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Sydnee Caldwell, Ingrid Haegele, Jörg Heining

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RFBerlin
ROCKWOOL Foundation Berlin –
Institute for the Economy
and the Future of Work

Gormannstrasse 22, 10119 Berlin
Tel: +49 (0) 151 143 444 67
E-mail: info@rfberlin.com
Web: www.rfberlin.com



BARGAINING AND INEQUALITY IN THE LABOR MARKET*

Sydney Caldwell
Ingrid Haegele
Jörg Heining

August 25, 2025

Abstract

We use novel surveys of firms and workers, linked to administrative employer-employee data, to study the prevalence and importance of individual bargaining in wage determination. We show that simple survey questions accurately elicit firms' bargaining strategies. Using the elicited strategies for 772 German firms, we document that the majority of firms are willing to engage in individual wage bargaining. Labor market factors predict firms' strategies better than firm characteristics. Survey responses from nearly 10,000 full-time workers indicate that most workers provide their salary expectations before they receive a job offer. Most outside offers are rejected, with the worker remaining at the incumbent firm. There is substantial heterogeneity in workers' bargaining behavior, which translates into within-firm wage inequality. Firms that set pay via individual bargaining have a 3 percentage point higher gender wage gap. *JEL Codes:* J30, J31, J42.

*Caldwell: scaldwell@berkeley.edu; Haegele: ingrid.haegele@econ.lmu.de; Heining: joerg.heining@iab.de. We thank the Ifo Institute for implementing the firm survey. We thank researchers at the IAB for assistance in linking the survey responses to the administrative data and for implementing the worker survey. We give special thanks to Matthew Backus, David Card, Lisa Kahn, Patrick Kline, Jonathan Kolstad, Attila Lindner, Alexandre Mas, Simon Mongey, Amanda Pallais, Andreas Peichl, Ricardo Perez-Truglia, Raffaele Saggio, Steve Tadelis, Dmitry Taubinsky, and Andrea Weber for their pre-implementation feedback on the design and wording of the firm survey (and, in many cases, on the draft). We additionally thank Lawrence Katz, Suresh Naidu, Isaac Sorkin, and Christopher Walters for useful conversations which shaped the draft. We thank Christopher Ackerman, Cristian Alamos, Marco Badilla-Maroto, Matthias Bing, Adam Drozynski, Javier Feinmann, Marie Hogan, Alexandra Kuhnert, Kyle Neary, Sebastian Puerta, and a team of UC Berkeley undergraduate students for outstanding research assistance. We thank seminar audiences at Berkeley, BI Norwegian Business School, Columbia, UC Santa Barbara, UC Santa Cruz, the University of Erlangen-Nuremberg, the University of Calgary, and conference participants at the BFI Women in Empirical Microeconomics Conference, the 6th CEPR-Bank of Italy Workshop, the CESifo Labor Conference, the CIREQ Montreal Conference on Wage Setting, the European Society for Population Economics Conference, the Italian Association of Labour Economics (AIEL) Conference, the Asian and Australasian Society of Labour Economics Conference, the Comparative Analysis of Enterprise Data Conference, the Scottish Economic Society Conference, the IAB Workshop on Wage Determination, the 2023 NBER Summer Institute Labor and Personnel sessions, the Workshop on Labor Economics (at Hamburg), the Southern California Conference on Applied Microeconomics (SOCCAM), the West Coast Junior Labor Conference, the 2024 Society of Labor Economists' Conference, the Norwegian Workshop on Labor Economics, the Empirical Management Conference (at Stanford), the 2024 Cowles Labor-Public Conference (at Yale), and the 2024 CEPR Labor Economics Symposium for helpful feedback. We thank the UC Berkeley Department of Economics, the Joachim Herz Foundation, and the Upjohn Institute for Employment Research for financial support. Corresponding author: Sydney Caldwell, Haas School of Business & Department of Economics, 545 Student Services Building #1900, Berkeley, CA 94720. Fax: 510-643-1412. Phone: 760-703-6769.

1 Introduction

Imperfect competition in the labor market creates scope for bargaining over rents (Manning 2011). How firms and workers agree on a wage may therefore determine which workers receive a greater share of their marginal product. For instance, if firms vary in the wages—or wage premia—that they post, workers who manage to obtain jobs at firms with higher wages or wage premia will earn more than their equally productive counterparts at other firms. If firms set wages by bargaining with individual workers, workers with better outside options—or a better ability to leverage those options—may earn more than their equally productive coworkers.

However, little is known about the prevalence and importance of individual bargaining in wage determination (Card 2022). It is hard to reliably measure firms’ wage-setting strategies. Firm-level proxies for bargaining, such as whether a firm announces wages in job ads, may be inaccurate if firms have strategic reasons to not publicize their pay (see Batra, Michaud, and Mongey 2023, for an analysis of firms’ behavior in job ads). Aggregating worker-level proxies such as whether a worker knew wages at the time they applied, or whether a worker reported negotiating their salary up, may yield unreliable measures of a firm’s policies to bargain with new hires or with incumbent workers if firms differentiate the initial offers they make to potential hires (e.g., by using their salary expectations), or if workers vary in their propensity to bargain, either at the start of, or during an employment spell (e.g., Agan, Cowgill, and Gee 2021; Biasi and Sarsons 2022). Further, it is rare to have data on both the firm- and worker-sides of bargaining, outside of specific industries or contexts, or to have information on workers’ outside options during these events.

To overcome these empirical challenges, we developed and validated a survey measure of firms’ bargaining strategies for Germany. We fielded this survey to human resource (HR) professionals and managers through the ifo Institute for Economic Research (ifo), an organization with decades of experience surveying this population. We linked responses from 772 German firms to balance sheet information from the Orbis database, and to administrative Social Security records that contain detailed employment histories, wages, industry, and occupation codes for each worker in Germany since 1975. These data allow us to examine the prevalence of individual bargaining

and to examine firm selection into bargaining. We also link firm-level strategies to nearly 10,000 responses we received from a worker survey that we fielded through the Institute for Employment Research (IAB), a group within the German equivalent of the Department of Labor. The result is a unique dataset which contains detailed information on the worker and firm-sides of bargaining for workers in multiple industries and labor markets.

Throughout the paper, we define a firm as having an individual “bargaining strategy” if it differentiates pay between workers in the same position it perceives to have similar productivity. This definition of bargaining encompasses both differentiation that occurs as the result of back-and-forth worker-firm negotiations and differentiation that results from firms varying the initial offers they make to workers. We focus on this definition because, as we document, it is empirically common for firms to elicit (and for workers to provide) workers’ salary expectations before making their initial offers. Many firms expect to vary the initial offers they make to workers they perceive to have similar productivity. This wage differentiation would not be captured by definitions that focused solely on back-and-forth negotiations, but could plausibly have an impact on within-firm wage inequality.

In an initial contribution, we show that it is possible to identify whether a firm engages in individual bargaining (has a bargaining strategy) using simple survey questions. We developed the wording of these questions based on conversations with over 100 HR professionals. To account for the likely possibility that firms’ wage-setting strategies vary across groups of workers within a firm, we elicited firms’ strategies for four groups of full-time workers: recent labor market entrants, experienced non-managers, managers, and workers in hard-to-fill bottleneck occupations (defined by each respondent firm). To allow bargaining strategies to differ for recruiting and retention, we separately elicited firms’ strategies for external hires and for incumbent workers who received an outside offer.

Drawing on our survey-based measures of firm bargaining strategies, we document that bargaining is possible at many firms. The majority (78%) of workers employed by the surveyed firms are in positions where individual bargaining is possible. However, there is substantial variation

across employee groups: more firms bargain with managers (95%) than with experienced non-managers (85%) and with recent labor market entrants (55%). This is true both for new hires and for incumbent employees who have received an outside offer. The extent to which firms are willing to differentiate pay also varies across employee groups. For labor market entrants, the typical firm is able to adjust pay by 3%; for experienced non-managers they are able to adjust pay by 7%; and for managers they are able to adjust pay by 13%

Our results are inconsistent with models in which firm productivity influences wage-setting strategy (Doniger 2015; Postel-Vinay and Robin 2004; Flinn and Mullins 2021). We find that firms that engage in individual bargaining are not more productive—as proxied for by firm age, size, or assets per employee—than those that do not. They also do not pay higher mean wages. Although firm productivity appears to be largely uncorrelated with bargaining, we do find that other firm-level factors, such as the presence of a collective bargaining agreement (CBA) and whether a firm is headquartered in Eastern Germany, are correlated with bargaining strategies. Our results also reveal an important role for market-level factors. Firms are most willing to adjust pay for workers in positions they are having a hard time filling. In addition, controlling for employee-group characteristics within firms explains more of the variation in bargaining strategies than do firm characteristics.

We use data from the worker survey to examine how worker-firm bargaining interactions typically unfold. We have detailed bargaining histories for all surveyed workers who received an offer in the previous six months, regardless of whether they accepted the offer. The majority of worker-firm interactions begin with the worker providing the firm their salary expectations. Almost all firms in our sample ask for this information and about a third require it. Many workers choose to provide this information, even when not required. Firms report that they use such expectations to set pay; 44% of firms say that variation in initial offers is as important or more important in determining the final offer as back-and-forth negotiations.

Our results highlight the importance of on-the-job renegotiation and place empirical restrictions on the types of models that are appropriate for the labor market. Among our sample of full-time

workers, most offers are rejected, with the worker ultimately remaining at the incumbent firm. In many cases, workers choose to remain at the incumbent firm after engaging in back-and-forth negotiations with the outside firm. In many cases, the worker uses the outside offer to improve her position at the incumbent firm. Our finding that a large share of offers are rejected—and that this sometimes occurs only after several rounds of back-and-forth negotiation—is a clear prediction of models in which both firms and workers have imperfect information about their counterpart’s outside options. These results align with previous findings for the product market (Backus et al. 2020).

Finally, we document that there is substantial between-worker heterogeneity in bargaining behavior, which translates into wage inequality within the firm. We focus on two dimensions of heterogeneity highlighted by the bargaining literature—outside options and risk tolerance—and two dimensions highlighted by the literature on wage inequality—gender and individual-specific wage premia (as estimated from a two-way fixed effects model following Abowd, Kramarz, and Margolis 1999). Relative to other workers in the same occupation and establishment, workers with better outside options are more likely to ask for and receive improvements in their offered wage, both at the beginning of and during an employment spell. Differences in outside options better explain differences in bargaining behavior than differences in risk tolerance. Women ask for and receive less both at the start of and during an employment spell. These gender differences cannot be explained by women being more likely to negotiate for non-wage amenities. Though women have worse outside options than their same-occupation male colleagues, this does not fully explain the gender gap in bargaining behavior.

Three pieces of evidence suggest individual bargaining contributes to wage inequality. First, we show that, after controlling for occupation-establishment fixed effects, there is no gender wage gap among surveyed workers whose wages are not set by individual worker-firm bargaining. Among surveyed workers whose wages are set by bargaining, we continue to see a 4 to 5 percentage point gender wage gap. This gap persists even when we control for hours worked (elicited in our worker survey) and is robust across different specifications and subsamples. Second, when pay

is set by bargaining, the wage policy—as measured by the AKM firm effect (Abowd, Kramarz, and Margolis 1999)—of an individual’s firm continues to predict their pay once they have moved to another firm. At bargaining firms, workers who came from higher-firm effect firms earn more than their same-occupation-establishment peers who joined from lower-firm effect firms. We find a statistically insignificant relationship with the prior-firm effect when we run similar regressions including workers whose pay is not set by bargaining.¹ Finally, we show that, compared to their same-occupation coworkers, workers with higher individual wage premia are more likely to negotiate pay. These workers also ask for more—as a fraction of their current salary—in a hypothetical bargaining scenario in which we provide workers with information about pay. Our results suggest that person effects may reflect, in part, differences in individual bargaining behavior.

Our results contribute to several distinct literatures. First, they contribute to a growing empirical literature on how bargaining works in the field (e.g., Cramton and Tracy 2003; Backus, Blake, and Tadelis 2019; Larsen, Lu, and Zhang 2021; Larsen 2021; Backus et al. 2023). The results are most analogous to those presented by Backus et al. (2020), who used new data from eBay to provide the first large-scale evidence on how buyers and sellers interact. This paper introduces and analyzes analogous data for the labor market.

Our results also contribute to a growing literature on firms’ wage bargaining strategies. As recent work has noted, we know little about how firms set wages (Card 2022). Our survey-based approach is distinct from much of the literature, which is either theoretical or relies on the structure of a model (Postel-Vinay and Robin 2004; Michelacci and Suarez 2006; Doniger 2015; Caldwell and Harmon 2019; Flinn and Mullins 2021). Relative to other recent empirical studies of wage bargaining, we are distinct in our wide industry coverage, in the level of detail we have on both the firm and worker sides of bargaining, and in our focus on individual (rather than collective) bargaining ((Brenzel, Gartner, and Schnabel 2014; Biasi and Sarsons 2022)). The worker survey we conducted and which we link to the firm survey and administrative outcomes is most related to

¹This is consistent with prior work by Di Addario et al. (2022), who found that the prior firm effect is insignificant for the average worker. We interpret the differences between our results and those presented in Di Addario et al. (2022) as reflecting the greater prevalence of collective bargaining in Italy (Bhuller et al. 2022).

the seminal survey by Hall and Krueger (2012), which asked workers about the negotiations that took place when they accepted their job offer.

Our empirical approach was inspired by the literature that uses surveys to elicit information on firm strategies (Blinder et al. 1998; Bewley 1999) and most closely mirrors the approach in Bloom and Van Reenen (2007). In particular, the way in which we developed and validated our firm bargaining measure closely follows the development and validation of their measure of management practices (Bloom and Van Reenen 2007; Scur et al. 2021). Our finding that AKM person effects are correlated with individual bargaining behavior mirrors the finding that AKM firm effects are correlated with firm management practices (Bender et al. 2018).

The rest of the paper proceeds as follows. Section 2 describes our survey instruments and data. Section 3 introduces and validates our survey-based bargaining measures. Section 4 provides new findings on firm-level bargaining strategies. Section 5 documents heterogeneity in worker bargaining behavior and outcomes. Section 6 examines the implications of bargaining for wage inequality. Section 7 concludes.

2 Survey Infrastructure and Data

We obtain data on firms' wage-setting strategies from a survey we fielded to a broad set of firms across all major sectors and regions in Germany. We link firms' survey responses to Social Security records and to additional firm productivity measures. We also link these data to the responses from a survey we fielded to 135,000 German workers, the majority of whom work at surveyed firms.

2.1 Firm Survey

We surveyed a broad set of German private sector firms about their wage-setting strategies through the ifo Institute for Economic Research (ifo), a well-known German research institute that has been conducting firm surveys since 1949. Through various survey panels, the ifo Institute offers insights for policy-making and academic research (Sauer, Schasching, and Wohlrabe 2023). The

results from these surveys are disseminated through the ifo Institute's own research outlet and are frequently covered by the media. For instance, the ifo Institute conducts a monthly business survey of firms that serves as the foundation of some of Germany's most important economic indicators for employment dynamics and business cycles (Lehmann 2023).

We fielded our firm survey using the ifo Institute's HR survey panel and management panel. The HR survey panel is a quarterly survey targeting senior HR representatives and has previously covered a wide range of HR topics, including recruiting strategies, wage-setting practices, and home office policies. The management survey is also conducted quarterly and focuses on top management representatives, predominately firm CEOs or owners. Using the ifo Institute's existing survey panels allowed us to leverage the high reputation the ifo Institute has with respect to conducting firm surveys. The median respondent in our survey has participated in the survey panel for over seven years. The fact that respondents repeatedly participate in these surveys suggest that they have a high trust in the survey and that they are well aware that their responses influence research and policy. See Appendix B for more information on the sampling frame and recruitment procedures. Fielding the survey as a special edition survey—rather than embedding our questions in one of the ifo Institute's existing surveys—allowed us to include a larger number of questions and to elicit consent to link firms' responses to other databases.

The majority of our survey respondents hold senior-level positions, such as human resources (HR) director, chief human resources officer, or CEO. These individuals are typically involved in and aware of general firm strategies regarding wage setting. While our survey was the first ifo survey to elicit bargaining strategies, the same respondents frequently respond to other detailed questions about wage setting (Schaller, Hennrich, and Wohlrabe 2025). We included a free-text field at the end of the survey which is a best practice at the ifo Institute for eliciting whether a survey was difficult for respondents. We found that many respondents used the text field to provide additional details on their firm's wage setting practices while only two indicated limited knowledge of wage setting.

The ifo Institute e-mailed survey invitations in two waves: September 2021 and January 2022.

Similar to other surveys conducted by the ifo Institute, the firm survey had a 51% response rate (Sauer, Schasching, and Wohlrabe 2023). For our main analysis sample, we restrict to complete responses and keep one observation per firm. For firms for which we have multiple responses, we prioritized responses according to whether they provided consent to link to the IAB records; within consent type, we prioritized responses in the order received. In total, our sample consists of 772 firms.

Column 1 of Table I shows that our sample captures a broad set of firms, industries, and regions. While the average firm age is 50 years, the youngest firm in our sample was founded in 2021, and the oldest was founded several centuries ago. Thirty-four percent of firms operate in the manufacturing sector. However, our sample also captures other key sectors, such as retail (17%), professional services (9%), and information services (7%). Twelve percent of firms have their headquarters in East Germany. The main way in which our sample differs from the set of all German firms is that we under-sample small firms. Column 1 shows that, while our firms cover all size classes, the median firm in our sample employs between 50 and 249 workers. We targeted our survey design and outreach at medium and large firms because small firms hire infrequently and are less likely to have formal bargaining strategies in place, making them less suitable for our study. Further, a large share of workers are at large firms: firms with more than 249 employees cover 45% of employees in Germany (Destatis 2022).

Columns 2 to 4 of Table I use three distinct data sources—which differ in how they define a firm—to describe the set of all firms in Germany. Column 2 uses data from the Statistical Business register, which defines a firm as a legal entity. Column 3 uses data from Orbis, where firms are defined based as entities within a corporate network. Column 4 uses data from the Establishment History Panel (BHP) housed at the IAB, which contains data on establishments (not firms) with workers with Social Security contributions. Columns 2 to 4 of Table I show that each data source provides similar characteristics for the average German firm.

Relative to the set of firms in Germany, the firms that participated in our survey (Column 1) have a similar sectoral composition once we account for the over-representation of the manufac-

turing sector. This over-representation of the manufacturing sector is partially explained by the fact that our sample is skewed toward larger firms. The high share of large firms also leads us to have a larger share of stock-based corporations. The share of our firms in East Germany is similar to that in the overall population. We provide additional information on sample coverage and representativeness in Appendix Section B.3.

While a large minority of firms in our sample (41%) have employees who are covered by CBAs, these agreements do not eliminate firms' ability to set pay flexibly (see Bhuller et al. 2022, for cross-country comparisons). German law grants firms the right to deviate from regulated wage floors by paying higher than regulated wages ("Günstigkeitsprinzip") and by issuing wage top-ups ("Übertarifliche Zulagen"), which can be implemented either as one-time payments or regular add-ons to the base wage.² By law, firms can pay these top-ups for a variety of reasons, including individual negotiation or market factors. In addition, higher-level employees and managers at CBA-covered firms are typically exempt from the CBA. In recent decades, opening clauses, which allow firms to set wages below the CBA-regulated wage, have also become more common (Fitzenberger, Kohn, and Lembcke 2013; Blien et al. 2013). Previous research has confirmed that German firms take advantage of this flexibility; as a result, wage inequality has grown over the past several decades (Dustmann, Ludsteck, and Schönberg 2009; Dustmann et al. 2014; Price 2018).

2.2 Social Security Records and Firm Productivity Measures

We link our firm-level survey responses to German Social Security records, which are assembled by the Institute for Employment Research (IAB) into the Integrated Employment Biographies (IEB) database. The IEB data capture all private-sector and public-sector employees with Social Security contributions and provide information on employee demographics (e.g., gender, age, and education), employer information (e.g., sector and location), and job-spell-based information (e.g., full-time status, daily pay, and occupation). We impute daily pay for individuals whose pay is

²In the case of Portugal, Cardoso and Portugal (2005) and Card and Cardoso (2022) provide evidence for this practice by documenting that a large share of CBA-covered workers receive wage cushions, which allow pay to differ across individuals in the same position.

censored at the Social Security maximum.

Among the 772 firms with complete survey responses, 553 (72%) provided consent for linking the survey responses to the IEB data. Under German privacy laws, this consent is strictly required to link firm responses to Social Security records. We can link 95% of eligible firms to the IEB data. Because both piloting and our validity tests described in Section 3.3 indicated that responses are stable across divisions in a firm, we follow the previous literature and match firm-level responses to all matching establishments in the IEB data (Bloom and Van Reenen 2007; Bender et al. 2018). A special department within the IAB performed this linkage using each firm’s name, headquarter address, and legal form. The matched firm survey-IEB data contain 416,821 full-time employees at matched firms in 2020, the most recent year for which we have administrative data. Our main sample includes the subset of these individuals between ages 25 and 50. To assign workers to firm bargaining strategies, we group them by experience (as reported in the IEB data) and based on whether their assigned occupational code indicates they are a manager.

We also link the 772 complete firm-level responses to balance sheet information from the Orbis database, which is compiled by the commercial data provider Bureau van Dijk. This database contains commonly used proxies for firm productivity, including firm age, total assets, and fixed assets. We match 99% of surveyed firms to Orbis.

2.3 Worker Survey

To examine how bargaining events typically unfold and to examine heterogeneity in worker bargaining behavior, we use data from a survey we fielded to 135,000 full-time German workers. We asked workers for their tenure, weekly hours worked, search behavior, and risk tolerance. We also included three bargaining modules. The first elicited the sequence of bargaining events for workers who had received an outside offer in the previous six months. The second elicited the sequence of bargaining events that occurred when individuals started their first job at their current firm. Because individuals’ ability to recall these events may decline over time, we asked these questions only of individuals who have been at the firm for three years or less. The third module

asked individuals to provide their salary expectations in response to a hypothetical prompt.

We used the Social Security records to select workers for inclusion in the survey. To ensure we could elicit responses from workers at the firms that participated in our firm survey, we first randomly selected 82,500 workers from the set of full-time workers between ages 25 and 50 at surveyed firms. We then randomly selected 52,500 workers from the set of full-time workers between ages 25 and 50 not employed at these firms. Including these additional workers allows us to obtain estimates representative of full-time German workers.

The IAB mailed invitations to participate between June 2022 and December 2022. The invitations, which were signed by the director of the IAB, described the survey as a scientific study on salary progression in Germany. The effective response rate of 11.4% compares favorably to other recent IAB surveys that target first-time respondents (Haas et al. 2021). For our main analysis sample, we keep the 9,756 respondents who completed the survey and who reported that they were still in Social-Security-covered employment (as opposed to those in self-employment or non-employment). Some of our analysis focuses on the subset of these workers who are at surveyed firms (N=7,079). Appendix Table A1 describes the characteristics of the surveyed workers.

3 Measuring Firm Bargaining Strategies

We designed and validated a new survey instrument that identifies whether a firm engages in individual bargaining.

3.1 Conceptual Definition of Wage Bargaining

We define wage bargaining as a situation when a firm differentiates pay between workers in the same position that it perceives to have equal productivity. This can occur either at the beginning of an employment spell or during an employment spell. Because we compare workers with the same productivity in the same position, our definition is analogous to standard definitions for price

discrimination.³ Our definition is somewhat broader than standard definitions used in the labor literature; within this literature, whether a firm engages in wage posting or (individual) wage bargaining depends on whether wages are determined *ex ante* (before a firm and worker meet) or *ex post*, once a worker’s outside options have been revealed (Manning 2003).⁴

A key feature of our definition is that it does not require wage differentiation to occur as the result of back-and-forth negotiation between an employer and (potential) employee.⁵ Instead, we define a firm as having a “bargaining strategy” if it either tailors the initial offers it makes to workers it perceives to have the same productivity or if it engages in back-and-forth negotiations with workers. A recent literature has highlighted the growing use of salary expectations questions, which may give firms information on how to tailor the initial offers they make (Agan, Cowgill, and Gee 2020).⁶

Our definition of wage bargaining also does not require that firms that “post” wages—i.e., those which do not bargain—announce these wages in job ads. This behavior is relatively uncommon both in the United States, where 5% of online ads contain specific pay information (Hazell, Kazemi, and Taska 2018), and among the German firms in our sample (Table E2). The decision whether to provide pay information in job ads may reflect other considerations (Batra, Michaud, and Mongey 2023).

³For instance, a standard graduate textbook in industrial organization says “it can be said that the producer price discriminates when two units of the same physical good are sold at different prices, either to the same consumer or to different consumers” (Tirole 1988).

⁴Firms may post wage schedules that condition on observed markers for productivity. As discussed in Hall and Krueger (2012), whether a firm posts wages is conceptually distinct from whether a firm regularly reviews its wage schedule or whether a firm lists its wage in a job ad.

⁵An alternative definition would differentiate between firms that make “take it or leave it” offers and firms that engage in back-and-forth negotiations. One challenge with this definition is that, if firms respond to workers’ salary expectations, these “take it or leave it” offers may not be the first offer in the bargaining event.

⁶While it is illegal in Germany (as it is in many states in the United States) to ask candidates about their current or past wages, it is not illegal to ask for a candidate’s salary expectations. The potential for tailoring initial offers was discussed in previous studies of bargaining, including Hall and Krueger (2012). While perfect tailoring of offers to workers’ reservation wages can result in the Diamond paradox, our results below suggest that not all firms use this information (Diamond 1971). Further, conversations with HR professionals suggest that, even when firms use information on workers’ salary expectations, they do not necessarily offer workers wages exactly equal to those expectations.

3.2 Survey Measures of Firm Bargaining Strategies

We designed a series of questions to elicit firms' strategies for bargaining with new full-time hires and with existing full-time workers who had received an outside offer. To allow for within-firm variation in bargaining strategies, our bargaining questions distinguish workers into four groups: recent labor market entrants, experienced non-managers, managers, and employees in hard-to-fill bottleneck occupations.⁷ Our objective in choosing these groups was to make distinctions that are relevant for common HR strategies, that can be identified in Social Security records (which do not include information on CBA coverage), and that are general enough to apply to firms in different sectors. We asked respondents to name the bottleneck occupation that was most relevant for their firm. Appendix Table B9 documents significant variation in stated occupations, ranging from white-collar management and IT positions to blue-collar jobs as technicians or service workers.

New External Hires. We elicited firms' strategies for new external hires by asking:

“How much more could a person maximally receive compared to the fixed compensation you would have offered based on the person's qualification/fit for the position alone?”

We prompted respondents to select one of the following options: “0%/no adjustments are possible”, “1–10%”, “11–20%”, “21–30%”, “31–40%”, and “more than 40%”. This question—which we refer to as the protocol question—represents our main measure of firm bargaining strategies. In most of our analysis we define a firm as not bargaining with a group of workers if they indicated that no adjustments are possible.

We chose the wording of the question—and in particular the phrase “qualifications and fit”—based on numerous conversations with HR professionals. These conversations suggested that HR

⁷The first category includes those that are entering the labor market following the conclusion of their schooling (e.g., college) or following the conclusion of an apprenticeship. The final category is an official term in German: since 2011, the German Federal Employment Agency has published annual statistics on the most common bottleneck occupations (Bundesagentur fuer Arbeit 2021). This concept is not specifically tied to wage setting, but rather captures the length and difficulty of filling a vacancy.

professionals typically use “qualifications and fit” to describe observed dimensions of worker productivity, including the quality of one’s educational background and prior experience, or how well the candidate would integrate with incumbent workers. This question captures both whether and the extent to which a firm is willing to vary the wages it offers to workers it perceives to have similar productivity. This variation could arise due to differences in workers’ skills in bargaining or due to differences in their outside options.

Most of our analysis focuses on policies for base wages (often referred to as “fixed compensation” by HR professionals), which comprise the majority of compensation for most workers.⁸ To check that our main bargaining measure is robust to alternative measures of compensation, we posed the same bargaining question with respect to special payments, which could include bonus pay or stock options. We also asked respondents whether—at their firm—specific non-wage amenities were more flexible than wages. We focused on four amenities that, during the development of our questionnaire, were most cited by HR professionals as important: flexible work (including vacation days), commute and moving costs, further education and training, and childcare subsidies.

Because firms may have strategies that are flexible in theory, but which do not typically result in wage variation, we also elicited the typical amount of wage variation induced by bargaining at both the initial and final offer stages. We told respondents we were interested in how much wage offers varied within a position. We prompted respondents to consider (separately for each group) a situation in which their firm made ten offers to candidates who had the same qualifications and fit but differed in their stated salary expectations and offers from other companies. We then asked respondents what they expected the spread would be between the highest and lowest (1) initial and (2) final offers their firm would make to these candidates. We refer to these questions as the incidence questions. We use these questions to validate firms’ responses to our main protocol question and to examine the importance of the initial stage. By explicitly prompting respondents

⁸Non-CBA-covered workers in Germany who do not hold management positions receive, on average, 88% of their pay in the form of base wages (hkp 2021). Even in sectors where special and variable pay are common, these types of pay only represent substantial portions of overall compensation for employees at higher levels. Changes in base wages also have longer-run impacts on firms’ budgets and workers’ lifetime earnings due to both downward nominal wage rigidity and annual cost-of-living adjustments. Another advantage is that base wages are easier to compare across firms than special payments, which often vary in maturity rates or vesting schedules.

that candidates differ in stated salary expectations—which is typically viewed by firms as signal of variation in workers’ outside options rather than their productivity (Agan, Cowgill, and Gee 2021)—these questions help us speak to the concern that firms may vary wages for other reasons (e.g., differences in worker effort, expected performance, or location of work).

Incumbent Workers. Because bargaining may also occur during an employment relationship, we also asked respondents how their firm would respond to a worker who received an outside offer:

“Suppose an employee at your company receives an external offer from another company and requests a salary increase. What is the maximum percentage by which your firm could possibly increase the fixed compensation (without changing the person’s tasks) in order to retain the person?”

This measure identifies whether firms are willing to adjust wages for a given worker without changing their job tasks (which could change the worker’s productivity). To the extent to which renegotiations lead to promotions, responses to our question provide us with a conservative measure of firms’ renegotiation strategies.⁹

Firm Policies vs. Recent History. One key design choice was to focus on firms’ policies for new hires and incumbent workers, rather than firms’ recent experiences with specific workers. In developing our survey, we found that many HR respondents found it more taxing to recall the specifics of recent hires. HR professionals at large firms wanted to consult with their colleagues before answering; professionals at small firms worried their most recent hire was not representative. Firm policies are better known as they apply to all workers, regardless of the worker’s leverage or actions. By contrast, the extent to which recent hires asked for (or received more) depends on both

⁹Promotions are difficult to accurately measure and compare across occupations and firms in Germany. While our question focuses on workers with an outside offer, there is no reason to expect—either from a theoretical perspective or based on our conversations with HR professionals—that firms would be more able to adjust wages for workers whose outside options had changed but who had not yet secured an outside offer. In addition, survey evidence from the Survey of Consumer Expectations (SCE) by the Federal Reserve Bank of New York that asked workers about negotiations with their employers in response to an outside offer documents that these negotiations are more than twice as likely to result in pay raises than in promotions (see Faberman et al. 2022, for details on the survey).

the firm’s policies and on the workers’ actions. Appendix Section B.4 shows that our preferred measure of bargaining yields similar results regarding the prevalence of bargaining to those we obtain when we analyze simple questions on recent hires.

3.3 Validity of Elicited Measures

Several validity exercises suggest that respondents’ answers are stable across different areas of the firm, that respondents are well-informed about how their firms set wages, and that our measures accurately capture firms’ bargaining strategies. We present the results from our main validity tests in this subsection.

We first test whether responses are stable across different areas of the firm, which is a prerequisite for using survey responses to assign strategies to firms. We follow Bloom and Van Reenen (2007) and leverage the fact that we have responses for multiple individuals from 37 firms.¹⁰ Appendix Table A2 documents significant overlap between independent responses from the same firm, corroborating feedback from practitioners that wage-setting strategies are typically determined at the firm level.

We next verify whether survey responses are reliable. One concern with the reliability of any firm survey is that respondents may lie to put their firms in a positive light. To mitigate this concern, we focused our questionnaire on factual questions regarding wage-setting strategies, rather than more subjective questions about why the firm chose such strategies (Bloom and Van Reenen 2007). Our conversations with HR professionals during piloting corroborate the idea that individuals do not perceive there to be a “right” answer to our questions. The high response rate (51%), completion rate (83%), and the fact that most professionals provided consent (72%) for their responses to be linked to external data sources, such as the administrative IAB data, are consistent with the idea that individuals do not perceive the answers to these questions to be sensitive. The high completion rate—and the median response time of 11 minutes—suggest that

¹⁰Bloom and Van Reenen (2007) compare correlations between the management scores implied by the interviews of 64 firms where they have more than one respondent.

survey fatigue and limited attention are not major concerns.

Finally, we conduct two distinct exercises that leverage additional data sources to verify that respondents provided accurate information. First, in Appendix Section C.3 we document that their answers to questions for which we were able to collect publicly available data align with those data. Second, Appendix Table A5 shows that the elicited firm strategies are positively and significantly correlated with the survey responses from workers who work at those firms. Appendix Section B.4 provides additional background on respondents, explains the survey instrument, and presents a series of additional robustness exercises.

4 Bargaining in the Labor Market

We use data from the firm and worker surveys to describe the prevalence and mechanics of worker-firm wage bargaining. Most firms are willing to differentiate pay between new external hires they perceive to have similar qualifications and fit and to adjust pay for incumbents who receive an outside offer. However, the frequency and magnitude by which they differentiate pay varies systematically across employee groups. Firms report they are willing to differentiate pay by 6-12%, depending on the group. For new hires, this differentiation is the result of both firms differentiating initial offers and responding to candidates' requests for more. After a firm has made its initial offer, the typical worker asks for 3% more, and receives 1.5% more.

4.1 Individual Bargaining Strategies are Pervasive

New External Hires. We start by using our protocol question to document the prevalence of bargaining strategies. Panel A of Figure I shows that roughly 50% of surveyed firms are able to differentiate base wages between recent labor market entrants they perceive to have similar qualifications and fit. More than 80% of firms are able to differentiate wages for experienced non-managers and for managers. These three groups are mutually exclusive and exhaustive. When asked specifically about workers in the bottleneck occupation that firms indicated they were struggling to fill, nearly

all firms are willing to adjust base wages to hire a worker.

Firms have a significant amount of discretion to increase wages, particularly for workers in higher-level positions (Panel A of Figure II). While only 7% of firms would increase base wages by more than 10% for new external hires that are labor market entrants, 22% of firms are willing to do so for new external hires that are experienced non-managers, and 63% are willing to do so for new external hires that are managers. Because wages are higher for workers in higher-level positions, the level amount by which firms could adjust pay would be larger even if bargaining strategies were equalized across groups. That both the base levels and the amount of discretion vary suggests that bargaining may result in substantial pay dispersion.

The between-group differences do not mechanically reflect differences in the variance of productivity across employee groups. When eliciting firms' bargaining strategies, we specifically prompted respondents to focus on adjustments between individuals with similar qualifications and fit. In our conversations with HR professionals, this was the phrase that most closely aligned with productivity. This result is corroborated by the findings on negotiations with incumbent workers that we discuss next and that hold productivity constant by conditioning on workers staying in their current position.

Firms say that their bargaining strategies can result in substantial variation in final offers. Figure III uses our incidence question to present the expected gap between the highest and lowest offers a firm expects to make to ten candidates for a position who have similar qualifications and fit, but “vary in stated salary expectations and offers from other firms.” The typical firm expects a 3% gap for recent entrants, 5% for experienced non-managers, and 10% for managers. Conditional on there being a gap, firms expect a 6% gap for recent entrants, 10% for experienced non-managers, and 12% for managers.¹¹

¹¹We calculate these averages by mapping each bin—other than the final bin (>40%)—to its midpoint; we assign the final bin to its lower limit. We then calculate the average across firms, treating all firms equally (i.e. not weighting by employment). Firms' bargaining policies suggest somewhat larger pay dispersion. Firms are willing to adjust pay by 4% for recent labor market entrants (7% conditional on non-zero adjustment), 7% (8%) for experienced non-managers, and 16% (17%) for managers.

Incumbent Workers. We find similar patterns for incumbent workers. Panel B of Figure I shows that, for recent labor market entrants, 57% of firms say they would be willing to increase an existing worker’s base wage if they received an outside offer. More than 80% of firms would be willing to do so for experienced incumbents, for managers, and for workers in bottleneck occupations. As with new hires, the fact that firms are more willing to increase pay for managers and for more experienced workers may reflect the fact that these workers are more difficult to replace (Bloesch, Larsen, and Taska 2022). Because we specifically asked HR professionals to consider a scenario in which the firm did not change the worker’s job tasks, these adjustments do not reflect short-run changes in the worker’s productivity (i.e., a change between the day before an offer is received and the day after). Rather, they suggest that firms expect to earn rents on incumbent workers: they are able to increase pay without it becoming unprofitable to employ the worker. This finding is consistent with models in which firms have market power, either due to search frictions, size, or preference heterogeneity (e.g., Manning 2003; Cahuc, Postel-Vinay, and Robin 2006).

The magnitude by which firms are willing to adjust wages is similar for incumbent workers. The typical firm in our sample will adjust pay by 3% for recent entrants, 6% for experienced non-managers, and 10% for managers who receive an outside offer. Conditional on responding to outside offers, the typical firm will adjust pay by 6% for recent entrants, 7% for experienced non-managers, and 14% for managers.

Robustness. The bargaining patterns we document using our main measure of bargaining over base wages are robust to accounting for other forms of compensation. Panel B of Appendix Table A6 documents similar patterns in bargaining with new external hires when we include bargaining over special payments in our measure of firm bargaining strategies. We also asked respondents whether, at their firm, it was easier to adjust four non-wage amenities—flexible work (including vacation days), commute/moving costs, training, and childcare—than wages.¹² Panel C of Appendix Table A6 shows similar bargaining patterns over base wages among those who responded “yes” to

¹²We focused on these amenities because, during the development of our questionnaire, they were most frequently cited by HR professionals as important.

this question.¹³ Appendix Section E shows that our main findings are robust to re-weighting our sample to match the overall distribution of firms in Germany.

4.2 Predicting Firm Bargaining Strategies is Difficult

Following the theoretical literature on firms' choice of wage-setting strategy, we next examine whether firm characteristics (Doniger 2015; Postel-Vinay and Robin 2004; Flinn and Mullins 2021) or characteristics of the labor market a firm is in (Ellingsen and Rosen 2003; Michelacci and Suarez 2006) are associated with firms' decisions to set pay via individual bargaining. The literature emphasizing firm productivity largely predicts that more productive firms will be more likely to set pay by bargaining. The literature that emphasizes labor market factors suggests that firms may be more likely to set pay via bargaining when the variance in worker productivity is larger, or when the labor market is tighter. Hall and Krueger (2010) and Hall and Krueger (2012) provide a summary of this theoretical literature.

Productivity. We first examine the correlation of firm bargaining strategies with common proxies for firm productivity.¹⁴ Figure IV presents binned scatterplots of an indicator that a firm has a bargaining strategy for experienced non-managers (the largest employment group) against common proxies for firm productivity: firm size, firm age, and total assets per employee. On these dimensions, we do not find significant differences between firms that do and do not bargain with new external hires or with incumbents. We also find that it is difficult to predict a firm's bargaining strategy using its AKM wage premium (Figure IV). Table II reports p-values from corresponding tests of equality of means. These confirm that firms that do and do not set pay via individual bar-

¹³In unreported results, we compare bargaining strategies for firms with a high versus low share of performance pay. For each firm, we compute the share of special pay out of total pay, and compare firms in the top versus bottom quartiles (Lemieux, MacLeod, and Parent 2009). We find that the bargaining strategies we elicit are similar even for firms with a low prevalence of performance pay, suggesting that presence of performance pay is not a key driver of the patterns we document.

¹⁴The choice of wage protocol may both be influenced by and influence firm productivity. However, because firms should choose the wage-setting protocol that maximizes their profits, we would expect that ex post measures of productivity, including firm size, firm age, and total assets per employee, would—if anything—over-estimate the gaps in underlying productivity.

gaining are similar with respect to several proxies for productivity. Appendix Figure A1 shows that we obtain similar results regardless of whether we use binary or continuous measures of bargaining.

Other Firm-Specific Factors. While we do not find systematic heterogeneity with regard to firm productivity, our results indicate that bargaining strategies are correlated with several other firm-specific factors. Table II shows that firms that have a collective bargaining agreement report less flexibility in adjusting wages, even though the CBA would not prevent them from making such adjustments (in particular, for managers who are typically not covered by CBAs).¹⁵ In addition, firms headquartered in East Germany, which historically had more rigid pay, are less likely to bargain with workers in all groups. We also find some evidence that firms' legal form is correlated with their bargaining strategies: firms whose shares can be traded on the stock market are more likely to set wages flexibly than firms with other legal forms. These results are consistent with the view that managerial style and culture are important for firms' wage-setting strategies (e.g., Bertrand and Schoar 2003; Acemoglu, He, and Le Maire 2022; Hjort, Li, and Sarsons 2020).

Labor Market Factors. The group-level variation documented in Figures I and II is consistent with the idea that workers' job characteristics and labor market factors such as tightness drive variation in wage-setting strategies. Figure II shows greater scope to adjust pay for managers than for experienced non-managers, and greater scope to adjust wages for experienced non-managers than for recent labor market entrants. This finding is consistent with theoretical work by Bloesch, Larsen, and Taska (2022) who emphasize that workers in managerial positions have the most hold-up power as they are difficult to replace.

Further, we find that firms are most willing to make adjustments for workers in the occupation

¹⁵In our sample, 41% of firms are covered by a CBA, reflecting the substantial decline of CBA coverage in Germany over the past decades. While 70% (56%) of workers in West Germany (East Germany) were covered by a CBA in 1996, this was only true for 45% (34%) in 2021 (Institut fuer Arbeitsmarkt- und Berufsforschung 2021). The decline in coverage occurred both across and within firms (Hassel and Rehder 2001; Brändle, Heinbach, and Maier 2011; Fitzenberger, Kohn, and Lembcke 2013; Fitzenberger and Sommerfeld 2016). While not all workers within a firm are covered by a CBA, we find that CBA coverage predicts firms' policies even for groups that are not covered. This finding mirrors the results on union spillovers on non-union employees documented in Beauregard et al. (2024).

they specify they are having a hard time filling (i.e., workers in bottleneck positions). As Appendix Table B11 documents, firms are more willing to adjust pay for managers in positions they are struggling to fill than for managers in other positions, suggesting that market tightness may affect how firms choose to set wages.¹⁶

Relative Importance of Firm and Market Factors. A simple variance decomposition provides additional support that our results are most consistent with models which emphasize the importance of market factors. In particular, it shows that employee-group characteristics within firms, rather than firm characteristics, explain more of the variation in bargaining strategies. We perform this decomposition by running a regression where the dependent variable, b_{ig} , is an indicator for whether firm i bargains with workers in group g (e.g., with recent labor market entrants) and the independent variables include different sets of covariates.

Column 1 of Table III shows that the four employee-group dummies alone explain 33% of the variation in wage-setting strategies for new hires. After adjusting for the number of fixed effects used, the amount of variation explained by the four group dummies is comparable to that explained by the more than 500 firm dummies (Columns 1 and 2). Columns 4 to 9 show that adding firm characteristics or coarse industry dummies does not significantly improve the adjusted R-squared, relative to a model that contains only the group dummies. Panel C documents similar results for the bargaining strategies for incumbent workers. Appendix Table A7 demonstrates robustness to alternative definitions of bargaining and to dropping the strategies for bottleneck occupations, which are harder to compare across firms.¹⁷

¹⁶In unreported results, we find that firms in tighter markets (as measured by the share of workers in bottleneck positions) are more likely to bargain.

¹⁷In unreported results, we attempted to use machine learning methods to predict firms' strategies, under both our baseline and several alternative definitions of bargaining. These exercises corroborated the importance of firm characteristics such as collective bargaining or legal form for firms' bargaining strategies. However, proxies for firm productivity such as firm age or firm assets are not systematically predictive of whether or not a firm engages in individual wage bargaining.

4.3 Typical Worker-Firm Interactions

The firm survey contains information on firms' bargaining policies: whether they are willing to bargain with (any) workers, regardless of leverage. The worker survey described in Section 2.3 provides us with information on how typical worker-firm bargaining events unfold, including how often workers provide their salary expectations and ask for (and receive) more.

The worker survey provides us with detailed worker-firm interactions for all workers who received an offer in the previous six months.¹⁸ For workers who accepted an offer (i.e., workers who then moved to a new firm), we use the interactions between the worker and their now-current firm. For workers who rejected an offer (i.e., workers who received an outside offer but did not switch firms), we use the bargaining associated with the most recent outside offer.¹⁹

The combination of data from the firm survey and the worker survey reveal three key facts about the dynamics of wage bargaining.

4.3.1 Firms Differentiate the Initial Salary Offers They Make to New Hires

First, at the beginning of a job spell, differences in the wages firms offer to workers with similar qualifications and fit emerge both as a result of differences in the initial offers that they make and as a result of back-and-forth negotiations. Figure III shows that firms are more likely to report that they would expect no variation in initial offers than in final offers. However, a large share of firms expect they would make different initial offers to candidates with similar qualifications and fit. Forty-four percent report that the variation in initial offers is at least as important as the subsequent back-and-forth negotiations in determining workers' pay.

Variation in initial offers may arise because firms often obtain information on workers' salary expectations before making an initial wage offer. In our sample, 29% of firms require candidates to

¹⁸Our main survey question asked about any job offer workers received. In this setting, while final offers are typically made in writing, most intermediate bargaining steps are made verbally.

¹⁹We use at most one event per worker; if a worker reports that they both switched firms and received and rejected an outside offer in the previous six months, we use data on the event that led to the change in firm. One distinction between this setting and the product market setting studied in Backus et al. (2020) is that only workers can "accept" offers. While a firm may accept a worker's proposed salary, in order for the match to be formed, the worker must still formally accept the firm's offer.

provide this information; most ask for it. Previous work has documented that how workers respond to questions regarding their salary expectations—whether they agree to provide their expectations, and the level of expectations provided—affects the salary that they are offered (Agan, Cowgill, and Gee 2020; Roussille 2024). This research has also shown—consistent with our conversations with HR professionals—that firms typically interpret variation in these stated expectations more reflective of differences in outside options, than in productivity (Agan, Cowgill, and Gee 2021).

While workers could refuse to provide their salary expectations, Panel A of Table IV shows that the majority (57%) of worker-firm interactions begin with the worker providing this information.²⁰ One interpretation of the fact that firms expect to differentiate initial offers—and that workers often provide their salary expectations before receiving an initial offer—is that workers sometimes make the first (salary) offer. Variation in initial offers—or in initial asks—is not captured by typical surveys of bargaining, which focus only on back-and-forth interactions which occur after a firm has made its initial salary offer.

4.3.2 Back-and-Forth Dynamics Imply Imperfect Information on Both Sides

Second, a large share of offers are accepted or rejected only after back-and-forth renegotiation. Firms that differentiate initial offers are also willing to engage in back-and-forth negotiation (93%). Similarly, firms that engage in back-and-forth negotiation also often differentiate initial offers (87%).

After a firm has made an initial salary offer, about one third of applicants ask the firm to increase the offer. The typical worker who asks for more asks their employer to increase their wage by 3%. Workers sometimes ask for more even when their salary expectations are met: 25% (61%) of workers whose expectations were met (not met) ask for more money. Conditional on a worker asking for more, it is also common for firms to counter: about half of firms raise the offer,

²⁰In their study, Hall and Krueger (2012) reported that about 40% of workers said their employer found out their previous salary (through any channel) before offering them a job. That our share of workers who say they directly provided this information is so much larger is surprising given that it is now illegal in most US states and in Germany for employers to ask workers for their salary history. To comply with this law, firms typically ask for workers' salary expectations or requirements instead.

but less than a third match what the worker asked for. The typical worker improves their offer by 1.5% at this stage.

That many offers are rejected only after back-and-forth negotiation places empirical restrictions on the types of models appropriate for modeling wage bargaining. It is difficult to rationalize such patterns with models in which either firms or workers have perfect information; such models typically predict immediate acceptance or rejection. However, models of two-sided incomplete information such as the Perry (1986) and Chatterjee and Samuelson (1983) models would rationalize such patterns.

Our findings are therefore consistent with a growing literature that has documented that firms have imperfect information about what other firms pay (i.e., what workers' outside options are) and that workers have imperfect information about what their firm is willing to pay (see, e.g., Cullen, Li, and Perez-Truglia 2022; Bertheau and Hoeck 2023; Friedrich and Zator 2024; Cullen 2024; Jäger et al. 2024; Caldwell, Haegeler, and Heining 2025). Among the HR professionals in our survey, 69% said that decision-makers at their firm only have market-level information on wages, not specific information on what their firm's competitors pay.

4.3.3 Outside Offer Renegotiation is Empirically Important

Third, while firms are more willing to differentiate wages at the beginning of a job spell, outside offer renegotiation is empirically more common. Only 9% of workers who received one or more outside offers in the past six months chose to move to a new firm. However, in a third of the cases in which a worker remains at the incumbent firm, the worker re-negotiated their salary at the incumbent firm. It is much more common for workers to receive and reject an outside offer—but use it to renegotiate their wage at their current firm—than it is for them to receive an outside offer and switch firms. Of the 91% of workers who chose to remain at their incumbent firm, 13% successfully renegotiated their pay at the incumbent.

4.3.4 Robustness

The findings from two robustness exercises corroborate the validity of the patterns we document. First, while our main sample focuses on workers who were employed at surveyed firms in 2020, in unreported results, we find similar patterns when we include a random sample of German workers who are employed at non-surveyed firms. This result indicates that the bargaining dynamics we document are not restricted to the specific sets of firms who participated in the firm survey.

Second, data from a follow-up survey we fielded in spring 2024—more than a year after the initial wave—confirm our finding that most outside offers are rejected. In this wave, we asked workers whether they had switched firms since the last survey wave; we again asked workers whether they had received an outside offer in the previous six months. These data allow us to address two potential concerns: (1) that workers who moved due to an accepted outside offer may have been less likely to receive our initial survey invitation or (2) that workers accepted some of the outside offers they reported in the survey after they completed the survey.²¹ One possibility we cannot account for is that workers report they did not receive an outside offer if they received outside interest and the incumbent was sufficiently aggressive in responding that this interest did not turn into an offer. However, if anything, this would lead us to understate the importance of on-the-job renegotiation.

5 Between-Worker Differences in Bargaining

The results from our firm survey highlight that many firms are willing to individually differentiate pay. This finding suggests that the actions of individual workers may be influential in pay determination. We next examine between-worker differences in bargaining behavior and outcomes, both before and after a firm makes its initial offer.

²¹Focusing on workers who provided their e-mail address in the initial wave and were randomized into being contacted via e-mail (to avoid the concern that workers who moved might have been more difficult to contact by mail), we find that the majority of workers (~80%) who received an outside offer chose to remain at the incumbent firm. Similarly, even if we re-code all offers as “accepted” if a worker switched to a new firm between the initial wave and the follow-up survey (assuming that all job-to-job transitions are the result of this offer, not offers they may have received in between survey waves), we find that no more than 26% of offers lead to a job-to-job transition.

5.1 Dimensions of Worker Heterogeneity and Bargaining Outcomes

We focus on two dimensions of heterogeneity highlighted by the bargaining literature—outside options and risk tolerance—and two dimensions highlighted by the literature on wage inequality—gender and AKM person effects.

We elicited information on outside options and risk tolerance in the worker survey. Outside options are a key driver of bargaining outcomes in most models (see, e.g., Nash 1950; Cahuc, Postel-Vinay, and Robin 2006; Caldwell and Danieli 2024) and have been shown to affect worker mobility and wage growth (Caldwell and Harmon 2019). Risk tolerance is sometimes thought to be related to bargaining power. We measure workers’ perceptions of their outside options by asking them how difficult it would be to obtain an outside offer that they would prefer to their current position.²² We followed Dohmen et al. (2011) and elicited risk tolerance by asking workers whether they were “generally [someone] who is willing to take risks or [whether they tried] to avoid taking risks”. We asked workers to provide their responses on a ten-point scale and we define someone as having high risk tolerance if they selected seven or above.²³

We obtain information on gender and on AKM person effects from the administrative data. Our focus on the AKM person effect was inspired by a large literature which has documented that the rise in variance of the AKM person effects explains a large share (40%) of the growth in German wage inequality over the past several decades (Abowd, Kramarz, and Margolis 1999; Card, Heining, and Kline 2013), and an even larger share of the rise of U.S. wage inequality (Song et al. 2019). While a common interpretation of the AKM person effects is that they represent workers’ observed and unobserved skills, they capture all worker characteristics that are valued across firms and do not vary over the time window used for estimation. We take these person effects from Bellmann et al. (2020). Because the person effects we use are estimated from regressions

²²This question generates variation across workers within the same establishment and occupation that could stem from—among other things—differences in preferences or information. While we do not attempt to distinguish between potential explanations, Appendix Table A8 documents that workers’ perceptions are positively correlated with objective measures.

²³Previous studies of bargaining have also highlighted the role of patience in determining prices in the product market (Backus et al. 2020). We elicited patience in a follow-up survey using the question developed by Falk et al. (2023) and analyze heterogeneity on this dimension in Appendix Table A10.

using population data from 2010–2017, they are not mechanically related to the outcomes of the bargaining events elicited in our survey, which only captures bargaining events dating back to 2019.²⁴

For each of these four dimensions of potential worker heterogeneity, we run regressions of different bargaining outcomes y_i on the heterogeneity dimension X_i , age, a quadratic in experience, education dummies, and three-digit occupation-establishment fixed effects:

$$y_i = \beta X_i + \delta \text{age}_i + \alpha \text{exp}_i + \gamma \text{exp}_i^2 + \zeta_{\text{educ}(i)} + \lambda_{o(i), \text{est}(i)} + \epsilon_i. \quad (1)$$

We include occupation-establishment fixed effects ($\lambda_{o(i), \text{est}(i)}$) to ensure that heterogeneity in bargaining behavior is not driven by heterogeneity in firm bargaining strategies. We cluster the standard errors at the firm level. Our baseline sample includes individuals who worked at surveyed firms in 2020.²⁵

Each row of Table V corresponds to a different bargaining outcome. We elicited information on bargaining at the start of the spell (Panel A) for workers who started their job in the previous three years and on bargaining during a job spell (Panel B) for all workers. Panel A shows that the majority (69%) of workers provided their salary expectations to their current firm before they received an initial salary offer; about a third of workers asked the firm to increase the offer it made. Most of these workers (72%) were successful: overall about a quarter of workers successfully negotiated their salary upward at the start of the spell. Panel B shows that in the previous six months, about a third of workers asked for a raise, most of them (78%) successfully.

Panel C describes workers' responses to a hypothetical bargaining scenario we embedded in the survey. We asked workers:

“Suppose you wanted to change jobs and were applying to a new position in a different company. The job ad lists a salary range, which goes from {90/110}% to {120/140}%

²⁴The model used in Bellmann et al. (2020) is a regression of log wages on worker and firm fixed effects, on demographic controls, and on occupation fixed effects.

²⁵The sample used in this section differs from the sample in Section 4.3, which only includes bargaining events that occurred within the previous six months for new hires and incumbents who received an outside offer.

of your current salary. You are asked for your salary expectations. Relative to your salary, what do you say?”

We provided a salary range as firms typically provide pay ranges, rather than exact numbers (Batra, Michaud, and Mongey 2023). We included this scenario so we could compare workers’ behavior— independent of firm actions—in a scenario in which information was equalized.²⁶ The scenario also provides us with more information on how workers behave at the salary expectations stage. Appendix Table A11 confirms that workers’ salary expectations differ depending on their randomly assigned range (90-120% or 110-140%). Appendix Table A12 confirms that workers’ responses to this hypothetical scenario are correlated with observed behavior and, in particular, that workers who provided their expectations in the past are more likely to do so in our scenario.

For this hypothetical scenario, we focus on three key outcomes: whether a worker provided their expectations, whether their stated expectations were at or above the midpoint of the stated range, and whether their expectations were above the top of the stated range. We focus on these outcomes as previous work has documented that firms offer higher wages to workers who state higher salary expectations (Agan, Cowgill, and Gee 2020).²⁷

5.2 Differences in Bargaining Outcomes

Table V documents substantial differences in workers’ bargaining outcomes across the four dimensions of worker heterogeneity we study. Each entry in Columns 2 to 7 presents an estimate of β corresponding to a regression where y_i is the action provided in that row and X_i is the dimension of worker heterogeneity provided at the top of the column.

²⁶Much of the recent policy discussion of bargaining has focused on the role of information. For instance, Germany—and many states in the United States—have made it illegal for firms to ask a worker for their previous salary when discussing pay (Agan, Cowgill, and Gee 2020). However, many firms continue to ask workers for their salary expectations, and, in the absence of information on the pay range associated with a position, workers may anchor their stated expectations to their previous salary (Agan, Cowgill, and Gee 2021). In recognition of this, policymakers have started to introduce and pass legislation which requires firms to provide pay information in job postings. In many cases, the stated goal of these policies is to close the gender pay gap (Council of the EU 2023).

²⁷This work has also shown that firms interpret these asks as more informative of a worker’s outside options than of a worker’s productivity (Agan, Cowgill, and Gee 2020).

Outside Options. Columns 2 and 3 of Table V document that workers with better outside options are more likely to engage in wage negotiations than their same-occupation coworkers with worse outside options. After the initial offer is made, workers who said it would be “easy” or “very easy” to obtain a better outside offer are 9 percentage points more likely to ask the firm to increase their offer (Column 2) than workers who said it would be “difficult” or “very difficult” to do so. Similarly, workers who said it would be easy or very easy to obtain a better outside offer are 7 percentage points more likely to successfully negotiate a raise. We observe a similar pattern on the intensive margin (including zeros): workers with better outside options see larger increases in pay during negotiation at the start of a job spell.

Panel B of Table V shows that heterogeneity in workers’ behavior after they have joined a firm mirrors the heterogeneity at the beginning of the spell. Workers with better outside options are 9 percentage points more likely to initiate and 8 percentage points more likely to succeed in renegotiations with their employer. Appendix Table A9 shows that these workers are not more likely to receive raises without asking for them.²⁸

Risk Tolerance. Columns 4 and 5 of Table V report similar patterns for workers who are more willing to take risks. Both at the beginning and during the employment spells, these workers are more likely to engage in wage negotiations and are also more likely to be successful, relative to their same-occupation coworkers. The gaps in successful negotiations are somewhat larger than those in attempted negotiations.²⁹ Workers with greater risk tolerance also ask for significantly more in our hypothetical scenario.

Gender. When examining bargaining differences by gender (Column 6 of Table V), we find that women are less likely to engage in back-and-forth negotiations, and that they are somewhat less

²⁸In unreported results, we show that controlling for workers’ confidence does not quantitatively or qualitatively change the point estimates. This finding suggests that the residual variation in stated outside options does not reflect variation in confidence or bias (Altonji, Elder, and Taber 2005).

²⁹Appendix Table A10 shows that we also find differences in bargaining actions by worker patience. In the smaller subset of workers who also participated in our follow-up survey, those with higher patience are more likely to provide expectations and to negotiate at the beginning of the employment spell.

likely to provide their salary expectations before the initial offer is made. While the gap of 5 percentage points in having provided their expectations at the start of the spell is not statistically significant,³⁰ we see a significant gap in expectations provision in the hypothetical scenario, for which we have responses for all workers. Women are less likely to provide salary expectations and provide lower expectations as a fraction of their current salary, even when the range is provided. For instance, women are 6 percentage points less likely to provide salary expectations that would lie above the range which is listed in the job ad. Panel B of Table V shows that these gender differences in bargaining also continue during workers' employment spell. Women are 6 percentage points less likely to successfully negotiate their pay up. In Appendix G, we discuss potential mechanisms.

AKM Person Effects. Finally, we find differences in bargaining outcomes between same-occupation coworkers with different AKM person effects. Column 7 of Table V shows that higher-person effect individuals are more likely to have provided their salary expectations when they applied to their current firm. Workers' responses to the hypothetical question on salary expectations show that higher-person effect workers also state higher expectations. Because this question asks respondents to provide their expectations as a fraction of their current salary, this finding does not simply reflect the fact that these individuals earn higher salaries at their current firms. Rather, it suggests that, conditional on their wage, these individuals ask for more. These results—and the fact that high-AKM workers are not more likely to receive raises without asking for them (Appendix Table A9)—are inconsistent with the idea that variation in AKM person effects solely reflects variation in skill. Consistent with the idea that high AKM person effects reflect, in part, fixed differences in worker bargaining behavior, we find significant differences by AKM person effect in whether workers attempted and whether they succeeded in salary negotiations.

³⁰This reflects, in part, the fact that we only observe this outcome for workers who switched firms in the previous three years; the standard errors indicate we would be unable to detect gaps of less than ten percentage points.

5.3 Discussion and Robustness

Differences in When or Over What Workers Bargain. In theory, workers could negotiate over different things, or at different stages. However, we do not find any evidence that workers who negotiate less over base pay (e.g., workers with worse outside options or women) negotiate more on other dimensions. Panel A of Appendix Table A9 documents that the two non-wage amenities that workers most frequently report having negotiated over are vacation days (27% of workers) and training opportunities (18%). We find no evidence that workers with worse outside options, lower risk tolerance, lower-person effects, or women negotiate more on non-wage dimensions. Further, with the exception of gender, we also do not find meaningful differences in bargaining for special pay, such as bonus and stock payments.

Similarly, we find no evidence that the groups of workers who negotiate more at the beginning of their employment spell bargain less later on. Instead, the heterogeneity in workers' behavior after they have joined a firm mirrors the heterogeneity at the beginning of the spell. The consistency of these results—and the fact that individuals who ask for more at the initial stages do not ask for less at later stages—suggests that the heterogeneity we uncover does not reflect heterogeneity in when individuals bargain, but rather heterogeneity in whether, and how effectively, they bargain.

Correlation Between Heterogeneity Dimensions. While the dimensions of worker heterogeneity are correlated with each other, they each have an individual contribution to the documented differences in bargaining. For instance, while women have worse outside options and are less tolerant of risk (Appendix Table G3), this does not fully explain the gender differences in bargaining. When we include each of the three characteristics in a single regression, we find that the coefficient on female shrinks by at most 15% (Appendix Table G4). Appendix Figure A2 presents a more general version of this analysis and shows that when we include all four worker characteristics in a single regression, we obtain similar coefficients on each dimension of heterogeneity. For the outcomes measured in the previous six months (for which we have the largest sample), each dimension is individually significant.

Specification and Sample. Three further robustness tests indicate that the results in this section are not specific to the sample or specification used. First, Appendix Figure A2 shows that we obtain similar results when we use alternative sets of fixed effects instead of the occupation-establishment fixed effects included in our main specification.³¹ Second, this figure shows that we find similar results when we expand our sample to include the random sample of workers who did not recently work at surveyed firms. Third, Appendix E documents that our results are robust to re-weighting our sample to match the characteristics of the average German worker.

6 Bargaining and Pay Inequality

We conclude our analysis of bargaining by examining the link between individual wage bargaining and pay inequality. We conduct two empirical exercises which test whether the documented differences in individual bargaining have meaningful impacts on pay inequality. First, motivated by the literature on the gender pay gap we test whether gender differences in pay are larger under individual bargaining. Second, based on the idea that workers who make job-to-job transitions use their previous firm as the outside option in negotiation (Cahuc, Postel-Vinay, and Robin 2006), we test whether under individual bargaining the pay policies associated with workers' previous firms continue to affect their pay. We find that at firms that engage in individual bargaining, gender wage gaps are 3 percentage points larger, and the characteristics of a worker's previous firm continue to influence their pay.

6.1 Bargaining and the Gender Pay Gap

The extent to which individual bargaining contributes to the overall gender pay gap depends on two empirical objects: the fraction of workers whose pay is set by individual bargaining and the

³¹Our preferred specifications group workers by 3-digit occupation fixed effects, rather than by finer level-occupation fixed effects. A limitation of both sets of controls is that, when we condition on occupation-establishment (or finer) controls, workers for whom we do not have a same-occupation-establishment peer do not contribute to our estimate of β . Appendix Figure A2 shows we obtain similar estimates when we replace the occupation-establishment effects with occupation fixed effects. The similarity of these estimates across specifications with different sets of fixed effects suggests that our findings are not driven by compositional differences across specifications.

gender pay gap associated with this type of pay strategy. Most (78%) workers employed in our surveyed firms are exposed to individual bargaining. Panel A of Appendix Table A13 shows that, within a labor market, women are not more exposed than men. This result holds also for the subset of surveyed workers (Panel B of Appendix Table A13), who are of particular interest because we observe their hours worked. To estimate the gender pay gap associated with individual bargaining for these workers, we run regressions of the following form:

$$\log w_i = \beta \text{Female}_i + \delta \text{age}_i + \alpha \text{exp}_i + \gamma \text{exp}_i^2 + \zeta_{\text{educ}(i)} + \lambda_{o(i), \text{est}(i)} + \epsilon_i. \quad (2)$$

where $\log w_i$ is a measure of an individual's log daily pay. We start by running these models separately for workers who are and are not exposed to individual bargaining. We say a worker is exposed to bargaining if their firm reported having a bargaining strategy for their employee group (i.e., labor market entrant, experienced non-manager, manager). Because these bargaining strategies come from a firm-level survey, we cluster the standard errors at the firm level.³²

Panel A of Table VI presents estimates of equation 2 for the set of surveyed workers. Columns 1 and 4 show that, before we control for occupation-establishment fixed effects, there is a large (9 percentage point) gender pay gap at firms with and without individual bargaining. This gap narrows substantially once we include occupation-establishment fixed effects (Columns 2 and 5). The gap closes at firms without individual bargaining (Column 2) and is 5 percentage points at firms with individual bargaining (Column 5). We find similar results once we include finer level-occupation-establishment fixed effects rather than occupation-establishment fixed effects (Columns 3 and 6).³³

Interpreting residual pay gaps as the result of individual bargaining can be difficult if men and women differ in the number of hours worked (Caldwell and Danieli 2024). For the subset of surveyed workers for whom we observe hours, we do find meaningful gender differences in

³²Note that because the sets of fixed effects that are typically available in administrative data are imperfect proxies for individuals' job titles, residual gaps at posting firms may reflect unobserved differences in skills and job tasks. Residual gaps at bargaining firms reflect both this and the effect of bargaining.

³³The overlap between 3-digit occupation groups between bargaining and posting firms in our sample is large, with approximately 80% of occupation groups existing in both bargaining and posting firms. In unreported results, we find similar patterns when we hold the number of observations constant across Columns 1 and 2 (and Columns 4 and 5) by restricting to workers for whom we can estimate specifications with occupation-establishment fixed effects.

hours worked among full-time workers in the same occupation and firm (Appendix Table A14). However, our estimates of the gender pay gap are not explained by these differences in hours worked. Panel B of Table VI shows that we obtain very similar estimates of the gender pay gap when we condition on log hours worked.

Figure V shows that the differences in gender gaps at firms with and without individual bargaining are robust to considering alternate measures of pay or to including non-surveyed workers. The estimates in this figure come from models in which we interact all of the covariates and fixed effects with an indicator for whether the firm engages in individual bargaining. We present the coefficient on an interaction between a female dummy and an indicator for whether the firm engages in individual bargaining. Estimates from our baseline specifications which use occupation-establishment fixed effects, are presented in black; estimates which use the finer level-occupation-establishment fixed effects are in blue.

The dotted gray line in this figure (which corresponds to the difference in Columns 2 and 5 in Panel A of Table VI) shows a 6 percentage point difference in the gender pay gap between firms who engage in individual bargaining and those who do not. We also find a substantial gender pay gap when we use daily base pay, which excludes special pay, as an outcome of interest. While this outcome is less commonly used when estimating gender pay gaps, it has the advantage of most closely capturing our survey-based measures of bargaining which asked firms about individual bargaining over base wages. The gender pay gap also persists when we condition on hours and when including all workers at surveyed firms irrespective of whether they participated in our survey. The pay gap we associate with bargaining is significantly larger than that presented in previous work; this likely reflects the fact that we focus on the private, rather than public, sector (Biasi and Sarsons 2022). Appendix Table A13 presents a simple decomposition which suggests that at our surveyed firms 44% of the residual gender pay gap can be attributed to bargaining.

Appendix Table A15 shows that the 3-5 percentage point gender pay gap we attribute to bargaining is not only robust across different types of pay and samples of workers, but also persists when we define firms' bargaining strategies based on renegotiation during an employment spell

instead of bargaining at the beginning of an employment spell. Appendix Table A16 shows that the gender pay gap among workers at surveyed firms is comparable, though somewhat smaller, than the gender pay gap among workers at non-surveyed firms. Taken together, our results provide strong evidence that gender differences in pay are significantly larger when workers are exposed to individual wage bargaining, suggesting that bargaining substantially contributes to wage inequality within firms.³⁴

6.2 Origin and Destination Effects in Pay Setting

If pay is set by bargaining, the pay policy of an individual’s firm may influence their pay even after they have moved to a new firm (Di Addario et al. 2022). We examine the link between an individual’s pay and the pay policy of her previous employer by running regressions of the form:

$$\log w_i = \beta\psi_{i,j^{prev}(i)} + \delta\text{age}_i + \alpha\text{exp}_i + \gamma\text{exp}_i^2 + \zeta_{educ(i)} + \lambda_{o(i),est(i)} + \epsilon_i.$$

In this regression the $\lambda_{o(i),est(i)}$ are occupation-establishment fixed effects and the $\psi_{i,j^{prev}(i)}$ indicate the wage premium associated with an individual’s previous employer. Because these premia are estimated in population regressions in which log daily pay is the dependent variable, we use log daily pay as the dependent variable. We cluster the standard errors at the firm level.

Table VII presents estimates of models which are run separately for workers who are and are not exposed to bargaining. As before, we say a worker is exposed to bargaining if their firm reported having a bargaining strategy for their employee group (i.e., labor market entrant, experienced non-manager, manager). The first entry shows that, when pay is not set via individual bargaining, the pay premium offered by an individual’s previous firm has no statistically significant relationship with her current pay after we control for occupation-establishment fixed effects (Column 1). However, when individual bargaining is possible, a 10 percentage point higher pay

³⁴Previous research has documented that important wage disparities can arise in the position in the earnings distribution, in addition to the level of earnings (Blau and Kahn 2017; Bayer and Charles 2018). In Appendix G.2, we document larger gender disparities in the presence of bargaining when we estimate gender gaps in wage percentiles computed within establishment and employee group.

premium at an individual’s previous firm is associated with 0.5 percent higher pay at her new firm (Column 2). We see a similar pattern both among all workers at surveyed firms (Columns 1 and 2) and among surveyed workers (Columns 3 and 4) at these firms. Panel B shows that we find similar results when we focus on the first pay a worker received when they joined their current firm, albeit with less pronounced differences. Columns 1 and 2 show that while there is a significant positive relationship between the prior-firm pay premium and current-firm starting wage regardless of exposure to bargaining, the effect is significantly higher for workers exposed to bargaining. Further, for surveyed workers, we only find a significant relationship between the prior firm effect and current wage for workers at bargaining firms. These results suggest that when pay is set via individual bargaining, the quality (as measured by pay premium) of an individual’s firm matters even after he or she has left the firm.³⁵ This result are consistent with the fact that during negotiations with an outside firm, an individual’s outside options include the option of remaining at her previous firm.

7 Conclusion

This paper presents novel evidence on the prevalence and importance of individual worker-firm wage bargaining. We first introduced and validated a survey measure of firms’ bargaining strategies. Using the strategies we elicited from 772 firms—which span all major sectors and states in Germany—we documented that most workers are employed at firms which indicate they would differentiate pay between workers they perceive to have similar qualifications and fit, and which indicate they would adjust pay (even without adjusting job tasks) for workers who received an outside offer. These results suggest that bargaining is pervasive: 78% of workers are in employee groups for which firms report that individual bargaining is possible. The typical firm is willing

³⁵Di Addario et al. (2022) use Italian register data and find limited influence of an individual’s previous firm. Like the authors of that paper, we find a limited (and statistically insignificant) role for the previous firm when we include all workers. We only find a significant relationship among workers whose pay is set via individual bargaining. A plausible explanation for why we find an effect in Germany, contrasting the lack of effect in Italy, are differences in the prevalence and importance of individual wage bargaining in the two countries. Previous research has documented that “the Italian system has not shown the [wage] flexibility exhibited by the German one”, in part because Italian firms are more likely to be covered by industry-wide settlements (Devicienti, Fanfani, and Maida 2019). While the variance of firm effects has grown over time in Germany, this is not the case in Italy.

to differentiate pay between 6 and 12%. Data from the firm survey suggest that firm productivity does not predict whether a firm engages in individual wage bargaining (or by how much it is willing to differentiate wages), but labor market factors do, consistent with theoretical models which emphasize replaceability or tightness in driving firms' decisions to bargain. Firms are more willing to differentiate pay for experienced workers than for recent labor market entrants; among experienced workers, they are more willing to differentiate pay for workers in managerial positions than for workers in other positions.

Several results place empirical restrictions on what a realistic model of bargaining in the labor market would need to feature. Because a large share of workers (>60%) provide their salary expectations before the firm makes its initial offer and our finding that firms tailor the initial offers they make, a realistic model would not assume firms always make the initial wage offer.³⁶ The fact that many bargaining encounters break down even after back-and-forth negotiation suggests such a model would also not assume that either firms or workers have perfect information about their counter-party. Finally, the fact that workers ask for and appear to receive different shares of their outside options suggest a realistic model would need to incorporate heterogeneity in worker bargaining power.

Using the linkage between the firm and worker surveys and the administrative Social Security records, we document that differences in bargaining behavior lead to wage inequality within the firm: residual gender wage gaps are 3 percentage points larger in firms which bargain. Providing information on firms' bargaining positions—as proposed by multiple policymakers (Treasury Department 2022; Council of the EU 2023)—would not suffice to close between-group differences in worker behavior: we still see differences, e.g., between men and women, in a hypothetical situation in which we equalize pay information.

Our analysis has several limitations. First, because we use data from a single cross-section, we

³⁶Earlier work by Hall and Krueger documented that 40% of workers said their employer found out their previous salary (regardless of the channel) before offering them a job (2012). The fact that our share of workers who say they directly provided this information is so much larger is especially surprising given that the legal environment has shifted so much since the publication of Hall and Krueger. It is now illegal in most US states and in Germany for employers to ask workers for their salary history.

are unable to examine whether individual bargaining has become more prevalent or more influential in wage determination over time or whether firms' policies vary over their lifecycle. Because we focused on bargaining policies for full-time workers, and bargaining behavior among these workers, our study does not speak to how firms set pay for part-time workers. Similarly, while we provide suggestive evidence that individual person effects reflect—in part—differences in bargaining behavior, we are not able to show how much of the variance of these person effects is driven by differences in individual-specific bargaining factors relative to individual-specific productivity. The relative importance of productivity and bargaining behavior in explaining these effects remains an open question. Second, to avoid issues associated with limited recall, we did not collect information on the specific salaries associated with each stage of negotiation. Such data could shed light on whether bargaining outcomes are efficient and on whether “split the difference” behavior is common in the labor market, as it is in the product market (Backus et al. 2020; Larsen 2021; Loertscher and Marx 2022). Finally, while our research suggests that workers with better outside options earn more and women earn less, our data do not allow us to examine why firms do or do not accommodate workers' requests. Understanding whether a firm's response depends on the reason behind the request—e.g., whether it is related to commuting time or changes in personal circumstances—is an interesting avenue for future work.

University of California, Berkeley, United States, & NBER

Ludwig Maximilian University of Munich, Germany, & Institute for Employment Research (IAB)

Institute for Employment Research (IAB), Germany

References

- Abowd, John M, Francis Kramarz, and David N Margolis (1999). “High Wage Workers and High Wage Firms”. In: *Econometrica* 67.2, pp. 251–333.
- Acemoglu, Daron, Alex He, and Daniel Le Maire (2022). “Eclipse of Rent-Sharing: The Effects of Managers’ Business Education on Wages and the Labor Share in the US and Denmark”. In: *NBER Working Paper Series*.
- Agan, Amanda, Bo Cowgill, and Laura Katherine Gee (2020). “Do Workers Comply with Salary History Bans? A Survey on Voluntary Disclosure, Adverse Selection, and Unraveling”. In: *AEA Papers and Proceedings*. Vol. 110, pp. 215–19.
- (2021). “Salary History and Employer Demand: Evidence from a Two-sided Audit”. In: *NBER Working Paper Series*.
- Altonji, Joseph G, Todd E Elder, and Christopher R Taber (2005). “Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools”. In: *Journal of Political Economy* 113.1, pp. 151–184.
- Backus, Matthew, Thomas Blake, Bradley Larsen, and Steven Tadelis (2020). “Sequential Bargaining in the Field: Evidence from Millions of Online Bargaining Interactions”. In: *The Quarterly Journal of Economics* 135.3, pp. 1319–1361.
- Backus, Matthew, Thomas Blake, Jett Pettus, and Steven Tadelis (2023). “Communication, Learning, and Bargaining Breakdown: An Empirical Analysis”. In: *NBER Working Paper Series*.
- Backus, Matthew, Thomas Blake, and Steven Tadelis (2019). “On the Empirical Content of Cheap-talk Signaling: An Application to Bargaining”. In: *Journal of Political Economy* 127.4, pp. 1599–1628.
- Batra, Honey, Amanda Michaud, and Simon Mongey (2023). “Online Job Posts Contain Very Little Wage Information”. In: *NBER Working Paper Series*.
- Bayer, Patrick and Kerwin Kofi Charles (2018). “Divergent Paths: A New Perspective on Earnings Differences between Black and White Men since 1940”. In: *The Quarterly Journal of Economics* 133.3, pp. 1459–1501.
- Beauregard, Pierre-Loup, Thomas Lemieux, Derek Messacar, and Raffaele Saggio (2024). “Why Do Union Jobs Pay More? New Evidence from Matched Employer-Employee Data”. In: *Working Paper*.
- Bellmann, Lisa, Benjamin Lochner, Stefan Seth, and Stefanie Wolter (2020). *AKM Effects for German Labour Market Data*. Institut für Arbeitsmarkt-und Berufsforschung (IAB).
- Bender, Stefan, Nicholas Bloom, David Card, John Van Reenen, and Stefanie Wolter (2018). “Management Practices, Workforce Selection, and Productivity”. In: *Journal of Labor Economics* 36.S1, S371–S409.
- Bertheau, Antoine and Christian Philip Hoeck (2023). “Firm Beliefs about Wage Setting”. In: *Unpublished Working Paper*.
- Bertrand, Marianne and Antoinette Schoar (2003). “Managing with Style: The Effect of Managers on Firm Policies”. In: *The Quarterly Journal of Economics* 118.4, pp. 1169–1208.
- Bewley, Truman F (1999). *Why Wages Don’t Fall during a Recession*. Harvard University Press.
- Bhuller, Manudeep, Karl Ove Moene, Magne Mogstad, and Ola L Vestad (2022). “Facts and Fantasies about Wage Setting and Collective Bargaining”. In: *Journal of Economic Perspectives* 36.4, pp. 29–52.

- Biasi, Barbara and Heather Sarsons (2022). “Flexible Wages, Bargaining, and the Gender Gap”. In: *The Quarterly Journal of Economics* 137.1, pp. 215–266.
- Blau, Francine D and Lawrence M Kahn (2017). “The Gender Wage Gap: Extent, Trends, and Explanations”. In: *Journal of Economic Literature* 55.3, pp. 789–865.
- Blien, Uwe, Wolfgang Dauth, Thorsten Schank, and Claus Schnabel (2013). “The Institutional Context of an “Empirical Law”: The Wage Curve under Different Regimes of Collective Bargaining”. In: *British Journal of Industrial Relations* 51.1, pp. 59–79.
- Blinder, Alan, Elie RD Canetti, David E Lebow, and Jeremy B Rudd (1998). *Asking about Prices: A New Approach to Understanding Price Stickiness*. Russell Sage Foundation.
- Bloesch, Justin, Birthe Larsen, and Bledi Taska (2022). “Which Workers Earn More at Productive Firms? Position Specific Skills and Individual Worker Hold-up Power”.
- Bloom, Nicholas and John Van Reenen (2007). “Measuring and Explaining Management Practices across Firms and Countries”. In: *The Quarterly Journal of Economics* 122.4, pp. 1351–1408.
- Brändle, Tobias, Wolf Dieter Heinbach, and Michael F Maier (2011). “Tarifliche Öffnung in Deutschland: Ausmaß, Determinanten, Auswirkungen”. In: *Zeitschrift für Arbeitsmarktforschung* 44.1, pp. 163–172.
- Brenzel, Hanna, Hermann Gartner, and Claus Schnabel (2014). “Wage Bargaining or Wage Posting? Evidence from the Employers’ Side”. In: *Labour Economics* 29, pp. 41–48.
- Bundesagentur fuer Arbeit (2021). *Fachkraefteengpassanalyse*.
- Cahuc, Pierre, Fabien Postel-Vinay, and Jean-Marc Robin (2006). “Wage Bargaining with On-the-Job Search: Theory and Evidence”. In: *Econometrica* 74.2, pp. 323–364.
- Caldwell, Sydnee and Oren Danieli (2024). “Outside Options in the Labor Market”. In: *Review of Economic Studies*.
- Caldwell, Sydnee, Ingrid Haegele, and Jörg Heining (2025). *Firm Pay and Worker Search*. Tech. rep. National Bureau of Economic Research.
- Caldwell, Sydnee and Nikolaj Harmon (2019). “Outside Options, Bargaining, and Wages: Evidence from Coworker Networks”. In: *UC Berkeley Department of Economics Working Paper*.
- Card, David (2022). “Who Set Your Wage?” In: *American Economic Review* 112.4, pp. 1075–90.
- Card, David and Ana Rute Cardoso (2022). “Wage Flexibility under Sectoral Bargaining”. In: *Journal of the European Economic Association* 20.5, pp. 2013–2061.
- Card, David, Jörg Heining, and Patrick Kline (2013). “Workplace Heterogeneity and the Rise of West German Wage Inequality”. In: *The Quarterly Journal of Economics* 128.3, pp. 967–1015.
- Cardoso, Ana Rute and Pedro Portugal (2005). “Contractual Wages and the Wage Cushion under Different Bargaining Settings”. In: *Journal of Labor Economics* 23.4, pp. 875–902.
- Chatterjee, Kalyan and William Samuelson (1983). “Bargaining under Incomplete Information”. In: *Operations Research* 31.5, pp. 835–851.
- Council of the EU (Apr. 2023). *Gender Pay Gap: Council Adopts New Rules on Pay Transparency*. URL: <https://www.consilium.europa.eu/en/press/press-releases/2023/04/24/gender-pay-gap-council-adopts-new-rules-on-pay-transparency/>.
- Cramton, Peter and Joseph Tracy (2003). “Unions, Bargaining and Strikes”. In: ed. by John T. Addison and Claus Schnabel. Edward Elgar Cheltenham, UK. Chap. 4, pp. 86–117.
- Cullen, Zoë (2024). “Is Pay Transparency Good?” In: *Journal of Economic Perspectives* 38.1, pp. 153–180.

- Cullen, Zoe B, Shengwu Li, and Ricardo Perez-Truglia (2022). “What’s My Employee Worth? The Effects of Salary Benchmarking”. In: *NBER Working Paper Series*.
- Destatis (2022). *Anteile Kleine Und Mittlere Unternehmen 2020 Nach Grossenklassen*. Statistisches Bundesamt.
- Devicienti, Francesco, Bernardo Fanfani, and Agata Maida (2019). “Collective Bargaining and the Evolution of Wage Inequality in Italy”. In: *British Journal of Industrial Relations* 57.2, pp. 377–407.
- Di Addario, Sabrina, Patrick Kline, Raffaele Saggio, and Mikkel Sølvsten (2022). “It Ain’t Where You’re from, It’s Where You’re at: Hiring Origins, Firm Heterogeneity, and Wages”. In: *Journal of Econometrics* 233.2, pp. 340–374.
- Diamond, Peter A (1971). “A Model of Price Adjustment”. In: *Journal of Economic Theory* 3.2, pp. 156–168.
- Dohmen, Thomas, Armin Falk, David Huffman, Uwe Sunde, Jürgen Schupp, and Gert G Wagner (2011). “Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences”. In: *Journal of the European Economic Association* 9.3, pp. 522–550.
- Doniger, Cynthia (2015). “Wage Dispersion with Heterogeneous Wage Contracts”. In: *Finance and Economics Discussion Series 2015-023*.
- Dustmann, Christian, Bernd Fitzenberger, Uta Schönberg, and Alexandra Spitz-Oener (2014). “From Sick Man of Europe to Economic Superstar: Germany’s Resurgent Economy”. In: *Journal of economic perspectives* 28.1, pp. 167–188.
- Dustmann, Christian, Johannes Ludsteck, and Uta Schönberg (2009). “Revisiting the German Wage Structure”. In: *The Quarterly Journal of Economics* 124.2, pp. 843–881.
- Ellingsen, Tore and Åsa Rosen (2003). “Fixed or Flexible? Wage-setting in Search Equilibrium”. In: *Economica* 70.278, pp. 233–250.
- Faberman, R Jason, Andreas I Mueller, Ayşegül Şahin, and Giorgio Topa (2022). “Job Search Behavior among the Employed and Non-employed”. In: *Econometrica* 90.4, pp. 1743–1779.
- Falk, Armin, Anke Becker, Thomas Dohmen, David Huffman, and Uwe Sunde (2023). “The Preference Survey Module: A Validated Instrument for Measuring Risk, Time, and Social Preferences”. In: *Management Science* 69.4, pp. 1935–1950.
- Fitzenberger, Bernd, Karsten Kohn, and Alexander C Lembcke (2013). “Union Density and Varieties of Coverage: The Anatomy of Union Wage Effects in Germany”. In: *ILR Review* 66.1, pp. 169–197.
- Fitzenberger, Bernd and Katrin Sommerfeld (2016). “A Sequential Decomposition of the Drop in Collective Bargaining Coverage”. In: *Jahrbücher für Nationalökonomie und Statistik* 236.1, pp. 37–69.
- Flinn, Christopher and Joseph Mullins (2021). *Firms’ Choices of Wage-Setting Protocols*. Discussion paper, New York University.
- Friedrich, Benjamin U and Michał Zator (Mar. 2024). “Price Discovery in Labor Markets: Why Do Firms Say They Cannot Find Workers?” In: *Working Paper*.
- Haas, Georg-Christoph, Bettina Müller, Christopher Osiander, Julia Schmidtke, Annette Trahms, Marieke Volkert, and Stefan Zins (2021). “Development of a New COVID-19 Panel Survey: The IAB High-Frequency Online Personal Panel (HOPP)”. In: *Journal for Labour Market Research* 55.1, pp. 1–14.
- Hall, Robert E and Alan B Krueger (May 2010). “Evidence on the Determinants of the Choice between Wage Posting and Wage Bargaining”. In: *NBER Working Paper Series*.

- Hall, Robert E and Alan B Krueger (2012). “Evidence on the Incidence of Wage Posting, Wage Bargaining, and on-the-Job Search”. In: *American Economic Journal: Macroeconomics* 4.4, pp. 56–67.
- Hassel, Anke and Britta Rehder (2001). “Institutional Change in the German Wage Bargaining System: The Role of Big Companies”. In: *Max-Planck-Institut für Gesellschaftsforschung*.
- Hazell, Jonathon, Mazi Kazemi, and Bledi Taska (2018). *Posted Wage Rigidity*. MIT Working Paper.
- Hjort, Jonas, Xuan Li, and Heather Sarsons (2020). “Across-Country Wage Compression in Multinationals”. In: *NBER Working Paper Series*.
- hkp (2021). *Top Management Survey 2021*.
- Institut fuer Arbeitsmarkt- und Berufsforschung (2021). *Tarifbindung und Betriebliche Interessenvertretung. Aktuelle Ergebnisse Aus Dem IAB Betriebspanel*.
- Jäger, Simon, Christopher Roth, Nina Roussille, and Benjamin Schoefer (2024). “Biased Beliefs about Outside Options”. In: *Quarterly Journal of Economics*.
- Larsen, Bradley (2021). “The Efficiency of Real-world Bargaining: Evidence from Wholesale Used-auto Auctions”. In: *The Review of Economic Studies* 88.2, pp. 851–882.
- Larsen, Bradley, Carol Hengheng Lu, and Anthony Lee Zhang (2021). “Intermediaries in Bargaining: Evidence from Business-to-business Used-car Inventory Negotiations”. In: *NBER Working Paper Series*.
- Lehmann, Robert (2023). “The Forecasting Power of the ifo Business Survey”. In: *Journal of Business Cycle Research* 19.1, pp. 43–94.
- Lemieux, Thomas, W. Bentley MacLeod, and Daniel Parent (Feb. 2009). “Performance Pay and Wage Inequality”. In: *The Quarterly Journal of Economics* 124.1, pp. 1–49. ISSN: 0033-5533.
- Loertscher, Simon and Leslie M Marx (2022). “Incomplete Information Bargaining with Applications to Mergers, Investment, and Vertical Integration”. In: *American Economic Review* 112.2, pp. 616–649.
- Manning, Alan (2003). *Monopsony in Motion: Imperfect Competition in Labor Markets*. Princeton University Press.
- (2011). “Imperfect Competition in the Labor Market”. In: *Handbook of Labor Economics*. Vol. 4. Elsevier, pp. 973–1041.
- Michelacci, Claudio and Javier Suarez (2006). “Incomplete Wage Posting”. In: *Journal of Political Economy* 114.6, pp. 1098–1123.
- Nash, John F (1950). “The Bargaining Problem”. In: *Econometrica*, pp. 155–162.
- Perry, Motty (1986). “An Example of Price Formation in Bilateral Situations: A Bargaining Model with Incomplete Information”. In: *Econometrica*, pp. 313–321.
- Postel-Vinay, Fabien and Jean-Marc Robin (2004). “To Match or Not to Match?: Optimal Wage Policy with Endogenous Worker Search Intensity”. In: *Review of Economic Dynamics* 7.2, pp. 297–330.
- Price, Brendan (2018). “The Duration and Wage Effects of Long-term Unemployment Benefits: Evidence from Germany’s Hartz IV Reform”. In: *Working Paper*.
- Roussille, Nina (2024). “The Role of the Ask Gap in Gender Pay Inequality”. In: *The Quarterly Journal of Economics* 139, pp. 1–54.
- Sauer, Stefan, Moritz Schasching, and Klaus Wohlrabe (2023). “Handbook of Ifo Surveys”. In: *ifo Beitrage zur Wirtschaftsforschung* 100.

- Schaller, Daria, Jonas Hennrich, and Klaus Wohlrabe (2025). “The ifo Human Resources Survey”. In: *CESifo Working Paper*.
- Scur, Daniela, Raffaella Sadun, John Van Reenen, Renata Lemos, and Nicholas Bloom (2021). “The World Management Survey at 18: Lessons and the Way Forward”. In: *Oxford Review of Economic Policy* 37.2, pp. 231–258.
- Song, Jae, David J Price, Fatih Guvenen, Nicholas Bloom, and Till Von Wachter (2019). “Firming up Inequality”. In: *The Quarterly Journal of Economics* 134.1, pp. 1–50.
- Tirole, Jean (1988). *The Theory of Industrial Organization*. MIT press.
- U.S. Department of the Treasury (2022). *The State of Labor Market Competition*.

8 Tables

Table I: Characteristics of Surveyed Firms Relative to German Labor Market

	Survey	German Labor Market		
		Business Register	Orbis	BHP
	(1)	(2)	(3)	(4)
<u>Sector</u>				
Manufacturing	0.34	0.06	0.07	0.06
Retail	0.17	0.17	0.16	0.16
Professional Services	0.09	0.15	0.17	0.09
Information Services	0.07	0.04	0.04	0.03
Transport	0.06	0.03	0.03	0.03
Real Estate	0.05	0.06	0.08	0.07
Administration	0.05	0.07	0.08	0.05
Finance	0.04	0.02	0.07	0.03
<u>Number of Employees</u>				
1-9	0.07	0.87	0.81	0.79
10-49	0.28	0.11	0.16	0.17
50-249	0.38	0.02	0.03	0.03
250+	0.27	0.00	0.01	0.01
<u>Other Firm Characteristics</u>				
Based in Eastern Germany	0.12	0.19	0.17	0.17
25 Years or Younger	0.33	--	0.76	0.79
Stock Corporation	0.09	--	0.01	--
Have a CBA	0.41	--	--	--
First Year in Survey Panel	2014	--	--	--
Observations	772	3435478	1801989	2961920

Note: This table provides summary statistics of the firms that participated in our firm survey (Column 1) and compares them to all firms in the German labor market. For surveyed firms, we elicited CBA coverage in the survey and take all other characteristics from Orbis. The ifo Institute provided us with information on how long each respondent had been in the ifo panel. To characterize the overall distribution of German firms, we use three distinct data sources based on the Statistical Business register provided by the Statistical Office (Column 2), the Orbis database (Column 3), and the BHP (Column 4).

Table II: Comparison Between Posting and Bargaining Firms

	Bargain with Recent Entrants			Bargain with Experienced Non-Managers			Bargain with Managers		
	No (1)	Yes (2)	p-value (3)	No (4)	Yes (5)	p-value (6)	No (7)	Yes (8)	p-value (9)
<u>Financial Status</u>									
Total Assets per Employee (std.dev)	1041.92 (11521.90)	191.89 (864.58)	0.21	250.45 (568.06)	641.79 (8480.20)	0.69	378.93 (781.30)	602.74 (8111.73)	0.89
Fixed Assets per Employee (std.dev)	727.42 (8736.26)	138.72 (817.97)	0.25	124.71 (317.92)	454.97 (6398.10)	0.66	195.57 (410.67)	423.09 (6124.16)	0.86
<u>Number of Employees</u>									
1-10	0.09	0.08	0.81	0.10	0.08	0.51	0.18	0.08	0.03
11-50	0.24	0.27	0.44	0.30	0.25	0.20	0.46	0.24	0.00
51-200	0.34	0.33	0.72	0.31	0.34	0.55	0.18	0.35	0.03
201-1000	0.21	0.23	0.65	0.18	0.23	0.23	0.08	0.23	0.02
1001-10000	0.06	0.04	0.18	0.05	0.04	0.62	0.03	0.05	0.55
10000+	0.04	0.03	0.31	0.02	0.03	0.38	0.00	0.03	0.25
<u>Other Firm Characteristics</u>									
Year of Incorporation (std.dev)	1969.20 (43.55)	1973.97 (39.27)	0.12	1974.29 (36.55)	1971.40 (42.19)	0.50	1973.70 (39.59)	1971.53 (41.76)	0.76
HQ in Eastern Germany	0.15	0.10	0.02	0.22	0.11	0.00	0.32	0.11	0.00
Have a CBA	0.50	0.35	0.00	0.56	0.39	0.00	0.46	0.42	0.58
Stock Corporation	0.06	0.11	0.03	0.04	0.10	0.07	0.05	0.09	0.38
<u>Sector</u>									
Manufacturing	0.37	0.32	0.12	0.42	0.32	0.05	0.21	0.35	0.07
Retail	0.15	0.19	0.20	0.17	0.17	0.95	0.10	0.18	0.24
Professional Services	0.07	0.11	0.08	0.04	0.11	0.02	0.03	0.10	0.14
Information Services	0.06	0.08	0.37	0.03	0.07	0.07	0.10	0.07	0.36
Transport	0.06	0.07	0.72	0.04	0.07	0.37	0.08	0.06	0.65
Real Estate	0.07	0.03	0.02	0.06	0.05	0.51	0.10	0.05	0.11
Administration	0.05	0.04	0.32	0.07	0.04	0.14	0.05	0.04	0.85
Finance	0.05	0.03	0.12	0.07	0.04	0.07	0.13	0.04	0.00
<u>Bargain With</u>									
Recent Entrants	0.00	1.00	---	0.06	0.62	0.00	0.23	0.55	0.00
Experienced Non-Managers	0.70	0.98	0.00	0.00	1.00	---	0.41	0.88	0.00
Managers	0.91	0.98	0.00	0.79	0.97	0.00	0.00	1.00	---
First Year in ifo Panel (std.dev)	2013.77 (5.25)	2013.78 (5.52)	0.98	2013.34 (5.49)	2013.84 (5.39)	0.37	2013.41 (5.95)	2013.80 (5.38)	0.66
Observations	341	399		112	627		39	691	

Note: This table compares posting and bargaining firms based on the bargaining protocol reported for three employee groups: recent labor market entrants, experienced non-managers, and managers. Posting firms are those that report zero wage flexibility, while bargaining firms are those that report non-zero wage flexibility. Within each set of columns, the first (second) column shows the mean for posting (bargaining) firms; the third column shows p-values from a test of equality between those means. CBA-coverage and bargaining strategies are elicited in the firm survey. All other firm characteristics are collected from Orbis. See Appendix Section C.2 for a detailed description of these variables.

Table III: Explaining Variation in Bargaining Strategies

Fixed Effects Only			Group Effects and Firm Characteristics						
Group	Firm	Group + Firm	Size, Productivity	Norms	Size, Productivity, Norms	Size, Productivity, Norms	Size, Productivity, Norms	Size, Productivity, Norms	Size, Productivity, Norms, Group Interactions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
<u>A. Bargaining with New Hires (Protocol Question)</u>									
R-Squared	0.33	0.40	0.73	0.36	0.34	0.36	0.50	0.50	
Adjusted R-Squared	0.33	0.19	0.63	0.35	0.34	0.35	0.44	0.44	
<u>B. Bargaining with New Hires (Incidence Question)</u>									
R-Squared	0.25	0.44	0.70	0.27	0.26	0.28	0.44	0.44	
Adjusted R-Squared	0.25	0.26	0.59	0.27	0.26	0.27	0.38	0.38	
<u>C. Renegotiating with Incumbent Workers</u>									
R-Squared	0.19	0.50	0.69	0.22	0.20	0.22	0.39	0.39	
Adjusted R-Squared	0.19	0.33	0.58	0.22	0.19	0.22	0.32	0.32	
Industry Dummies						1-digit	4-digit	4-digit	

Note: This table presents the R-squared and adjusted R-squared from regressions of a continuous measure of the firm-group bargaining protocol for new external hires using the midpoint of the range selected by each firm (Panel A), the expected variation in final offers to new external hires (Panel B), or the amount of possible adjustment for incumbent workers (Panel C) in each firm-group, on the covariates indicated at the top of the table. There are up to four observations for each firm. We use total assets to proxy firm productivity. We use indicators for whether the firm is covered by a collective bargaining agreement, whether its headquarters are in East Germany, and indicators for firm's legal form (e.g., whether it is listed on the stock market) as proxies for norms. Column 9 includes interaction terms of the firm characteristics indicated at the top of the table and employee groups.

Table IV: Summary Statistics of Bargaining Events

	Rejected Offers (1)	Accepted Offers (2)
Number of Workers	2651	275
A. Before Firm Makes Initial Offer		
Worker Provides Expectations	57%	74%
Expectations Are Met Expectations Provided	52%	64%
B. Between Firm's Initial and Final Offers		
Worker Counters Salary Offer	31%	39%
Firm Raises Offer Worker Counters	42%	45%
Counter Is Matched Worker Counters	21%	28%
Firm Improves Amenities (New Hires Only)		
Bonus payment or Stock Options	---	24%
Vacation Days or Remote Work	---	21%
Company Car or Commuting Subsidy	---	11%
Training	---	13%
Childcare Subsidy	---	4%
C. On-The-Job Renegotiation		
Worker Attempts to Renegotiate with Incumbent	33%	---
Renegotiation Is Successful Attempt	46%	---

Note: This table describes the bargaining events reported in the worker survey. We use one event for each worker who reported that they either switched firms or received and rejected an outside offer in the previous six months. If a worker reported that both of these events occurred, we use data on the accepted offer. Events end in acceptance if the worker moved to the firm in question. Events end in rejection if the worker stayed at their former firm. An event ends immediately if the worker either accepts or rejects the first offer presented by the firm. An event takes one round if the worker either accepts the offer or rejects the offer after the firm accepts the worker's initial counter-offer. An event takes two or more rounds if the firm counters or rejects the worker's initial counter. The full sequence of events is presented in Figure A3. Appendix Table A1 describes the characteristics of workers in this sample.

Table V: Differences in Worker Bargaining Behavior

	Outside Options			Risk Tolerance		Female	AKM Worker Effect
	Mean	Binary	Level	Binary	Level		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>A. Bargaining at the Start of the Spell</u>							
Provided Expectations	0.69	-0.016 (0.038) 842	0.012 (0.021) 842	0.007 (0.032) 844	-0.010 (0.010) 844	-0.050 (0.051) 847	0.118** (0.054) 603
Asked Firm to Increase Base Wage	0.36	0.087*** (0.029) 846	0.056*** (0.021) 846	0.052 (0.037) 848	0.021* (0.012) 848	-0.075 (0.051) 851	0.121** (0.055) 607
<u>Negotiated Base Wage Upward</u>							
Binary	0.26	0.067* (0.034) 844	0.049* (0.025) 844	0.075* (0.038) 846	0.024** (0.010) 846	-0.068 (0.048) 849	0.187** (0.073) 605
Percentage Points	1.46	0.513** (0.219) 840	0.487*** (0.182) 840	0.413* (0.238) 842	0.129* (0.066) 842	-0.614* (0.325) 845	1.555** (0.667) 602
<u>B. Events in Previous Six Months</u>							
Asked for a Raise	0.36	0.090*** (0.014) 5103	0.062*** (0.008) 5103	0.079*** (0.015) 5085	0.022*** (0.003) 5085	-0.058*** (0.018) 5138	-0.023 (0.021) 4360
Asked for & Received a Raise	0.28	0.077*** (0.010) 5103	0.054*** (0.006) 5103	0.085*** (0.015) 5085	0.023*** (0.003) 5085	-0.064*** (0.014) 5138	0.005 (0.021) 4360
<u>C. Hypothetical Bargaining Scenario</u>							
Provided Expectations	0.93	-0.001 (0.007) 5121	0.002 (0.005) 5121	0.001 (0.007) 5104	0.002 (0.002) 5104	-0.022*** (0.007) 5158	0.006 (0.011) 4380
<u>Level of Expectations</u>							
Midpoint of Range or Above	0.73	-0.008 (0.016) 5044	-0.003 (0.010) 5044	0.027** (0.013) 5023	0.006* (0.003) 5023	-0.043*** (0.012) 5072	0.039** (0.015) 4303
Above Range	0.11	-0.002 (0.006) 5044	0.003 (0.005) 5044	0.025* (0.014) 5023	0.007*** (0.003) 5023	-0.057*** (0.008) 5072	0.050*** (0.014) 4303

Note: This table reports OLS regressions that shed light on worker differences in bargaining behavior based on the worker survey. Each entry provides the coefficient on the variable indicated in the column from a model which regresses the outcome indicated in the row on the column characteristic (binary unless otherwise indicated), and on an individual's level of education, a quadratic in experience, age, and three-digit occupation-establishment fixed effects. Standard errors, presented in parentheses, are clustered at the firm level. Panel A uses data on individuals who joined their firm in the previous three years. The first outcome is an indicator for whether the individual provided salary expectations during the application and hiring process. The second outcome is an indicator for whether the worker asked for a higher wage, independent of whether the worker was successful in her negotiation. The third outcome is an indicator for whether the worker negotiated successfully, that equals one if they asked the firm to increase the salary provided in their initial offer and the firm increased the offer. The fourth outcome captures the intensive margin of negotiating successfully, including zeros for those who do not successfully negotiate up. Panel B focuses on all workers who have experienced a bargaining event in the previous six months. The first outcome is an indicator for whether a worker asked for a higher wage. The second outcome is an indicator for whether a worker successfully negotiated a higher wage. Panel C examines how workers respond to a hypothetical scenario which asks them to provide their salary expectations in response to a stated salary range. The first outcome is an indicator for whether an individual did provide their expectation. The second and third outcomes represent indicators for whether the level workers provided is at least at the midpoint of the provided range or above the range, respectively. These outcomes are missing for individuals who did not provide their expectations. Additional outcomes are presented in Appendix Tables A9 and A10. Appendix Figure A2 presents robustness checks. Levels of significance: * 10%, ** 5%, and *** 1%.

Table VI: Gender Pay Gaps and Firm Bargaining Strategies

	Without Individual Bargaining			With Individual Bargaining		
	(1)	(2)	(3)	(4)	(5)	(6)
A. Daily Pay						
Female	-0.072*** (0.026)	0.008 (0.032)	0.007 (0.031)	-0.095*** (0.019)	-0.053** (0.023)	-0.050** (0.019)
p-value for equality	0.305	0.063	0.085	0.305	0.063	0.085
Clusters	90	32	32	304	130	124
Observations	1617	1226	1181	4673	3381	3220
B. Daily Pay, Controlling for Hours						
Female	-0.061** (0.026)	0.020 (0.034)	0.021 (0.034)	-0.086*** (0.017)	-0.045** (0.021)	-0.043** (0.017)
p-value for equality	0.271	0.058	0.073	0.271	0.058	0.073
Clusters	90	32	32	304	130	124
Observations	1617	1226	1181	4673	3381	3220
C. Daily Base Pay						
Female	-0.073*** (0.026)	0.008 (0.032)	0.007 (0.031)	-0.093*** (0.019)	-0.049** (0.022)	-0.048** (0.019)
p-value for equality	0.370	0.073	0.094	0.370	0.073	0.094
Clusters	90	32	32	304	130	124
Observations	1616	1225	1180	4665	3376	3217
Level-Occ-						
Fixed Effects	---	Occ-Est	Est	---	Occ-Est	Est

Note: This table presents estimates of the gender pay gap separately by whether workers are exposed to individual bargaining. Columns 1 to 3 include workers in positions at firms which do not engage in individual bargaining, while Columns 4 to 6 include workers at firms which engage in individual bargaining. Each column presents results from a separate regression of log wages on a female dummy, age, a quadratic in experience, education dummies, and on the fixed effects indicated in each column. Panel A and B focus on daily pay as outcome of interest. Panel C uses daily base pay, which excludes special pay, such as bonus and stock payments. See Appendix C for more details on how these pay measures are constructed. Appendix Table A14 documents a gender gap in hours. Panel B includes log hours as additional control. Standard errors are clustered at the firm level. Levels of significance: * 10%, ** 5%, and *** 1%.

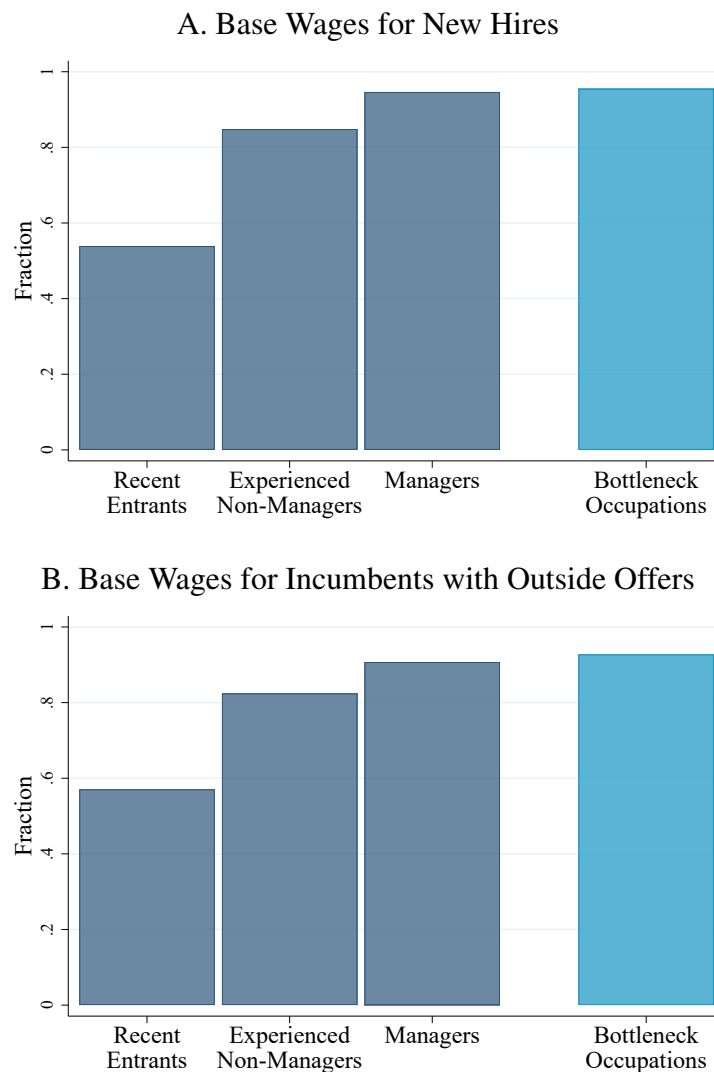
Table VII: Bargaining and the Influence of the Previous Firm

	All Workers		Surveyed Workers	
	Without Bargaining	With Bargaining	Without Bargaining	With Bargaining
	(1)	(2)	(3)	(4)
A.Current Daily Pay				
Prior Firm Effect	0.006 (0.018)	0.049*** (0.010)	-0.082 (0.060)	0.081*** (0.025)
Clusters	172	434	26	111
Observations	36117	118233	1030	2879
p-value	0.016		0.008	
B. Starting Daily Pay				
Prior Firm Effect	0.094*** (0.032)	0.234*** (0.055)	0.182 (0.149)	0.377*** (0.109)
Clusters	172	434	26	111
Observations	36117	118233	1030	2879
p-value	0.010		0.237	

Note: This table describes the relationship between an individual's current pay and the pay policy (firm effect) of her previous firm. Columns 1 and 3 include workers in positions at firms which do not engage in individual bargaining, while Columns 2 and 4 include workers at firms which engage in individual bargaining. Each column presents results from a separate regression of log daily pay on the prior-firm AKM wage effect, age, a quadratic in experience, education dummies), and occupation-establishment fixed effects. Panel A focuses on an individual's current daily pay. Panel B focuses on the daily pay the individual received when they joined their firm. For each panel, the p-values are from a test of equality of the coefficients on prior firm effect between Columns 1 and 2 and between Columns 3 and 4. Standard errors are clustered at the firm level. Levels of significance: * 10%, ** 5%, and *** 1%.

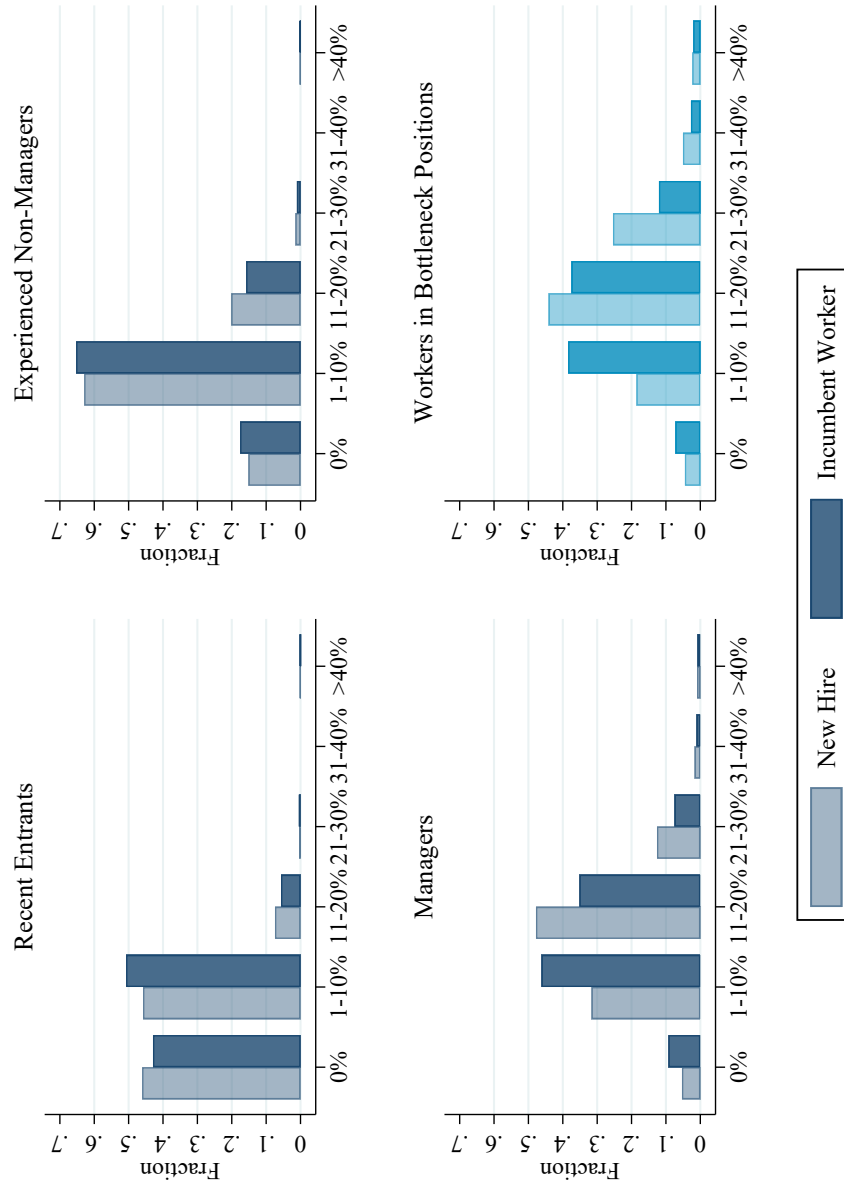
9 Figures

Figure I: Share of Firms with Individual Bargaining Strategies



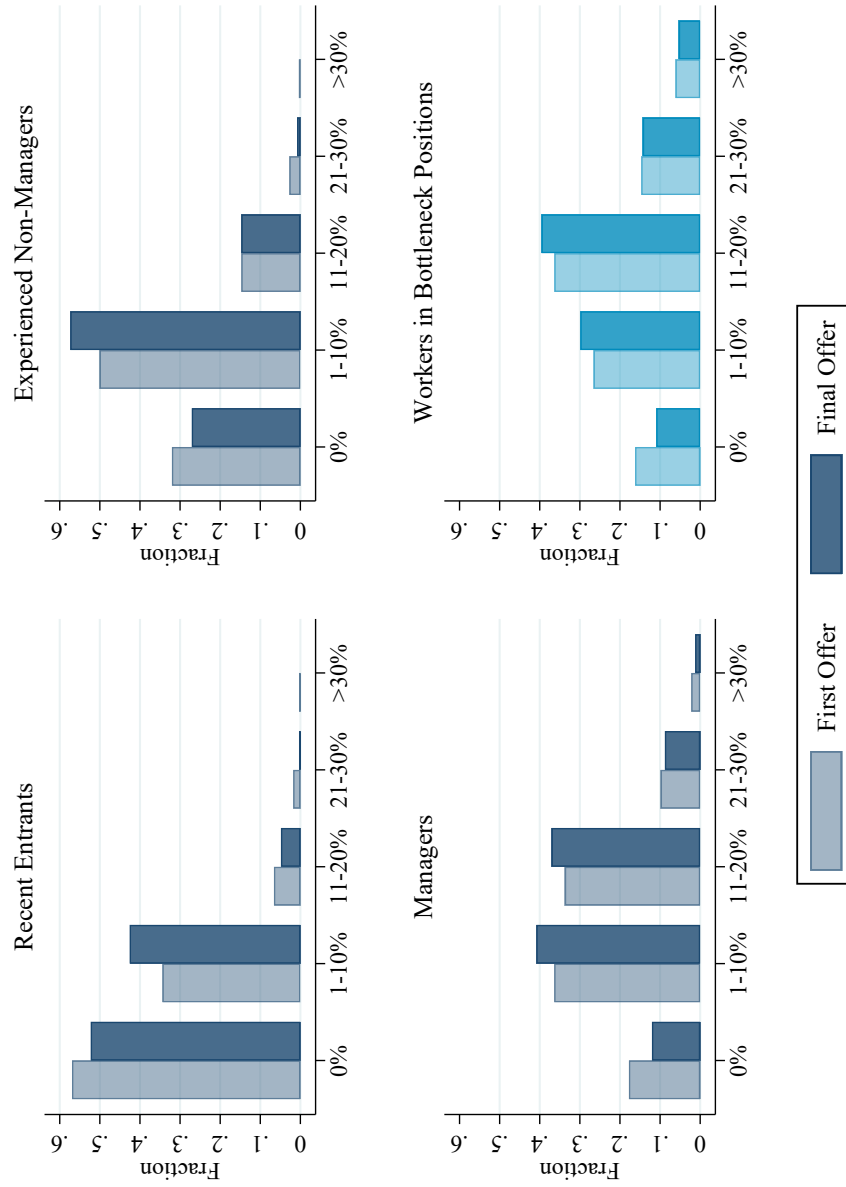
Note: This figure documents the prevalence of individual bargaining strategies based on the protocol question, as described in Section 3. Panel A shows the share of firms that say they could increase base wages for new external hires by a non-zero amount beyond what is offered to an individual with given qualifications and fit. Panel B shows the share of firms that could adjust incumbent workers' base wages by a non-zero amount—without changing their job tasks—in response to an outside offer. Results are presented separately for each of the following employee groups: recent labor market entrants, experienced non-managers, managers, and employees in bottleneck occupations. The sample contains 772 firms.

Figure II: Variation in the Intensive Margin of Bargaining



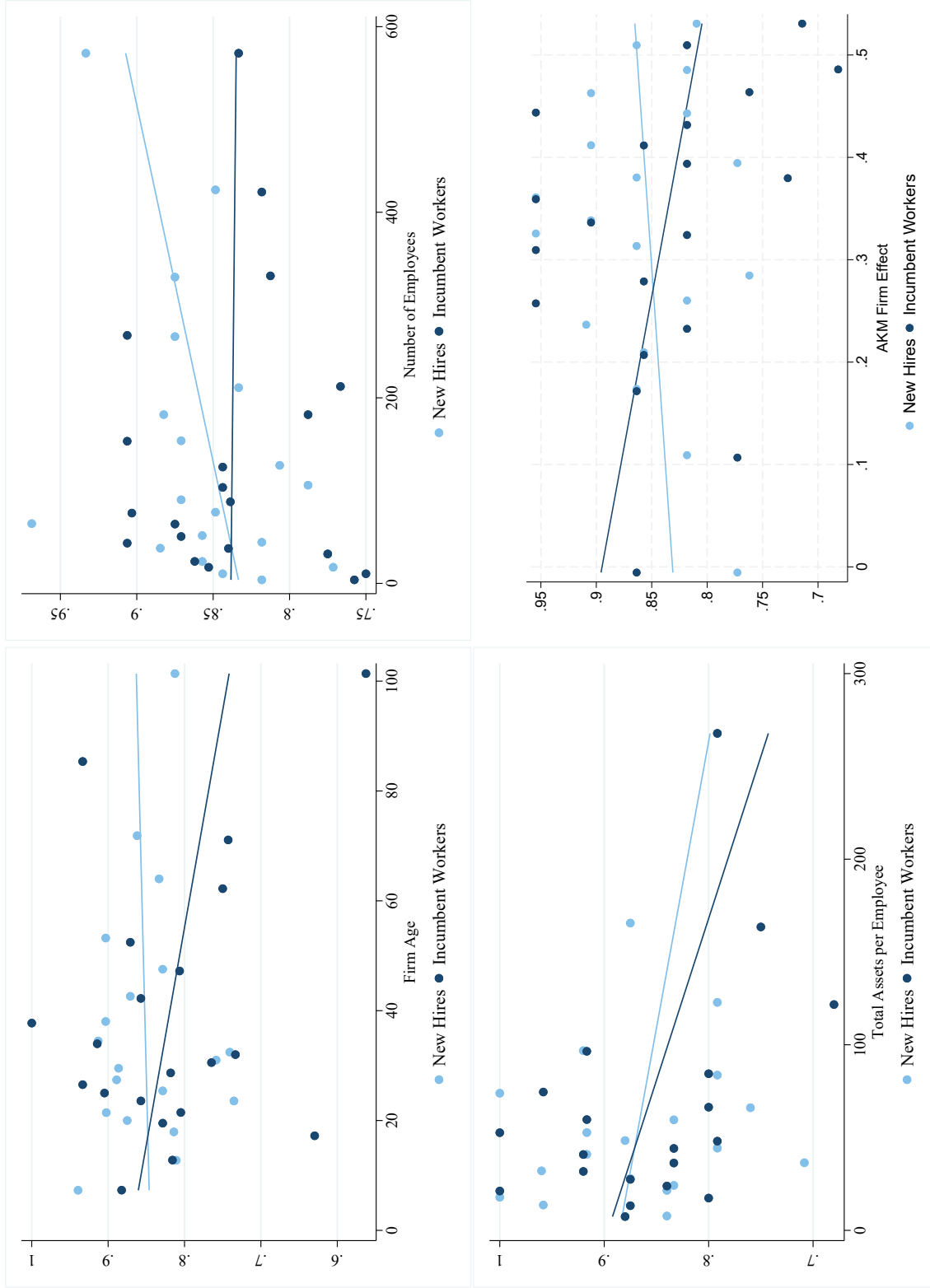
Note: This figure describes the extent to which firms can adjust base wages for new external hires. These graphs use our main protocol question, as described in Section 3. Table A6 presents additional tabulations. The sample contains 772 firms.

Figure III: Firms' Expected Variation in First and Final Offers



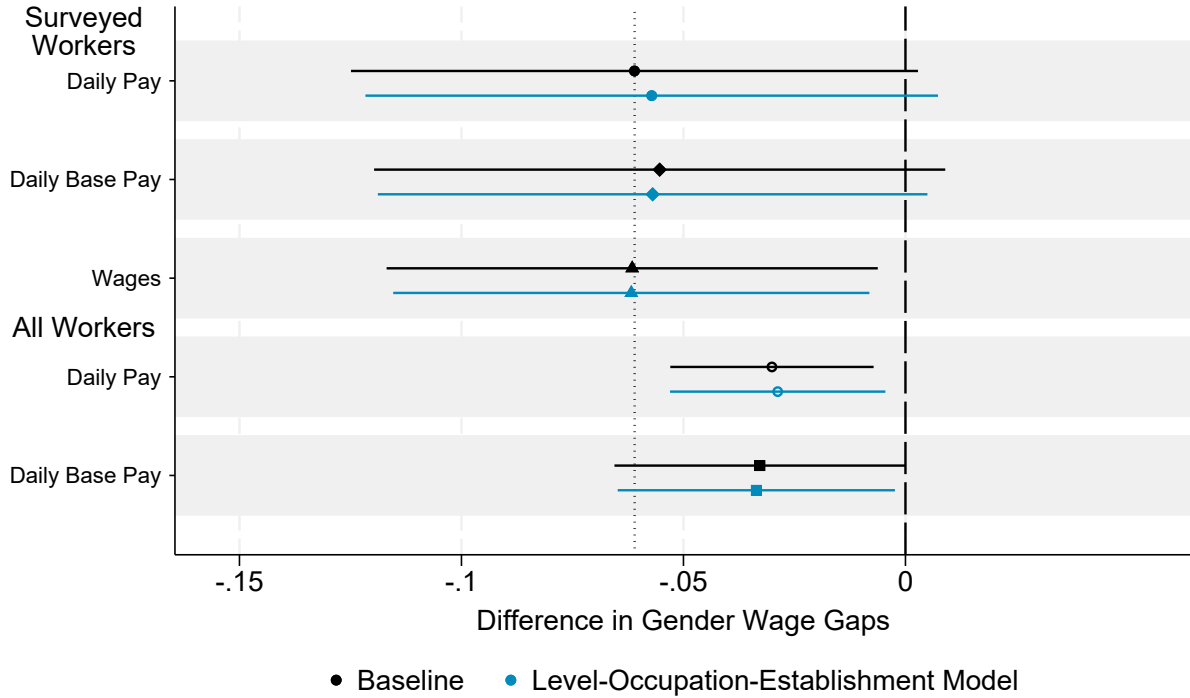
Note: This figure reports the expected gap between the highest and lowest offers made to ten hypothetical external candidates who are similar in qualifications and fit, but with potentially different offers from other firms. This uses the incidence question, as described in Section 3. We elicited results for four employee groups: recent labor market entrants, experienced non-managers, managers, and employees in bottleneck occupation. The sample contains 772 firms.

Figure IV: Bargaining Strategies and Firm Characteristics



Note: This figure describes the relationship between the bargaining and renegotiation protocols for experienced non-managers and each of the indicated firm characteristics. The first three figures focus on our firm-level sample of 772 respondents. The fourth figure uses data from the 527 firms that are linked to the Social Security records and for which we have AKM firm effects. For each figure, we use an indicator for whether a firm has a bargaining strategy (i.e., reported they could increase the wage by a positive amount) for experienced non-managers, the largest group of workers. Information on the number of employees, firm age, and total assets stem from Orbis. The AKM firm effects come from regressions using population data from 2010–2017 (Bellmann et al. 2020). See Appendix Section C.2 for a detailed description of these variables.

Figure V: Gender Pay Gaps and Bargaining



Note: This figure presents estimates of the gender pay gap that we attribute to individual bargaining. We estimate fully interacted versions of equation 2. Each dot and whiskers plots the coefficient and 95% confidence interval from the coefficient on the interaction between a female dummy and a dummy for whether pay is set via individual bargaining. The baseline model includes demographic controls (age, a quadratic in experience, and education dummies), as well as occupation-establishment fixed effects. Standard errors are clustered at the firm level. We present robustness checks for each specification in blue, which include finer level-occupation-establishment fixed effects. The first panel focuses on surveyed workers only, while the second panel includes all workers at surveyed firms. The first estimates in each panel correspond to the difference between Columns 5 and 2 (or Columns 6 and 3) of Table VI. The second estimates use daily base pay as an alternative outcome, which excludes special pay. To account for gender differences in hours, we also use hourly wages as an additional outcome for surveyed workers for whom we collect hours information in the survey. See Appendix C for more details on how these pay measures are constructed.