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# Monopsonistic Competition and the Minimum Wage: Evidence from Germany

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PRELIMINARY - PLEASE DO NOT CITE

## Abstract

This paper investigates the degree of monopsony power of German employers in different industries using a semi-structural approach based on a dynamic model of monopsonistic competition. The empirical analysis relies on a linked employer-employee data set which allows us to control for heterogeneity both on the worker and on the firm side, and to perform separate analyses for East and West Germany. Our results show important differences in monopsonistic competition between industries, and between East and West Germany. From a policy point of view, the introduction of a uniform minimum wage may therefore lead to deviating employment reactions in industries with a similar wage structure. At the same time, existing minimum wages at the sectoral level are apparently unrelated to the degree of monopsony power in the respective industries.

**JEL codes:** J42; J31; J38

**Keywords:** monopsony; labour supply; minimum wage.

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# 1 Introduction

Germany is special in not having a minimum wage at the national level. Instead, minimum wages exist for a number of industries, which are based on collective bargaining agreements declared generally binding. The main institutional framework for minimum wages in Germany, the Posting of Workers Law (*‘Arbeitnehmerentsendegesetz’*), stipulates that unions and employer associations have to apply jointly for a minimum wage introduction in their industry. Thus, the social partners not only determine the level of the wage floor, but also influence the decision whether it should exist in the first place. Politicians also have an important role to play in this context, because they decide about the introduction of minimum wages in an industry through its inclusion into the Posting of Workers Law.

The German minimum wage institution will change drastically as of January 1st, 2015. At this date, a country-wide minimum wage will be introduced at a level of €8.50 for most workers, with exemptions for specific industries until 2017. The minimum wage will affect 15 percent of all West German employees and 27 percent of all East German employees (Brenke and Müller, 2013), and will thus be relatively high compared to other industrialized countries (Kluge, 2013). Consequently, there are wide-spread fears that many jobs are at risk of getting destroyed.

In the context of the changing minimum wage institution, we analyze if and to which extent industries are characterized by deviating degrees of monopsonistic competition. First, the higher the variation in monopsony power among low-wage industries, the more diverse are the expected employment effects of a uniform minimum wage. Second, an investigation of monopsony power in the existing minimum wage industries allows to us to provide new insights into the mechanism underlying the introduction of minimum wages at the sectoral level. Third – and to the best of our knowledge – we are the first to study sectoral differences in monopsonistic competition, which is of primary interest because wage-setting takes place at the sectoral and regional level to a large extent.

The employment effects of minimum wages depend on two main factors. On the one hand, the absolute level of the minimum wage, be it at the national or at the sectoral level, plays a crucial role. On the other hand, given a binding minimum wage, the structure of the labour market is an important determinant of employment effects. In a neo-classical labour market, the wage elasticity of labour supply to the firm is infinite, the wage equals the marginal product of labour, and an increase of the wage therefore unambiguously leads to an increase in unemployment (Neumark and Wascher, 2008). In a monopsonistic labour market, by contrast, mobility of workers is limited, and the elasticity of labour

supply is relatively low. As a consequence, firms can use their market power to set the wage below a worker's productivity (Manning, 2003a). Minimum wages may therefore lead to a reduction in firms' profits, without a corresponding increase in unemployment.

Against this background, it is of great interest to analyse the degree of monopsony power in the German labour market at the sectoral level for two reasons. First, the structure of the labour market may have played a role for the introduction of minimum wages at the sectoral level, which started in 1997. If the main aim when introducing these minimum wages was to raise wages at the bottom of the wage distribution while avoiding large disemployment effects, minimum wages should have been introduced mainly in industries characterised by low wages and a high degree of monopsony power. Second, for the new statutory minimum wage, estimates of monopsony power at the sectoral and regional level yield insights into the likely employment effects of the minimum wage introduction in 2015.

In this paper, we therefore investigate the role of monopsony power of German employers following a semi-structural approach based on the dynamic model of monopsonistic competition proposed by Manning (2003a). We do so using a unique linked employer-employee data set for Germany which allows to control for worker heterogeneity, firm heterogeneity and demand side effects. Our analysis yields estimates of the wage elasticity of labour supply, which provides a measure of monopsony power, separately for different industries and for East and West Germany. Furthermore, we investigate the role that the composition of the workforce may play for monopsony power in an industry. Finally, we examine how our estimates are correlated with the vacancy rate at the industry level, which is a key outcome of the monopsonistic model of the labour market.

The paper is structured as follows. In the next section, we discuss the theoretical background of our estimation strategy and provide an overview of the existing empirical research. Section 3 presents details of the empirical approach and describes the data set. Section 4 discusses the empirical results and the final section concludes.

## **2 Sectoral Differences in Monopsonistic Competition**

The early versions of monopsonistic labour market models, epitomized by the textbook version of a Robinsonian one-firm monopsony model, are clearly theoretical artifacts and an unlikely characteristic of labour markets of industrialised countries such as Germany. The reason for this is that monopsony power in this model derives from the existence of a single employer of labour in a market. In contrast, the source of monopsony power in dynamic models of monopsonistic

competition is not employer concentration.<sup>1</sup> Instead, the source of monopsony power lies in search frictions as well as heterogeneous preferences over non-wage employer characteristics (Bhaskar, Manning, and To, 2002; Boal and Ransom, 1997).

Search frictions constitute any factor that lengthens the time firms and workers need to find each other. Popular examples include limited mobility of workers, or information asymmetries between firms, unemployed job searchers, and workers who search on the job. Non-wage employer characteristics cover, among others, flexible working-time arrangements, commuting time, training and career opportunities, or the general working atmosphere. Workers differ in their preferences and in the extent to which they face search frictions. Firms differ in their non-wage characteristics. Consequently, workers who are exactly equal to each other, but differ in their preferences over non-wage employer characteristics or the degree of search frictions they face, can earn different wages at any point in time.

Independently of the exact cause of monopsony power, the single most important result is that the labour supply to the firm is not perfectly elastic. Figure 1 shows the situation of the individual firm in a monopsonistic labour market facing an upward sloping labour supply curve. In contrast to the competitive model of the labour market, firms are wage setters and can choose any wage-employment combination on the labour supply curve. Intuitively, this means that some - but not all - workers will leave the firm if the wage is reduced by a small amount. Consequently, the only possibility for a firm to increase its employment level is to offer a higher wage rate. Therefore, the employer-size wage effect, i.e. large employers paying a higher wage, is a natural outcome in this framework (Manning, 2011).

While workers with the same productivity may earn deviating wages in different firms, the monopsony model assumes that equal workers in terms of observable characteristics receive the same wage rates within one firm. Consequently, if a firm wants to increase its employment level, the higher wage has to be paid not only to the additional worker, but also to all existing employees of the same type. Stated differently, the marginal cost of labour includes the wage paid to the new employee as well as the wage increases of the workers already employed. Therefore, the marginal cost (MC) of labour exceeds the average cost (AC) of labour. A profit-maximizing firm will choose its employment level such that marginal costs are equal to the marginal revenue product (MRP) of labour (Manning, 2003a). Thus, the firm depicted in Figure 1 will choose employment

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<sup>1</sup>Manning (2003b) and Hirsch, König, and Möller (2013) do propose models of geographic oligopsony, in which a combination of regional employer concentration and limited mobility of workers are the sources of monopsony power. However, in the majority of modern monopsony models, employer concentration is irrelevant.

level E1. The wage that needs to be paid to obtain this employment level equals W1.

This stylized description of a monopsonistic labour market has several important implications. First, wages W1 and employment E1 are lower in the monopsonistic equilibrium compared to the equilibrium under perfect competition (W2 and E2). Second, workers earn less than their marginal product, since the marginal cost exceeds the average cost of labour. Third, the firm operates with a constant amount of vacancies, i.e. at the going wage rate W1 the firm would like to employ workers up to E3. Stated differently, the equilibrium is supply-side constrained.

Finally, a moderate minimum wage that is slightly above the going wage rate could increase wages and at the same time increase employment, while decreasing firm's profits. For example, exogeneously increasing the wage rate slightly above W1, implies moving along the labour supply curve. However, this relationship only holds until labour supply equals labour demand. At higher wage rates, labour demand is the decisive factor in determining the employment level. Thus, a minimum wage exceeding the level W2 would lead, exactly as under perfect competition, to employment losses. Therefore, the effects of a minimum wage depend, among other things, on its level as well as the degree of monopsonistic competition in the labour market. The degree of monopsonistic competition is defined by the wage elasticity of labour supply or, stated differently, the slope of the labour supply curve. The flatter this curve, i.e. the higher the wage elasticity of labour supply, the more competitive the labour market.

Against this background, a crucial question for the minimum wage debate in Germany is whether industries are characterized by different degrees of monopsonistic competition. The industry dimension is particularly important in the German context for several reasons. First, the existing minimum wages are determined at the industry level. The question why minimum wages have been introduced in some industries but not in others has not been answered so far. If minimum wages had been introduced in industries with the highest degree of monopsony power, this would be an economic justification for why minimum wages were introduced in the chosen industries, but not in others. Additionally, again if minimum wages had been introduced in monopsonistic industries, this could explain the largely non-negative employment effects which were found in a large-scale evaluation of the existing industry-specific minimum wages by the Ministry of Labour and Social Affairs.<sup>2</sup>

Second, differences in monopsonistic competition across the German industries are relevant for the employment effects of the introduction of a statutory

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<sup>2</sup>The reports containing detailed results can be downloaded at: <http://www.bmas.de/DE/Themen/Arbeitsrecht/Meldungen/evaluation-mindestloehne.html>.

minimum wage of €8.50 in 2015. Wage-setting takes place at the sectoral and regional level to a large degree, resulting in inter-industry wage differentials. This will lead to large differences in the bite of the minimum wage across industries and regions. All else equal, industries with lower average wages can be expected to show a stronger reaction to the uniform minimum wage in terms of employment. However, the employment effects of the minimum wage will also depend on the degree of monopsony power in the different industries and regions. For example, if all low-wage industries were characterized by a relatively high degree of monopsonistic competition, the overall employment effect of the minimum wage would be negligible. If the opposite was the case, i.e. if monopsony power was relatively low in low-wage industries, one would expect large employment effects. Finally, if the picture was more diverse, i.e. if there were large differences in monopsonistic competition among low-wage industries, this could explain deviating employment reactions in these industries, despite similar wage levels prior to the introduction of the statutory minimum wage.

## 2.1 Previous Empirical Studies

The single most important test for monopsony power in the labour market is to estimate the labour supply elasticity to the individual firm. If labour supply is rather elastic, perfect competition is a more appropriate model to describe the functioning of the labour market than monopsonistic competition. The opposite is true for rather low elasticities. At first sight such an estimation appears to be straightforward and involves regressing the firm's employment level on the wage paid. However, such a regression would be endogenous as the firm decides simultaneously on wages and employment.

The existing empirical literature can be divided into two methodological strands, depending on how the endogeneity problem is solved. The first set of studies uses exogenous wage variations, which should not affect all firms in the market. In such a situation, the unaffected firms constitute the control group that is needed to identify the effect of increasing the wage rate on the firm's employment level. From a theoretical point of view, the exogenous change should not affect all firms because competition between firms for workers is not altered in this case. Stated differently, if the wage distribution over firms is simply shifted to the right, the relative position in the wage distribution of each individual worker is not changed. Since such wage variations are extremely rare, the second strand of empirical studies follow a semi-structural approach based on the dynamic model of monopsonistic competition proposed by Manning (2003a), which is explained in more detail in Section 3.

As for the first strand of the literature, two studies, Falch (2010) as well as Staiger, Spetz, and Phibbs (2010), estimate a static model by regressing the

employment level on the wage rate. In order to solve the endogeneity problem, both studies exploit an exogenous variation in wages, in the first case for school teachers in Norway and in the second case for nurses employed in Veteran Hospitals in the US. The estimated labour supply elasticities are low at 1.4 for school teachers in Norway and 0.1 for nurses in the US. In a sense, these studies are in the tradition of the Robinsonian monopsony model, as employer concentration is an important source of monopsony power, and focus on very special labour markets. Therefore, the external validity is low and the degree of inference that can be drawn for the more general functioning of the labour market is limited.

While Ransom and Oaxaca (2010) as well as Ransom and Sims (2010) also concentrate on specific labour market segments, namely the grocery retail industry and school teachers, their empirical specification is based on Manning's model of dynamic monopsony. This eliminates the need for an exogenous variation in wages, but still limits the studies' transferability to other labour market segments. To some degree this is less true for the analysis by Ransom and Oaxaca (2010), since instead of employer concentration, search frictions or heterogeneous preferences are more likely reasons for monopsony power in the retail grocery industry compared to school teachers. The estimated labour supply elasticities are in the range of 1.4 – 3.02 for the grocery retail industry in the US, and 3.7 for school teachers in the US.

A semi-structural investigation of monopsony power for an entire labour market is presented by Hirsch, Schank, and Schnabel (2010a). Using linked employer-employee data for Germany, the authors provide separate estimations for men and women, showing that the labour supply elasticity to the firm lies in the range of 1.9 – 3.7, and that it is lower for women.<sup>3</sup> A back of the envelope calculation demonstrates that this difference is large enough to account for the unexplained part of the gender pay gap in Germany. Further, Hirsch, Schank, and Schnabel (2010a) show that it is crucial to take heterogeneity at the establishment level into account in order to ensure that demand-side effects are adequately controlled for. Only if this is the case, the empirical investigation identifies supply-side effects, which can be interpreted as monopsony power.

Hirsch and Jahn (2012) use exactly the same set-up as Hirsch, Schank, and Schnabel (2010a), but focus on differences between natives and immigrants in Germany. They estimate labour supply elasticities of 1.64 – 2.6, and show that the labour supply elasticity of migrants is low enough to account for the unexplained pay gap between migrants and natives. Sulis (2011) confirms the result that women have lower labour supply elasticity than men for Italy. The elastic-

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<sup>3</sup>Note that the labour supply elasticity of women to the market is actually more elastic than that of men. Stated differently, women react more strongly than men to the offered wage when deciding how many hours to supply. At the same time, men react more strongly to wages when moving between potential employers.



ities are below one for both men and women. Booth and Katic (2011) also find evidence for monopsonistic competition for the entire Australian labour market using individual level data. The estimated labour supply elasticity is 0.71.

Dube, Lester, and Reich (2013) is the only study that explicitly links minimum wages to monopsonistic competition in the labour market by exploiting discontinuities at state borders in federal minimum wage rates in the US to estimate wage elasticities of accession and separation rates. The minimum wage elasticities of the separation rate are small, with an increase of 1 percent in the minimum wage leading to a decrease in separations of  $-0.24$  percent for teenage workers in the entire economy, and of  $-0.32$  percent for restaurant workers. Based on these wage elasticities, the remaining parameters of the Burdett and Mortensen (1998) equilibrium search model are estimated. The results point towards a significant degree of search frictions in the low-wage labour market in the US, which Dube, Lester, and Reich (2013) interpret as an explanation for non-negative employment effects of the minimum wage.

### 3 Estimation Strategy and Data

The aim of this study is to analyse the degree of monopsonistic competition in Germany across sectors in general and for the minimum wage industries in particular. Ideally, each industry would have an exogenous wage variation that could be used to estimate the labour supply elasticity to the individual firm. At first sight, minimum wages or collective bargaining agreements appear to offer such a variation at the industry level in Germany. Unfortunately, all firms are equally affected by this wage increase, which implies that the wage distribution over firms and workers is just shifted to the right or compressed from below. Since no convincing exogenous wage change exists that only affects some firms in a specific industry, we follow the semi-structural approach proposed by Manning (2003a).

The following paragraphs will give a very short (and stylized) overview of the dynamic model of monopsonistic competition (Manning, 2003a), which in turn heavily draws from the Burdett and Mortensen (1998) equilibrium search model. The underlying idea is that a stable equilibrium distribution of wages exists, both over workers and over firms. Each worker receives job offers at an exogenously determined job offer rate. If the offered wage is higher than the wage paid in the current job, the worker accepts and moves up the job ladder. This implies that firms have a constant flow of hirings and separations. The separation rate  $s(w_t)$  depends negatively on the wage, simply because there are fewer firms that will make a better wage offer in comparison to the current wage paid. The opposite is true for the number of recruits  $R(w_t)$ . The number of

workers in a firm  $N_t$  can be expressed as the sum of workers who were already employed in the firm in the previous period  $N_{t-1}$  and the number recruits in period  $t$ . The number of separations  $s(w_t)N_{t-1}$  has to be subtracted.

$$N_t = [1 - s(w_t)]N_{t-1} + R(w_t) \quad (1)$$

Note that both, the separation rate  $s(w_t)$  and the number of recruits  $R(w_t)$  depends on the wage rate offered by the firm. In the steady state, firm size should be constant, which means that the number of separations should be equal to the number of recruits:

$$N(w) = R(w)/s(w) \quad (2)$$

This implies that the long-term elasticity of labour supply to the individual firm  $\epsilon_{Nw}$  can be expressed as:

$$\epsilon_{Nw} = \epsilon_{Rw} - \epsilon_{sw} \quad (3)$$

Thus, in order to estimate the labour supply elasticity, it is sufficient to estimate the recruitment elasticity as well as the separation rate elasticity. Under the assumption that recruitment from and separations to non-employment are wage inelastic, only the separation rate elasticity of job-to-job transitions has to be estimated.<sup>4</sup> The reason is that in this case, the recruit of one firm must be a separation to another firm, which implies that  $\epsilon_{sw} = -\epsilon_{Rw}$ . The long-term elasticity of labour supply can then be expressed as:

$$\epsilon_{Nw} = -2\epsilon_{sw} \quad (4)$$

Estimating the wage elasticity of labour supply to the individual firm therefore amounts to estimating the wage elasticity of job-to-job transitions. The focus on job-to-job transitions has the additional advantage that the majority of job-to-job transitions is voluntary from the point of view of the worker, i.e. they are mostly supply-side driven; by contrast, many transitions to non-employment are due to dismissals and thus involuntary, i.e. they are more likely to be due to demand-side factors. This is crucial because we aim at identifying the labour supply, not the labour demand curve of the individual firm. We additionally control for firm characteristics to ensure that demand-side shocks do not bias the

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<sup>4</sup>Clearly, the assumption that separations to non-employment are wage inelastic may not be true for all workers. Manning's (2003a) model of monopsonistic competition relaxes this assumption at a later point. However, since the estimation is considerably complicated by relaxing this assumption and the empirical literature shows that differences in the estimated labour supply elasticities are small (Hirsch, Schank, and Schnabel, 2010a), we only present results based on the assumption that separations to non-employment are wage inelastic.

results. This is especially important for our comparison of different industries as the macroeconomic situation may vary between industries.

We model the instantaneous separation rate of employment spell  $i$  in firm  $j$  at duration time  $t$  as:

$$s_i(x_i(t), z_j(t)) = h_0 \exp(x_i(t)' \beta + z_j(t)' \gamma) \quad (5)$$

where  $s$  is a dummy variable which takes the value 1 if a separation takes place and 0 otherwise. Thus, the instantaneous separation rate depends on a constant baseline hazard  $h_0$  as well as worker characteristics  $x_i(t)$  and firm attributes  $z_j(t)$  that shift the baseline hazard. Worker characteristics include sex, age, educational attainment and the current wage. On the firm side, we control for the profitability of the firm, whether re-organisation or outsourcing takes place, and for the share of women and temporary workers among total employment. Furthermore, the regression equation includes year dummies to control for aggregate year-specific effects, such as business cycle conditions. All estimations are carried out separately for East and West Germany as well as specific industries (one digit industry classification and minimum wage industries<sup>5</sup>).

The wage rate is entered as log wage, which enables us to interpret the coefficient directly as the wage elasticity of job-to-job transitions. The absolute value of the separation elasticity multiplied by two equals the wage elasticity of labour supply to the individual firm. We opt for the exponential model with a constant baseline hazard, because we explicitly do not want to control for tenure. In the model of monopsonistic competition, higher wages induce lower separation rates, thereby increasing tenure. Thus, including tenure would take away variation from wages and therefore bias the estimated wage elasticity (Hirsch, Schank, and Schnabel, 2010a; Booth and Katic, 2011).

An alternative estimation approach to the hazard model presented above consists in estimating a logit or linear probability model. However, this method does not allow one to deal with delayed entry and correcting for length-biased sampling (Cameron and Trivedi, 2005). As Section 3.1 shows, our data is based on a stock sample with a rather short observation period. The stock sample itself leads to an oversampling of short employment spells, which might be selective in terms of transition probabilities. Fortunately, we do have information on the original start date of the spell, which enables us to correct the spell's contribution to the likelihood function for delayed entry, i.e. the fact that no transition took place until the spell comes under observation. Additionally, duration analysis is able to explicitly deal with right-censoring of spells, which occurs frequently.

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<sup>5</sup>The minimum wage industries are identified based on the five digit industry classification as suggested in the individual reports of the large scale evaluation of minimum wages by the BMAS.

In a last step, we test in how far the estimated labour supply elasticities are in line with the theoretical framework of monopsonistic competition. This is done by correlating the industry-specific labour supply elasticities with (i) indicators of worker composition and (ii) the amount of vacancies. Note that a high share of vacancies is a direct prediction of the theoretical model, while our hypothesis in terms of worker composition are based on existing empirical studies.

In terms of worker composition, existing empirical studies show that women and migrants are subject to a higher degree of monopsonistic competition compared to men and natives, which is discussed in detail in Section 2.1. No studies exist for differences in the degree of monopsony power faced by workers belonging to different skill groups. Nevertheless, it seems plausible that low-skilled workers face higher information asymmetries or higher mobility costs. This is in line with low-skilled workers generally featuring lower transition rates in the German labour market (Bachmann, 2005). We therefore expect the degree of monopsonistic competition in an industry to be higher with increasing shares of women, migrants or low skilled workers of the workforce.

Note that we already control for sex, nationality and highest educational attainment at the individual level. While this implies allowing for differences in the separation probability, the wage elasticity of the separation rate is still assumed to be homogenous across individuals. To the extent that e.g. high-skilled individuals do not only make more transitions per se, but are also more sensitive to the wage in their decision, the average estimated wage elasticity will be higher with increasing shares of high-skilled labour at the industry level.

As for the role of vacancies, one of the key predictions of the monopsonistic model of the labour market is that in equilibrium, firms are supply-side constrained, and therefore operate with a constant amount of vacancies. Given this theoretical prediction, the existence of vacancies in an industry can be viewed as a potential indicator for the existence of monopsony power. We therefore expect to find higher degrees of monopsonistic competition in industries with a larger share of vacancies among total employment.

### 3.1 Data

The following analysis uses the LIAB, a linked employer-employee data set for the German labour market.<sup>6</sup> The basis of the data set is the *Employment Statistics Register*, an administrative panel data set of the employment history of all individuals in Germany who worked in an employment covered by social secu-

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<sup>6</sup>The LIAB is described in Alda, Bender, and Gartner (2005). Detailed information on the data on individual workers and on the firm side contained in the LIAB, the IAB Establishment Panel, is provided by Klosterhuber, Heining, and Seth (2013) and Ellguth, Kohaut, and Möller (2014), respectively.

rity between 1975 and 2010. The basis of the employee history is the integrated notification procedure for health insurance, the statutory pension scheme, and unemployment insurance. At the beginning and at the end of any employment spell, employers have to notify the social security agencies. This information is exact to the day. For spells spanning more than one calendar year, an annual report for each employee registered within the social insurance system is compulsory, and provides an update on, for example, the wage and the current occupation of the employee. Further worker characteristics included are the year of birth, sex, and nationality.

The LIAB combines this information on workers' employment and unemployment history with plant-level information from the IAB Establishment Panel, an annual representative survey of German establishments that employ at least one worker who pays social security contributions. Starting in 1993, the establishments covered by the survey were questioned each year about various issues, such as the number of employees, the composition of the workforce, sales and investments. Using the unique establishment identification number, one can match the information on workers with the establishment panel, and obtain a linked employer-employee data set providing detailed information on individual and establishment characteristics.

In order to follow firms and workers over time and thereby to control for heterogeneity at both levels, we use a longitudinal version of the LIAB ("LIAB LM2").<sup>7</sup> This data set is constructed as follows. First, establishments who participated in the IAB Establishment Panel between 2000 and 2002 are selected.<sup>8</sup> In a second step, the Employment Statistics Register is used to link the sample of establishments with the employee history information for all individuals who worked at least one day in one of the selected establishments between 1997 and 2003. At the individual level, the information is updated at least once a year when the annual notification is supplied by the employer. At the establishment level, a new wave is provided each year as of June 30. We are thus able for time-varying covariates in our analysis.

In order to compute separation elasticities from the LIAB, we need to identify labour market states and direct job-to-job transitions at an individual level, as well as workers' wages. We can derive three labour market states at each point in time: employment (E) covered by social security, unemployment (U), if the worker is receiving transfer payments, and non-participation (N). Non-

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<sup>7</sup>The longitudinal LIAB versions "LM3" as well as the LM9310 both offer data for more recent years; however, in these versions the matching between firms and workers is poor (i.e. a significant share of workers is matched to the wrong establishment.)

<sup>8</sup>To be exact, establishments that participate in the time period 1999-2001 or 2000-2002 are selected. Because weights are only available for the second group, we restrict our analysis to these establishments.

participants are those individuals not recorded in the data sets. Therefore, this state includes those workers out of the labour market, as well as workers not covered by social security legislation, e.g. civil servants and self-employed workers. As the distinction between unemployment and non-participation is not relevant for our analysis, we consider these two labour market states jointly as non-employment. Because we are only interested in job-to-job transitions, we drop all employment spells that result in non-employment.

Because of the way the data are collected, both firms' reports of a new employee and individuals' notifications of moving into or out of unemployment are not exactly consistent with the actual change of labour market state. For example, workers might report to the unemployment office only a few days after having been laid off. In order to deal with these potential measurement errors, we proceed as follows. If a worker makes a transition from one firm to another (according to the establishment identification number), we consider this to be a direct job-to-job transition if the two employment records are less than 8 days apart, and as a transition from employment to non-employment otherwise. In order to deal with recalls, if the time lag between two employment notifications at the same firm does not exceed 120 days, it is defined as one single employment spell. If the non-employment spell is equal to or larger than 120 days, we drop this observation, as in this case a distinction between a transition from employment to non-employment and a continuous employment would be arbitrary. Additionally, all employment spells that are shorter than three days are dropped, as are individuals with more than 300 employment spells.

The data provide precise information on the daily wage of every spell. However, no information on working hours is provided. To ensure comparability between daily wage rates, we restrict our analysis to regular, full-time employees. Workers in vocational training, marginal employees and part-time workers are thus dropped from the dataset. Furthermore, all employment spells with wages in the bottom one percent of the wage distribution are excluded. This procedure is not sufficient for the upper end of the wage distribution, because wages are right-censored at the social security contribution limit. To avoid possible biases in the estimated wage elasticity of labour supply, all workers whose wages are at this limit at least once during the observation period are dropped. Finally, only individuals aged 16 to 55 on 1 January 2000, the beginning of our observation period, are included in the analysis.

Table 1 describes the resulting sample, separately for East and West Germany. We observe a total of 727,610 (241,664) employment spells in West Germany (East Germany), of which 112,000 (39,816) end in a job-to-job transition. The remaining spells are right-censored. The annual transition probability is similar in East and West Germany and equals six percent. Note that the num-

ber of workers is only slightly below the number of spells. At first sight this seems odd, since a job-to-job transition would result in at least two employment spells per worker. This is however not entirely true for our sample, because we only fully observe the subsequent employment spell if the establishment also participates in the IAB Establishment Panel, which is rarely the case.

The descriptive evidence on our main explanatory variables is in line with expectations – where it should be taken into account that our sample is conditioned on individuals in employment who do not make a transition to non-employment. Not surprisingly, the average daily wage is at €99.75 higher in West Germany compared to East Germany (€73.83). Interestingly, the average educational attainment is higher in East compared to West Germany which may be partly explained by focusing on employment spells ending in job-to-job transitions. On the firm-side, 19 percent of all firms report a low profitability during the last year in West Germany, while this figure only amounts to 15 percent in East Germany. This surprising difference can be explained by the observation that 40 percent of all establishments do not answer this question in East Germany. We therefore control for non-response in the regression analysis.

## 4 Results and Discussion

### 4.1 Results

In order to estimate the labour supply elasticity, we use the exponential model for job-to-job transitions described in Section 3. The results of our baseline specification, which includes all industries, are presented in Table 2 for East Germany and in Table 3 for West Germany. We present four different models: Model 1 only contains industry and year dummies, Model 2 adds individual-level controls and Model 3 also includes controls at the establishment level in order to account for demand-side effects. Model 4 additionally controls for the existence of a workers' council and collective bargaining coverage.

The coefficients of the control variables do not differ qualitatively in East and West Germany. Women are less likely than men to change employers. The transition probability also decreases with age, but at a diminishing rate as workers get older. In contrast, employees with a university degree are more likely and workers holding a schooling degree as highest educational attainment are less likely to make a job-to-job transition compared to individuals who received vocational training. Non-Germans also show a lower separation probability, although this relationship is only statistically significant in West Germany. Therefore, these estimation results are in line with the existing literature on labour market transitions in Germany (Bachmann, 2005; Kluve, Schaffner, and Schmidt, 2009).

Turning to the establishment-level controls, workers in firms with a low profitability in the previous year or in firms pursuing outsourcing have a higher separation probability (Model 3 in Tables 2 and 3). This shows the importance of controlling for demand-side factors: Some workers change employers with an increasing threat of job loss. This decision is most probably independent of the wage. Reorganisation within the establishment has, in contrast, no influence on the likelihood to change employers.<sup>9</sup> The presence of a workers' council and collective bargaining coverage are not correlated with the job-to-job transition probability in East Germany and are only significant at the 10 percent level in West Germany.

The coefficient of interest is the one on the (log) daily wage. It can directly be interpreted as the wage elasticity of the separation rate of job-to-job transitions (cf. Section 3). The estimation results show that if the wage increases by one per cent, the probability to make a separation, conditional on job survival until time  $t$ , is decreased by 1.09–1.15 per cent in East Germany and by 1.39–1.46 per cent in West Germany. Assuming that separations to non-employment are wage inelastic, the wage elasticity to the individual firm is simply twice the wage elasticity of separations to employment (cf. Equation 4). Thus, taking values of 2.18–2.3 in East Germany and 2.78–2.92 in West Germany, the average labour supply elasticity to the individual firm is considerably lower than infinity as suggested by the neoclassical model of the labour market, which assumes that labour supply to the individual firm is perfectly elastic. Note that this result is in line with other estimates of the labour supply elasticity (Ransom and Oaxaca, 2010; Hirsch, Schank, and Schnabel, 2010a).

In order to obtain the wage elasticity of labour supply by industry, we now estimate the baseline specification separately for each industry, and East and West Germany. We do so using Model 3, which is our preferred specification for several reasons. First, it controls for worker-level heterogeneity. Second, demand-side factors are taken into account through the inclusion of firm-level variables. Third, it is unclear whether the existence of a workers' council and coverage by a collective bargaining agreement should be included as additional control variables at the establishment level, as is done in Model 4. On the one hand, workers' councils and union coverage tend to increase wages and reduce separation rates (Hirsch, Schank, and Schnabel, 2010b). On the other hand, the role of unions is not well grounded in the theoretical framework of monopsonistic competition. Further, Model 3 provides more conservative estimates than Model 4, since the inclusion of collective bargaining coverage and the existence

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<sup>9</sup>The coefficient of the dummy for non-response to the question on re-organisation is actually negative and highly significant in East Germany. One possible explanation is that firms that undertake restructuring tend not to provide an answer.



of a workers' council further reduces the estimated wage elasticities of labour supply.

Before turning to the labour supply elasticities, we start by providing a descriptive overview of the average daily wage and the job-to-job transition probability by industry (Tables 4 and 5). Even though the industry classification is rather broad, significant differences exist along both dimensions.

One may be tempted to describe a labour market segment that is characterized by monopsonistic competition as one in which wages are low and job-to-job transitions are rare. However, the wage level itself is mainly influenced by composition effects of the workforce leading to productivity differences, and the degree of observed transition dynamics may be equally affected by third factors, such as the share of temporary workers. This ambiguity in the direct relationship between wages and job-to-job transitions is also present in Tables 4 and 5. For example in East Germany, mining is characterized by high wages (€80.40) and a high annual job-to-job transition probability (10.6 percent). Along the same line, public and private services have low average wages of €54 and a low separation rate of 6.3 percent. Similar examples can be found for West Germany: Electricity and water supply is characterized by high wages (€107.3) and a high job-to-job transition probability (11.5 percent), and public administration has low wages (€87.5) and low separation rates (4.6 percent). However, in other industries the relation between the average wage level and the job-to-job transition rate is reversed: Financial services show high average wages and a low transition probability in West and East Germany alike, while the opposite is true for the hotel and restaurant industry.

From a theoretical point of view, however, it is not the level of job separations that characterises the degree of monopsony power in a market, but its sensitivity to the wage. Recall from Section 2 that monopsonistic competition is defined as a situation in which workers do not change employers necessarily if they could earn a higher wage in another job. What is therefore needed for an assessment of the degree of monopsonistic competition in an industry is a connection between worker mobility and wages at the individual level, i.e. the labour supply elasticity of the separation rate.

The estimation results of the labour supply elasticities for East and West Germany are also presented in Tables 4 and 5, respectively, both for the broad industry classification as well as for the minimum wage industries. These results reveal considerable differences between industries, ranging from zero (retailing, hotels and restaurants) to 7.2 (mining) in East Germany and from zero (hotels and restaurants) to 4.2 (Transportation and communication) in West Germany. Industries with especially low labour supply elasticities, and consequently a higher degree of monopsonistic competition, include construction, wholesale,

retailing, and hotels and restaurants. In contrast, mining, manufacturing, electricity and water supply, financial services, and education are characterized by relatively high labour supply elasticities in East and West Germany alike.

As discussed in Section 2, one of the key predictions of the monopsony model is that firms operate with a constant amount of vacancies. We therefore compare the estimated labour supply elasticities at the industry level to the amount of vacancies in the industry. The latter is measured as the ratio of vacancies to total employment.<sup>10</sup> The expected negative correlation between the estimated labour supply elasticities and the amount of vacancies prevails in East and West Germany (Figure 2). However, it is much stronger in West Germany, with a correlation coefficient of -0.69 that is significant at the 1 percent level.

We now turn to the composition of the workforce in different industries. Following the results in the literature (cf. Section 2.1), we expect to find a higher degree of monopsonistic competition in industries with a high share of women, non-Germans and low-skilled workers. The correlation coefficients all have the expected sign, although they are statistically insignificant except for the share of high-skilled workers in East Germany.<sup>11</sup> Therefore, the relationship between worker composition at the industry level with the estimated labour supply elasticities provide (weak) evidence which is in line with the hypotheses formulated in Section 2.

## 4.2 Discussion

The results presented above have important implications for the existing industry-specific minimum wages. Overall, the minimum wage industries show labour supply elasticities that lie in the middle of our range of estimates. Electricians are the only exception with a labour supply elasticity that is very small in magnitude and not statistically different from zero.<sup>12</sup> The labour supply elasticities of the commercial cleaning industry, main construction, and waste removal (only East Germany) are smaller than two. Waste removal (only West Germany) and elderly care show elasticities between two and three (Tables 4 and 5).

The fact that the large-scale evaluation conducted by the Ministry of Labour and Social Affairs generally found no disemployment effects of the industry-specific minimum wage can thus partly be explained by the degree of monop-

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<sup>10</sup>This indicator is calculated as the number of vacancies a firm offers divided by the current number of employee, given that a firm has vacancies. Only information from the establishment-side contained in the LIAB is used.

<sup>11</sup>These results are not contained in any table, but can be obtained from the authors upon request.

<sup>12</sup>To be exact, the labour supply elasticity for painters in West Germany is rather high at 3.7. However, this estimate should be interpreted with care due to the low number of observations, especially in terms of job-to-job transitions.

sonistic competition in the labour market. Of course, other explanations exist that are at least equally important. These include a low bite of the sectoral minimum wages (especially in West Germany), substitution of high-skilled for low-skilled workers, decreasing profits of firms, higher prices on the product market, increasing working hours and, especially for the construction sector, potential disemployment effects for posted workers as well as increasing occurrence of undeclared work (IAB, RWI, and ISG, 2011; IAW, 2011a,b).

Concerning the question why minimum wages were introduced in some, but not in other industries, our results suggest that the degree of monopsony power in an industry did not play a role. A well-informed, welfare-oriented politician would introduce minimum wages in industries with a high degree of monopsonistic competition, because wages could be increased to an extent without employment losses. However, our estimation results do not provide evidence for this. For example, the industries with the lowest labour supply elasticities, such as retailing as well as the hotel and restaurant industry, have no minimum wage. The strongest economic justification exists for the commercial cleaning industries, where average wages are the lowest in our sample and the labour supply elasticity is just above one in East and West Germany alike (Tables 4 and 5). In general, however, the chosen industries were neither those with the lowest wage, nor those with the strongest monopsony power.

Given the institutional framework governing sector-specific minimum wages, the selection criterion for the minimum wage introduction in specific industries appears thus more politico-economic in nature. Recall that after a specific industry is added to the Posting of Workers Law (by politicians), the social partners bargain over the minimum wage rate and jointly apply for an extension to all workers and firms in that industry. The needed consensus between the social partners can be explained by possible effects of sectoral minimum wages on product market competition. Haucap, Pauly, and Wey (2001) proposes that industry-specific minimum wages may be used as a cost-raising strategy of firms to deter market entry. Bachmann, Bauer, and Frings (2014) provide some empirical evidence on this theory for Germany. Indeed, the first minimum wage introductions in Germany during the late 1990s were clearly motivated by preventing low-wage competition from abroad (IAB, RWI, and ISG, 2011).

In terms of the introduction of a uniform minimum wage of €8.50 in 2015, one can first note that industries with the highest labour supply elasticities are generally characterized by lower average wages and vice versa (Tables 4 and 5). Still, there are exceptions to this pattern. Agriculture in West Germany shows one of the lowest average wage rates and a rather high wage elasticity of 3.4 at the same time. The same is true for public and private services in East Germany. Stated differently, negative employment effects of a uniform minimum wage of

€8.50 might be mitigated in some, but not in all low-wage industries.

Brautzsch and Schulz (2013) calculate the bite of the minimum wage for specific sectors, i.e. the share of workers currently earning less than the level of €8.50 at which the statutory minimum wage will be introduced. The bite is strongest in agriculture, retailing, the hotel and restaurant industry as well as transportation and communication, ranging between 26.2–67.1 percent in East Germany and between 14.1–41.1 percent in West Germany. At the same time, the estimated labour supply elasticity is rather high in agriculture as well as transportation and communication in West Germany. The combination of high labour supply elasticities and high-impact minimum wages implies that employment losses appear inevitable, not only in East but also in West Germany. Additionally, even if the degree of monopsonistic competition, in e.g. retailing and the hotel and restaurant industry, does soften the impact of the minimum wage to some extent, the bite is almost certainly too high to prevent disemployment effects completely.

## 5 Conclusion and Outlook

In this paper, we have analysed the degree of monopsony power of German employers following a semi-structural approach based on the dynamic model of monopsonistic competition proposed by Manning (2003a). In doing so, we compute the degree of monopsony power for different industries, and separately for East and West Germany. Using a unique linked employer-employee data set for Germany allows to control for heterogeneity of both firms and workers, and for demand side effects.

Our findings are first, that the labour supply elasticity to the individual firm is considerably lower than suggested by the neoclassical model of the labour market, which is in line with existing estimates. Second, we find important differences in labour supply elasticities between industries. Therefore, the labour markets of different industries seem to be characterised by differing degrees of monopsony power. Finally, we showed that the estimated labour supply elasticities are negatively correlated with the amount of vacancies at the sectoral level. This is consistent with the monopsonistic model of the labour market, which predicts the existence of a positive stock of vacancies.

As the degree of monopsony power is one important determinant of the employment effects of minimum wages, our results have important policy implications. First, it becomes obvious that the industries where, starting in the late 1990s, minimum wages were introduced at a sectoral level, were generally not characterised by a high degree of monopsony power. Therefore, avoiding negative employment effects does not seem to have been an important criterion when

introducing minimum wages at the sectoral level. This is likely to be due to the institutional framework governing sectoral minimum wages in Germany, where trade unions and employer associations have to agree on collective bargaining agreements with respect to a minimum wage which can then – under certain conditions – be declared generally binding.

Our findings are also relevant for the expected effects of the introduction of a statutory minimum wage in Germany on January 1st, 2015. On the one hand, given our finding of monopsony power on the German labour market, the negative employment effects of the minimum wage introduction may be less severe than suggested by a neoclassical model of the labour market, although they may still be sizeable, especially because the minimum wage will be introduced at a relatively high level. On the other hand, given large inter-industry differences in monopsony power between East and West Germany and between industries, the employment effects of the minimum wage introduction are likely to be very unevenly distributed in the German labour market. This calls for a very close monitoring and evaluation of employment effects, as well as – if necessary – swift political action.

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## 6 Tables and Figures

**Table 1: Sample Description**

	East Germany		West Germany	
	Mean	sd	Mean	sd
Daily wage	73.38	23.19	99.75	27.38
Log(Daily wage)	4.24	0.35	4.56	0.30
Age	40.93	8.89	38.74	9.18
Non-German	0.0065	0.0805	0.0950	0.2932
Female	0.4416	0.4966	0.2697	0.4438
Educational attainment: School degree	0.0393	0.1943	0.1640	0.3703
Educational attainment: University degree	0.1692	0.3749	0.1178	0.3224
Firm profitability: Low	0.1518	0.3006	0.1908	0.3190
Firm profitability: High	0.2278	0.3614	0.3266	0.3812
Firm profitability: Non-response	0.0352	0.1516	0.0538	0.2001
Firm profitability: Not applicable	0.4005	0.4726	0.1828	0.3730
Reorganisation: yes	0.2710	0.3138	0.4063	0.3146
Reorganisation: Non-response	0.3828	0.2540	0.3774	0.2375
Outsourcing	0.1272	0.2574	0.1453	0.2888
Share of women	46.18	27.27	32.63	23.81
Share of temp. workers	10.91	21.09	5.34	9.02
Workers' council: yes	0.8446	0.3623	0.9409	0.2359
Workers' council: Non-response	0.0266	0.1309	0.0176	0.1092
Collective bargaining: Industry level	0.6365	0.4531	0.8186	0.3636
Collective bargaining: Firm level	0.1556	0.3278	0.1021	0.2845
Collective bargaining: Non-response	0.0051	0.0457	0.0020	0.0314
Spell duration	2,318	1,343	2,328	1,331
Transition probability	0.0681		0.0626	
Observation numbers				
Job-to-job transitions	39,816		112,058	
Employment spells	241,664		727,610	
Workers	239,689		721,415	
Firms	3,693		4,529	

**Notes:** The unit of observation are continuous employment spells that do not result in non-employment. Note that the reference category is omitted in the case of dummy variables. The reference categories include “vocational degree”, “normal firm profitability”, “no reorganisation”, “no workers’ council” and “no collective bargaining agreement”.

**Source:** LIAB, version “LM2”. Authors’ calculations.

**Table 2: Separation rate to employment in East Germany**

	Model 1	Model 2	Model 3	Model 4
Log(Daily wage)	-1.383***(0.106)	-1.325***(0.138)	-1.146***(0.118)	-1.090***(0.113)
Female		-0.153** (0.076)	-0.134***(0.036)	-0.130***(0.036)
Age		-0.131***(0.013)	-0.120***(0.015)	-0.121***(0.015)
Age <sup>2</sup>		0.001***(0.000)	0.001***(0.000)	0.001***(0.000)
Educational attainment:				
School degree		-0.023 (0.075)	-0.104 (0.079)	-0.101 (0.078)
Vocational training		0.407***(0.096)	0.356***(0.088)	0.349***(0.085)
Non-German		0.094 (0.093)	0.026 (0.093)	0.036 (0.094)
Profitability:				
Low			0.306** (0.120)	0.310***(0.119)
High			0.021 (0.135)	0.019 (0.134)
Non-response			0.955***(0.335)	0.952***(0.332)
Not applicable			-0.134 (0.175)	-0.121 (0.181)
Reorganisation:				
yes			-0.059 (0.124)	-0.050 (0.125)
Non-response			-1.222***(0.261)	-1.124***(0.297)
Outsourcing			0.613***(0.156)	0.616***(0.157)
Share of women			-0.001 (0.003)	-0.001 (0.003)
Share of temp. workers			0.011***(0.003)	0.010***(0.004)
Workers' council:				
yes				-0.155 (0.112)
Non-response				-0.333** (0.170)
Collective bargaining:				
Industry level				0.029 (0.109)
Firm level				0.103 (0.137)
Non-response				-0.257 (0.665)
Industry dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
LogLikelihood	-102,941	-93,046	-90,156	-90,089
Observations	610,635	574,750	573,175	573,175

**Legend:** \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Notes:** Clustered standard errors at the establishment level in parentheses.

**Source:** LIAB, version "LM2". Authors' calculations.

**Table 3: Separation rate to employment in West Germany**

	Model 1	Model 2	Model 3	Model 4
Log(Daily wage)	-1.271***(0.149)	-1.377***(0.154)	-1.463***(0.089)	-1.387***(0.081)
Female		-0.065 (0.050)	-0.100***(0.033)	-0.095***(0.033)
Age		-0.082***(0.012)	-0.076***(0.009)	-0.079***(0.009)
Age <sup>2</sup>		0.001***(0.000)	0.001***(0.000)	0.001***(0.000)
Educational attainment:				
School degree		-0.060 (0.047)	-0.098** (0.045)	-0.094** (0.045)
Vocational training		0.631***(0.083)	0.545***(0.051)	0.526***(0.050)
Non-German		-0.272***(0.056)	-0.266***(0.058)	-0.260***(0.058)
Profitability:				
Low			0.189 (0.121)	0.182 (0.121)
High			-0.243* (0.126)	-0.243* (0.126)
Non-response			0.540* (0.296)	0.562* (0.299)
Not applicable			-0.435***(0.160)	-0.379** (0.166)
Reorganisation:				
Yes			-0.147 (0.099)	-0.134 (0.100)
Non-response			-0.371 (0.245)	-0.330 (0.247)
Outsourcing			0.405***(0.131)	0.420***(0.135)
Share of women			0.001 (0.003)	0.001 (0.003)
Share of temp. workers			0.010***(0.004)	0.010***(0.004)
Workers' council:				
Yes				-0.177* (0.105)
Non-response				-0.386***(0.149)
Collective bargaining:				
Industry level				-0.166* (0.101)
Firm level				-0.097 (0.144)
Non-response				-0.704 (0.637)
Industry dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
LogLikelihood	-304,360	-282,286	-264,823	-264,452
Observations	1,885,004	1,819,537	1,760,060	1,760,060

**Legend:** \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Notes:** Clustered standard errors at the establishment level in parentheses.

**Source:** LIAB, version "LM2". Authors' calculations.

**Table 4: Wage elasticity in individual industries - East Germany**

	Industry averages			Elasticity of labour supply	LogLL	Observations	
	Wages		Trans. prob.			Spells	Transi- tions
	Mean	sd					
Agriculture	41.47	14.89	0.0999	1.537** (0.309)	-1,435	7,560	673
Mining	80.40	16.59	0.1060	7.181***(1.154)	-704	8,801	1,597
Manufacturing	67.03	23.93	0.0503	3.024***(0.256)	-21,143	156,212	8,088
Electricity and water supply	86.15	18.17	0.0896	4.598***(0.616)	-1,812	19,965	1,869
Construction	60.47	19.95	0.0984	2.219***(0.249)	-5,915	29,219	3,134
Wholesale and repairs	59.24	21.09	0.0565	1.481* (0.403)	-1,631	11,136	649
Retailing	52.30	22.37	0.0811	-0.380 (0.283)	-1,251	6,698	531
Hotels and restaurants	40.90	15.41	0.1721	-0.430 (0.344)	-361	1,113	259
Transportation and communication	73.11	17.85	0.0894	1.491* (0.432)	-4,138	32,689	3,105
Financial services	86.91	20.69	0.0622	4.313***(0.277)	-2,541	18,005	1,086
Business services	60.76	30.38	0.1187	1.712***(0.298)	-5,465	22,797	2,791
Public administration	73.22	20.37	0.0460	1.512* (0.392)	-15,902	130,188	5,960
Education	64.27	30.81	0.1308	3.172***(0.250)	-9,027	38,580	4,815
Health	69.75	22.60	0.0595	1.744***(0.241)	-9,306	64,733	3,674
Public and private services	53.93	26.09	0.0627	3.345***(0.244)	-3,806	25,470	1,585
Minimum wage industries							
Electricians	57.15	16.09	0.1284	-0.810 (0.438)	-479	1,906	271
Main construction	63.23	20.24	0.0942	1.797** (0.358)	-4,057	21,301	2,198
Waste removal	50.08	17.66	0.0907	1.873***(0.355)	-1,086	6,569	637
Elderly care	60.15	20.19	0.0702	2.850***(0.458)	-783	6,577	454
Cleaning	35.33	14.67	0.0934	1.558***(0.301)	-456	2,158	304
All industries	66.91	24.84	0.0681	2.292***(0.118)	-90,156	573,175	39,816

**Legend:** \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Notes:** Clustered standard errors at the establishment level in parentheses. Each row shows the coefficient of  $\log(\text{daily wage})$  multiplied by  $-2$ . The estimations are run separately by industry and based on Model 3 (cf. Section 4). Additionally, the average wage and the annual transition probability at the industry level are provided. The average wage level is calculated based on a different sample, i.e. before employment spells resulting in non-employment are excluded.

**Source:** LIAB, version "LM2". Authors' calculations.

**Table 5: Wage elasticity in individual industries - West Germany**

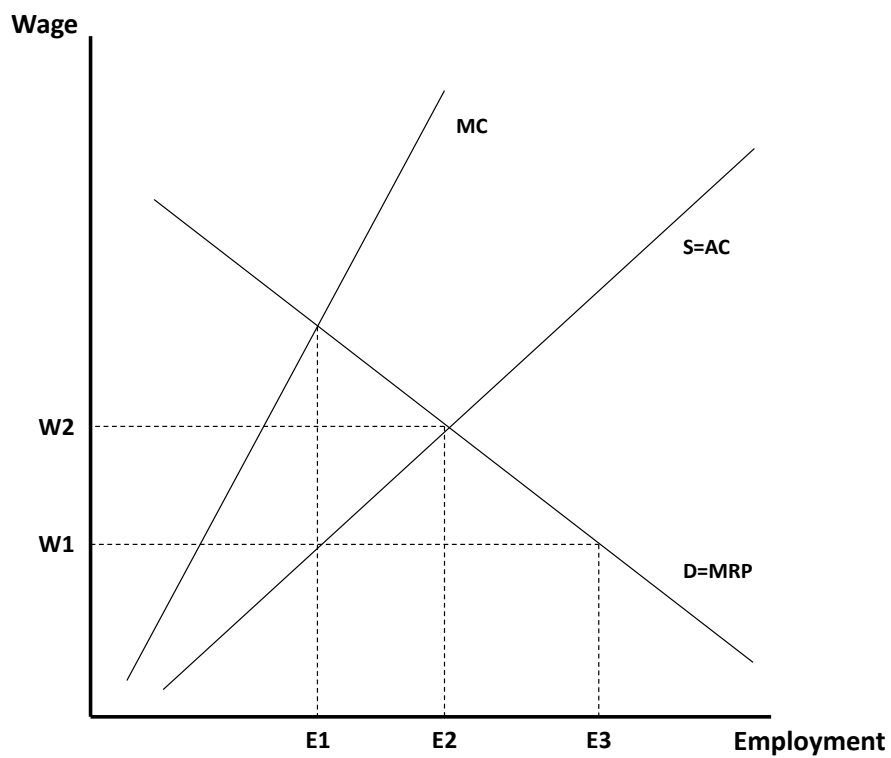
	Industry averages			Elasticity of labour supply	LogLL	Observations	
	Wages		Trans. prob.			Spells	Transi- tions
	Mean	sd					
Agriculture	60.37	23.22	0.0947	3.441*** (0.493)	-400	1,725	155
Mining	85.67	15.67	0.1614	4.031*** (0.313)	-4,025	23,470	3,582
Manufacturing	99.79	27.78	0.0545	2.958*** (0.175)	-118,957	922,142	52,381
Electricity and water supply	107.29	26.08	0.1152	3.907*** (0.355)	-4,247	23,208	2,585
Construction	88.80	24.18	0.0886	1.516*** (0.177)	-7,440	40,270	3,669
Wholesale and repairs	92.03	31.75	0.0813	1.804*** (0.313)	-9,350	48,343	3,810
Retailing	73.00	25.94	0.1075	0.628** (0.149)	-5,724	25,075	2,790
Hotels and restaurants	55.52	22.11	0.1820	0.702 (0.223)	-1,460	4,110	757
Transportation and communication	92.51	23.74	0.0464	4.149*** (0.367)	-12,742	105,782	4,901
Financial services	110.04	28.28	0.0653	2.883*** (0.306)	-23,599	149,905	9,596
Business services	82.86	39.60	0.1319	2.979*** (0.213)	-18,419	66,962	9,064
Public administration	87.50	23.39	0.0456	3.259*** (0.194)	-20,918	158,978	7,123
Education	85.97	30.00	0.0815	2.797*** (0.388)	-4,545	26,336	2,054
Health	83.83	27.22	0.0647	2.593*** (0.101)	-20,839	122,339	7,588
Public and private services	90.75	33.24	0.0432	2.502*** (0.157)	-5,251	41,415	2,003
Minimum wage industries							
Painters	76.00	20.28	0.0984	3.687*** (0.364)	-206	960	108
Electricians	87.16	29.88	0.1379	0.456 (0.409)	-489	3,988	546
Main construction	90.83	23.07	0.0824	1.751*** (0.208)	-5,233	30,449	2,591
Waste removal	97.26	20.45	0.0293	2.928*** (0.354)	-1,133	14,355	428
Elderly care	71.84	25.29	0.0929	2.437*** (0.275)	-2,057	8,966	773
Cleaning	46.64	24.72	0.1398	1.177*** (0.226)	-771	2,318	673
All industries	95.12	29.36	0.0626	2.925*** (0.089)	-264,823	1,760,060	112,058

**Legend:** \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Notes:** Clustered standard errors at the establishment level in parentheses. Each row shows the coefficient of  $\log(\text{daily wage})$  multiplied by  $-2$ . The estimations are run separately by industry and based on Model 3 (cf. Section 4). Additionally, the average wage and the annual transition probability at the industry level are provided. The average wage level is calculated based on a different sample, i.e. before employment spells resulting in non-employment are excluded.

**Source:** LIAB, version "LM2". Authors' calculations.

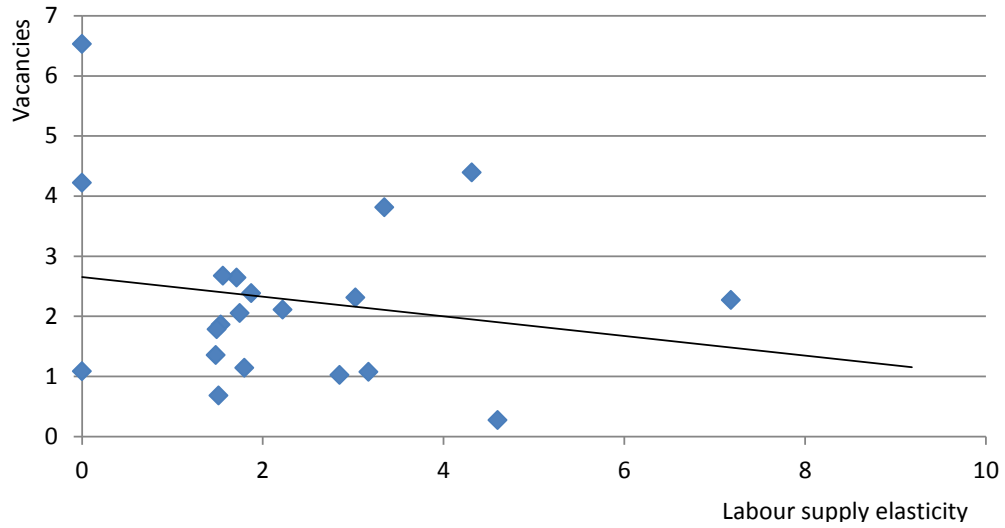
Figure 1: The firm in a monopsonistic labour market



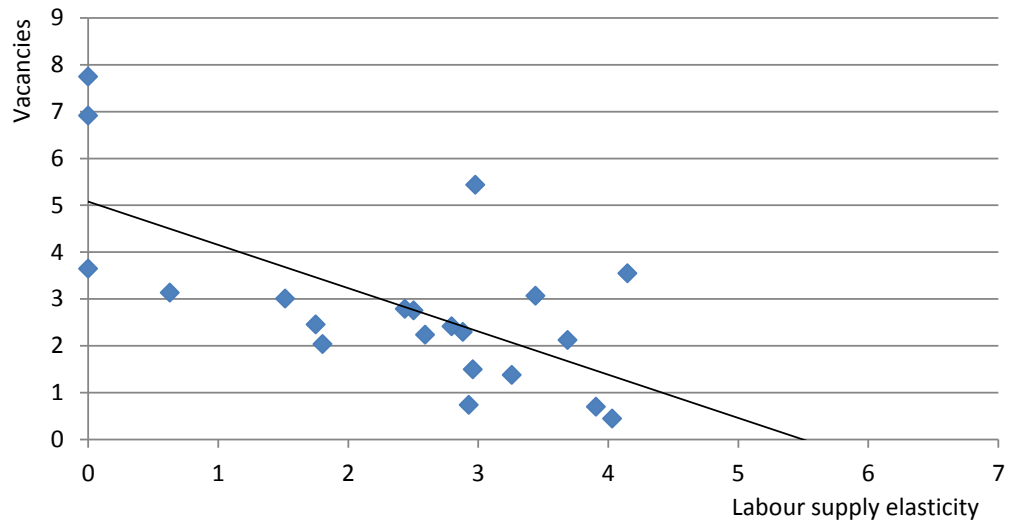
**Legend:** S = Labour supply; AC=Average cost of labour; MC= Marginal cost of labour; D=Demand for labour; MRP=Marginal revenue product of labour.  
**Source:** Own illustration, based on (Manning, 2003a).

**Figure 2: Correlation of wage elasticities and vacancies**

(a) East Germany



(b) West Germany



**Note:** Estimated labour supply elasticities are taken from Tables 4 and 5. Vacancies are expressed as the ratio of vacancies to the current employment level of the firm (in percent). The correlation coefficients amount to  $-0.189$  in East Germany and to  $-0.692$  in West Germany. The correlation is not significant at the 10 percent level in East Germany, but at the 1 percent level in West Germany.  
**Source:** LIAB, version “LM2”. Authors’ calculations.