Firm Beliefs About Wage Setting [*]

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Abstract

This paper sheds light on two questions: Do firms accurately assess their position on the wage distribution? Why do they pay less or more than other firms? An extensive body of research has documented that many firms have some wage-setting power, but we lack evidence on how firms perceive their wage-setting power. We measure firms' beliefs about wage policy in a representative sample of Danish firms, and compare these beliefs with proxies for actual wage paid. While firms generally their position on the wage distribution when declaring to pay or low, two-thirds of employers who think they pay about the same wages as other firms are paying higher or lower wages using objective benchmarks of pay premiums. We show that wage misperceptions have several concrete implications. Firms are less likely to cut pay instead of laying off if they wrongly perceive that their wages are low compared to other firms. Second, we show using a monopsony model that wages misperceptions decrease with monopsony power. The most common reason for paying high wages is to alleviate search frictions and retain employees. Compensating for negative job characteristics is the least common reason to set high wages.

1 Introduction

Similar workers are paid differently depending on where they work (Card, Cardoso, Heining and Kline, 2018). This finding is influential because it provides clear evidence that the marginal product of labor does not solely dictate wages as in a neoclassical model. However, our knowledge of how the power of employer wage setting operates in practice is limited. Can employers assess their position on the pay distribution? What are their motives for paying less or more than their competitors?

This paper provides answers to these questions. We do so by designing and implementing a large-scale survey, asking Danish employers about their position in the pay distribution and their reasons for paying higher or lower than other employers. The survey was conducted online in the summer of 2021. The resulting data set contains responses from more than 2,000 firms and is representative of the Danish firm population.[1]

We first link the survey with administrative labor market data, allowing us to assess whether employers correctly assess their position of the pay distribution, relative to objective benchmarks of employer-specific pay policies. Our main objective benchmark to estimate employer-specific pay premium is the additive worker and firm effects wage model proposed by Abowd, Kramarz and Margolis (1999; hereafter, AKM). Next, we document why employers set higher or lower wages than their competitors. We elicit employers' views using statements related to search and matching, compensating differential, fairness, and efficiency-wage motives. Finally, we reveal the extent to which pay premiums relate to unfavorable job amenities (e.g., on-call, evening shift), and non-standard work schedules (i.e., overtime) using existing but unexplored matched employer-employee data. By linking our survey to administrative data on employers and their employees, this work provides the first representative evidence of how employer wage-setting power operates in practice.

The key insight of this paper is that some employers misperceive their position on the pay distribution. Two-fifth who think they pay about the same wages as their competitors are either in the bottom or the top quintile of objective measures of pay premiums. One-four of employers who think of themselves as high-paying are in the bottom two quintiles of objective measures of pay premiums. Employers that misperceived the most their position on the pay distribution– i.e., saying they pay high, whereas objective benchmarks shows the opposite- are respondents in smaller, less productive, and less unionized firms.

We then elicit employers' motives to pay higher or lower than their competitors.

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[1]The institutional setting allows studying cross-firm dispersion in wages (Mortensen 2003, page 82). Around 80% of private-sector employees have their pay set at the firm level. In contrast, in many European countries (e.,g France) thousands of wage floors apply.

Around 90 percent offer high wages to retain employees and attract candidates. Interestingly, only 40 percent do it to hire quickly. Motives relating to efficiency and incentive alignment also matter. Around 60 percent pay higher wages to increase morale, reduce the need for monitoring, and share rents. One-fifth report paying higher wages to compensate for negative job amenities. We also uncover several motives for employers to set lower wages than their competitors. Most employers state they cannot pay higher wages due to low demand or high competition in the product market. Moreover, the lack of competition on the labor market matter less, as 15 percent of low-wage employers do so as they think they do not need to raise pay due to few competing employers.

Literature. We contribute to the literature investigating the role of imperfect competition in the labor market (Card et al., 2018; Kroft et al., 2022). To our knowledge, we are the first to ask a representative sample of employers for their knowledge and motives to set wages and compare them to objective benchmarks using administrative labor market data. Jäger et al. (2023) show that workers wrongly anchor their beliefs about outside options on their current wage. We complement their evidence by showing that some employers misperceive their position on the pay distribution. This paper also relates to Cullen et al. (2022), who show that firms benchmark their salaries to competitors.

The dominant motives to set high wages are the ones put forward by search models (see, e.g., Burdett and Mortensen (1998)), in which employers have a pay policy to reduce search costs and, at the same time, increase the retaining of employees. This evidence complements Hall and Krueger (2010), who surveyed U.S. workers and analyzed the wage determination process. Finally, our paper contributes to the literature that opens up the black box of employer-specific pay premiums (see, e.g., Di Addario et al. 2022; Engbom et al. 2022; Leitao et al. 2023).[2] We complement existing evidence and show how pay for unfavorable job amenities and non-standard work schedules explain the variation in employer-specific pay premiums.

The remainder of the paper is structured as follows. Section 2 describes the survey and the administrative data. Section 3 and 4 reports the results from the survey and the comparison with the administrative data. Section 6 concludes.

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[2]The importance of pay premiums to explain wage inequalities is well-documented (see,e.g., n.d.; Card et al. 2013; Criscuolo et al. 2023; Engbom and Moser 2022; Leitao et al. 2023).

2 Linked Survey-Administrative Data

2.1 Survey Overview

Sampling process. The target population that we want to survey is all private and public limited companies (ApS, *Anpartsselskab* and A/S, *Aktieselskab*) in Denmark.[3] The coverage error, the difference between the potential pool of respondents and the target population, should be zero, as it is mandatory for firms to be able to receive digital mail from the authorities (e.g., the tax authority). In Denmark, firms' email addresses are publicly available. Also, because all firms are sampled, the planned sample corresponds to the potential pool of respondents. Therefore, in Stantcheva's (2022) sketch of the different stages of survey errors, the only variation coming from the target population to the actual sample is a nonresponse error. Nonresponse error comes from respondents ignoring the invitation, or answering that they don't want to participate. We exploit information on nonresponders obtained from the administrative records to build weight to correct for (weak) selection.

Recruiting respondents. An international Danish consulting firm (Ramboll) conducted the online survey by sending invitation emails to companies in June 2021.[4] The survey closing date was at the beginning of August 2021, and a couple of reminders were sent in June and July to increase the response rate. Online surveys have key advantages in terms of selection compared to in person, telephone or mail surveys. In particular, it gives respondents more flexibility to complete the survey (Stantcheva, 2022). The email contained an invitation letter stating that, on behalf of the University of Copenhagen, Ramboll is conducting a survey (See Figure A.1). The invitation letter was designed to recruit as many respondents as possible, minimize selection bias, and appear legitimate and trustworthy. It provided useful information to the respondents, that is, the deadline for completing the survey and that the survey could be answered using mobile-friendly devices. The actual topic of the survey was kept vague and used simple language to minimize selection bias. Furthermore, the University of Copenhagen was clearly visible, as was that of the funding partner for this research, and we explained that all data generated comply with data protection rules.

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[3]We did not send the survey to firms in agricultural and mining sectors or to the sole-proprietorship companies (self-employed, *"Enkeltmandsvirksomhed"*).

[4]Firms' email addresses are publicly available at datacvr.dk. The international consulting company (Rambøll) has access to a dataset that links the firm identifiers to the email addresses of the company. We sent out to a email address (e-boks).

Response rate. The response rate was 12.76% for observations in the survey that can be linked with administrative on firms and their employees.[5] Respondents who we consider as not knowing enough about the pay policy are deleted. Specifically, respondents who check "I only know a little about salary and employment conditions." to the question "In the following questions, we ask about pay and hiring practices. How close are you to such decisions?". Missing data are coded in a different category to transparently show where respondents skip a particular question or item in a question. The sample size is 2787 observations.

2.2 Administrative Data on Firms and Workers

Data sources. The administrative data sets come from various sources gathered by the National Statistics Agency (Statistics Denmark), the National Employment Policy Agency (STAR) and the largest employer association in Denmark (DA). We link administrative datasets with the survey data using the CVR-number, which is the unique administrative identifier for a firm vis-a-vis its stakeholders. Appendix Table A.3 provides an overview of the data sources.

We use a matched employer-employee dataset (IDAN) to estimate employer-specific pay premiums. The dataset contains information on the universe of jobs in Denmark with information on earnings (base salary and other payments such as bonuses and overtime pay), hours worked (including overtime), and occupation (at 4-digit code) at the annual frequency. To construct direct hiring from other firms, we use a dataset (BFL) containing the date at the daily frequency of each job spell. We then link registers containing information on unionization status and educational attainment. Additionally, we use another matched employer-employee dataset (LONN) that records different types of pay and hours components collected from a mandatory employer survey for all companies with at least ten employees.[6]

The financial account data (FIRM) contains annual financial statements for private sector firms.[7] The largest employer association in Denmark provides the dataset con-

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[5]A 12.76% response rate is high for a voluntary online survey. Scur et al. (2021) report that response rates of 0.1% to 13% in recent surveys. This might be cause the invitation letter puts the University of Copenhagen in the spotlight by displaying the logo and writing *"On behalf of the University of Copenhagen [...]."*. This visual display and the language increase the response rate as the University of Copenhagen is a legitimate and trustworthy institution in Danish society.

[6]The data set on the pay component is from the Wage Statistics (*Lønstatistikken*). The quality of the survey is high, as it is required by law to comply with Eurostat and produce several Eurostat products (*"Structure of Earnings Survey"* and labor cost surveys). Moreover, the survey is designed so that the collected data already exists in the firms' electronic payroll systems. Labanca and Pozzoli (2022) provides a detailed description of this data set.

[7]The dataset contains information collected in the mandatory company's official annual report that all Danish firms must submit to the Danish Business Authority. Value added to estimate labor produc-

taining the level of wage-setting. Job openings and unemployment data to construct labor market tightness is provided by a Danish public agency (STAR). Job openings are scrapped from Denmark's largest job board platforms containing the near universe of vacancies. Datasets and variables used are reported in Appendix A.3.

2.3 Institutional Setting: The Danish Wage-Setting System

Macroeconomic performance Labor market performance in Denmark, measured by long-term unemployment and labor market turnover, is comparable to the United States. The singularity of the Danish institutional setting is the combination of "right" and "duty", known as the Flexicurity model. Unemployed receive high unemployment benefits but must actively search for jobs and participate in active labor market policies. Since the introduction of the Flexicurity system in the mid-1990s, the Danish unemployment rate has been lower and more volatile than the unemployment rate in the Euro area (Kreiner and Svarer, 2022).[8]

The wage-setting A collective agreement covered 87% of private sector employees in 2017 (DA, 2020). Eighty-seven percent is comparable to other Scandinavian countries and approximately ten percentage points higher than in continental Europe (Bhuller, Moene, Mogstad and Vestad, 2022). There is a wide range of 'sectoral' bargaining levels in Europe. Specifically, the reference benchmark in the literature classifies the level of wage-setting in Denmark as follows "sectoral and company, with company agreements that specify and can deviate from sectorally agreed norms, guidelines or targets" (see OECD and AIAS). Specifically, for 80% of workers, pay is established through local negotiations at the firm level with little evolution in recent years (see Table A.1). Industry-level agreements are limited to other conditions. These industry-level agreements also set a wage floor for a few industries, which applies mainly to entry-level positions.[9] For the remaining 20% of the workers, the sectoral level agreements set out all the main terms, including pay, followed locally ("*normallønssystemet*"). However, even in this case, various pay components, such as bonuses, are set at the firm level. A notable difference compared to the US labor market is the percentage of employee representation coverage, among the highest in developed economies.

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tivity comes from the FIRM dataset (available from 1999 up to 2020.

[8]Also, by comparing the consequences of job loss across European labor markets, Bertheau et al. (2023) shows that earnings losses after a job loss are at least twice as low in Denmark as compared to Italy, Spain, or Portugal.

[9]These correspond to the wage-setting practices called in Danish "*minimallønssystemet*" and "*uden lønsats*". *The General Agreement* sets the framework for collective agreements. The General Agreement is signed between the Danish Confederation of Trade Unions (LO, since 2019 named the Danish Trade Union Confederation "*FH*") and the Danish Employer Confederation (DA). The General Agreement established the rules for issues the labor code would regulate in many other countries (Fulton, 2021).

Therefore, as summarized in Dahl et al. (2013) and Labanca and Pozzoli (2022), the pay is negotiated mainly at the firm level in Denmark. How does this wage setting compare with other countries? This wage-setting system is between two groups (see Bhuller et al. (2022); Cazes et al. (2019)). In some countries, employment conditions are established directly at the firm level. In other countries, there is little room for firm-level agreements, and most pay conditions are set at the industry level. For instance, 70% of workers in France are covered by an industry-wide agreement (DARES (2018)). The coverage of collective agreements in Portugal is above 90 percent (e.g., Card and Cardoso 2022; Raposo, Portugal and Carneiro 2021).

Wages in Denmark are mainly negotiated in a decentralized manner at the firm level, and wage floors apply to a few entry-level positions(Dahl et al., 2013). Section A.1 provides additional background on the institutional setting. This is in contrast to most other European countries (see, e.g., Bhuller et al. (2022)).

We find that the level of wage-setting in Denmark is closer to the US than in other European economies. The role of employer-specific premiums in explaining wage inequality is smaller in Denmark compared to the US and other European countries. Still, wage inequality increased in the last 20 years and the increase is partly driven by employer-specific wage premiums (Criscuolo et al., 2023).

2.4 Sample Restriction and Sample Characteristics

Sample selection. Table A.2 reports detailed sample construction. The sample frame contains firms with more than five full-time equivalent employees in each month of 2019, positive sales and purchases in 2019. The following observations are excluded: 1. skip at least 10 out of the 34 questions, 2. 'incoherent' answers[10]

Table 1 reports descriptive statistics. Column 1 shows the means of selected variables in the population of Danish firms under study, and Column 2 shows the summary statistics of our sample. While the means in Columns 2 and 1 are similar, we construct sample weights to match population closely means for the firm size, industry distribution, and productivity decilesWe construct weight using an entropy-balancing approach of Hainmueller and Xu (2013). The summary statistics for the resulting weighted sample are in Column 3. We use these sampling weights throughout the rest of the paper.

We also asked the firms about the change in revenue. Interestingly, the responses to the survey are broadly similar to the statistics of the administrative data (Figure A.2), further reassuring that the individuals who completed the survey knew the economic situation of the firm.

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[10]That is, the respondents contradict themselves: a. Choose "None of the above" but also choose other options. b. Strongly agree on "none of the above" and also strongly agree on other options.

2.5 Objective Benchmarks of Pay Premiums

In the following section, we use the AKM model to recover employer-specific pay premiums. The AKM model is

$$Y_{it} = X'_{it}\beta + \alpha_i + \psi_{j(i,t)} + \varepsilon_{it},$$

where Y_{it} are the log hourly wages of worker i in period t, X_{it} are exogenous covariates, namely age and calendar time, α_i is the unobserved worker effect, $j(i,t)$ is the firm where i works at t, $\psi_{j(i,t)}$ is the unobserved firm effect, and ε_{it} is an idiosyncratic error term. We denote as N the number of workers, J the number of firms, and T the number of time periods. We estimate the model from 2009 to 2019. To be consistent with our survey question on the ranking of employers on pay distribution, we include industry and region-fixed effects. Following Abowd et al. (1999), we assume that we assume that the mean independence condition holds. This assumption imply that high-wage workers may be more likely to move to higher-paying firms than low-wage workers. However, it rules out endogenous mobility with respect to shocks and state dependence. It also rules out sorting effects, i.e, interactions between worker effects and firm effects (see Bonhomme et al. 2023). To test that sorting patterns do not drive wage variation between firms, we run a validation exercise following Card et al. (2013). Figure A.3 reports an event study graph that shows the average wage gains and losses of workers moving to different quartiles of the mean wages of the coworkers in the previous and new jobs. The graph shows the average wages prior to a move for workers who go from quartile 4 to quartile 1 job is lower than for those who go from quartile 4 to quartile 2. This pattern is consistent with the assumption of the AKM model.

3 Beliefs About Wage Policy vs. Objective Benchmark

3.1 Can Employers Assess Their Position On the Pay Distribution?

We first elicit the firms' views about their pay policy relative to their competitors using the following question: "Do you think this company offers lower or higher salaries than competing companies in your industry? Competing companies are other employers that hire people with the same abilities in your region."

Respondents have five potential options: much lower, lower, about the same, higher, and much higher. We then compare the answers to the firm effects recovered from the AKM model presented above. Figure 1 reports the results. Specifally we plot the share of firms belonging to each within-industry-region AKM decile, by survey answers.

Table 1: Descriptive Statistics, Linked Survey-Administrative Data

	Study population	Unweighted sample	Weighted sample
Firm characteristics			
Number of employees (FTE)	35.02	50.58	38.46
Age	17.48	19.93	19.23
Revenue growth in 2020 (%)	-4.70	-2.04	-2.10
Value added per worker (K EUR)	87.62	94.45	92.45
Labor costs per worker (K EUR)	65.50	69.69	68.22
Profit per worker (K EUR)	15.73	17.73	17.67
Capital per worker (K EUR)	97.34	112.67	106.55
Current assets per worker (K EUR)	123.58	139.33	137.49
Liquid assets per worker (K EUR)	22.28	23.87	23.98
Firm export (%)	44.02	54.02	49.38
Job creation in 2019 (%)	3.98	4.26	4.02
Hiring rate (%)	58.23	43.73	44.85
Poaching hiring rate (%)	46.64	47.62	46.67
In the manufacturing sector (%)	13.68	17.36	13.97
In the services sector (%)	60.19	59.37	59.94
In other sectors (%)	26.14	23.27	26.09
Copenhagen (%)	27.02	25.77	24.99
Employees characteristics			
Female (%)	28.49	28.71	28.17
Employee's age	40.22	42.03	41.93
Tenure (years)	4.81	5.36	5.43
High skilled (%)	15.35	18.67	16.95
Medium skilled (%)	26.88	27.41	26.07
Furloughed workers in 2020 (%)	16.69	15.87	15.94
Unionized workers (%)	53.98	58.84	57.61
Observations	25581	2875	2875

Notes: This table reports descriptive statistics of our sample. Column 1: The eligible study population of firms. Column 2: our sample. Column 3: Weighted main sample.

From the figure it is clear that firms that answer that they pay a high wage compared to their competitors are more likely to be in top deciles of the AKM Firm FE distribution within their industry and region. The opposite holds for firms that think they pay a lower wage than their competitors. This supports the idea that firm effects capture the wage-setting policy of the firm, such as "rent-sharing, an efficiency wage premium, or strategic wage-posting behavior" (Card et al., 2013). The question is framed in a way that employers should not worry about pay differences coming from geographical and workers' skills variation. Indeed, some studies have argued that Murphy and Topel (1990) argue that higher paying firms employ more able workers.[11]

Figure 1: Distribution of Beliefs About Wage Policy vs. Objective Benchmark
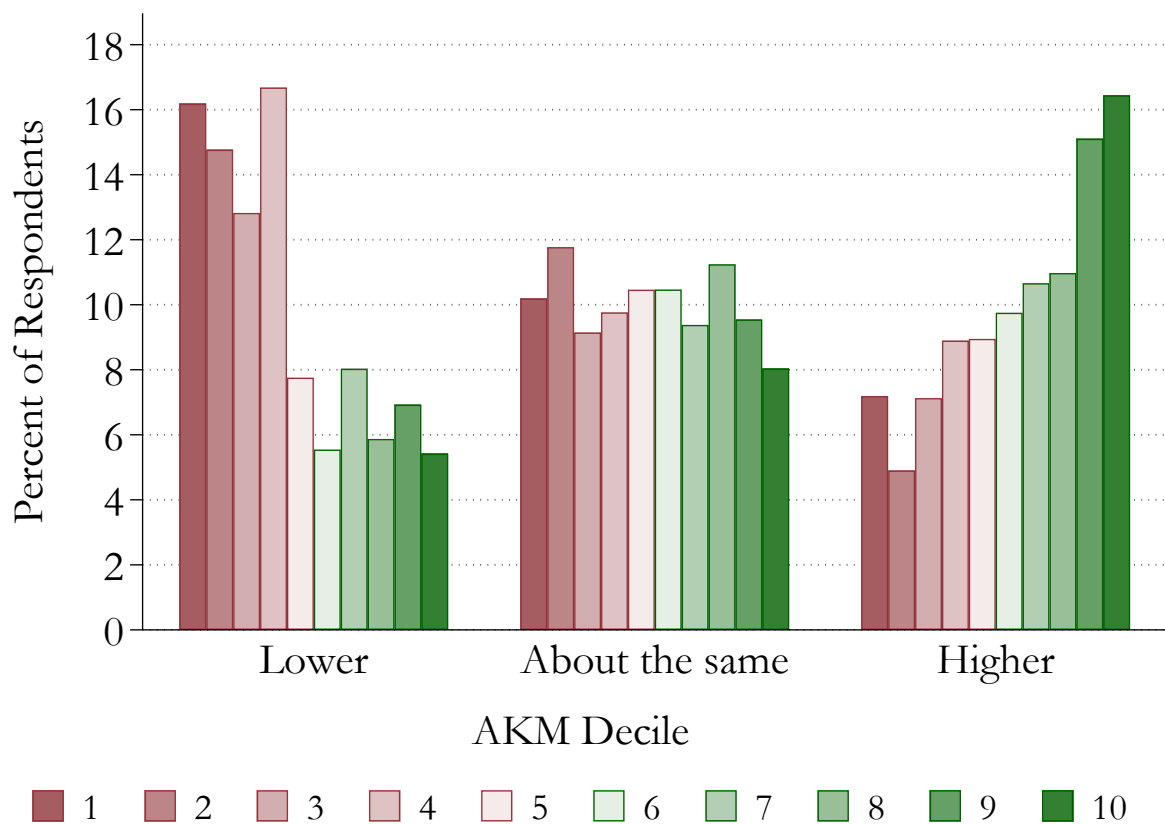
Note: This Figure plots the share of firms in deciles of firm fixed effects AKM, by responses to the survey question: "Do you think that this company offers lower or higher salaries than competing companies in your industry?"

Figure 2 shows the evolution of wages for workers who switch jobs, depending on the response to the survey of the destination firm. Again, we see that the firm's survey answers do correlate with objective wages: Workers who switch to a firm that thinks

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[11]The identification of sorting, i.e., recovering from observational data the relationship between unobserved worker skill and firm productivity is inherently difficult (Bagger and Lentz, 2019).

they are a high-wage firm on average see a wage increase of 4 pct., while workers that move to firms that think they are low-wage firms experience a 4 pct. wage decrease.

Figure 2: Change in Wages for Movers by Destination
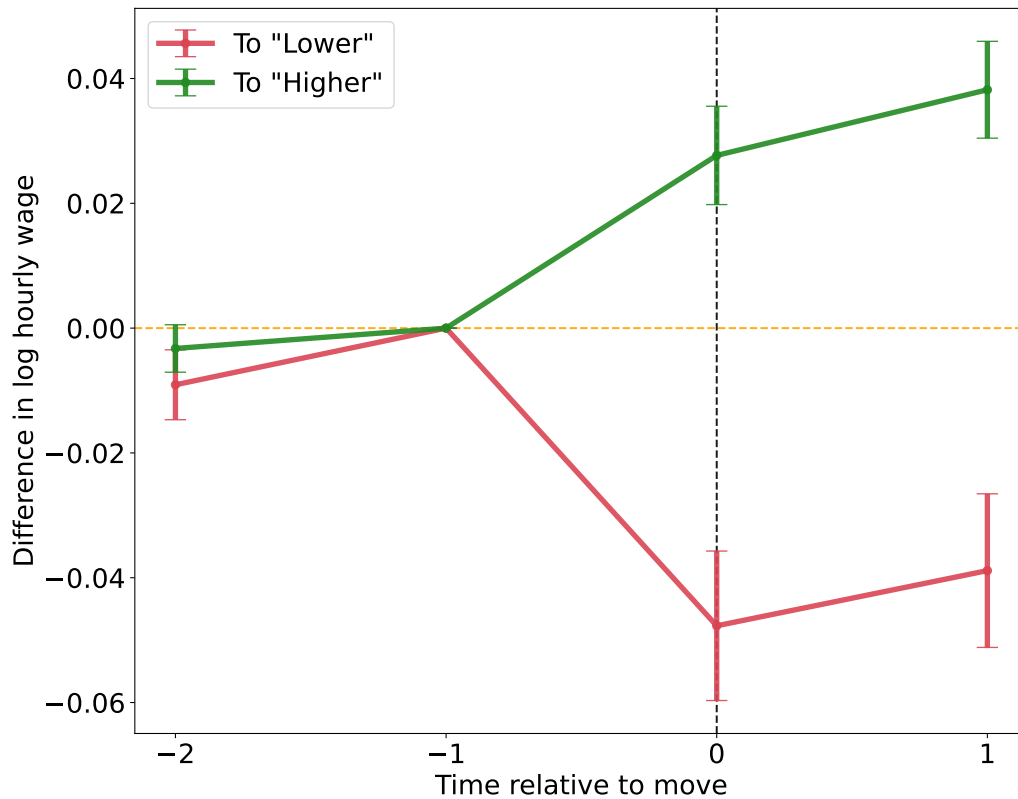
Note: This figure shows the evolution in log hourly wages for workers who switch employers. The changes are plotted by survey answers. The shown changes are relative to workers that move to firms that answer "About the same".

Figure A.6 shows the correlation between the firm beliefs on wage-setting and different characteristics. Reassuringly, and in line with the previous results, we find that firms that state they pay higher wages also have higher observed labor costs. They also tend to have higher value-added per worker. This could indicate that some firms pay higher wages because of a rent-sharing motive. This point is explored further in Section 4. Additionally, firms that say they pay higher wages tend to be smaller, less capital-intensive and grow faster, but these differences are not significant.

To better quantify the discrepancy between the distribution of beliefs about wage policy and our objective benchmark, we use a rank-rank estimator (see Figure A.7).

Figure 3: Wrong Beliefs On the Pay Distribution and Firm Characteristics
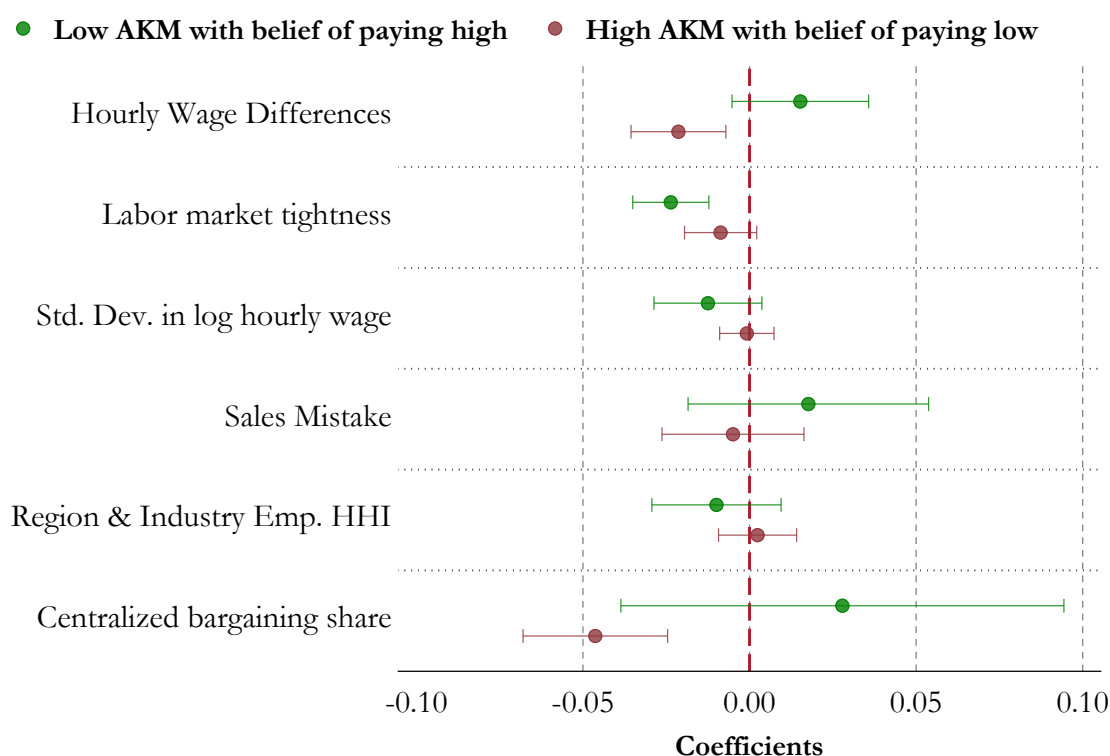
Note: This figure reports OLS estimates of firms stating that they are high-paying, whereas they have low employer-specific pay premiums and the opposite.

3.2 Who Wrongly Perceive Their Rank on the Pay Distribution?

Figure 3 report the characteristics of the firm associated with a misperception of the pay distribution. We define misperception as saying you pay a high wage, while actually belonging to the two lower quintiles of the AKM distribution in your industry and region, and vice versa for saying low. Most of the estimated coefficients are close to zero. However, we do see that a tighter labor market is associated with fewer mistakes.

4 Why Do Firms Set Higher or Lower Wages?

4.1 Evidence From Our Survey

After surveying the firms' rank on the pay distribution, we asked the firms, which declared paying "higher" or "much higher" wages than their competitors, what their wage premium was. Respondents are asked to agree or disagree with the following propositions: *We want to compensate for negative aspects of the job (job insecurity, working*

conditions, etc.); We want to attract the best candidates. We want to hire quickly. We want to ensure reliable employees who do not change jobs often.; We want to increase employee morale.; We want to reduce the need to control and monitor employees.; We want to share the high earnings we generate with the employees..

Similarly, we asked firms, which declared paying "lower" or "much lower" wages than their competitors, why they were paying lower wages. Again they were asked to agree or disagree with the following statements: *We cannot pay higher wages (low demand for our products/services or high level of competition); We do not need to pay high wages as there are few competing employers.; We do not have to pay too high wages as we can offer a lot of valuable facilities that compensate for higher wages (job security, work environment, etc); We need to keep wages low in order to invest the profit we generate in other strategic priorities (e.g. research and development, marketing).*

The responses are shown in Figure 4. The insight from the survey can be divided into the following categories:

Figure 4: Reasons for Setting Higher or Lower Wages

Panel (a): Why Do Firms Pay Higher Wages?

Panel (b): Why Do you Pay Lower Wages?
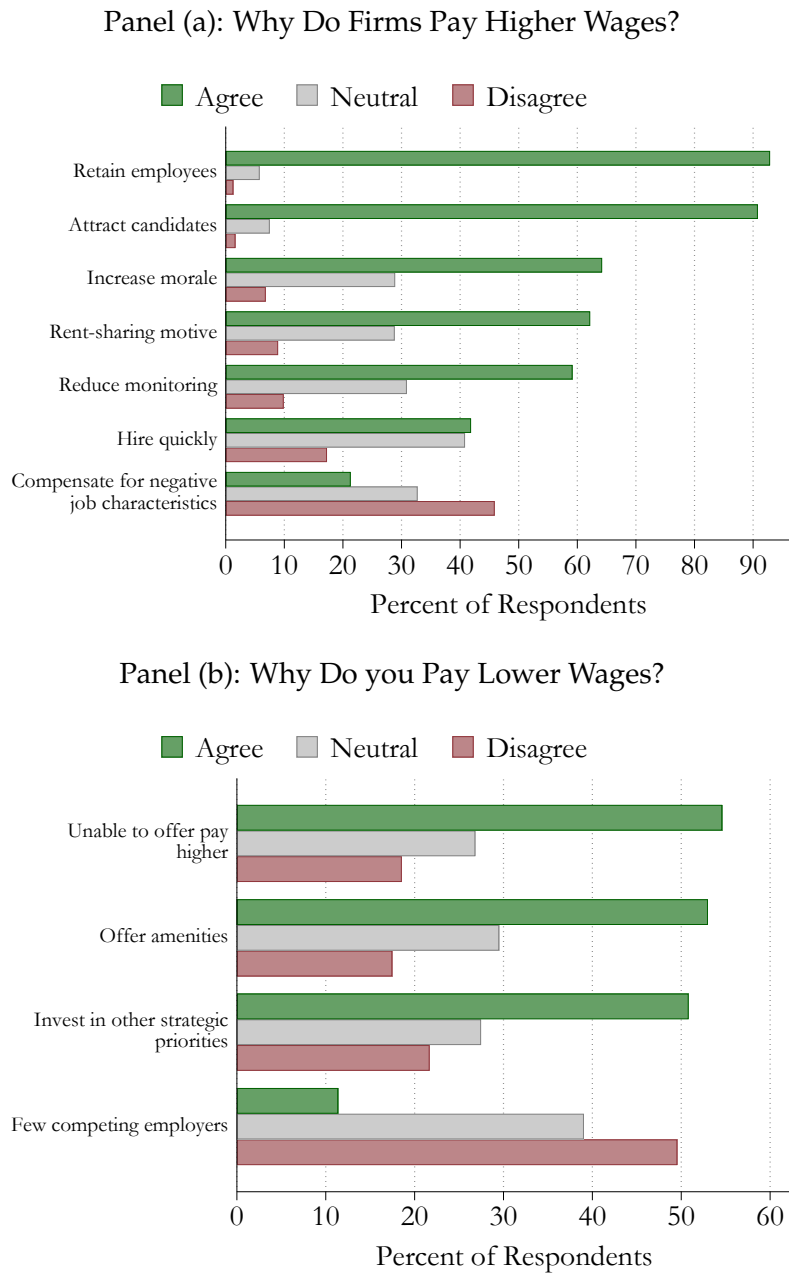
Note: These figures represent the responses to the question: "Why do you offer higher (lower) wages than other companies in your industry?" Respondents are asked to state their opinions on the following statements: We want to compensate for negative aspects of the job (job insecurity, working conditions, etc.); We want to attract the best candidates. We want to hire quickly. We want to ensure reliable employees who do not change jobs often.; We want to increase employee morale.; We want to reduce the need to control and monitor employees.; We want to share the high earnings we generate with our employees.

Worker Hiring and Retention: More than 90 percent of firms who report offering higher wages say they do it to retain employees and attract candidates. This indicates that firms believe wages affect potential workers' search behavior. Figure **??** , show

that higher wages also have relatively fewer quits to other firms. Specifically, we see that a 1 log-point increase in firm premiums is associated with a 26 percentage points decrease in the shares of separations being due to quits to other firms. This result is in line with models in the nature of Burdett and Mortensen (1998), where wage increases arise from switching due to poaching and from the incumbent firm countering poaching offers. These poaching and quit ranks have previously been used to characterize the job-ladder or industry-ladder rank (Bagger and Lentz, 2019; Krueger and Summers, 1988; Sorkin, 2018). Interestingly, the survey and administrative data seem to contradict models where wages are not allocative such as the canonical search and matching model with bargaining (Pissarides, 2000), and instead, favor models where wages influence search outcomes, such as Burdett and Mortensen (1998). However, only 40 percent report offering higher wages to hire quickly. The comparatively small share is in line with the findings in Mueller et al. (2022), and is in contrast to directed search models (see, e.g., Kaas and Kircher 2015) highlighted earlier, where this channel is a key determinant of the wage policy.

Efficiency and Incentives: Around 60 percent state that they pay higher wages to increase morale and reduce the need for monitoring, which is in line with efficiency wage models (see,e.g.,Shapiro and Stiglitz 1984). 60 percent declare wanting to share high profit with their employees as a reason for paying higher wages. This rent-sharing motive coincides with the findings in **?**, which show some degree of pass-through to wages. We also find a positive association between employer-specific wage premiums and labor productivity (see Appendix Figure A.8).

Competition and market power: More than 50 percent that pays low wages, state that they are unable to pay higher wages due to low demand or high competition in the product market. Conversely, less than 15 pct. of low-wage firms, state that they do not have to raise wages due to few competing employers.

4.2   Evidence From Pay Component Data

We link several administrative data to complement our evidence on potential explanations for variation in employer-specific pay premiums from our survey. Table 2 reports the results of estimates of OLS regressions where we include, step by step, firm characteristics, product and labor market characteristics, and the different pay components of employees, to explain the variation in employer-specific pay premiums. Industry fixed effects explain a small share of the variation in the employer-specific pay premiums (column 1). Including firm size, capital stock, productivity, and workforce composition explain a large share of the variation. Additionally, including product and labor market characteristics, the R^2 increases too.

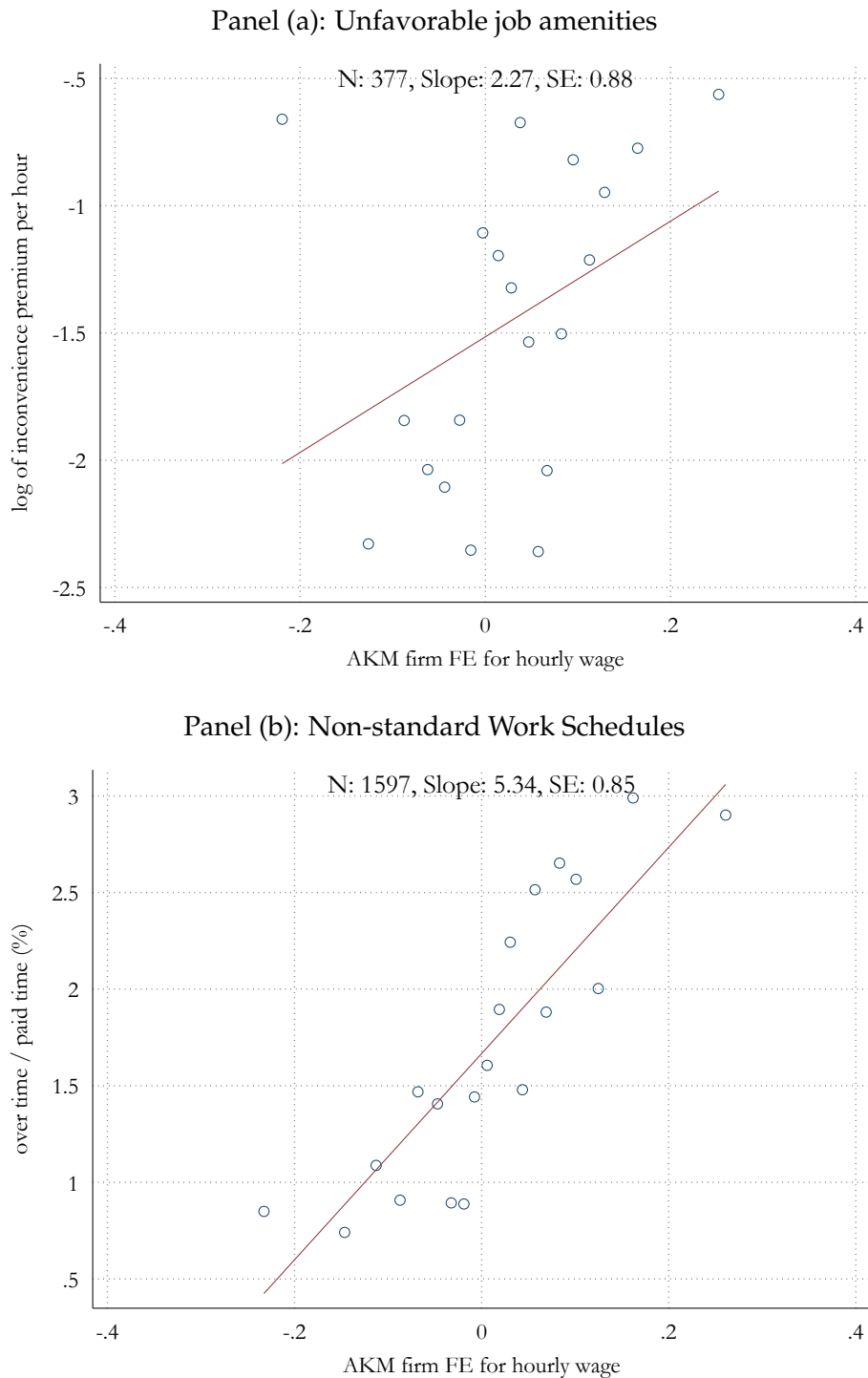Table 2: Pay Premiums and Firm Performance, Competitiveness, and Amenities

	Industry fixed-effects	Firm performance	Labor and product competition	Jobs with Unfavorable amenities
	(1)	(2)	(3)	(4)
R2	.265	.355	.358	.371
N	1601	1601	1601	1601

Notes: This table reports the adjusted R^2 of OLS models. We regress the firm effects (i.e., pay premiums) on (1) industry fixed effects (3-digit industry), (2) firm characteristics (size, age, value-added per worker), (3) labor market tightness, labor and product market competition (employment and sales HHI index), and (4) unfavorable amenities (% of wage bill paid for unfavorable amenities)

Our results complement recent papers trying to understand employer-specific pay premiums. Engbom et al. (2022) find that the number of employees, capital stock, and productivity explain 28% of the variation in employer-specific pay premiums in Sweden. Including the composition of the workforce and the concentration of products, and the concentration of the labor market as additional regressors, Leitao et al. (2023) explain 42% of the variation in Portugal.

In Figure 4, we find that 20 percent state that they pay higher wages to compensate for negative job characteristics. However, more than half of the firms that offer lower wages state that they offer nonwage benefits that compensate for the lower wage. Figure 5 uses compulsory survey data, and show the relationship between the wage premiums and overtime hours, and the share of pay dedicated to payment related to non-standard working conditions (e,g, outdoor work, shift work, etc.). This result indicates that negative non-wage characteristics are positively correlated with wages. This is in line with the finding that the compensating differential accounts for a large part of the variance in earnings (see,e.g., Sorkin 2018; Sullivan and To 2014). For example, Sorkin finds that 70 percent of the variation in AKM firm effects can be attributed to compensating differentials.

# Figure 5: Employer Pay Premiums: The Role of Non-standard Working Conditions

Panel (a): Unfavorable job amenities

N: 377, Slope: 2.27, SE: 0.88

y-axis: log of inconvenience premium per hour

x-axis: AKM firm FE for hourly wage

Panel (b): Non-standard Work Schedules

N: 1597, Slope: 5.34, SE: 0.85

y-axis: over time / paid time (%)

x-axis: AKM firm FE for hourly wage

Note: The figures represent the relationships between the AKM firm effects and overtime hours and payments for non-standard working conditions (e,g, outdoor work, shift work, etc.). We find a strong positive relationship for these two negative characteristics of jobs, in line with evidence from our survey (Figure 4). In the Appendix, we link the AKM firm fixed effects to labor productivity, fringe benefits, revealed preferences à la Sorkin (2018), and quit rate from and to other firms.

5 Misperceptions and Firm Behaviour (In Progress)

Implication 1: Misperception Increases Separation Rate

Figure 6: Misperception and Separation Rate
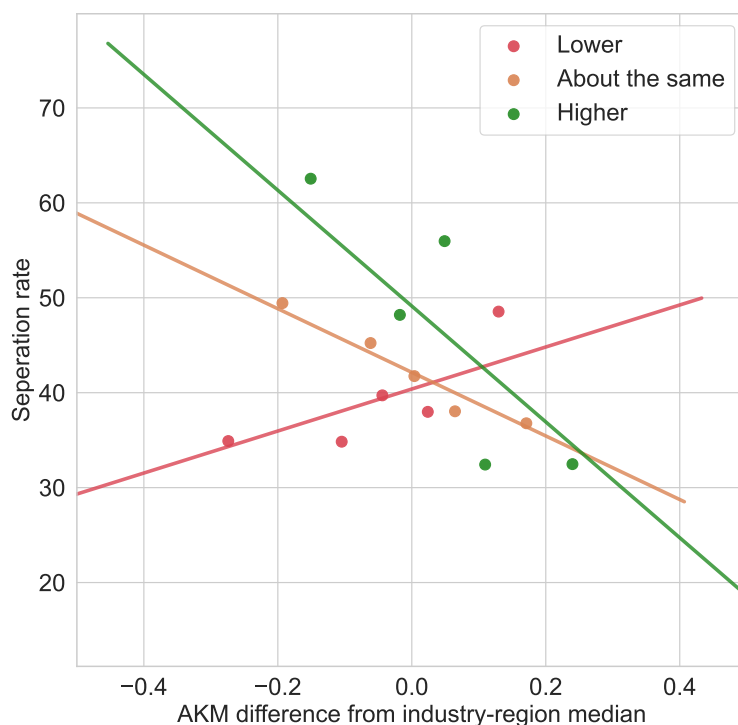
Note: The figure plots the firm-level difference in wages from the industry-region median against yearly separation rates. The relationships are reported separately by survey responses to the question: Do you think that this company offers lower or higher salaries than competing salaries in your industry? We group the responses into three groups: lower, about the same, and higher.

Implications 2: Misperception Reduces Wage Adjustment

Implication 3: Misperception Increases with Labor Market Power

6 Conclusion

While a large literature shows that market forces do not solely determine wages as employers have some wage-setting power, there is still scarce evidence on how wage-

Figure 7: Misperception and Worry About Quits
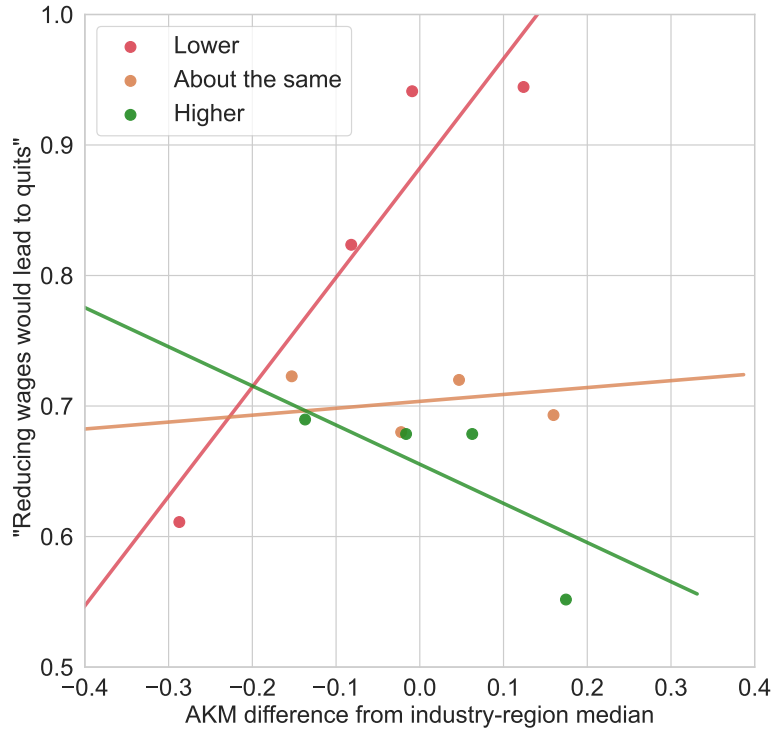
Note: This figure plots the firm-level difference in wages from industry-region median against agreeing to "Wage reduction would lead to employees resigning" in the survey. The relationships are reported separately by survey responses to the question: Do you think that this company offers lower or higher salaries than competing salaries in your industry? We group the responses into three groups: lower, about the same, and higher.

setting operates in practice.[12] This paper offers such evidence. To do so, we designed a unique survey asking employers about wages and combined it with administrative labor market data. We first show that some employers misperceive their rank on the pay distribution. While only speculative, employers' lack of knowledge is surely related to employees' lack of knowledge about their outside options (Jäger et al., 2023). Two-thirds of employers who think they pay about the same wages as their competitors are paying higher or lower wages than their competitors. 20% of employers who think of themself as high-paying firms are low-paying firms. We then open up the black box of pay premiums using survey responses on the reasons for employers' wage-setting be-

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[12]David Card suggested that more work should be done on this question. See Card (2022): "Once we accept that firms set wages, the analysis of wage setting becomes a part of labor economics, just like the analysis of price setting is a part of IO. Right now, much of the practical discussion of wage setting is done by noneconomists."

Figure 8: HHI and Misperception
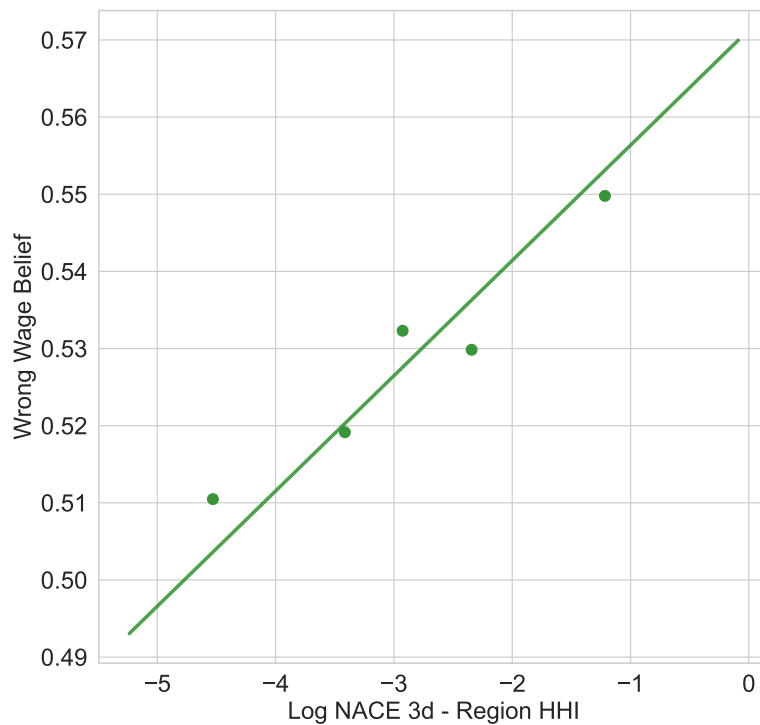
havior. The most common reason to pay high wages is to alleviate search frictions and retain incumbent employees. Compensating differentials for unfavorable job amenities is the least common reason to pay high wages. On the other hand, compensating differentials is one of the most common reasons for paying lower wages. This could indicate that non-wage job characteristics are compensating for low-wage firms and augmenting for high-wage firms. A fruitful avenue for future research would be to ask *both* employers and employees questions on wage-setting and study if employers achieve the desired goals of their wage-setting policy.

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Online Appendix

Employer Wage-Setting Power: Evidence From Linked

Survey-Administrative

By Antoine Bertheau and Christian Philip Hoeck

A Data Sources and the Danish Labor Market

A.1 Institutional Setting

Table A.1: Wage Systems in the Danish Labor Market

Year	1989	1991	1993	1995	1997	2000	2004	2007	2010	2012	2014	2017
Regulated pay	34	19	16	16	16	15	16	16	16	17	19	20
Decentralized pay	66	81	84	84	84	85	84	84	84	83	81	80

Note: Percentage of employees in the private sector covered by sectoral agreements that regulate pay via wage floors ("normallønssystemet") and sectoral agreements without or few wage floors. Source: Dahl et al. (2013) and Danish Employers' Federation (DA, 2018). The figure illustrates that most employees are covered by decentralized wage setting.

A.2 The Survey Questionnaire

This section contains the original Danish survey questions and the corresponding English translations. Respondents are asked to agree or disagree with the following propositions:

- **Danish:** *Tror du, at denne virksomhed tilbyder lavere eller højere lønninger end konkurrerende virksomheder i jeres branche? Konkurrerende virksomheder er andre arbejdsgivere, der ansætter folk med samme evner i jeres region. Hvis du ikker er sikker så kom med et estimat.*
  Options: *Meget lavere, Lavere, Cirka det samme, Højere, Meget højere.*

- **English:** *Do you think that this company offers lower or higher salaries than competing companies in your industry? Competing companies are other employers that hire people with the same skills in your region. If you are not sure, please come up with an estimate.*
  Options: *Much lower, Lower, About the same, Higher, Much higher.*

If firms answered *Higher* or *Much Higher*, in the question on the relative wage of the firm, they were asked the following question:

- **Danish:** *Hvorfor tilbyder I højere lønninger end andre i jeres branche? Angiv venligst din holdning til det følgende udsagn*

- **English:** Why do you offer higher salaries than others in your industry? Please state your position on the following statement.

The statements were the following:

1.
   - **Danish:** *Vi vil gerne kompenserer for negative aspekter ved jobbet (jobusikkerhed, arbejdsvilkår, etc.)*
   - **English:** *We want to compensate for negative aspects of the job (job insecurity, working conditions, etc.)*

2.
   - **Danish:** *Vi vil gerne tiltrække de bedste kandidater.*
   - **English:** *We want to attract the best candidates.*

3.
   - **Danish:** *Vi vil gerne ansætte hurtigt.*
   - **English:** *We want to hire quickly.*

4.
   - **Danish:** *Vi vil gerne sikre stabile medarbejdere der ikke skifter job tit (undgå at medarbejdere går over til konkurrenter.)*
   - **English:** *We want to ensure reliable employees who do not change jobs often (avoid employees switching to competitors).*

5.
   - **Danish:** *Vi vil gerne increase employee morale.*
   - **English:** *We want to increase employee morale.*

6.
   - **Danish:** *Vi vil gerne reducere behovet for kontrolllere og monitorere de ansatte.*
   - **English:** *We want to reduce the need to control and monitor employees.*

7.
   - **Danish:** *Vi vil gerne dele den høje indtjening vi genererer med de ansatte.*
   - **English:** *We want to share the high earnings we generate with the employees.*

For each statement the firms could choose one of the following responses:

- **Danish:** *Meget enig, Enig, Hverken enig eller uenig, Uenig, Meget uenig*

- **English:** *Strongly agree, Agree, Neither agree nor disagree Disagree, Strongly disagree.*

If firms answered *Lower* or *Much Lower*, in the question on the relative wage of the firm, they were asked the following question:

1.
   - **Danish:** *Vi kan ikke betale højere lønninger (lav efterspørgsel efter vores produkter/service eller høj grad af konkurrence)*
   - **English:** *We cannot pay higher wages (low demand for our products / service or high level of competition)*

2.
   - **Danish:** *Vi har ikke behov for høje lønninger, da der er få konkurrerende arbejdsgivere*
   - **English:** *We do not need to pay high wages as there are few competing employers.*

3. - **Danish:** *Vi behøver ikke at betale for høje lønninger, da vi kan tilbyde en masse værdifulde faciliteter, der kompenserer for højere lønninger (jobsikkerhed, arbejdsmiljø osv.).*

   - **English:** *We do not have to pay too high wages as we can offer a lot of valuable facilities that compensate for higher wages (job security, work environment etc)*

4. - **Danish:** *Vi er nødt til at holde lønninger lave for at kunne inverstere indtjeningen, som vi genererer, i andre strategiske prioriteter (f.eks. forskning og udvikling, marketing)*

   - **English:** *We need to keep wages low in order to invest the profit we generate in other strategic priorities (e.g. research and development, marketing)*

- **Danish:** *Meget enig, Enig, Hverken enig eller uenig, Uenig, Meget uenig*

- **English:** *Strongly agree, Agree, Neither agree nor disagree Disagree, Strongly disagree.*

A.3 Variable definition

Categorical variables:

- Family firm: From in the questionnaire: Do you consider the company to be a family business?

- Subcontractor: From in the questionnaire: Is the company primarily a subcontractor to other companies? This variable equals 1 if the company is primarily a subcontractor to other companies for more than 50% of the revenue, otherwise equals 0.

- Region: The firm's location (according to NUTS3 statistical regions of Denmark).

- Legal form: The firm's legal form. There are two forms in the sample: A/S (Limited Company) firm and ApS (Limited Liability Company) firm. This variable equals 1 if the firm is an A/S firm; otherwise equals 0.

- Industry: 36 different industry categories according to Danish Industry Code DB07 (version 3, 2014).

- Worker representative: Which of the following forms of employee representation exist in the company now?

Other variables:

- Value added (GF-VTV, FIRM): Includes revenue, work done for own account and listed under assets, Other operating income, changes in inventory goods consumption, subtracted by purchases of goods for resales, raw materials, energy, subcontracting work, expenses for rent, small inventories, temporary employment agencies, long-term rental and leasing expenses, ordinary losses on debtors.

- Profit (GF_RFEP, FIRM): Gross profit. Computed as income from primary operations (revenue) and secondary operations (other operating income) minus costs. Costs are consumption of goods and services for ordinary operations, salaries, pension costs, and other social security costs, depreciation and amortization of tangible and intangible fixed assets as well as exceptional write-downs of current assets.

- Firm age: The log of firm's age until 2019, calculated by *jur_fra_dato* (FIRM).

- Firm size: The log of the number of employees in the firm (*gf_ansatte* (FIRM)).

- Productivity: Sales minus purchases, divided by Full Time Equivalent workers (i.e. Total Hours Worked computed in 2019 in BFL of a firm / 1924 (37×52 hours)).

- Surplus per worker: Profit divided by Full Time Equivalent workers (i.e. Total Hours Worked computed in 2019 in BFL of a firm / 1924 (37×52 hours)).

- Labor costs per worker: Labor costs (salaries of employees) divided by Full Time Equivalent workers (i.e., Total Hours Worked computed in 2019 in BFL of a firm / 1924 (37×52 hours)).

- Capital: Fixed assets (GF-AAT, FIRM)

- AKM: Firm fixed effects on hourly wage estimated by the AKM model. (Abowd et al., 1999) .

- Union: The number of employees that are unionized (*fagfkd* (IND)) divided by the total number of employees.

- Furlough: The number of employees that have the government furlough compensation (`samlet_kompensation`) divided by the total number of employees.

- Net job Creation: (Average employment in December 2019 - Average employment in December 2018) / (Average employment in December 2019 + Average employment in December 2018)$\times$0.5. The average employment is defined by working time, i.e., using the total working time (hours) of a firm over a month divided by 148 (37×4 hours).

A.4 Survey implementation, sample selection, representativeness

Representativeness. Comparing the industry composition of our sample to the population, we find that, apart from agricultural firms, all sectors are represented. The sample contains 18% of manufacturing firms and 62% of market services firms, where market services firms include trade, transportation, food service, IT and information services (NACE 45 to NACE 63) and real estate activities, professional services, R&D, administrative and support service activities (NACE 68 to NACE 82).

B   Additional Figures

Figure A.1: Invitation Letter to Participate In the Survey

Note: The figure shows the invitation letter that firms received in an email asking them to participate in the survey. The invitation letter is designed to provide valuable information to recruit as many respondents as possible and minimize selection bias. In the letter we gave the respondents the following information: The deadline date for completion of the survey; that the survey could be completed on any device, including tablets and smartphones; that all information provided was anonymous and the survey complied with all data protection regulations; and we explained the reward system for respondents. The letter was purposely vague about the actual research topic, it used simple language, and it displayed the logo of the University of Copenhagen, which is a legitimate and trustworthy institution. See an English translation of the letter below.

Att: The Administrative Director

On behalf of the University of Copenhagen, Rambøll is carrying out a survey to shed light on how companies can emerge stronger from the COVID-19 crisis. We ask what you/you and others have done to get through the crisis and what thoughts you have about the time after COVID-19.

The project is carried out under the leadership of Niels Bohr Professor Morten Bennedsen, Department of Economics, University of Copenhagen, and is supported by, among others, Industriens Fond and the Social Science Research Council.

If you participate in the survey, we will offer you an anonymized benchmarking report that shows your responses against the distribution of the other responses. We naturally comply with all data protection regulations.

It takes approximately 20 minutes to complete the questionnaire. You can close the form and resume it later by again clicking on the link below. Therefore, please remember to save this invitation until you have completed the survey.

Here's how you do it

The questionnaire is answered electronically via the Internet. You can complete the questionnaire on any computer, tablet (e.g. iPad, etc.) or smartphone. To access your personal questionnaire, click on the link below: LINK

We ask that you complete the questionnaire no later than 27 June 2021.

You are guaranteed confidentiality

Your answers are treated confidentially by Rambøll and will only appear in anonymized form. You can find more information about the treatment of personal data in connection with the survey on the front page of the questionnaire.

Contact

If you have further questions, please feel free to contact Rambøll by e-mail: skemasupport@ramboll.com or tel. 6915 8076 on weekdays between 8.00-16.00.

Thank you in advance for your participation

Yours sincerely

Rambøll and University of Copenhagen

Figure A.2: Validating Survey Responses: Comparing Revenue Change in the Survey and in the Administrative Data
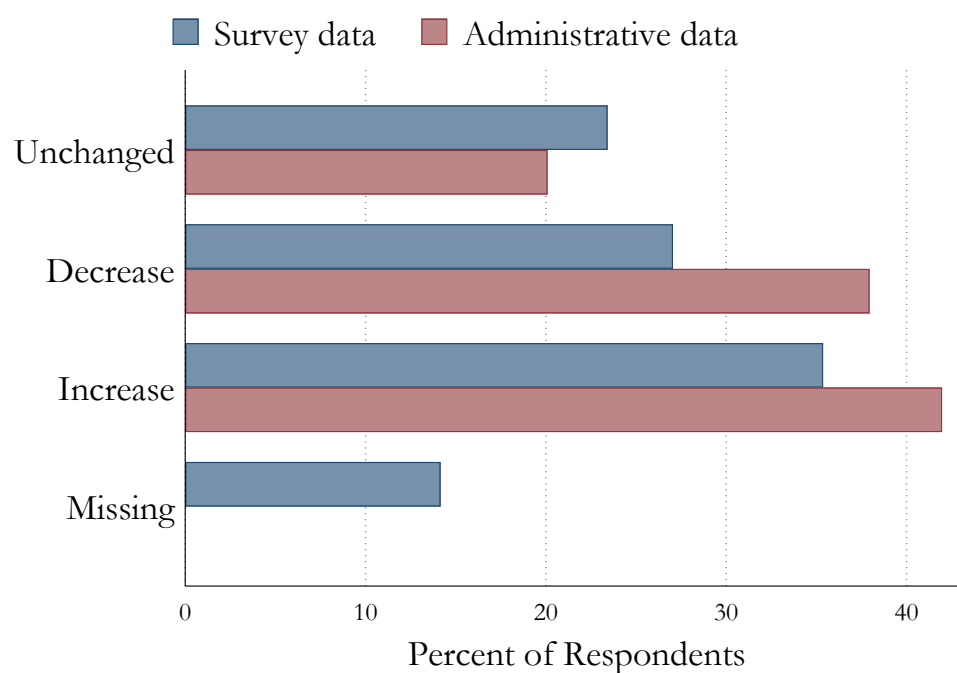
Note: This figure compares the response to the question: "How much did revenue change in 2020 compared to 2019?" in our survey, and the administrative data (FIRM). Unchanged is defined as a growth rate between -5% to +5%. Reassuringly, the responses are broadly similar, and it further shows that respondents know the economic situation of the company.

Figure A.3: Validating the AKM Model: Job Changes and Wage Premiums

Panel (a):Daily Earnings


Panel (b): Hourly Wage
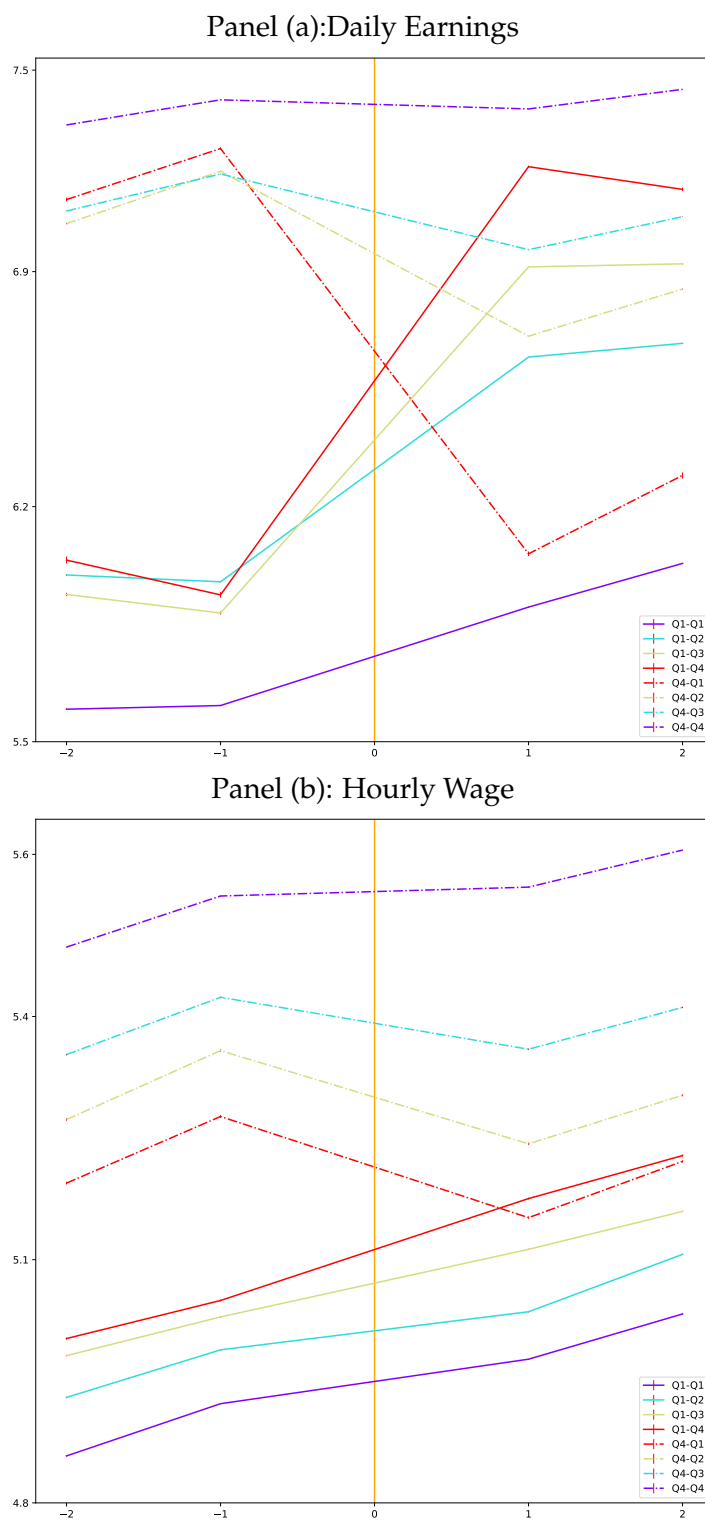
Note: This figure shows the wage dynamics of job changes. It plots the mean wages of job changers classified by quartile of mean wage of coworkers at origin and destination firm. See Card et al. (2013).

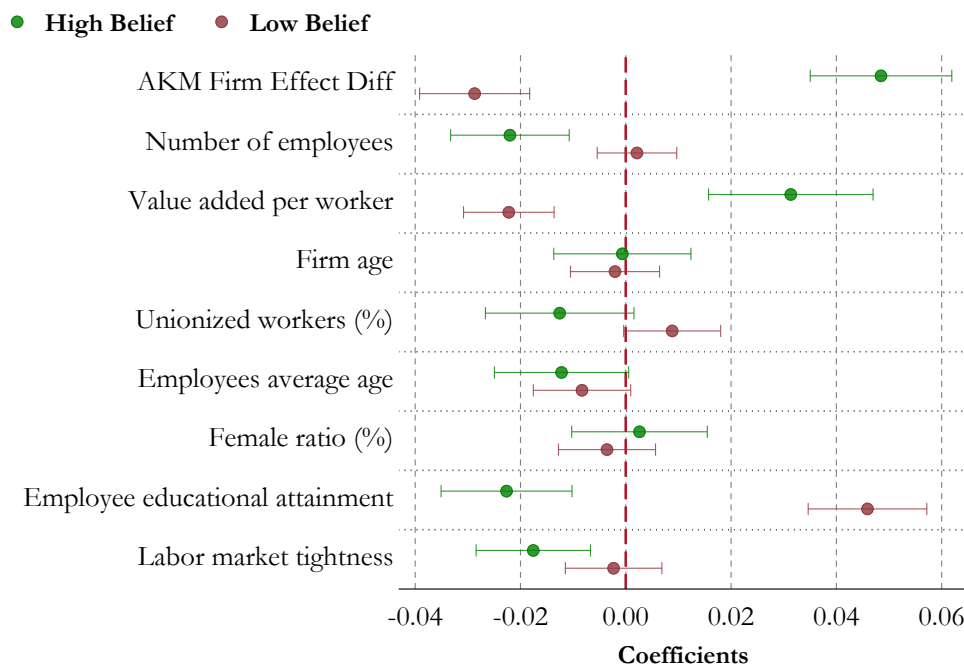Figure A.4: Beliefs About Wage Policy vs. Obj. Benchmark: Nonparametric
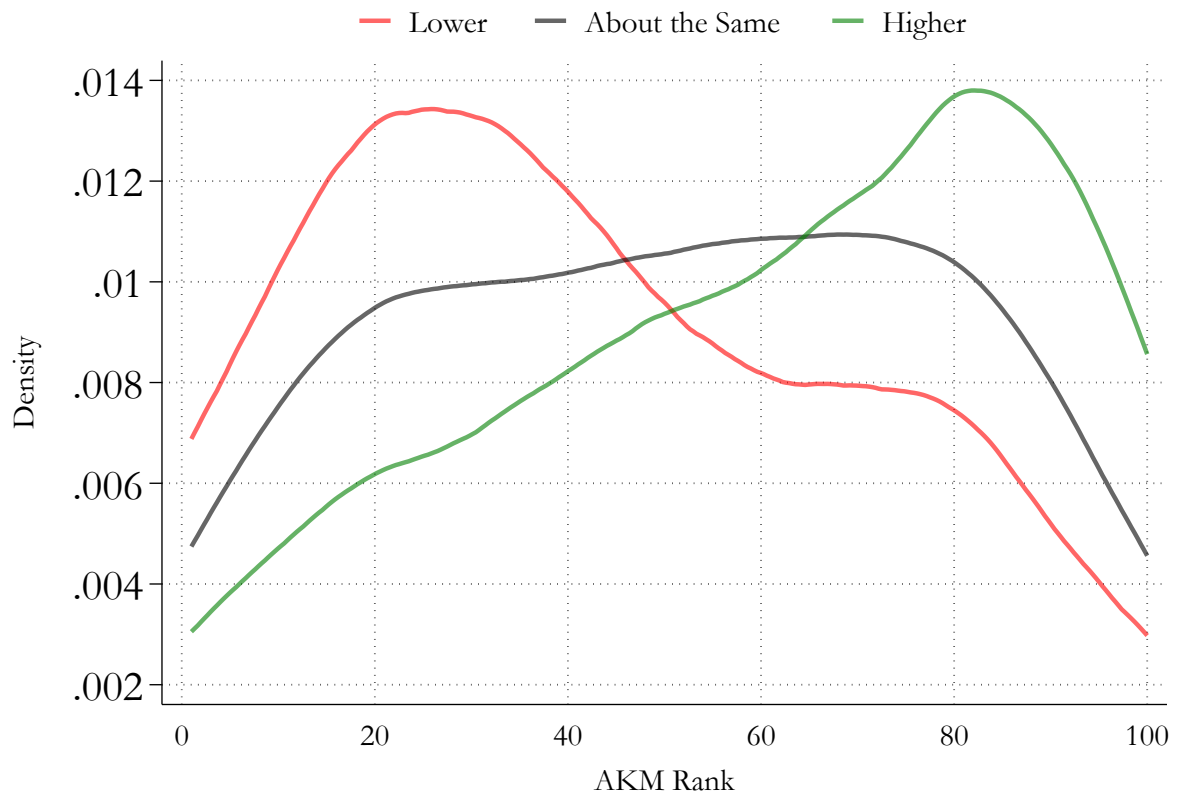
Note: This figure plots non-parametric density estimates, where employer-specific wage premiums firms are centiles of the AKM firm fixed effect estimate, by responses to the survey question: *"Do you think that this company offers lower or higher salaries than competing companies in your industry?"*

Figure A.5: Beliefs About Wage Policy vs. Objective Benchmark: Alternative Measures
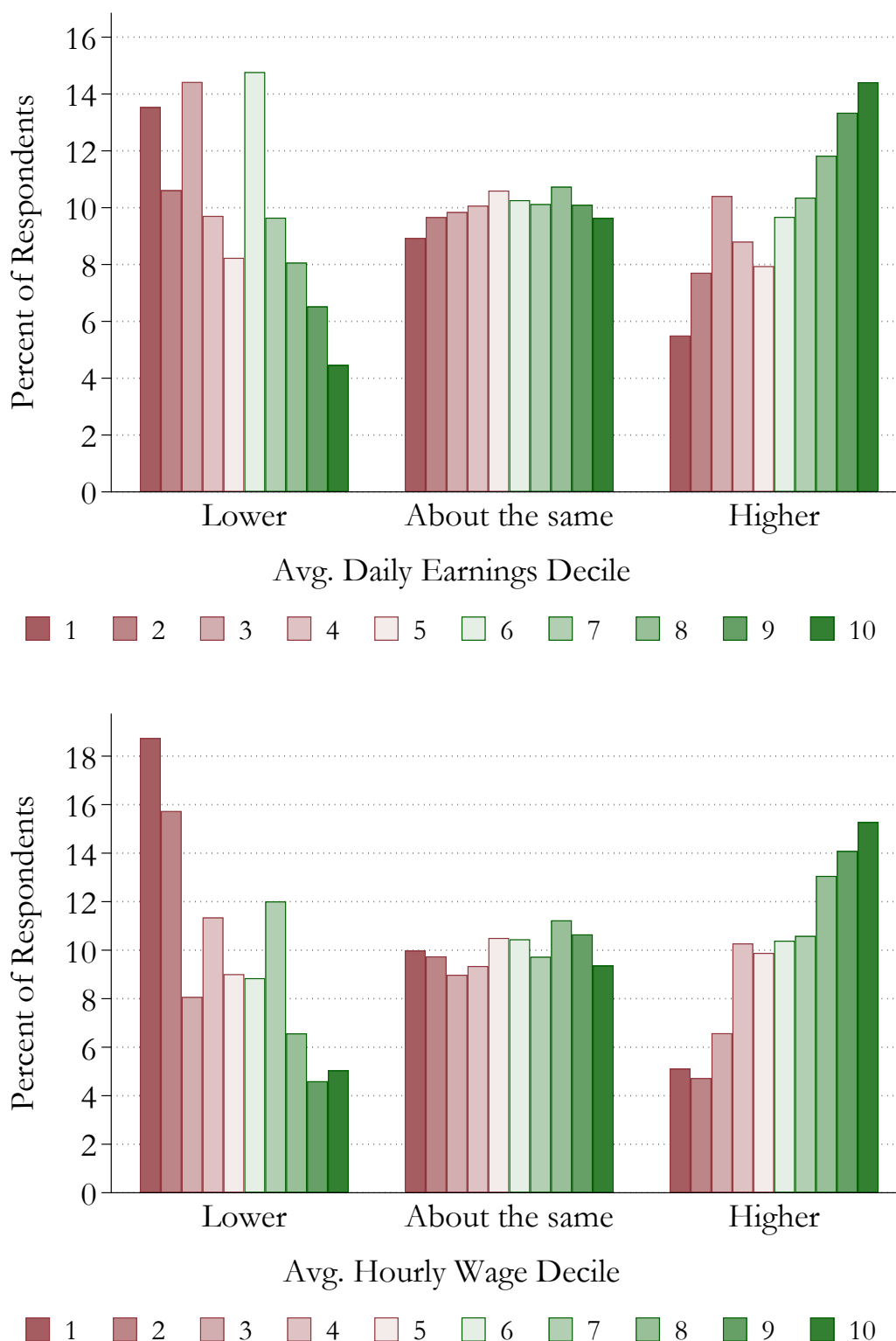
Note: Panel (a) plots the share of firms in deciles of residualized average earnings at the firm level, by responses to the survey question: *"Do you think that this company offers lower or higher salaries than competing companies in your industry?"* Panel (b) plot the share of firms in deciles of average hourly wages at the firm level. Figure 1 in the main text plot the share of firms in deciles of AKM firm fixed effects.

Figure A.6: Beliefs About Wage Policy and Firm Characteristics

Note: The figure reports OLS estimates of beliefs about wage policy on firm characteristics. The survey question is: *"Do you think this company offers lower or higher salaries than competing companies in your industry?"*

Figure A.7: Rank-Rank Estimates of Beliefs About Wage Policy
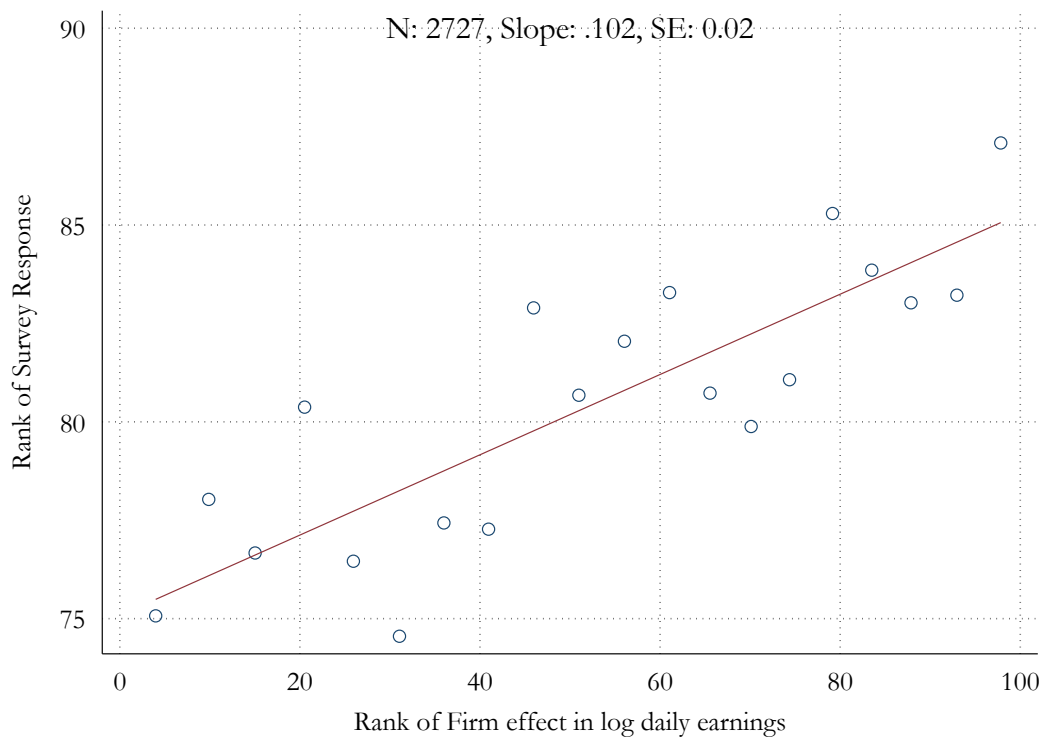
Note: This figure reports the rank-rank estimates between the survey responses and the employer-specific wage premiums in the labor market administrative data.

Figure A.8: Pay Premiums and Labor Productivity

N: 1585, Slope: .1, SE: 0.01

Note: The figure shows the correlation between employer-specific wage premiums and value-added per hours (labor productivity).

Figure A.9: Pay Premiums and Fringe benefits
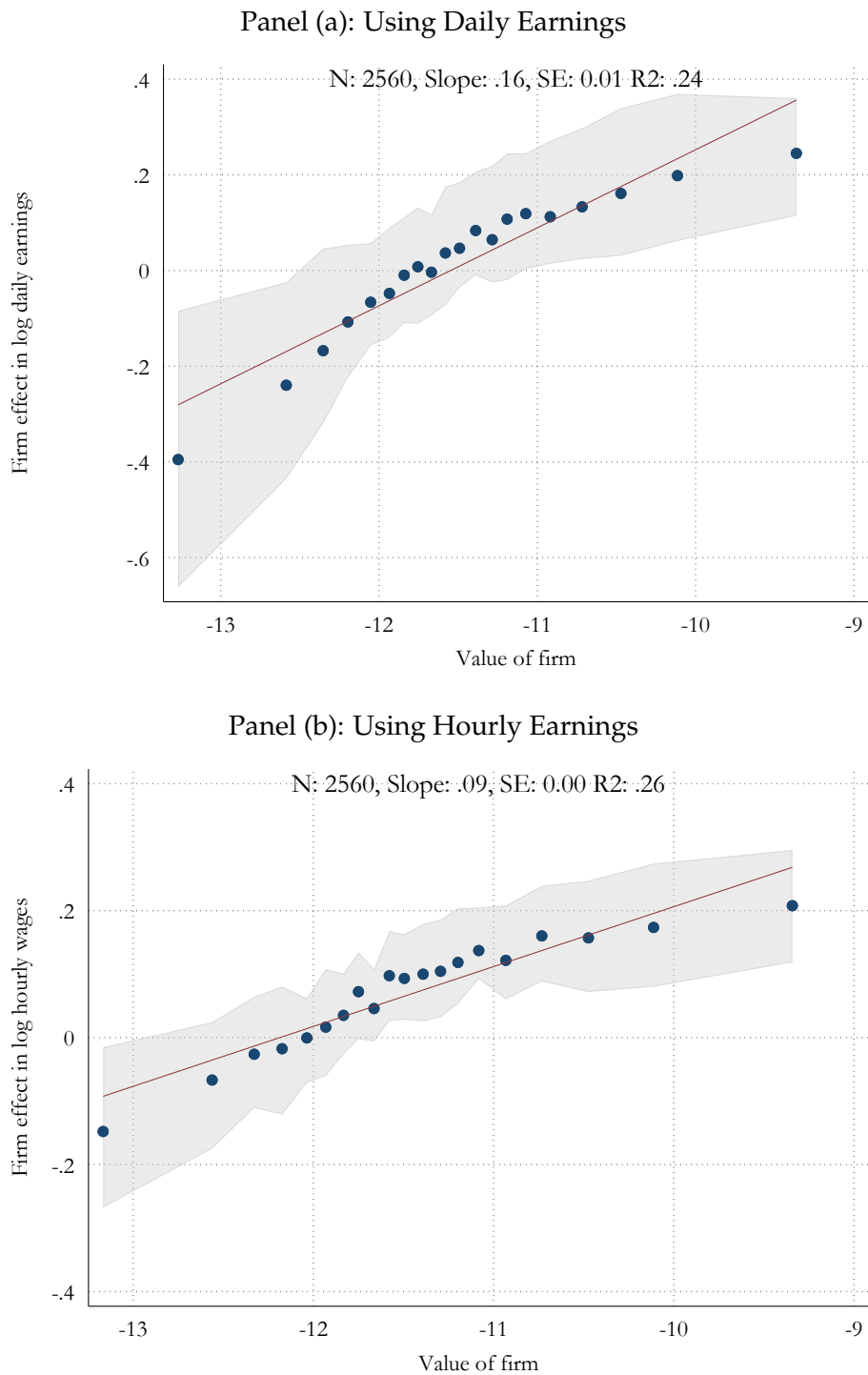

N: 1413, Slope: 1.87, SE: 0.35
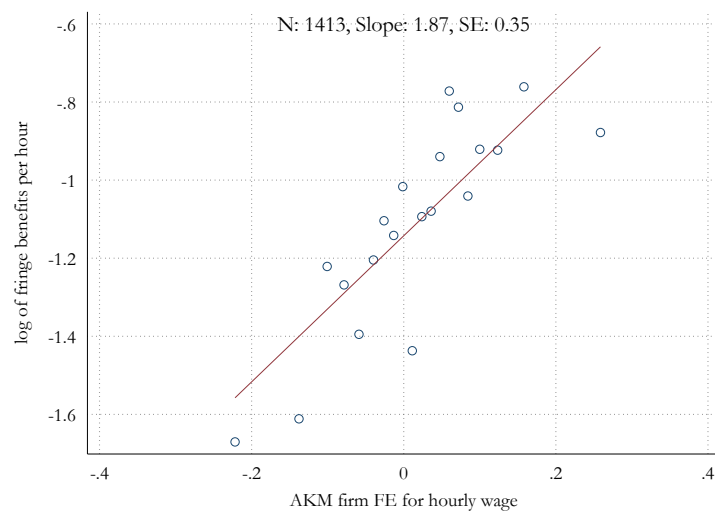
Note: The figure represents a binscatter linking employer-specific wage premiums to payments fringe benefits.

Figure A.10: Pay Premiums And Quit Rates
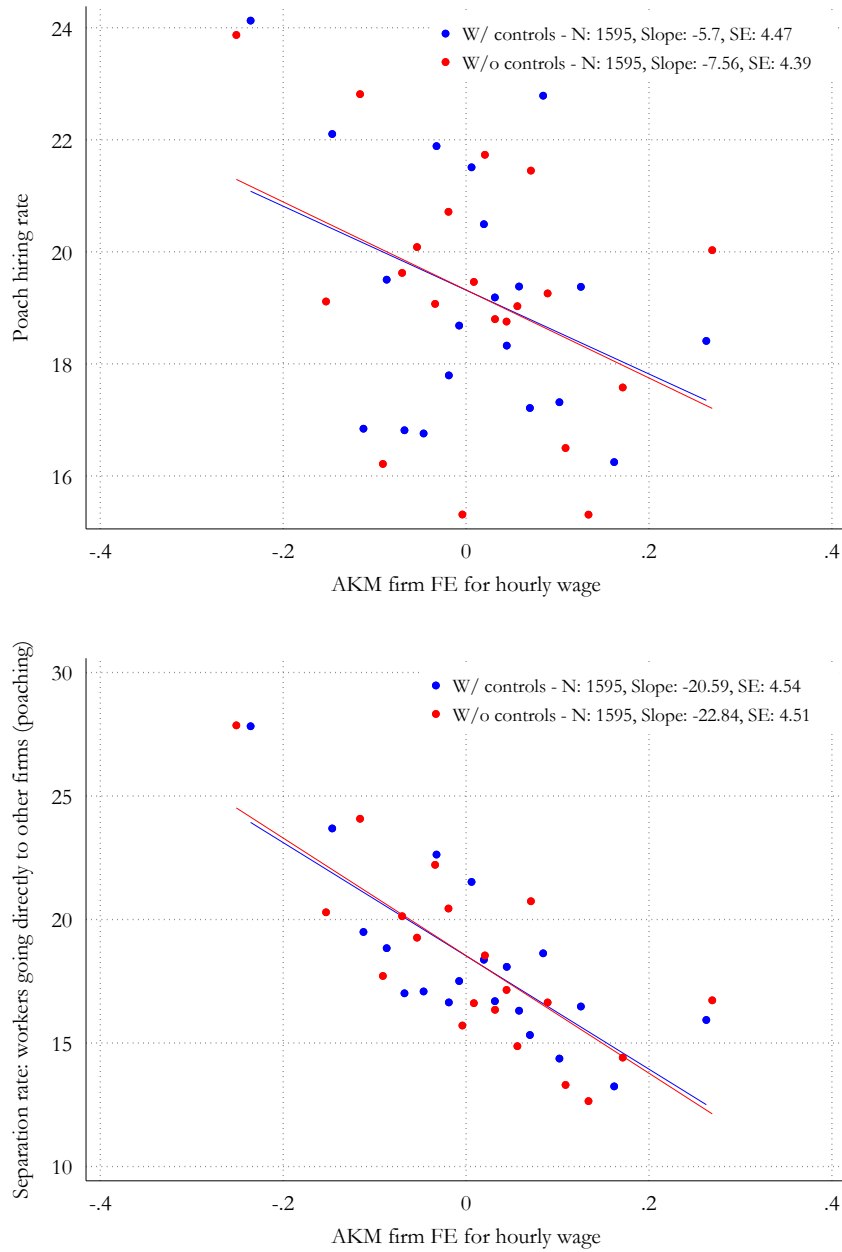
Note: The figures represent the relationships between the estimated AKM firm effects and share of EE-hires and EE-separations. "With control" specifications include industry times region fixed effects

Figure A.11: Pay Premiums and Revealed Preference Estimates

Panel (a): Using Daily Earnings

N: 2560, Slope: .16, SE: 0.01 R2: .24

Panel (b): Using Hourly Earnings

N: 2560, Slope: .09, SE: 0.00 R2: .26

Note: These figures report the estimates between employer-specific pay premiums estimated using an AKM model, to the estimates of the value of a firm using the revealed approach as in Sorkin (2018).

C Tables

C.1 Data Sources

Table A.2: Response Rate, Matching Rate and Sample Selection

	Number of observations
Matching Survey data to administrative datasets:	
Response rate:	
Response rate for participation in the survey (1, 2, 3)	15.25% (3329/21835)
1. Respondents don't want to participate (no data available)	16.28% (542/3329)
2. Respondents answer to some questions (some missing data)	14.42% (480/3329)
3. Respondents answer to all questions (no missing data)	69.30% (2307/3329)
Response rate for participants (2,3)	12.76% (2787/21835)
Sample Selection (Survey and administrative data):	
1)Little HR knowledge	9.22% (257/2787)
2) Missing answers	5.10% (142/2787)
3) Incoherent answers	1.44% (40/2787)
1) 2) and 3)	10.73% (299/2787)
Number of observations before -2787- and after -2488- sample selection.	

Note: The table reports the response rate in the survey and the sample selection steps to construst the sample. There are 21,836 firms that have been contacted by email (*e-boks*) that can be matched in the matched employer-employee (BFL) and the financial account (FIRM) data sets. It represents the population of the private and public limited firms (ApS and A/S) with at least five employees in 2019 and non-missing financial account data. Under the column *Sample Selection (Survey and administrative data)*: **1) Little HR knowledge** means that we delete observations where respondents answer *"I know only a little about pay and employment conditions."* to the question *"In the following questions, we ask about salary and hiring practices. How close are you to such decisions?"* or respondents who do not answer this question. **2) Missing answers** stands for respondents who do not answer at least 10 questions out of the 34 questions on the impact of the 2020 pandemic, on pay and layoffs. **3) Incoherent answers** stands for respondents whose answers contradict themselves. For example, in the question, *"Has your company used the following practices in 2020?"*, if the respondent selected *"pay cut"* and *"none of the above"* at the same time are deleted.

Table A.3: Summary of the Data Sources

Dataset (name in parenthesis)	Source	Year	Main Variables
Our survey	——	2020	Employers' views on wage setting
Employer-Employee (BFL)	DST	2018-2021	Compensation, hours worked, occupation
Employer-employee (IDAN)	DST	2019	Workforce characteristics
Income (IND)	DST	2019	Workforce characteristics
Education (UDDA)	DST	2019	Workforce characteristics
Salary statistics (LONN)	DST	2009-2020	Breakdown of pay (base pay and total pay) and hours (normal and overtime)
Company Statistics (FIRM)	DST	2019-2020	Value added, revenue, etc
Confederation of Employers	DA	2019	Level of wage setting
Occupation-level vacancy and unemployment data	STAR	2019	Tightness measure

Note: The table reports the data sets that we use. The data sets come from the national statistical agency (DST, *Danmarks Statistik*), from the agency responsible for the implementation of the employment policy (STAR, *Styrelsen for Arbejdsmarked og Rekruttering*), and the largest confederation of employers (DA, *Dansk Arbejdsgiverforening*).

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