these variables are the same for all firms in one industry. For differences between industries refer to Table 2. Turnover/worker is measured in 1000 Euros.

Source: Own data collection. For a detailed description of the survey, refer to Section 4.1. The HHI is obtained from the German Federal Statistical Office.

Table 4: Summary Statistics - Correlation Coefficients

	Minimum wage (d)	Small (d)	Young(d)	Rel. productivity	Unskilled	Union wage diff.	Non-union sector	HHI	East (d)	Col. bargaining (d)	Wages	Turnover/worker
Minimum wage (d)	1.000											
Small (d)	0.083*	1.000										
Young (d)	0.0229	0.1096**	1.000									
Rel. productivity	0.057	-0.269***	-0.0254	1.000								
Unskilled	-0.071	0.014	0.0760*	-0.019	1.000							
Union differential	0.272***	-0.123	-0.1921**	0.072	0.015	1.000						
Non-union sector	-0.131***	0.194***	0.1322***	0.000	-0.144***	-0.0791	1.000					
HHI	-0.080*	-0.160***	-0.0491	-0.014	0.084*	0.080	-0.317***	1.000				
East (d)	-0.227***	0.043	0.0323	-0.138***	-0.074*	-0.298***	0.076*	-0.073	1.000			
Col. bargaining (d)	0.148***	-0.127***	-0.0920**	0.084*	-0.014	0.235***	-0.015	0.063	-0.336***	1.000		
Wages	0.289***	-0.213***	-0.2144***	0.090	-0.055	0.963***	-0.063	0.033	-0.295***	0.313***	1.000	
Turnover/worker	0.080*	-0.400***	-0.0724	0.768***	-0.076	0.088	-0.238***	-0.031	-0.079*	0.055	0.195**	1.000

(d) = Dummy variable.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

For a detailed description of the individual variables, refer to Section 4.2. The upper panel contains all variables contained in the basic model, while the lower panel reports some additional indicators of interest.

Source: Own data collection. For a detailed description of the survey, refer to Section 4.1. The HHI is obtained from the German Federal Statistical Office.

Table 5: Estimation Results of the Basic Models

	Model 1		Model 2	
Small (d)	0.21	(0.16)	0.21	(0.16)
Young (d)	0.22***	(0.043)	0.22***	(0.044)
Relative productivity	0.037	(0.035)	0.016	(0.014)
Unskilled labor	-0.17***	(0.035)	-0.17***	(0.036)
Union wage differential	0.070**	(0.020)	0.070**	(0.020)
Non-union sector	-1.78***	(0.40)	-1.81***	(0.43)
Non-union sector*Col. barg.	2.01***	(0.44)	2.09***	(0.49)
HHI	-0.35**	(0.095)	-0.35**	(0.097)
HHI*Productivity	-0.055	(0.067)		
Dummy East (d)	-0.060	(0.094)	-0.059	(0.094)
Observations	183		183	

Specifications without Wages (Union Wage Differential)				
	Model 1a		Model 2a	
Small (d)	0.15	(0.089)	0.15	(0.091)
Young (d)	0.092	(0.048)	0.094	(0.050)
Relative productivity	0.042	(0.038)	0.0080	(0.011)
Unskilled labor	-0.13**	(0.037)	-0.13**	(0.038)
Non-union sector	-2.20**	(0.71)	-2.23**	(0.74)
Non-union sector*Col barg.	1.96*	(0.83)	2.01*	(0.88)
HHI	-0.32***	(0.063)	-0.31***	(0.057)
HHI*Productivity	-0.10	(0.11)		
Dummy East (d)	-0.12	(0.059)	-0.12	(0.061)
Observations	487		487	

Marginal effects; Standard errors in parentheses.(d) for discrete change of dummy variable from 0 to 1.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

For a detailed description of the individual variables, refer to Section 4.2. Industry dummies are not included, because they are jointly insignificant.

Source: Own data collection. For a detailed description of the survey, refer to Section 4.1. The HHI is obtained from the German Federal Statistical Office.