Firm Beliefs About Wage Setting

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Preliminary.

This paper yields new insights into why similar workers are paid differently by surveying a representative sample of Danish firms and linking responses to administrative data. We find that a substantial minority of firms—about 18 percent —have inaccurate beliefs about their position on wage distribution. Inaccurate beliefs are more likely to occur for smaller firms. We study implications of firms' inaccurate beliefs by building a tractable monopsony framework. Using our survey, we elicit firms' motives for setting high wages. The dominant motive aligns with wage posting models, i.e., to retain and attract new employees. Compensating for negative job characteristics is the least common motive.

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1. Introduction

Employers offer different wages for identical work. This holds across worker groups, over time, and across countries, making it one of the most important recent findings in labor economics (Kline 2024). Driven by the evidence, recent studies of wage setting reflect the paradigm shift from "markets set wages" to "firms set wages" (Card 2022)).

To make progress on the importance of firms in wage inequality, the empirical literature has used high dimensional fixed effects methods.[1] Although rich, the literature does not yet have solid evidence on how employers perceive their wages compared to other firms and the firm's viewpoint about their wage policy. Firms' beliefs on that matters are important to gauge for several reasons. First, firms with inaccurate knowledge about the market wages can be a source of wage dispersion (Cullen, Li and Perez-Truglia 2024). Comparing what firms think to their actual position—whether firms have accurate or inaccurate beliefs—is one way to measure the extent of friction on the *firm side* as a factor contributing to wage inequality. There are reasons to believe that frictions on the firm side can be non-negligible. Indeed, in countries (as in the US and Denmark) where detailed wage floors do not guide a firm's wage setting, where it is illegal for firms to share information regarding their workers' wages, and where posted wages on job search platforms are very rare, firms could have difficulties to have precise knowledge on their own firm wage differences compared to their competitors.[2] Second, eliciting firms' beliefs for setting higher wages than competitors is useful as it directly speaks to the premises of the canonical Burdett–Mortensen model, a workhorse model in the study of wage and employment dynamics. In this framework, some firms set high-wages to retain existing employees and attract new ones.

To our knowledge, this paper offers the first large-scale and representative evidence on how employers perceive their wages and their reasoning for setting higher or lower wages than other firms. We do so by designing and implementing a representative survey of firms. We conducted the survey in the Summer of 2021 and use several tests to validate the quality of the data. The main sample contains elicited firms' beliefs

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[1]See among others, Di Addario, Kline, Saggio and Sølvsten (2023), Lachowska, Mas, Saggio and Woodbury (2022, 2023).

[2]Batra, Michaud and Mongey (2023) document that 6 percent of online job posts contain point wage in the U.S. Point wage is also very rare in job posts in Denmark. Sectoral wage floors are also very rare in Denmark. This contrasts with some European countries. For instance, Gautier (2017) documents 60,000 minimum wage floors in France from 2007-2016 (roughly 3,000 collective wage agreements, with 6,500 levels of qualification across 367 industries). In April 2023, the European Union voted on a directive on wage transparency that will impact all EU countries by 2026.

for about 2,800 firms. The main question that we use is: "Do you think this company offers lower or higher wages than competing companies in your industry? Competing companies are other employers that hire people with the same abilities in your region." Firms must respond on a five-point scale (from much lower to much higher). Crucially, we link our survey to administrative data that allows us to benchmark firms' beliefs to objective measures of their wage policy. When firms declare that they pay higher or lower than competitors, we ask why, with the possible answer being in line with different canonical models from labor economics.

This paper's first insight is that a substantial minority of firms have inaccurate beliefs about their position in wage distribution. Indeed, some firms believe they pay "About the same" as their competitors even though they are positioned in the tails of the wage distribution. There are also firms that think they pay higher wages or lower wages, whereas the administrative data show the opposite. We measure the extent of inaccurate beliefs by measuring the joint distribution, i.e., the fraction of firms by survey responses and firm objective wage measures. Using our preferred characterization of inaccurate beliefs, we estimate that about 18 percent of firms hold inaccurate beliefs about their position on the wage distribution.

We find similar patterns when we measure firm wages using the residualized (by observable worker characteristics) firm wages.

This paper's second insight is that most firms that declare being high-paying do so to alleviate search frictions, and a minority do so to compensate for negative job characteristics. Specifically, about 90 percent offer high wages to retain employees and slightly less to attract the best candidates. 40% respond that the speed of the recruitment process is not a motive to set high wages, much less than the 90% who declare to do so to retain employees. Around two-thirds pay higher wages to increase morale, reduce the need for monitoring, and share rents. 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 only 15 percent of low-wage employers say they do not need to raise pay due to few competing employers.

1.1. Contribution to the literature

We contribute to the literature that explains why similar workers are paid differently (Mortensen (2003)). Evidence on how wages are actually set by firms is still limited, as argued in Card (2022). Up to now, most studies focus on showing that firm wage effects

matter for wage inequality across groups, over time, and across countries. Kline (2024) survey this literature. Existing evidence focuses on the wage-setting of new hires and, in particular, the importance of wage bargaining compared to wage posting. There is also very limited evidence on wage posting vs. bargaining. Brenzel, Gartner and Schnabel (2014) and Caldwell, Haegele and Heining (2024) survey German firms on this question. Like us, Caldwell, Haegele and Heining (2024) use a novel survey of firms that fielded in 2021 and linked to administrative employer-employee data. Bewley (1999) (chapter 7) interviewed about 150 business owners and gathered insights on the reasons to set higher wages.

A few studies speak to the extent of firm-sided frictions as a factor contributing to wage inequality. Using a natural experiment, Cullen, Li and Perez-Truglia (2024) show that firms with access to a salary benchmarking tool change their entry wages in the US. Also consistent with our evidence, Hjort, Li and Sarsons (2020) and Hazell, Patterson, Sarsons and Taska (2022) document how firms set wages across space. They document firm-wide wage-setting practices that vary little with the wages of other firms in the same labor market. In a model with employer optimization frictions, Dube, Manning and Naidu (2020) show that employer misoptimization can explain one feature of US wage distribution: bunching at round numbers. Beliefs have been mainly studied from the worker perspective. We believe this paper and Cullen et al. (2024) complement worker-level survey papers showing that workers have inaccurate beliefs about the external wage distribution.[3]

Our evidence on elicited firms' strategies to pay higher (or lower) speak to labor market models that explain wage inequality for similar workers (e.g., Bagger and Lentz (2019), Taber and Vejlin (2020), and the above-mentioned papers). Some studies (e.g., Lamadon, Mogstad and Setzler (2022)) find that a substantial part of firm wage effects reflect compensation differentials for firm-specific disamenities. Other studies (e..g, Bassier, Dube and Naidu (2022)) find evidence against this view. We find that the premises of the canonical Burdett–Mortensen model (Mortensen 2003)– an employer's wage policy is designed to retain existing employees and attract new ones – are the most common firm strategy to set higher wages. Compensating differential for negative job traits plays a less prominent role.

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[3]See, e..g, on worker wage beliefs, Caliendo, Cobb-Clark and Uhlendorff (2015), Jäger, Roth, Roussille and Schoefer (2024), Caliendo, Mahlstedt, Schmeiber and Wagner (2023), Mueller, Spinnewijn and Topa (2021), Menzio (2023), Braun and Figueiredo (2022).

2. A Firm Survey Linked To Administrative Datasets

2.1. Wage Setting in the Danish Labor Market

Before presenting our data, we provide background on the Danish labor market. We describe minimum wage floors at the sectoral level, salary benchmarking and transparency practices, and the importance of firm wage effects on wage inequality.

Minimum wage and wage floors. There is no national minimum wage in Denmark. Sectoral collective agreements covered 87% of private sector employees in 2017 (DA 2020). 87% is comparable to other Scandinavian countries and approximately ten percentage points higher than in continental Europe (Bhuller, Moene, Mogstad and Vestad 2022). However, being covered by a collective agreement does not mean that a wage floor (i.e., a minimum wage in the industry or industry-position level) is set at the sectoral level.[4] Wages are set at the firm level for 80% of workers.

Even if wages are set at the firm level, wage floors applies mainly to entry-level positions. By firm level, we mean that a salary grid is negotiated at the firm level, or there is no particular guideline, and the wage of a particular employer is entirely bargained with her employer. These correspond to the wage-setting practices called in Danish "*minimallønssystemet*", "*mindstebetalingssystemet*, and "*uden lønsats*". For the remaining 20% of the workers, the sectoral level agreements set out all the main terms, including wages ("*normallønssystemet*"). Therefore, as summarized in (Mortensen 2003, page 83), Dahl, Le Maire and Munch (2013) and Labanca and Pozzoli (2022), wages are negotiated mainly at the firm level in Denmark.[5]

Salary benchmarking and salary transparency. As in the US (Cullen 2024), firms cannot share information regarding their workers' wages with other firms (Datatilsynet 2023).

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[4]*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).

[5]There is a wide range of 'sectoral' wage floors levels among OECD countries. The OECD 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). Bhuller et al. (2022) classify countries into three groups according to the wage setting level. Portugal, France, Italy, Iceland, Germany, Austria, and Belgium are categorized as "sectoral". Israel, Luxembourg, Australia, Switzerland, Spain, Finland, Sweden, Norway, Netherlands, and Denmark are categorized as "some sectoral". United States, New Zealand, Greece, Canada, United Kingdom, Ireland, and Japan are categorized as "firm".

The employer association Dansk Arbejdsgiverforening (henceforth DA) provides the main salary benchmarking tool. We discussed with one employee of the employer association Dansk Arbejdsgiverforening (henceforth DA). We learned that a minority of DA members use the salary benchmarking tool. To our knowledge, DA is the only provider of large-scale salary benchmarking surveys in Denmark.[6] Firms in Denmark must prepare wage statistics and share them with their employees. However, there is no such transparency at the job application level. For instance, it is very to find a posted wage in the two most relevant job search platforms in Denmark (Jobindex and Jobnet).[7] Hence, employers cannot learn from the wage policy of their competitors through mandatory wage range posting like, for instance, in Austria (e.g., Frimmel, Schmidpeter, Wiesinger and Winter-Ebmer (2024)).

Wage inequality and firm wage effects. Table A.1 reports that about 7 percent of the wage variance wage in Denmark between 2008 and 2021 is explained by firm wage effects. Our estimates are in line with previous estimates (e.g, Sørensen and Vejlin (2013), Lentz, Piyapromdee and Robin (2023) and Morin (2023) reports that firm effects explain about 8% to 14%.) Overall, although still significant, the role of firms in explaining wage inequality is somewhat less important in Denmark compared to other developed economies (Palladino et al. 2024).

2.2. Measuring Firm Beliefs About Wage Setting

We describe our survey, which elicits firms' strategies for wage-setting and their beliefs.[8]

Population Studied. The target population that we want to survey is most private and public limited companies (ApS, *Anpartsselskab* and A/S, *Aktieselskab*) in Denmark that were active in the first quarter of 2021. We did not send the survey to firms in the agricultural and mining sectors or to the sole-proprietorship companies (self-employed, *"Enkeltmandsvirksomhed"*). We exploit information on nonrespondents obtained from the administrative records to build weight to correct for weak selection (see below).

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[6]The largest companies in Denmark conduct their survey, as it has been documented in the US by Bewley (page 92).

[7]In April 2023, the European Union voted a directive on pay transparency that will impact EU countries, including Denmark (link). A Danish national law has to pass at the latest in 2026 (link).

[8]When designing the survey, we follow the working paper version of Stantcheva (2023) on how to run a survey.

Implementation.   The international consulting company Ramboll conducted the on-line survey by sending invitation emails to companies in June 2021. Online surveys give respondents more flexibility to complete the survey and are less subject to social desirability bias. The coverage error, the difference between the potential pool of respondents and the target population, should be zero, as firms must be able to receive digital mail from the authorities (e.g., the tax authority). Firms' email addresses (via e-boks) are publicly available at datacvr.dk. As all firms are sampled, the planned sample corresponds to the potential pool of respondents.[9] The survey closing date was at the beginning of August 2021, and a couple of reminders were sent in July 2021 to increase the response rate.

The email contained an invitation letter with information about the survey. For example, the deadline to complete it, the funding partner, the incentives for the respondents (i.e., getting an anonymized benchmark report), and compliance with data protection rules. The letter was designed to recruit as many respondents as possible, minimize selection bias, and appear legitimate and trustworthy. To do so, the actual topic of the survey was kept vague, and simple language was used to minimize selection bias. The University of Copenhagen logo was visible, and we explained that all data generated comply with data protection rules.

Questionnaire.   The survey contains questions on firm beliefs about layoffs, wage cuts, hiring obstacles, and abilities of employed vs. unemployed workers. Those questions are reported and analyzed in Bertheau, Kudlyak, Larsen and Bennedsen (2023b) and Bertheau, Larsen and Zhao (2023a). The survey contains questions about the respondent (job function in the company, knowledge of HR policies), firm characteristics to test the validity of our data (firm size, change in revenue from the previous year), and firm characteristics are unobservables in administrative data (e.g., ownership type).

2.3.   Measures of Firm Wages, Firm and Aggregate Labor Market Characteristics

We link the survey with administrative datasets using the firm-level identifier, the CVR number. We aim to check the quality of our survey data and measure firm and labor market characteristics to explain firm beliefs about wage setting.[10]

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[9]The only variation coming from the target population to the actual sample is a nonresponse error. Nonresponse errors come from respondents ignoring the invitation or answering that they don't want to participate.

[10]The data providers are administrative Statistics Denmark, the National Employment Policy Agency (STAR), and the largest employer association (Dansk Arbejdsgiverforening, DA).

Measuring hourly wages. We use the dataset *IDA ansættelser* (IDAN) dataset to measure workers' annual earnings, hours worked, and occupation codes linked with firm identifiers. It contains information on the worker-firm-year frequency for all workers. Earnings is defined as pre-tax labor earnings subject to labor income taxation. Hours worked include annual paid hours: contractual and overtime hours.

Measuring firm characteristics. We focus on firms (and not establishments) as it correspond to the notion of an employer. We use the dataset *Generel firmastatistik* (FIRM) to measure firm age, location, industry categories, and information from the income statement of all private-sector firms. Value-added measure gross revenue minus expenses for intermediate inputs. Worker characteristics are obtained from several registers (IDAP, IND, UDDA, BFL). We measure workforce characteristics by aggregating worker-level information at the firm level.[11]

Measuring market characteristics that firm faces. We use administrative data from a government agency (STAR) that registers the universe of online vacancies and unemployed individuals to measure labor market tightness.[12] We use a dataset from the largest Danish employer association that registers the level of wage-setting (sectoral or firm-level) that applies to each occupation (1-digit level) by industry (3-digit level).

Measuring employer-to-employer transitions. We use the dataset *Beskæftigelse for lønmodtagere* (BFL) to construct measures of direct hiring from other firms. The key advantage of this dataset is that it contains the date at the daily frequency of each job spell that we use to measure employer-to-employer (EE) transitions, aiming at measuring voluntary transitions (see Bertheau and Vejlin (2022) for evidence of EE transitions in Denmark).

2.4. Sample Description

Our dataset is unique as we precisely measure a firm's wage policy with labor market data, firms' output with value-added data, and firms' characteristics coming from workforce characteristics.[13]

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[11]We use the dataset *Uddannelser* (UUDDA) to measure educational attainment.

[12]Vacancy data cover the universe of job vacancies posted online in Denmark. Vacancies are scraped from the two largest job board platforms in Denmark. In Denmark, workers must file their occupation at the start of any unemployment spell. Public employment services manage Jobnet, and Jobindex is a privately owned job board.

[13]For example, all paid hours are recorded, and earnings and hours are not top-coded. We measure labor productivity using value-added per full-time equivalent workers and not sales.

Sample selection.   Recall that the target population of our survey is private and public limited companies (ApS, Anpartsselskab, and A/S, Aktieselskab) in Denmark that were active in the first quarter of 2021.[14] We add the following additional sample selections. We focus on firms with estimated AKM firm fixed effects (presented below) that employed at least one worker in 2019, 2020, and 2021. We do not study firms from three small sectors with limited competition. Specifically, we drop observations for mining and quarrying (Code B in NACE Rev 2), electricity and gas supply (code D in NACE Rev 2), and water supply (code E in NACE Rev 2). We also drop firms located in Bornholm, a small island.

On the survey, we focus on firms that answer the survey question about the firm's beliefs about their wages compared to other firms, with information on the respondent's job function and the respondent's response about the firm's revenue growth rate aligns with the firm's revenue growth rate in the firm-level administrative data (the dataset FIRM).[15] Finally, to ensure respondents self-report that they know HR practices, we use the following question in our survey. "In the following questions, we ask about pay and employment practices. How close are you to such decisions?" There are three options. 1." I am responsible for wage and employment conditions." 2. "I am not responsible, but I know about wage and employment conditions" 3. " I know only a little about pay and employment conditions. We focus on respondents who reported options 1 or 2.

Overall, these sample restrictions aim to focus on active firms for several years, with a well-defined industry and local labor market, and with respondents who know the HR practices of the firm.

Representatitiveness.   Table 1 shows that our sample of firms is quite representative of the population under study. Column 1 reports the number of employees, firm age, industry categories, and other firm characteristics about the population of firms under study.[16] Column 2 reports our sample. Comparing the number of observations in Columns 1 and 2, we infer that the response rate is 9.11% (2802/30732) for the linked survey-administrative data. It is high for non-mandatory government surveys (e.g., Scur et al. (2021) report that response rates of 0.1% to 13% in recent surveys.).

One important statistic to remember is that 30.4 percent of firms in our sample

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[14]Our dataset does not cover self-employed (sole-proprietorship) or "Enkeltmandsvirksomhed".

[15]We drop observations in the bottom and top percentile of the difference between the revenue growth rate between the survey and the administrative data (for the revenue growth rate between 2019 and 2020).

[16]Firms are classified following the NACE Rev 2 classification at the first level of aggregation. Due to the small number of firms in some industries, we combine finance (code K) and real estate (code L). We also combine other services (code S) with arts, entertainment, and recreation (code R).

employ between one and ten employees. For comparison, of the 246 companies that Bewley (1999) interviewed between 1992 and 1994 in Connecticut, only 4 percent had one to nine employees. Caldwell et al. (2024) surveyed 772 German firms between 2021 and 2022. Eight percent had one to nine employees. 91.8% of firms can be linked with value-added information (labeled "With Productivity" in Table 1.). Quite remarkably, the percent of firms in the top quartile of the AKM firm wage effects (labeled "AKM Wage Effects (Q4)") is very similar in our sample compared to the population of the firms under study. Overall, our sample covers both small and large, young and old, and companies from different industries and average wages.

Correcting for non-response bias.   Using an entropy-balancing estimator (Hainmueller and Xu 2013), we re-weight observations to match the population distribution for firms: number of employees, age, percentage of firms in different sectors (manufacturing, services, and other sectors), average hourly wage. Column 3 reports a weighted sample. There is no difference between the population and our re-weighted sample in terms of key firm characteristics, rending our sample representative of the population of Danish firms. We use these sampling weights throughout the rest of the paper.

Table 1 also describes some variables from our survey. 84% of respondents are managers or owners of the company. Around 8% think they pay lower wages, 75% think they pay higher wages, and 17% think they pay higher wages than their competitors.[17]

Survey validation.   We compare responses from our survey to administrative data to gauge the quality of our data. We use the survey question "How much did revenue change in 2020 compared to 2019?" in our survey and the administrative data on revenue changes from 2020 to 2019. Figure A.1 shows that respondents have good knowledge about the financial situation of their companies. Less than 10 percent of firms report that they have grown over the years 2019-2020, but they have shrunk.

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[17]Appendix Table A.2 shows firm characteristics from administrative data by firm beliefs about their wages compared to their competitors. Larger firms do not necessarily think they pay higher wages. We also do not find variation across the age distribution.

TABLE 1. Characteristics of The Target Population and Surveyed Firms

	Population	Surveyed	Surveyed (Weighted)
Number of Employees (%)			
1-10	36.6	30.4	33.4
11-50	49.8	51.1	51.8
51-200	10.8	14.2	12.0
201+	2.8	4.2	2.8
Firm Age (%)			
1-10	33.9	25.0	32.5
11+	66.1	75.0	67.5
Industry (%)			
Agriculture	1.9	1.7	2.3
Manufacturing	13.7	17.0	13.7
Construction	16.9	14.3	16.1
Trade	25.8	25.7	24.3
Transport	4.8	5.2	5.3
Accomodation and Food Services	7.0	4.0	6.0
Information Services	6.7	8.1	8.6
Finance and Real Estate	3.4	1.9	1.9
Professional Services	8.4	11.5	10.5
Administration Services	5.6	6.4	7.0
Other Services	2.6	2.1	2.5
Health	3.1	2.0	2.0
Other Firm Characteristics			
Log Wages	3.4	3.4	3.4
AKM Wage Effecs (Q4)	25.0	25.4	24.7
With Productivity	87.9	91.8	90.7
Productivity (in Th. EUR)	103.4	111.6	103.9
Copenhagen area (%)	27.5	25.7	27.5
From Our Survey (%)			
Manager respondent		83.5	84.3
Lower wage		8.2	8.6
About the same		74.6	74.5
Higher wage		17.2	16.9
Observations	30732	2802	2802

Note: This table reports the mean characteristics of surveyed firms and the population of firms considered. Column 1: the eligible study population of firms consists of all Danish limited liability companies in the industries listed in the table. Column 2: firms that responded to our survey linked to administrative employer-employee data. Column 3: Weighted sample. See text for details.

3. Firms Knowledge About Their Position on the Wage Distribution

3.1. Measures of Firm Wage Differences: In Our Survey and in Administrative datasets

Survey data. The survey questionnaire elicits firms' beliefs about their rank on the wage distribution using the following question:

"Do you think this firm offers lower or higher wages than competing companies in your industry? Competing companies are other employers that hire people with the same abilities in your region."

Respondents have five options: much lower, lower, about the same, higher, and much higher. The original Danish questionnaire is reported in the Appendix. With this wording, we ask only one specific thing (their beliefs about their rank) and try to hold everything as equal as possible. Specifically, we give a frame to the respondents by specifying that we are interested in within-industry variations, and we also define what a competitor is. Denmark has five main regions, and the most common industry classification is the NACE Rev 2 classification at the first hierarchical level. We use the industries presented in Table 1.[18]

Firm wage differences in administrative data. The main measure of firm wage is the mean hourly wage adjusted for worker composition. Specifically, we regress the mean hourly wage in 2021 on the firm's average workforce characteristics (age and education), as well as on average hours, the fraction of females, and the worker fixed effects retrieved from the AKM model (presented below). The rich information on earnings, hours, and workforce characteristics allows us to construct a good proxy for objective wages, which allows us to compare it to firms' beliefs. Our survey question mentions the abilities of workers that a firm typically hires. To be as close as possible as to the survey question, we measure worker abilities using observable characteristics (age and education) and a proxy for unobservable characteristics of worker fixed effects. Worker fixed effects are estimated from an AKM model, which importantly measures separately the time-invariant firm-specific wage effects and the time-invariant worker-specific wage effects. [19] Also, recall that in our survey question, we specifically defined a competitor firm as a firm within the same industry and region. The regions are the 5 administrative regions

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[18] We use fewer industries because public-sector (teaching, public administration) related as well as small and specific (utilities, mining) industries are excluded. Also, we combine some industries (finance with real estate and arts and entertainment with other services).

[19] 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).

in Denmark (corresponding roughly to the five main "local" labor markets), and the industries are classified as shown in Table 1. Of course, there are possible alternative measures of firm-driven wage differences from matched employer-employee data. We show below that our findings are robust to alternative measures.

3.2. Firm's Precision of Knowledge About Wages of Other Firms

Figure 1 reports our main findings regarding firm precision of knowledge about their own wages compared to other firms. The x-axis presents survey responses gathered in three groups. We group "higher" and "much higher" in one category. We do the same "lower" and "much lower". The y-axis present the percent of firms in quitiles of objective wage differences, as defined above.

FIGURE 1. Firm Beliefs About Their Wages And Objective Wage Differences
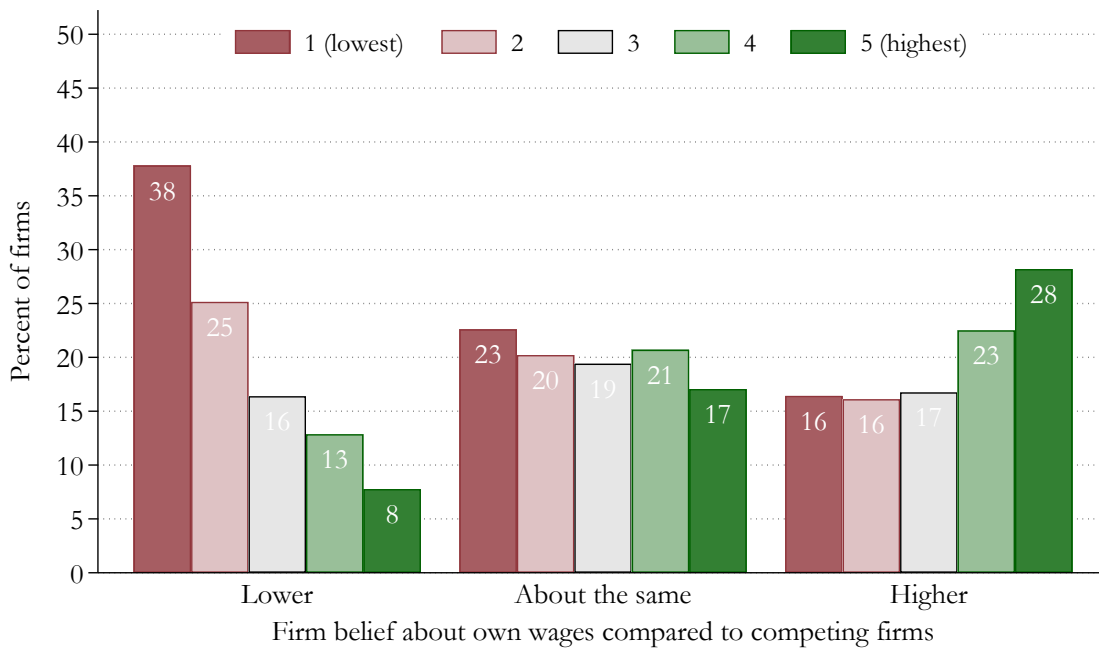
Notes: This figure plots the percent of firms in quintiles of firm wages measured in matched employer-employee data by responses to the survey question that elicits a firm's beliefs about own wages compared to competing firms. Firm wage measure is the average hourly wages in 2021 (adjusted for workforce characteristics). See text for details.

Focusing on firms that think they lower wages than other firms (8.2% of the 2802 observations), 38% are in the lowest quintile of objective wage differences, and only 8% are in the highest quintile. There is a clear relationship between what firms think and their actual rank in the wage distribution for firms that think they pay lower than

other firms. However, firms that reply to pay about the same (74.6% of firms) have less accurate knowledge. Instead of an inverted U-shape pattern, as we expect if firms have, on average, precise knowledge of their wages compared to other firms, we find a rather flat pattern across the objective wage differences distribution. 23% think they pay about the same while they are ranked in the lowest quintile, and 19% think they pay about the same while they are in the third quintile. Finally, firms that think they have higher wages (17.2% of firms) are on average right, as 28% of firms are located in the highest quintile and about 16% are located in the lowest quintile. Hence, there is a 12 percentage point difference between the highest and lowest quintiles, which is lower than the 30 percentage point difference between the highest and lowest quintiles for firms that reply low.

Figure A.2 plots for the three survey responses (lower, about the same, and higher) by deciles of firm wage differences (constructed as in Figure 1). Splitting into deciles reveals that the aggregation of firm wage differences in administrative data in quintiles does not drive the result in Figure 1. In addition to the percent of firms in each decile, Figure A.2 reports calculated the quadratic prediction. The prediction curve visually reveals that a higher percent of firms that think to be low-paying firms are indeed low-paying firms, in comparison to firms that think they are high-paying and are high-paying.[20]

Alternative firm wage differences in administrative data. We additionally estimate an AKM model to recover firm-specific relative wage 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 year t. Hourly wage is defined as annual earnings divided by annual hours of work. X_{it} are year dummies and quadratic and cubic terms in age fully interacted with four levels of educational attainment.[21] α_i is the worker effect (a time-invariant portable component of earnings ability), $\psi_{j(i,t)}$ is the firm effect (a time-invariant firm-specific relative wage premiums), and ε_{it} is a time-varying error term capturing shocks to human capital, person-specific job match effects, and other factors. To maximize the number of workers switching across firms

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[20]Linear probability models with and without respondents' characteristics reveal that the omission of respondent characteristics in Figure 1 and A.2 do not alter the results. see Table A.3 and Table A.4.

[21]The four groups are lower secondary, upper secondary and vocational training, bachelor and short-cycle tertiary education, and Master, Ph.D., or equivalents. We focus on individuals between 20 and 60 years of age who are not students. We select the main employer for each person for each year (the main employer is based on the highest annual earnings).

and therefore reduce the bias in person and firm effects, we estimate the AKM model from 2015 to 2021. To limit noise in the estimate of firm wage effects, we also restrict to firms with at least ten movers.

Figure A.3 plots the percent of firms in quintiles, but this time uses four alternative definitions of wages in matched employer-employee data. Panel (A) reports firm-level mean wages adjusted for education and age of the workforce (and not additionally adjusted by work hours, gender composition, and the worker fixed effects as in Figure 1). Results are overall similar. Still, even more firms that report paying are in the lowest quintile (46 percent instead of 38 percent), and more firms that report paying high are actually paying high (30 percent instead of 28 percent). This indicates that worker unobservable characteristics and other aspects do not play a significant role. Panel (B) reports the unadjusted firm-level wages, and the results are similar. Finally, Panel (C) and (D) use directly the fixed effects methods typically used to measure firm wage differences (Kline (2024)). As these wage premiums can be noisy for a limited number of movers, we use a common alternative in the literature which consist of limited the sample to firms with at least 10 movers over the period study (2015-2021) (Morchio and Moser (2023), Palladino et al. (2024)).[22] Interestingly, for either Panel (C) or (D), not more firms that report paying low are in the lowest quintile (32 percent instead of 38 percent).[23] Overall, across the alternative measures, the results are very consistent with Figure 1.

3.3. Measuring Firm's Inaccurate Beliefs in Their Wages Compared to Other Firms

Because our question does not provide a quantitative scale, comparing the survey to objective wage measures is not straightforward. Keeping this constraint in mind, our linked survey-administrative data still allow us to provide some bounds on the extent of inaccurate beliefs about a firm's wage compared to mean wages observed in matched employer-employee data. Table 2 reports the extent of inaccurate beliefs. We use several threshold to define what constitute an inaccurate wage beliefs.

In the main definition, an inaccurate belief is when a firm thinks its wages are high (respectively low), whereas the firm is in the bottom (respectively top) quintile of mean wages in matched employer-employee data. When the firm answered "about the same,"

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[22]The bias is about the variance and not the mean estimated firm effects Kline et al. (2020). Still, the estimate can be noisy with very few movers to identify firm effects.

[23]Slightly more firms that report paying high in the survey are paying high in the administrative data (30 percent instead of 28 percent). However, the percent of firms in the *bottom* quintile for firms that declare to pay high is actually higher in either Panel (C) or Panel (D) of Figure A.3 than in Figure 1.

we do not use the same threshold. In this case, an inaccurate belief is when a firm thinks its wage is either in the bottom or top decile. As in Figure 1, the mean wage is the firm-level average hourly wages in 2021 (adjusted for workforce characteristics).

TABLE 2. The Extent of Inaccurate Wage Beliefs

	Mean Wage	Firm Wage Effect
Main definition		
Underestimate	6.58	7.27
Overestimate	11.56	10.66
Total	18.15	17.92
Using top/bottom deciles		
Underestimate	6.24	6.97
Overestimate	10.03	9.21
Total	16.27	16.19
Using top/bottom quintiles		
Underestimate	13.38	15.23
Overestimate	19.62	18.44
Total	32.99	33.67
Observations	2802	2802

Note: This table reports the percentage of firms with inaccurate beliefs about their wages compared to competing firms. In the main definition, an inaccurate belief is when a firm thinks its wages are high (respectively low), whereas the firm is in the bottom (respectively top) quintile of mean wages in matched employer-employee data. When the firm answered "about the same," an inaccurate belief is when a firm thinks its wage is either in the bottom or top decile. Mean wage is the average hourly wages in 2021 (adjusted for workforce characteristics) as presented in Table 1. Firm wage effects is the AKM firm effects, that is, the employer-specific component that measures the monetary advantage or disadvantage of working for that employer.

The table indicates that about 6.58% underestimate and 11.56% overestimate their wages. In total, summing up inaccurate beliefs on both sides leads to 18.15% of firms that have rather imprecise knowledge of their wages compared to other firms. How does that estimate vary with an alternative measure of firm wage differences? Column 2 presents the results using the firm wage effect from the AKM model as presented above. Results are very similar, with a total percent of firms of 17.92%.

3.4. Predicting Inaccurate Beliefs

Table 3 links the firm beliefs on wage-setting and firm size. We use linear probability models to document how the number of employees in a firm predicts the probability of reporting either overestimating or underestimating. We group firms into size different firm size categories and use 11 to 20 employees as the baseline category.

TABLE 3. Inaccurate Wage Beliefs and Firm Characteristics

	(1)	(2)	(3)
1-5	16.9***	16.0***	16.0***
	(3.5)	(3.5)	(3.6)
6-10	6.9***	6.3***	6.0***
	(2.2)	(2.1)	(2.2)
11-20	0.0	0.0	0.0
	(.)	(.)	(.)
21-50	-6.2***	-5.7***	-6.1***
	(1.8)	(1.8)	(1.9)
51-200	-6.4***	-5.1**	-4.7**
	(2.0)	(2.0)	(2.2)
201	-8.0***	-6.1**	-5.3*
	(2.9)	(3.0)	(3.2)
N	2802	2802	2802
Mean Dep. Var.	18.15	18.15	18.15
Mean wages	No	Yes	Yes
Fixed effects	No	No	Yes

Notes: The table reports linear probability estimates of inaccurate beliefs, i.e., overestimate or underestimate its wage compared to mean wages in matched employer-employee data on firm characteristics.

Column (1) shows that firms with less than ten employees are more likely to hold inaccurate beliefs about their position on the wage distribution. Specifically, firms with one to five employees are 16.9 percent more likely to hold inaccurate beliefs than the reference group. Firms with 6 to 10 employees are 6.9 percent more likely to hold inaccurate beliefs. The difference is also significant for firms with more than 20 employees and up to 200 employees. They are about 6 percent less likely to hold inaccurate beliefs.

The largest firms are the least likely to hold inaccurate beliefs. Column (2) shows that the impact of the actual mean wages (adjusted for workforce composition) has a tiny effect on the results, perhaps with the expectation of the largest firm group, where the reduction is 1.9 percentage points. The fact that the difference between the estimated coefficient between Column (1) and Column (2) is the largest is intuitive, as the largest firms are typically high-paying. Finally, in column (3), we add market-specific fixed effects, firm age fixed effects and a series of variables indicating the respondent knowledge of the firm.[24]

Table A.6 reports separately overestimating and underestimating. We find that both underestimating and overestimating play a role in explaining the results reported in Table 3. Still, overestimating seems to be more widespread across firms of different sizes.

3.5. Discussion of Findings

We are unaware of other surveys assessing the precision of knowledge about pay. A useful comparison to our findings is the studies by Bewley (1999) and Cullen et al. (2024). Bewley reports in a book (Bewley (1999), chapter 7) the interviews he conducted with about 100 to 150 employers about the wage-setting on the "external" labor market (to distinguish from the wage-setting inside organizations). His interviews led him to conclude that *"Employers' and workers' knowledge of external pay rates was normally vague.*[25] He finds that the source of information of firms' competitors varies a lot across firm size. Small firms (0-50 employees) typically use informal sources, while medium-sized and large firms (51+ employees) use pay surveys. Cullen et al. (2024) also document that the use of salary benchmarking is widespread in the U.S. They find that the benchmark information reduces salary dispersion by 25%. Interestingly, their sample is most representative of the top quartile of firms in the United States (the mean number of employees is 501). Our results show that small firms are more likely to hold inaccurate beliefs; it seems quite plausible that a supply shock to information about competitor prices will reduce salary dispersion by more than 25% for small firms.

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[24]Specifically, we control for the deviation of the respondent's answer to the question on firm revenue growth rate from 2019 to 2021 to the actual measure revenue growth rate in the administrative data, her response about her knowledge about the firm's HR practices, and her role in the company.

[25]Bewley (1999), page 95.

4. A Model of Inaccurate Beliefs About Firm Wages

How can firms' misepercetions about the wages paid by their competitors affect the labor market? To examine this we introduce a differentiated demand model of the labor market as in Card et al. (2018) and Manning (2021) where we incorporate subjective firm beliefs about the general wage level. We only include key equations and results in this section, but all detail and derivations are described in Appendix B. The notation follows Manning (2021) closely.

Firm-level labor supply: Each firm posts a single wage and workers then choose which firm to work for based on the wages posted, w_f, the firm-specific disutility from working, $\tilde{b}_f$, and an idiosyncratic taste shock. If we assume that the taste shock is Type 1 Extreme Value distributed, the choice probabilities for choosing a given firm take on the logit-form. A log-linear approximation of these choice probabilities result in the following firm-specific labor supply curve

$$(1) \qquad n_f = \frac{1}{\varepsilon}\left[w_f - \bar{w} - b_f\right]$$

where n_f is log employment at firm f, $\bar{w}$ is the average wage paid in the labor market, i.e $\bar{w} = \sum_{f'} s_{f'} w_{f'}$, where s_f is the share of total employment at firm f, and b_f is a sum of factors that include the firms own attractiveness and the mean attractiveness in the labor market. Note that each firm faces an inverse labor supply elasticity of ε.

Production: Firms face perfectly elastic product demand and a production technology of the form

$$(2) \qquad y_f = a_f + (1-\eta)n_f - (1-\eta)$$

where y_f is log output and a_f is log firm-level revenue productivity.

Firm beliefs: Firms do not observe the objective mean wage in the labor market, $\bar{w}$. Instead each firm has its own subjective beliefs, $\bar{w}_f^b$, which its believes is the same as the objective mean with certainty. For a given posted wage, a firm f therefore expects to employ

$$(3) \qquad n_f^b = \frac{1}{\varepsilon}\left[w_f - \bar{w}_f^b - b_f\right]$$

while actual employment is given by Eq. 1. The perceived optimal wage, which is also the actual posted wage is

$$(4) \qquad w_f = \frac{1}{\varepsilon + \eta} \left[\varepsilon a_f + \eta b_f + \eta \bar{w}_f^b - \varepsilon \ln(1 + \varepsilon) \right]$$

Intuitively, a firm that believes its competitors pay a higher wage than they actually do (i.e underestimate its own wage), will post a higher wage to counter the perceived better outside option of its employees. This inaccurate beliefs can contribute to inter-firm wage dispersion. Even if firms face the same fundamentals, differences in beliefs can lead to wage dispersion. In the appendix we also show that the value-added at a firm will be given by

(5)

$$y_f - n_f = \frac{1}{\varepsilon + \eta} \left[\varepsilon a_f + \eta b_f + \eta \ln(1 + \varepsilon) + \eta \bar{w} + \frac{\eta^2}{\varepsilon} \left(\left(w_f - \bar{w}_f^b \right) - \left(w_f - \bar{w} \right) \right) \right] - \ln(1 - \eta)$$

Here $w_f - \bar{w}_f^b$ reflects how the firm thinks its posted wage compares to the average wage, while $w_f - \bar{w}$ reflects how the posted actually compares to the average wage. If a firm underestimates how its own posted wage compares to the average wage (i.e, the term $\left(\left(w_f - \bar{w}_f^b \right) - \left(w_f - \bar{w} \right) \right)$ is negative) it will tend to have a lower productivity. As $w_f - \bar{w}_f^b$ directly maps to our survey question of whether a firm thinks it pays a higher or lower wage than its competitors, and $w_f - \bar{w}$ directly maps to our objective measures, Eq. 5 is a testable prediction. To test it, we restrict the sample to firms that either answer "Lower" or "Higher", so that we know that either $w_f - \bar{w}_f^b > 0$ or $w_f - \bar{w}_f^b < 0$. We then regress the (log) value-added per total hours of work at the firm on a dummy indicating that $w_f - \bar{w}_f^b > 0$, while including fixed effect for each decile of deviation from the objective average wage in the competitor group, $w_f - \bar{w}$, and fixed effects for each competitor group defined by geography and industry as in Fig. 1. The results are shown in Table 4.

As seen in the table the predictions from the model holds in the data: Controlling for how a firm's wage actually compares to that of their competitors, firms that believe they pay a higher wage than their competitors will tend to have a significantly higher productivity. In the framing of the model, the firms underestimate the average wage payed by it competitors and posts a lower wage than it would otherwise have. This leads to employment being suboptimally low. With decreasing marginal productivity, a firm with a suboptimally low employment will have a higher productivity. Combined with

TABLE 4. Firm-level Productivity and Inacurate Wage Beliefs

	Log Value Added per Hour
Higher (Survey)	0.09
	(0.04)
Intercept (Lower(Survey))	4.44
	(0.03)
N	631
Adj.R2	0.407
Market FE	Yes
Hourly Wage Decile in Market FE	Yes

Notes: The table reports OLS estimates of firms beliefs (indicated by Survey) on log value added per worker, controlling for actual wages relative to the relevant labor market. Labor market is defined as in the rest of the paper. As noted in the text, the sample only excludes firms that state the pay "About the Same" as their competitors.

model, the results from Table 4 indicate that firms' subjective beliefs and misperceptions potentially can lead to dispersion in productivity and do lead to misallocation in the labor market as in Hsieh and Klenow (2009).

5. Firms' Wage Setting Strategies

This section addresses the following questions that arise in light of the evidence shown in the previous section. First, what reasons do firms give to set higher or lower wages than their competitors? Second, do the reasons align with objective measures of firm performance that we get from administrative data?

Efficiency wage models (see, e.g., Katz (1986)) assume that firms set wages. The reasons to set higher or lower wages than their competitors rely on the assumption that workers' productivity depends positively on their wages. Hence, firms could decide to set higher wages to motivate employees or reduce the need to monitor them.

Wages could vary because of negative unobservable job characteristics (see, e.g., Rosen (1986)).

In the Diamond-Mortensen-Pissarides framework, the employer negotiates the wages with each of its employees (see, e.g., Pissarides (2000)) after they meet ("ex-post rent-splitting"). Wages will depend on the worker's outside options and the firm's productivity. Hence, the source of wage variation across firms is related to a firm's productivity.

Card et al. (2018) report that wage-productivity elasticities (passthrough) are in the range of 0.05–0.15. Chan et al. (2023) using Danish data estimate a passthrough elasticities of 0.08.

In the directed search model (see,e.g., Moen (1997)), workers search for jobs in submarkets that differ from their job finding for workers and wages. Some firms will offer high wages but lower job finding probability. Other firms will offer low wages but a higher job-finding probability. Mueller et al. (2023) use linked vacancy–employer–employee data in Austria to provide evidence on the link between vacancy duration and entry wages. They find that vacancy duration is negatively correlated with the starting wage, but these elasticities are small in magnitude and can account only for a small fraction of the variation in vacancy filling across establishments.

In wage posting models (see, e.g., Burdett and Mortensen (1998), Manning (2011)), each employer commits to a unique firm-wide wage policy. Firms use the wage to achieve two goals: recruit workers and retain workers. It is assumed that workers know the ranking of the firm in the wage distribution, but employers do not know the wage policy of the job applicant. This one-sided imperfect information leads high-wage firms to entirely share their rents with those working from low-paying firms (as well as unemployed workers). Bassier et al. (2022) present evidence that workers are much less likely to leave firms offering high wage premiums.

In the differentiated jobs model of Card et al. (2018), the source of wage dispersion only comes from the current firm productivity. Hence, in this new classical monopsony class of model, there is not really a "wage policy", i.e., a tradeoff between higher wages and lower profit per worker. Even if they would like to hire more workers, firms set wages below marginal revenue products to capture some of the surplus from inframarginal workers (see, Card (2022), Manning (2021)).

5.1. Characterizing Motives For Wage Setting Strategies

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.. The responses are shown in Figure 2.

Labor market frictions.　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 A.6 shows 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 wage posting models (Burdett and Mortensen 1998), where wage increases arise from switching to new employers. 40 percent report offering higher wages to hire quickly. The comparatively small share is consistent with the findings in Mueller et al. (2023).

Efficiency and Incentives.　: Around two-thirds percent state that they pay higher wages to increase morale and reduce the need for monitoring, which aligns 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 is in line with the passthrough literature (Card et al. 2018).[26]

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)*.

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.

5.2.　Linking Motives to Firm and Market-Specific Characteristics

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
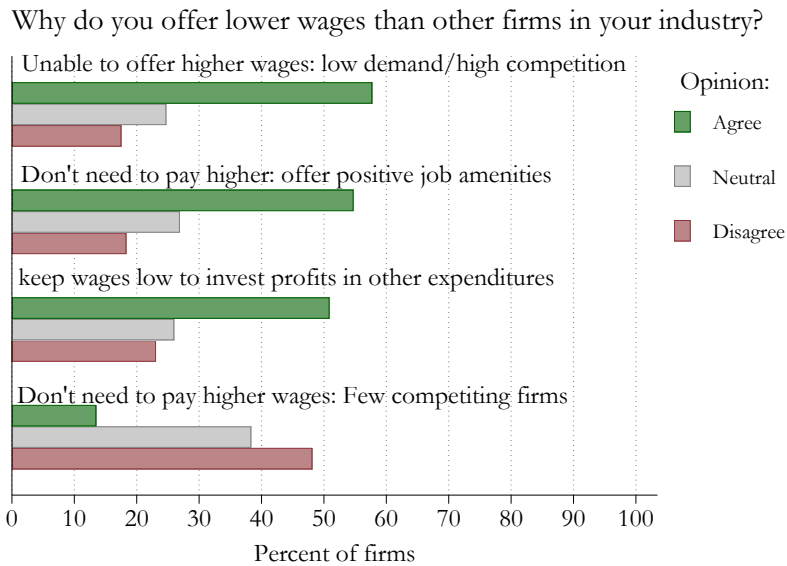
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[26]Figure A.4 shows a strong relation between wage premiums and labor productivity.

FIGURE 2. Reasons for Offering Higher or Lower Wages

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

Why do you offer higher wages than other firms in your industry?
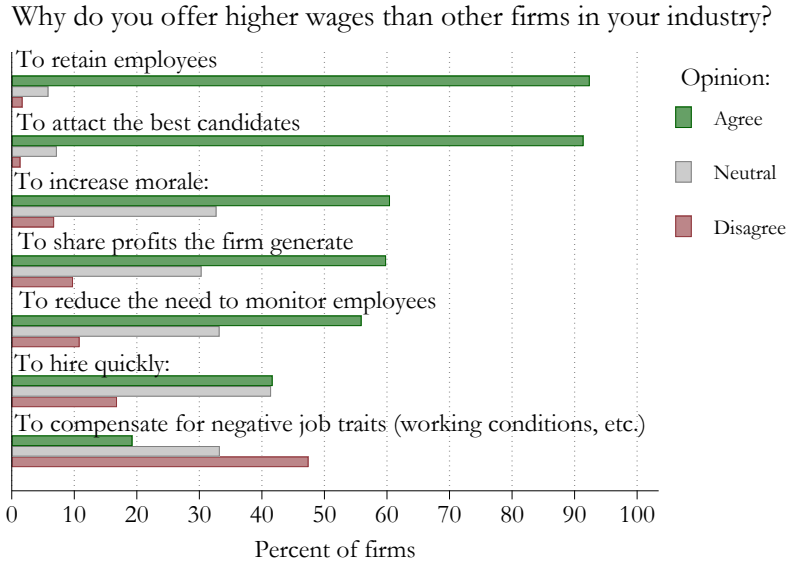
B. Panel (b): Why Do you Pay Lower Wages?

Why do you offer lower wages than other firms in your industry?

Notes: 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.

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.

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 2, 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 A.7 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., Sullivan and To 2014; Sorkin 2018). For example, Sorkin finds that 70 percent of the variation in AKM firm effects can be attributed to compensating differentials.

6. Conclusion

This paper yields new insights about why similar workers are paid differently by surveying firms and linking responses to administrative data. First, a significant minority of firms misperceive their position on the wage distribution. This misperception is plausibly related to information frictions on the firm side (see, e.g., Cullen (2024)) or employees' lack of knowledge about their outside options (see, e..g, (Jäger et al. 2024)). Second, 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 motive to pay high wages.

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Part I

Appendix

## A.   Additional Figures and Tables

A.1.   Figures

FIGURE A.1. Validating Survey Responses: Comparing Revenue Change in the Survey and in the Administrative Data
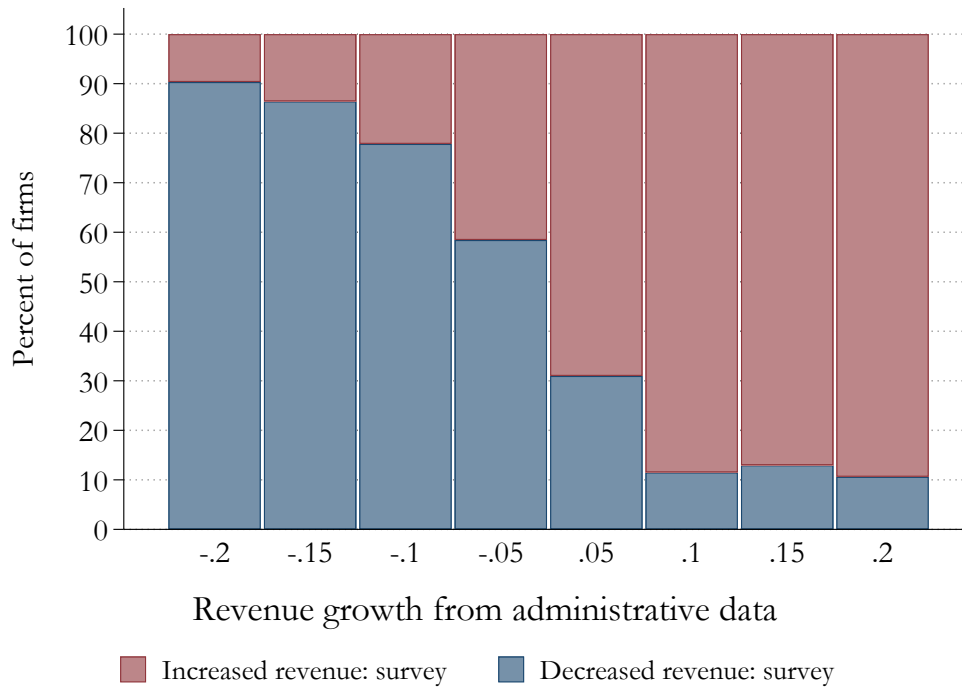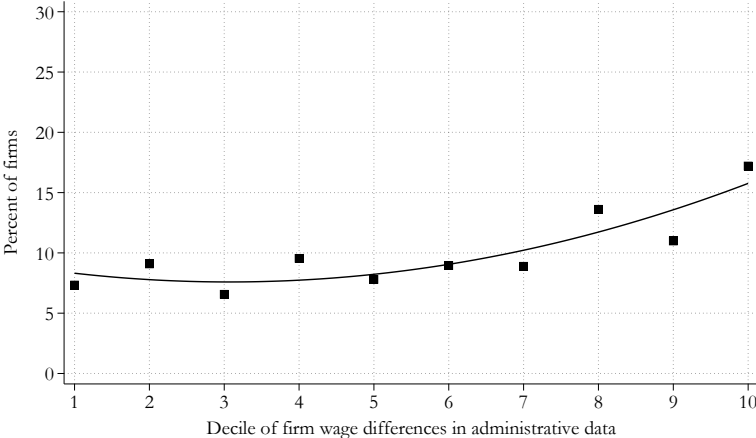

Notes: This figure compares the response to the question: "How much did revenue change in 2020 compared to 2019?" in our survey and the administrative data on income statements (FIRM).

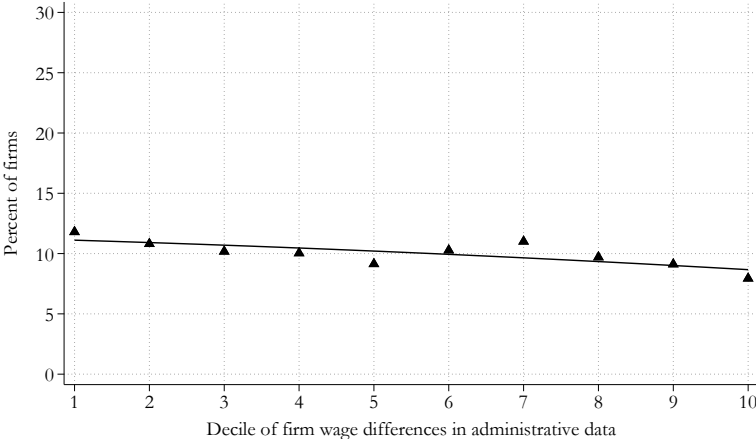FIGURE A.2. Firm Beliefs About Their Wages And Objective Firm Wage Differences

A. Lower wages than competing firms
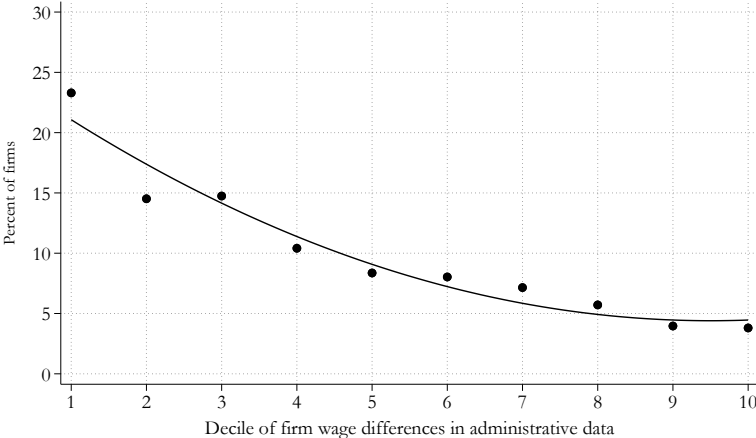
B. Higher wages than competing firms

C. About the same wages than competing firms

Notes: This figure plots the percent of firms in decile of firm wages measured in matched employer-employee data by responses to the survey question that elicits a firm's beliefs about own wages compared to competing firms. Firm wage measure is the average hourly wages in 2021 (adjusted for workforce characteristics). See text for details. The plotted curve is the quadratic prediction of the model.

FIGURE A.3. Alternative Measures of Objective Wage Differences

Notes: Panel (A) plots mean hourly wages in 2021 adjusted for the workforce education and age (and not additionally adjusting as by work hours, gender composition, worker fixed effects as in Figure 1). Panel (B) plots the firm-level unadjusted mean wages. Panel (C) and (D) plot the firm wage effects from an AKM model. Panel (D) focus on firms with at least 10 movers over the 2015-2021 time period.

FIGURE A.4. Wage Premiums and Labor Productivity

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

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

FIGURE A.5. Wage Premiums and Fringe benefits

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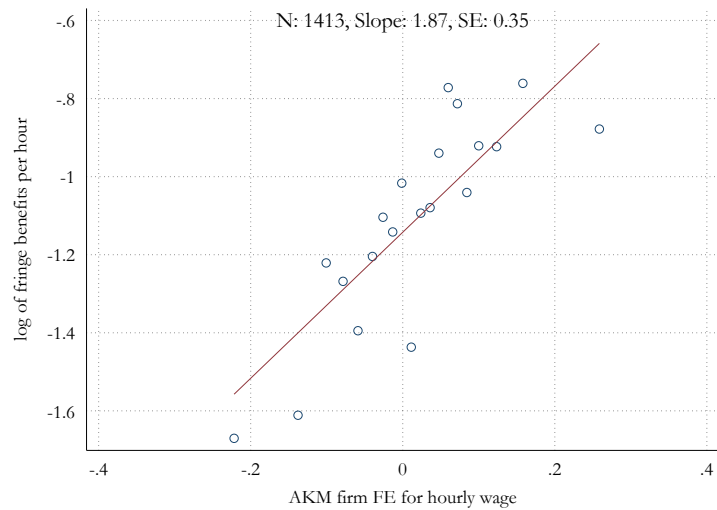
Notes: The figure represents a binscatter linking employer-specific wage premiums to payments fringe benefits.

FIGURE A.6. Wage Premiums: Employer-to-Employer Transitions Rates
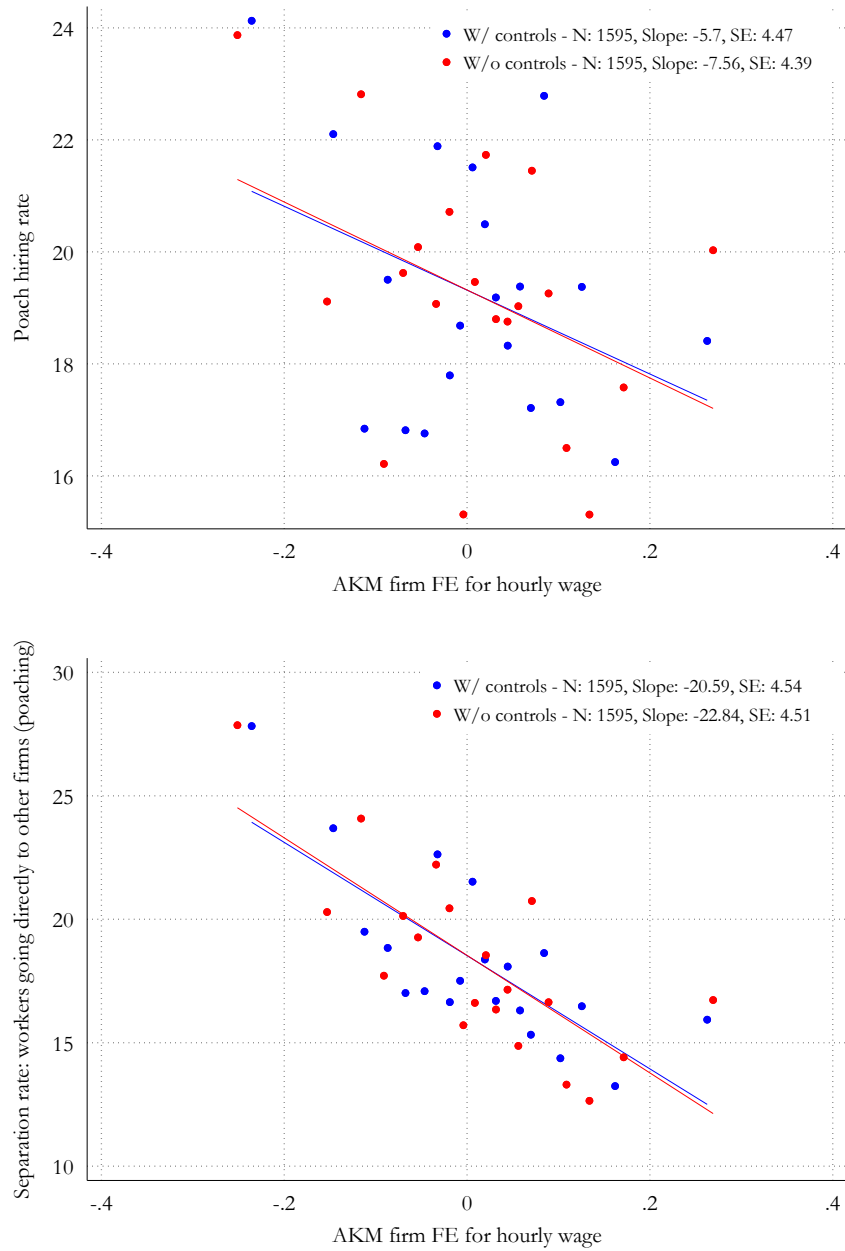
Notes: The figures represent the relationships between the estimated AKM firm effects and share of EE-hires and EE-separations. "With control" specifications include industry times region fixed effects

FIGURE A.7. Wage Premium: The Role of Non-standard Working Conditions

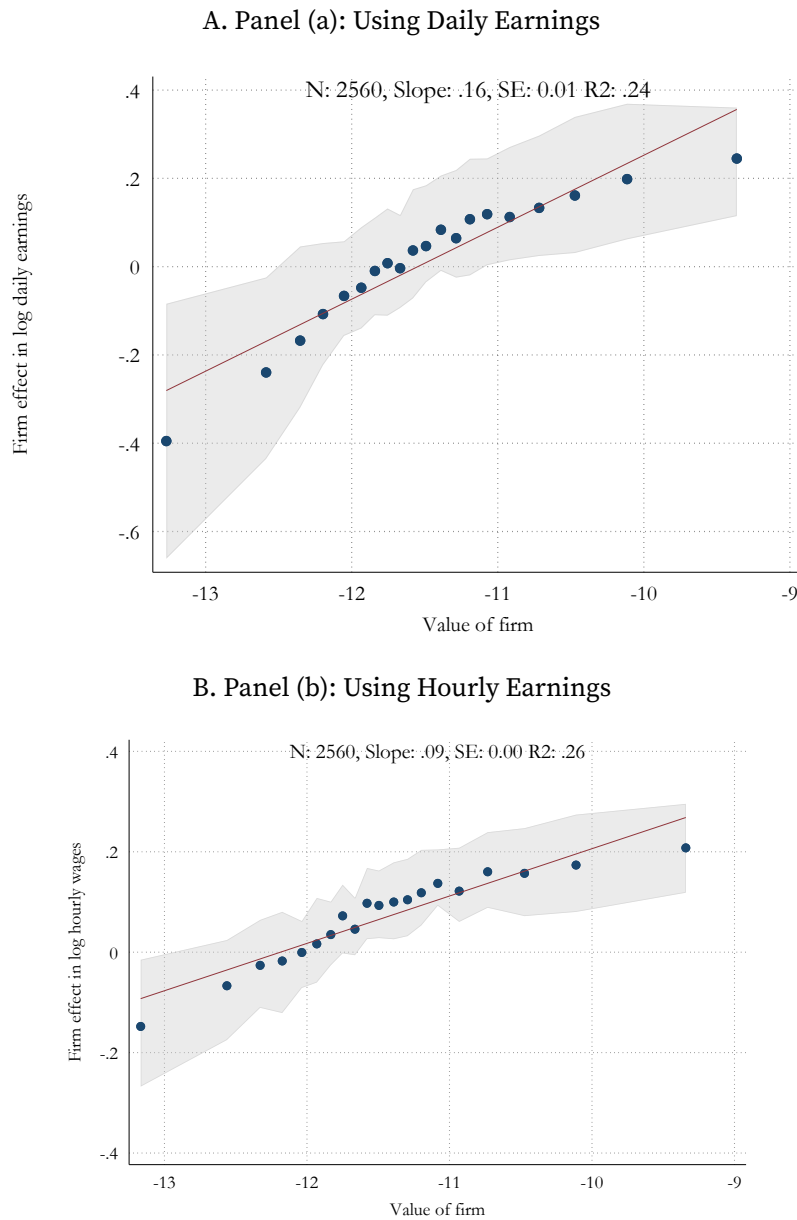### A. Panel (a): Unfavorable job amenities
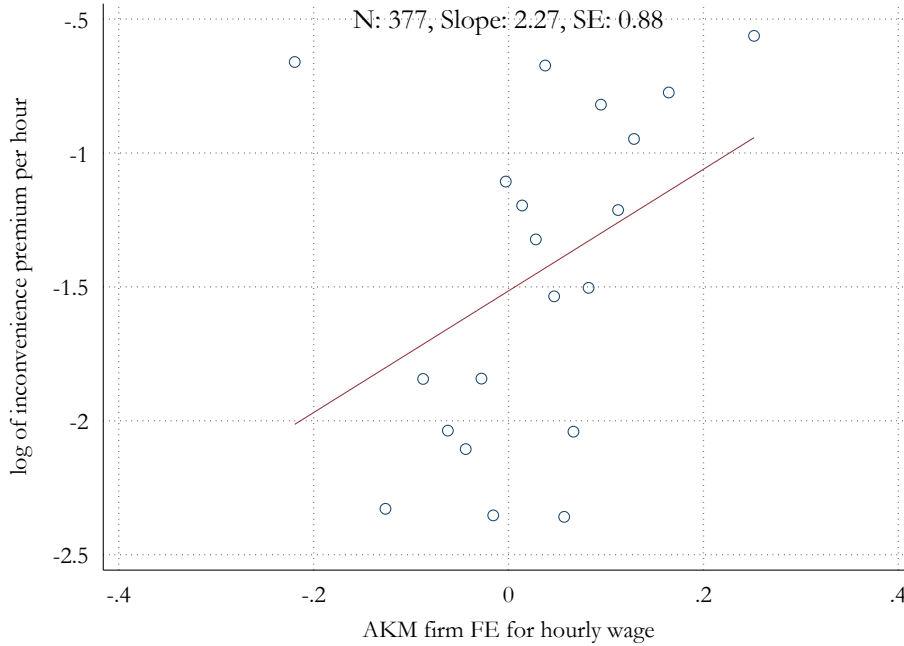
B. Panel (b): Non-standard Work Schedules
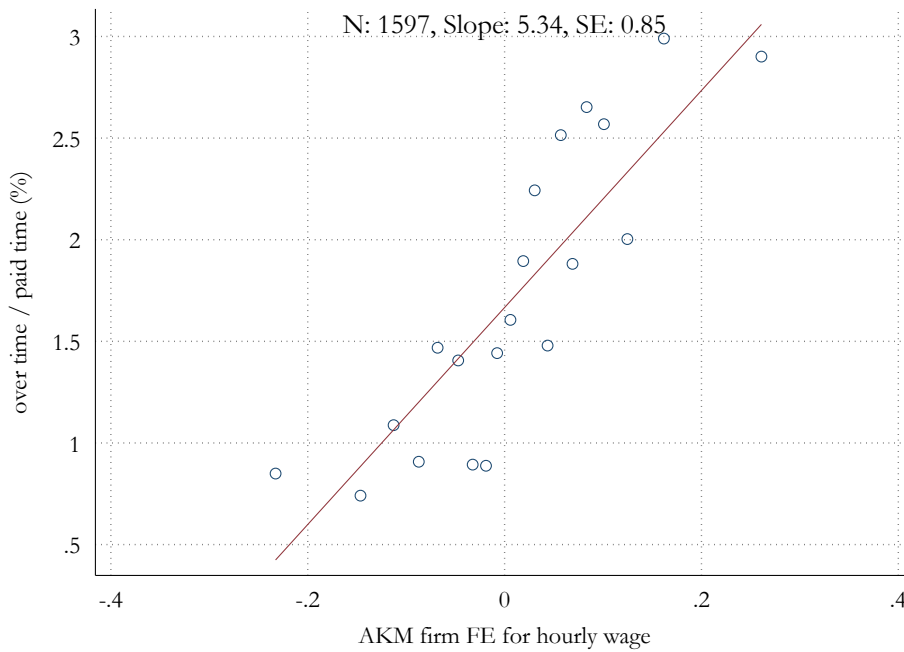
Notes: The figures represent the relationships between the AKM firm effects and overtime hours and payments for non-standard working conditions (e,g, outdoor work, shift work, etc.). We find a strong positive relationship for these two negative characteristics of jobs, in line with evidence from our survey (Figure 2). 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.

FIGURE A.8. Wage Premium: Revealed Preference Estimates a la Sorkin

A. Panel (a): Using Daily Earnings

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

B. Panel (b): Using Hourly Earnings

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

Notes: 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).

A.2. Table

TABLE A.1. AKM Variance Decomposition of Log Hourly Wages

	2008-2021	2008-2015	2015-2021
# of Obs.	20406494	9433701	10387098
# of Firms	143696	82822	87907
# of Workers	2571153	1905876	2046635
# of Moves	2392484	851099	1080850
Log Hourly Wage Variance	0.131	0.12	0.136
Log Hourly Wage Variance (Residual)	0.0957	0.0897	0.1
Variance of Firm FEs	0.00887	0.00975	0.00821
Share explained by Firm FEs	0.0679	0.0814	0.0605
Variance of Worker FEs	0.0559	0.0601	0.0665
Share explained by Worker and Firm FEs	0.542	0.617	0.598

Notes: This table reports the variance decomposition after fitting an AKM model to log hourly wages. Variance components are corrected using the leave-out bias correction of Kline et al. (2020) via leaving a worker–firm match out. Model includes controls for a cubic in age interacted with education dummies and education by calender year dummies.

TABLE A.2. Firms Characteristics Across Beliefs Distribution

	"Lower"	"About the same"	"Higher"	"Total"
Number of Employees (%)				
1-10	40.2	33.5	29.1	33.4
11-50	45.8	51.0	58.3	51.8
51+	13.9	15.5	12.6	14.8
Other Firm Characteristics				
Log Wages	3.3	3.3	3.4	3.4
AKM Wage Effecs (Q4)	12.8	23.8	32.7	24.3
Manufacturing (%)	14.6	13.2	9.5	12.7
Services(%)	56.4	60.0	69.6	61.4
Other sectors (%)	29.0	26.7	20.9	26.0
Copenhagen area (%)	37.5	25.9	29.8	27.5
Observations	229	2091	482	2802

Notes: This table reports mean of firm characteristics by survey response.

TABLE A.3. Firm Beliefs About Their Wages And Objective Wage Differences

	Firm Wage Effects			Mean Wages		
	(1) Higher	(2) About the same	(3) Lower	(4) Higher	(5) About the same	(6) Lower
Decile 1	3.31	-7.56*	4.25	-4.60	-3.92	8.52***
	(3.15)	(3.98)	(3.00)	(3.03)	(3.93)	(2.95)
Decile 2	1.69	-4.02	2.33	-0.73	-2.66	3.39
	(2.98)	(3.79)	(2.78)	(3.14)	(3.82)	(2.61)
Decile 3	3.78	-5.68	1.90	-3.76	-0.84	4.60
	(3.05)	(3.83)	(2.81)	(3.01)	(3.86)	(2.82)
Decile 4	-1.23	-0.12	1.36	1.26	-2.09	0.83
	(2.88)	(3.80)	(2.84)	(3.22)	(3.80)	(2.45)
Decile 5	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)
Decile 6	3.19	1.10	-4.29*	0.44	0.68	-1.12
	(2.92)	(3.51)	(2.28)	(3.13)	(3.68)	(2.32)
Decile 7	5.81*	-4.04	-1.77	-0.34	2.51	-2.17
	(3.06)	(3.69)	(2.49)	(3.07)	(3.57)	(2.17)
Decile 8	5.83*	-0.40	-5.43**	8.06**	-4.84	-3.22
	(3.13)	(3.65)	(2.23)	(3.38)	(3.78)	(2.11)
Decile 9	8.74***	-1.69	-7.05***	5.75*	-1.42	-4.34**
	(3.10)	(3.56)	(2.06)	(3.37)	(3.75)	(2.02)
Decile 10	16.82***	-12.64***	-4.18*	16.88***	-12.33***	-4.55**
	(3.56)	(4.02)	(2.40)	(3.78)	(4.11)	(2.10)
N	2802	2802	2802	2802	2802	2802
Mean Dep. Var.	16.90	74.50	8.59	16.90	74.50	8.59
Adj.R2	0.013	0.005	0.014	0.022	0.004	0.019
Respondent char.	No	No	No	No	No	No

Notes: This table reports linear probability model estimates for thinking that the firm pays higher, about the same, or lower than competitors (columns 1,2, and 3) on deciles of firm wage differences in administrative data measured by firm wage effects and mean wages (adjusted for workforce composition, as in Figure 1).

TABLE A.4. Firm Beliefs About Their Wages And Objective Wage Differences

	Firm Wage Effects			Mean Wages		
	(1)	(2)	(3)	(4)	(5)	(6)
	Higher	About the same	Lower	Higher	About the same	Lower
Decile 1	2.20	-7.24*	5.04*	-6.25**	-3.41	9.67***
	(3.15)	(4.01)	(3.02)	(3.02)	(3.96)	(2.97)
Decile 2	0.99	-3.91	2.92	-1.35	-2.56	3.90
	(2.97)	(3.80)	(2.79)	(3.13)	(3.83)	(2.62)
Decile 3	3.42	-5.66	2.24	-4.65	-0.50	5.15*
	(3.07)	(3.84)	(2.81)	(3.03)	(3.87)	(2.80)
Decile 4	-1.54	-0.05	1.59	0.68	-1.88	1.21
	(2.89)	(3.79)	(2.85)	(3.21)	(3.79)	(2.45)
Decile 5	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)
Decile 6	3.13	1.11	-4.25*	-0.10	0.93	-0.83
	(2.94)	(3.51)	(2.28)	(3.13)	(3.67)	(2.33)
Decile 7	6.09**	-4.25	-1.84	-0.09	2.30	-2.21
	(3.09)	(3.70)	(2.48)	(3.08)	(3.57)	(2.17)
Decile 8	6.34**	-0.80	-5.53**	8.71**	-5.26	-3.46
	(3.14)	(3.66)	(2.23)	(3.38)	(3.78)	(2.12)
Decile 9	9.25***	-2.13	-7.12***	6.53*	-1.88	-4.65**
	(3.15)	(3.58)	(2.06)	(3.37)	(3.75)	(2.02)
Decile 10	16.97***	-12.80***	-4.16*	17.24***	-12.61***	-4.62**
	(3.59)	(4.05)	(2.42)	(3.79)	(4.12)	(2.12)
N	2802	2802	2802	2802	2802	2802
Mean Dep. Var.	16.90	74.50	8.59	16.90	74.50	8.59
Adj.R2	0.017	0.006	0.016	0.029	0.005	0.022
Respondent char.	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports linear probability model estimates for thinking that the firm pays higher, about the same, or lower than competitors (columns 1,2 and 3) on deciles of firm wage differences in administrative data measured by firm wage effects and mean wages (adjusted for workforce composition, as in Figure 1). All regressions additionally control for the respondent role, her stated knowledge about the firm's wage policy and her inaccurate beliefs about revenue growth in 2019-2020 (measured as the absolute difference between stated revenue growth and administrative data revenue growth).

TABLE A.5. The Extent of Inaccurate Wage Beliefs: Alternative Labor Market Definition

	Mean wage	Firm Wage Effects
Main definition		
Underestimates	6.55	7.21
Overestimates	11.35	10.33
Total	17.90	17.53
Using top/bottom deciles		
Underestimates	6.30	6.77
Overestimates	9.96	8.73
Total	16.26	15.50
Using top/bottom quintiles		
Underestimates	13.56	15.72
Overestimates	19.04	17.86
Total	32.60	33.58
Observations	2802	2802

Note: This table reports the percentage of firms with inaccurate beliefs about their wages compared to competing firms. Compared to the table in the main text, this table defines the labor market using more than 30 industry categories (instead of 12 industry categories by 5 regions as in the main text). In the main definition, an inaccurate belief is when a firm thinks its wages are high (respectively low), whereas the firm is in the bottom (respectively top) quintile of mean wages in matched employer-employee data. When the firm answered "about the same," an inaccurate belief is when a firm thinks its wage is either in the bottom or top decile. Mean wage is the average hourly wages in 2021 (adjusted for workforce characteristics) as presented in Table 1. Firm wage effects is the AKM firm effects, that is, the employer-specific component that measures the monetary advantage or disadvantage of working for that employer.

TABLE A.6. Inaccurate Wage Beliefs and Firm Characteristics

	Panel A. Overestimate		
	(1)	(2)	(3)
1-5	11.5***	7.8***	7.3***
	(3.1)	(2.5)	(2.6)
6-10	4.9***	2.1	1.7
	(1.9)	(1.5)	(1.6)
11-20	0.0	0.0	0.0
	(.)	(.)	(.)
21-50	-7.6***	-5.3***	-5.3***
	(1.4)	(1.2)	(1.2)
51-200	-9.1***	-3.3***	-3.0**
	(1.4)	(1.2)	(1.3)
201	-11.3***	-2.7**	-2.2
	(1.2)	(1.3)	(1.5)
N	2802	2802	2802
Mean Dep. Var.	11.56	11.56	11.56
Mean wages	No	Yes	Yes
Fixed effects	No	No	Yes
	(1)	(2)	(3)
1-5	5.3**	8.3***	8.7***
	(2.3)	(1.9)	(2.0)
6-10	2.0	4.2***	4.3***
	(1.3)	(1.2)	(1.2)
11-20	0.0	0.0	0.0
	(.)	(.)	(.)
21-50	1.4	-0.4	-0.8
	(1.2)	(1.1)	(1.2)
51-200	2.6*	-1.9	-1.8
	(1.6)	(1.4)	(1.5)
201	3.3	-3.4	-3.1
	(2.7)	(2.4)	(2.4)
N	2802	2802	2802
Mean Dep. Var.	6.58	6.58	6.58
Mean wages	No	Yes	Yes
Fixed effects	No	No	Yes

Notes: The table reports linear probability estimates of inaccurate beliefs, i.e., overestimate or underesti

TABLE A.7. Predicting Firm-specific Wage Premiums

	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-specific wage premiums on (1) industry fixed effects (3-digit industry), (2) firm characteristics (size, age, value-added per worker), (3) characteristics of the product and labor market (labor market tightness, labor, and product market competition), and (4) unfavorable job-characteristics. Unweighted by firm employment.

B. A Differentiated Demand Model with Misperception

This appendix includes derivations for the differentiated demand model introduced in Section 4. The model is an extension of the random utility of the firm-choice model from Card et al. (2018). The notation closely follows the version in Manning (2021).

Firm-Specific Labor Supply: The utility of worker i from working at firm f is given by

$$(A.1) \qquad u_{if} = \frac{1}{\varepsilon}\left[w_f - \tilde{b}_f\right] + \epsilon_{if}$$

where w_f is log-wage posted by firm f and $\tilde{b}_f$ is an inverse measure of how attractive it is to work at firm f for all workers. We assume that the taste shock, ϵ_{if}, is Type 1 extreme value distributed. In this case the firm-specific labor supply is given by

$$(A.2) \qquad N_f = \frac{\exp\left(\frac{1}{\varepsilon}\left[w_f - \tilde{b}_f\right]\right)}{\sum_{f'}\exp\left(\frac{1}{\varepsilon}\left[w_{f'} - \tilde{b}_{f'}\right]\right)}L$$

where L is the total labor supply. Log-linearizing results in the following firm-specific labor supply

$$(A.3) \qquad n_f = \frac{1}{\varepsilon}\left[w_f - \tilde{b}_f - \sum_{f'}s_{f'}\left[w_{f'} - \tilde{b}_{f'}\right] + \varepsilon l\right]$$

where l is the log of the total labor supply and s_f is the share of the labor force employed at firm f, i.e.

$$(A.4) \qquad s_f = \frac{N_f}{L} = \frac{\exp\left(\frac{1}{\varepsilon}\left[w_f - \tilde{b}_f\right]\right)}{\sum_{f'}\exp\left(\frac{1}{\varepsilon}\left[w_{f'} - \tilde{b}_{f'}\right]\right)}$$

Note that

$$(A.5) \qquad \frac{d\ln\left(\sum_{f'}\exp\left(\frac{1}{\varepsilon}\left[w_{f'} - \tilde{b}_{f'}\right]\right)\right)}{d\left[w_f - \tilde{b}_f\right]} = \frac{1}{\varepsilon}\frac{\exp\left(\frac{1}{\varepsilon}\left[w_f - \tilde{b}_f\right]\right)}{\sum_{f'}\exp\left(\frac{1}{\varepsilon}\left[w_{f'} - \tilde{b}_{f'}\right]\right)} = \frac{1}{\varepsilon}s_f$$

A.3 can then be rewritten as

$$(A.6) \qquad n_f = \frac{1}{\varepsilon} \left[w_f - \bar{w} - b_f \right]$$

where

$$(A.7) \qquad \bar{w} = \sum_{f'} s_{f'} w_{f'}$$

and

$$(A.8) \qquad b_f = \tilde{b}_f - \varepsilon l - \sum_{f'} s_{f'} \tilde{b}_{f'}$$

Note that Eq. A.6 is same as Eq. 1 in Section 4.

Misperceptions about competitors' wages: We now deviate from Card et al. (2018) and Manning (2021) by introducing misperceptions about competitors' wages. Let $\bar{w}_f^b$ denote the subjective belief of firm f about the competitors weighted wages, $\bar{w}$. Note that we assume that each firm is small compared to the market and takes $\bar{w}_f^b$ as given. We also do not model any uncertainty. Firms are certain that their beliefs are correct. For a given posted wage, w_f, firm f expects its employment will be

$$(A.9) \qquad n_f^b = \frac{1}{\varepsilon} \left[w_f - \bar{w}_f^b - b_f \right]$$

while actual employment is given by Eq. A.6 ($n_f = \frac{1}{\varepsilon} \left[w_f - \bar{w} - b_f \right]$). Eq. A.9 is same as Eq. 3 in Section 4.

Firm Optimization: We assume that firms face a production technology such that revenue at firm f is given by

$$(A.10) \qquad Y_f = A_f \frac{1}{1 - \eta} N_f^{1 - \eta}$$

where A_f is a firm-level revenue productivity. Firms optimize by posting a wage that ensures that the perceived marginal cost of labor equals the perceived marginal revenue

product of labor

(A.11)
$$MCL_f^b = MRPL_f^b$$

Isolating w_f in firm's employment belief equation (A.9), adding n_f^b, exponating, differentiating and taking logs again results in

(A.12)
$$\ln MCL_f^b = \varepsilon n_f^b + \bar{w}_f^b + b_f + \ln(1 + \varepsilon)$$

A.10 implies that

(A.13)
$$\ln MRPL_f^b = a_f - \eta n_f^b$$

where $\ln A_f = a_f$. Inserting A.12 and A.13 into A.10 and rearranging results in

(A.14)
$$n_f^b = \frac{1}{\varepsilon + \eta}\left[a_f - \bar{w}_f^b - b_f - \ln(1 + \varepsilon)\right]$$

The perceived optimal wage, which is also the actual posted wage, will therefore be

(A.15)
$$w_f = \frac{1}{\varepsilon + \eta}\left[\varepsilon a_f + \eta b_f + \eta \bar{w}_f^b - \varepsilon \ln(1 + \varepsilon)\right]$$

which is the same as Eq. 4 in Section 4.

With this posted wage actual employment will be

(A.16)
$$n_f = \frac{1}{\varepsilon}\left[\left(\frac{1}{\varepsilon + \eta}\left[\varepsilon a_f + \eta b_f + \eta \bar{w}_f^b - \varepsilon \ln(1 + \varepsilon)\right]\right) - \bar{w} - b_f\right]$$

which reduces to

(A.17)
$$n_f = \frac{1}{\varepsilon + \eta}\left[a_f - b_f - \ln(1 + \varepsilon) - \bar{w} + \frac{\eta}{\varepsilon}\left(\bar{w}_f^b - \bar{w}\right)\right]$$

Value-added per worker is then given by

(A.18)
$$y_f - n_f = a_f - (1 - \eta)n_f - \ln(1 - \eta) - n_f$$

Inserting A.16 results in

$$(\text{A.19}) \qquad y_f - n_f = \frac{1}{\varepsilon + \eta} \left[\varepsilon a_f + \eta b_f + \eta \ln(1 + \varepsilon) + \eta \bar{w} - \frac{\eta^2}{\varepsilon} \left(\bar{w}_f^b - \bar{w} \right) \right] - \ln(1 - \eta)$$

Here the mispercetion is written as the difference between the perceived average wage and the actucal average wage. To map the misperceptions to the data, this can be rewritten to

(A.20)

$$y_f - n_f = \frac{1}{\varepsilon + \eta} \left[\varepsilon a_f + \eta b_f + \eta \ln(1 + \varepsilon) + \eta \bar{w} + \frac{\eta^2}{\varepsilon} \left(\left(w_f - \bar{w}_f^b \right) - \left(w_f - \bar{w} \right) \right) \right] - \ln(1 - \eta)$$

where we simply add and subtract w_f in the last parenthesis and flip the sign outside and inside the parenthesis. This is identical to Eq. 5 in Section 4.

B.1. Dataset *not* provided by Denmark Statistics

FIGURE A.9. Invitation Letter to Participate In the Survey

Notes: The invitation letter sent to participate in the survey. 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

B.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:

What is your role in the company?
- Owner manager
- Director without ownership
- Board member without ownership
- Owner without being a board member
- Others

Does a person or family have 50% or more of the ownership?
- Yes
- No
- Do not know

How much did revenue (*omsætningen*) change in 2020 compared to 2019? Note: If you do not know the exact change, give your best estimate.
- Reduced by 100 percent
- Reduced (indicate the percentage): —————————
- Unchanged
- Increased (indicate the percentage): —————————
- Increased by 100 percent or more

Is the company primarily a subcontractor (*underlerverandør*) to other companies?
- Yes, for 90 percent or more of the revenue
- Yes, for 50 percent to 89 percent of the revenue
- Yes, for 25 percent to 49 percent of the revenue
- Yes, for 10 percent to 24 percent of the revenue
- Yes, for less than 10 percent of the revenue
- No
- Do not know

In the following questions, we ask about pay (*løn*)[27] and hiring practices (*ansættelsespraksis*). How close are you to such decisions?
- I am responsible for pay and employment conditions

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[27] In Danish, the word løn is usually translated as salary, pay or wages. The definition in the dictionary ordnet.dk is "payment that an employee receives for working".

- I am not responsible, but I know about pay and employment conditions
- I only know a little about pay and employment conditions

Which of the following forms of employee representation currently exist in the company? List as many as apply.
- Trade union representative for the entire company without professional divisions, TR (*Tillisrepræsentant*)[28]
- Trade union representatives divided into professional groups and with an overall joint shop steward
- Employee representative at the board-level (*Medarbejderrepræsentanter*)[29]
- Cooperation Committee, SU (*Samarbejdsudvalg*)
- None of the above

If revenue decreased in 2020 and base pay reduction was not used in 2020: What are the main reasons for not lowering the contractual base pay (*basisløn*)? Please state your position on the following statements. Respondents have five options (strongly agree, agree, neutral, disagree, and strongly disagree).
- It would be illegal or almost impossible to change the base pay and contractual allowances
- The company thinks of the base pay as a commitment to its employees
- Pay reduction can damage productivity because employees do not work as hard
- Pay reduction would lead employees to quit
- Pay reduction damages morale and is demotivating for employees in general
- Unions / employee representatives are against pay reductions
- Pay reduction would not save jobs

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*

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[28]The trade union representative (tillidsrepræsentant) takes up workers' day-to-day concerns with the employer and usually has a mandate to bargain locally on pay, working time arrangements and other issues. Trade union representatives also have priority with regard to the representation of employees on the Danish equivalent of the works council, the cooperation committee (Fulton 2021).

[29]In Denmark, some employees can be part of the governance and management of firms ("company representation" and in Danish "selskabsrepræsentation") when a company has had at least 35 employees on average over the previous 3 years.

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:

- 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.)*

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

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

- 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).*

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

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

- 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:

- 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)*

- 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.*

- 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)*

- 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.*

C. Related Work

If market forces were strong enough to dictate wages, we should not observe wage dispersion for similar workers working in different firms. Below we briefly summarize some studies that indicate that firms have non-negligible wage-setting power, and the motives for wage setting strategies differ across labor market models.

Wage-setting. Table 8 categorizes labor market models depending on the underlying wage-setting assumption and motives to set high or low wages. The table shows that in the majority of labor market models, the underlying assumption is that firms set wages instead of individual bargaining wages with their employees. This is consistent with empirical evidence. Cahuc et al. (2006) conclude that bargaining plays no role in wage determination for intermediate and lower-skill workers, and plays a modest role for higher-skill workers. Hall and Krueger (2012) and Brenzel et al. (2014) find that a third of all workers bargained with their current employers. Consistent with those results, Caldwell and Harmon (2019), Dube et al. (2022), and Lachowska et al. (2022) show that

workers' outside options have a limited impact on wages.[30]

Different classes of wage-setting models.   In efficiency wage models (see, e.g., Katz (1986)), firms set wages. The reasons to set higher or lower wages than their competitors rely on the assumption that workers' productivity depends positively on their wages. Hence, firms could decide to set higher wages to motivate employees or reduce the need to monitor them.

Wages could vary because of negative unobservable job characteristics (see, e.g., Rosen (1986)). Sorkin (2015) and Lamadon et al. (2022) find evidence that it is the case. Bassier et al. (2022) find evidence against this view. Indeed, controlling for estimated amenities values does not substantially alter the separations elasticity. Lachowska et al. (2023) document that firms' policies on hours is positively correlated with firms' utility. Firms' policies on hours. is estimated using a two-way model of hours. They interpret the AKM-style firm hours effects as firms' policies on hours.

In the Diamond-Mortensen-Pissarides framework, the employer negotiates the wages with each of its employees (see, e.g., Pissarides (2000), Jarosch et al. (2023)) after they meet ("ex-post rent-splitting"). Wages will depend on the worker's outside options and the firm's productivity. Hence, the source of wage variation across firms is related to a firm's productivity. Card et al. (2018) report that wage-productivity elasticities (passthrough) are in the range of 0.05–0.15. Chan et al. (2023) using Danish data estimate a passthrough elasticities of 0.08.

In the directed search model (see,e.g., Moen (1997), Kaas and Kircher (2015)), workers search for jobs in submarkets that differ from their job finding for workers and wages. Some firms will offer high wages but lower job finding probability. Other firms will offer low wages but a higher job-finding probability. Mueller et al. (2023) use linked vacancy–employer–employee data in Austria to provide evidence on the link between vacancy duration and entry wages. They find that vacancy duration is negatively correlated with the starting wage, but these elasticities are small in magnitude and can account only for a small fraction of the variation in vacancy filling across establishments.

In wage posting models (see, e.g., Burdett and Mortensen (1998), Manning (2011)), each employer commits to a unique firm-wide wage policy. Firms use the wage to achieve two goals: recruit workers and retain workers. It is assumed that workers know the ranking of the firm in the wage distribution, but employers do not know the wage policy of the job applicant. This one-sided imperfect information leads high-wage firms

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[30]Cheremukhin and Restrepo-Echavarria (2020) develop a model where wage-setting is endogenous.

TABLE 8. Wage-Setting Strategies in Labor Market Models

Labor market models	Assumption	Sources of wage dispersion
Efficiency wage	Firm set wages	Motivate employees
Compensating differential	Firm set wages	Unobservable job characteristics
Matching (DMP)	Negotiated wage	Current firm productivity
Directed search	Firm set wages	Attract employees
Wage posting	Firm set wages	Attract and retain employees
Sequential auction	Firm set wages	Current and previous firm productivity
Differential jobs	Firm set wages	Current firm productivity

to entirely share their rents with those working from low-paying firms (as well as unemployed workers). Bassier et al. (2022) present evidence that workers are much less likely to leave firms offering high wage premiums.

In contrast to wage posting, in the sequential auction model pioneered by Postel-Vinay and Robin (2002), firms optimize in a complete information environment. They propose for each new hire a different wage according to their previous situation. The wage that they offer is the minimum wage to attract the new hire.[31] Di Addario et al. (2023) test this assumption and conclude that the wage-setting of the previous firm has little effect on the variance of hiring wages for job movers.

In the differentiated jobs model of Card et al. (2018), the source of wage dispersion only comes from the current firm productivity. Hence, in this new classical monopsony class of model, there is not really a "wage policy", i.e., a tradeoff between higher wages and lower profit per worker. Even if they would like to hire more workers, firms set wages below marginal revenue products to capture some of the surplus from inframarginal workers (see, Card (2022), Manning (2021)).

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[31]Another alternative is firms set wage contracts that depend on employees' tenure (see,e.g., Burdett and Coles (2003) and Stevens (2004)). Data on employment contracts are typically not available.

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