Bargaining in the Labor Market*

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Abstract

We use novel, linked survey-administrative data to study the prevalence and importance of individual bargaining for wage determination. We introduce and validate a survey measure of firms' bargaining strategies for both new hires and incumbent workers. Using elicited strategies for 772 German firms, we document that the majority of firms engage in individual bargaining. Market factors predict firm strategies better than firm characteristics. Most worker-firm interactions begin with the worker providing their salary expectations. Workers reject most outside offers they receive. In many cases rejection happens after several rounds of bargaining. There is substantial between-worker heterogeneity in bargaining behavior, which translates into wage inequality within the firm. Our results help explain the importance of firm-invariant differences in worker pay ("person effects").

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1 Introduction

A large literature documents that labor markets are characterized by substantial frictions (see, e.g., Card, Jörg Heining, and Kline 2013). How workers and firms agree on a wage may therefore affect 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. If firms set wages by bargaining with individual workers, workers with better outside options—or ability to leverage those options—may earn more than their equally productive colleagues.

However, little is known about the prevalence and importance of individual bargaining in wage determination (Card 2022). This largely reflects the fact that it is hard to reliably measure firms' wage-setting strategies. Firm-level proxies for bargaining, such as whether a firm lists wages in job ads, may be inaccurate if firms have strategic reasons not to 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 if workers are uninformed, if firms differentiate the initial offers they make to workers (e.g., by using their salary expectations), or if workers vary in their propensity to bargain (Biasi and Sarsons 2022; Jäger et al. 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.

In order to overcome these empirical challenges, we developed and validated a survey measure of firms' bargaining strategies. We fielded this survey to HR professionals and managers through the ifo Institute for Economic Research (ifo), an organization which has been surveying this population for decades. We obtained responses for 772 German firms. We linked these responses to balance sheet information from the Orbis database, and to administrative Social Security records which 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

the more than 10,0000 responses we received when the Institute for Employment Research (IAB), a group within the German equivalent of the Department of Labor, fielded a survey to workers on our behalf. To the best of our knowledge, this represents the only dataset which contains detailed bargaining histories for workers across multiple industries or labor markets.

In an initial contribution, we show that firms' bargaining strategies can be reliably measured using a simple survey instrument. We designed the instrument to align with theoretical definitions of bargaining and developed the specific wording based on conversations with more than a hundred HR professionals. To account for the possibility that strategies likely vary across groups of workers within a firm, we elicited strategies for four groups of workers: recent labor market entrants, experienced non-managers, managers, and workers in hard-to-fill bottleneck occupations (defined by each respondent). To allow strategies to differ for recruiting and retention, we elicited strategies for both external full-time hires and for incumbent workers who received an outside offer.

We evaluate the quality of the survey data using a series of internal and external validations. First, we find there is internal consistency in respondents' answers to distinct questions on wage-setting. Second, we find that, among firms for which we have responses from multiple HR professionals, there is agreement in the responses of individuals within the same firm. We conduct external validations by merging the responses to the worker survey and to publicly available data we collected. We find that the firm and worker survey responses align, and, for the subset of responses that can be measured using publicly available data, the survey measures are accurate.

After validating the survey, we examine the prevalence of individual bargaining. We document that the majority (eighty percent) of individuals are in positions where individual bargaining is possible. There is substantial variation across employee groups: firms are more likely to bargain with managers than they are with experienced non-managers or with recent graduates. This is true both for firms' policies for new hires and for firms' policies for existing workers who have received an outside offer.

We also examine the characteristics that predict whether a firm engages in individual bargaining. Our results are most consistent with a story in which firm norms and market factors—rather

than innate firm productivity—drive firms' wage-setting choices. Firms that engage in individual bargaining are not more productive—as proxied for by size, assets per employee, or other characteristics, than those that do not. They also do not pay higher mean wages. However, characteristics such as whether a firm is headquartered in Eastern Germany, whether a firm has a collective bargaining agreement (CBA) for some workers, and a firm's legal structure do predict whether a firm bargains.[1] The group-level variation we document, as well as the fact that firms are most willing to adjust pay for workers in positions they are having a hard time filling, speak to the potential importance of market factors.

We use data from the worker survey to examine how worker-firm bargaining interactions typically unfold. Our data contain detailed bargaining histories for all workers who received an offer in the previous six months, regardless of whether they accepted the offer. We document that the majority of worker-firm interactions began with the worker providing the firm their salary expectations. Almost all firms in our sample ask for this information; 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; forty-four percent 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 employed workers, most offers are rejected, with the worker ultimately remaining at the incumbent firm.In many cases, this only occurs after several offers (by either the firm or worker) have been made. In a large fraction of cases, the worker used the outside offer to improve her position at the incumbent firm. The fact that a large share of offers are rejected—and that this sometimes occurs only after several rounds of back-and-forth negotiation—suggests that both firms and workers have imperfect information about their counter-party. These results line up with previous findings for the product market (Backus et al. 2020).

Finally, we document that there is between-worker heterogeneity in bargaining behavior, which

[1]This first and third results are not driven by differences in CBA coverage. Instead, we find similar patterns when focusing on the 60% of firms that do not have a collective bargaining agreement for any workers.

translates into wage inequality within the firm. Compared to other workers in the same occupation and establishment—individuals who are more risk-loving are more likely to ask for more, but not necessarily more likely to receive more. By contrast, workers with better outside options are more likely to ask for and receive improvements in their offered wage. Differences in outside options better explain differences in bargaining behavior than differences in risk preferences.

We present two pieces of evidence that individual level bargaining contributes to wage inequality. First, we document that, when pay is set by bargaining, the quality of an individual's firm continues to predict their pay once they have moved. Workers who came from better firms earn more than their same-occupation peers in the same establishment. Consistent with the earlier literature, 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 (Di Addario et al. 2022).

Second, we document a link between AKM person effects and bargaining behavior. Previous work has shown that the growth in variance of AKM person effects explains 40% of the growth in German wage inequality over the past several decades (Card, Jörg Heining, and Kline 2013).[2] High person-effect individuals earn more than observably similar individuals in the same firm. We document that these individuals are also more likely to successfully negotiate and to have provided their salary expectations before the firm made its initial offer. These differences in behavior do not seem to reflect differences in productivity: high person-effect workers are not more likely to receive raises without asking for them. In addition, these workers state higher expectations—as a fraction of their current salary—when provided with a specific salary range. This suggests the AKM person effects may reflect, in part, differences in bargaining skill.

Our results contribute to several distinct literatures. First, they contribute to a growing empirical literature on how bargaining works in the field (see, e.g., P. Cramton and Tracy 2003; Backus et al. 2020; B. J. Larsen, Lu, and Zhang 2020; B. J. Larsen 2021). The results are most analogous

[2]While these fixed effects are typically interpreted solely as a measure of unobserved skill, they capture any time-invariant worker characteristic that is valued across firms. By comparison, the growth in the variance of firm-specific wage premia explains roughly 25% of the growth in wage inequality and the growing covariance between individual and firm fixed effects explains 34% of the growth in wage inequality. The variance of worker fixed effects has increased by more in the United States (Song et al. 2019).

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 analogous data for the labor market.

The results also contribute to a growing literature on firms' wage bargaining strategies (see, e.g., Postel-Vinay and Robin 2004; Michelacci and Suarez 2006; Doniger 2015). As recent work has noted, little is known 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 (see, e.g., Brenzel, Gartner, and Schnabel 2014; Biasi and Sarsons 2022, as well as the survey in; Hall and Krueger 2012a). The worker survey we conducted and which we link to the firm survey and administrative outcomes is most related to the seminal survey by Hall and Krueger (2012b), in which workers were asked about the negotiations that took place when they accepted their job offer.

Our empirical approach was inspired by the literature which 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 skill 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 the survey instruments and data. Section 3 validates our survey-based bargaining measures. Section 4 provides new findings on firm-level bargaining strategies. Section 5 documents heterogeneity in how workers respond to firm bargaining strategies and examines the implications for wage inequality. Section 6 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. The ifo Institute for Economic Research (ifo), an organization which regularly surveys firms, fielded the survey on our behalf. They sent invitations via e-mail in two waves: September 2021 and January 2022. The majority of our survey respondents hold senior-level positions, such as HR director, chief human resources officer, or CEO. Targeting these HR professionals and senior managers through the ifo Institute had the advantage that these individuals are usually most involved in and aware of general firm strategies regarding wage setting. See Appendix B for more information on the sampling frame and recruitment procedures, as well as other information on the implementation of the firm survey.

Similar to other surveys conducted by the ifo Institute, the firm survey had a 51% response rate (Sauer, Schasching, and Wohlrabe 2023). Respondents and non-respondents have similar observable characteristics (Appendix Table B1). For our main analysis sample, we restrict to complete responses and keep one observation per firm, yielding a sample of 772 firms.[3]

Table 1 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

[3] A total of 959 human resource professionals and managers participated in the survey. We define a response as complete if a respondent saw all questions in the survey. While this does not require the respondent to have answered every question, Appendix Table B3 documents that the share of missing answers is low. 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.

Table 1: Characteristics of Surveyed Firms

	Mean (1)	Std. Dev (2)	N (3)
Have a CBA	0.41	0.49	770
Number of Employees			
1-10	0.08	0.27	772
11-50	0.26	0.44	772
51-200	0.33	0.47	772
201-1000	0.23	0.42	772
1001-10000	0.04	0.21	772
10001+	0.03	0.17	772
Sector			
Manufacturing	0.34	0.47	772
Retail	0.17	0.37	772
Professional Services	0.09	0.29	772
Information Services	0.07	0.26	772
Transport	0.06	0.24	772
Real Estate	0.05	0.22	772
Administration	0.05	0.21	772
Finance	0.04	0.20	772
Other Firm Characteristics			
HQ in Eastern Germany	0.12	0.33	764
Year of Incorporation	1972.29	41.19	760
Total Assets per Employee	566	7680	576
Fixed Assets per Employee	395	5801	571

Note: This table describes firms in the firm survey. CBA coverage is elicited in the survey. All remaining characteristics stem from Orbis. See Appendix Section C.2 for a detailed description of these variables. The number of observations for which we have data is listed next to each characteristic. Not all variables in Orbis are available for all firms.

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. In addition, Appendix Table B5 shows that our sample covers every German state and has a similar geographic distribution to the set of all German firms. Appendix Section B.3 provides additional information on the coverage of our sample and shows that our firms are similar to those participating in the well-studied World Management Survey (Bender et al. 2018).

The main way in which our sample differs from the set of all German firms is that we under-sample small firms. Table 1 shows that, while our firms cover all size classes, the median firm in our sample employs between 50 and 200 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, while most German firms are small (83% have fewer than 10 employees), these firms employ 18% of German workers; firms with more than 249 employees cover 45% of employees (Destatis 2022).

While a large minority of firms in our sample (41%) have some workers who are covered by collective bargaining agreements, 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.[4] By law, firms can pay these top-ups for a range of different reasons, including individual negotiation (if the extra payment was required to attract the candidate) or market factors. In addition, higher-level employees and managers at CBA-covered firms are typically exempt from CBA agreements. In recent decades, opening clauses, which allow firms to set wages below the CBA-regulated wage, have become more common (Fitzenberger, Kohn, and Lembcke 2013; Blien et al. 2013). Previous research has confirmed that German firms take advantage of this flexibility, and that, as a result, wage inequality has grown over the past several decades (Dustmann, Ludsteck, and Schönberg 2009; Dustmann, Fitzenberger, 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, average daily wage, and occupation). We construct daily wages using informa-

[4] In 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.

tion on an individual's base wage, which excludes pay that results from bonuses, or other types of special payments.[5] We impute wages for individuals whose pay is censored at the Social Security maximum, as described in Appendix Section C.1.

Among the 772 firms with complete survey responses, 552 (72%) provided consent for linking the survey responses to the IEB data. Under German privacy laws, this consent is strictly required in order to link firm responses to Social Security records.[6] Appendix Table B4 documents that respondents who provided this consent are similar to those who did not.

We can link 96% of eligible firms to the IEB data.[7] 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. Our main sample includes the subset of these individuals between ages 25 and 50. In order 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. Appendix C.1 provides additional information on data cleaning and sample construction and describes validity checks we conducted to ensure the accuracy of the coding of managers.

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.

[5] While our preferred wage measure restricts to base wages in order to align with the wording used in the firm survey, we also present specifications which use a broader measure of pay.

[6] To the best of our knowledge, our survey is the first external firm survey to explicitly ask for this consent and to link responses to the IAB records. Other institutions in Germany have recently elicited consent to link survey responses to their own internal records. For instance, a 2020 Online Panel Survey of Firms conducted by the Bundesbank, elicited consent to link responses to other Bundesbank databases. Our consent rate is comparable to the 73% consent rate in that survey (Bundesbank 2021).

[7] Because our IEB data is from 2020, we cannot link firms founded in 2021. By law, we are also not allowed to link sole proprietorships.

2.3 Worker Survey

In order to examine how bargaining events typically unfold, we use data from a survey we fielded to 135,000 full-time German workers.[8] We asked workers for their tenure, weekly hours worked, search behavior, and risk preferences. 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 ask 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. Appendix Figure E1 describes the flow of the survey and Appendix D.3 provides the full text of the questions in each bargaining module.

We selected workers for inclusion in the survey based on the Social Security records in two groups. 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. The inclusion of 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 described the survey as a scientific study on salary progression in Germany.

For our main analysis sample, we keep the 11,868 respondents who completed the survey, 8,506 of whom worked at surveyed firms in 2020.[9] Appendix D provides details about how we selected respondents and implemented the survey. It also discusses non-response.

[8] Historically, it has been difficult to link survey data to IAB records. In recent years the German Socio-Economic Panel (GSOEP) has had annual open calls, which offer researchers the opportunity to embed questions into the panel. Recent waves of the GSOEP have contained around 600 individuals whose records could be matched to the IAB data (Jäger et al. 2022). We chose to conduct an independent survey, rather than embed question into an established panel, so that we could ensure sufficient sample size among the firms in our survey. This approach also gave us more freedom to design the questionnaire, which includes multiple distinct modules.

[9] Our effective response rate of 11.7% is significantly higher than response rates of other surveys at the IAB that target first-time respondents (Haas et al. 2021).

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 it perceives to have equal productivity. This can occur either at the beginning of or during an employment spell. This definition is analogous to standard definitions for price discrimination.[10] It 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).[11]

Our definition of wage bargaining does not require that firms which "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—5% of online ads contain specific pay information—and among the German firms in our sample (Table A1) (see, e.g., Hazell, Kazemi, and Taska 2018).

Our definition also does not require wage differentiation to occur as the result of back-and-forth negotiation between an employer and (potential) employee. [12] Wage discrimination can also occur if firms vary the initial offers they make to equally productive workers (Hall and Krueger 2012b).[13] A recent literature has highlighted the growing use of salary expectations questions,

[10] For instance, a standard industrial organization textbook says that "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).

[11] Firms may post wage schedules that condition on observed markers for productivity. However, they do not observe an individual worker's outside options until they meet a worker.

[12] An alternative definition would differentiate between firms that make "take it or leave it" offers and firms that say they 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.

[13] When both sides have perfect information, the unique equilibrium is for employers to make an initial offer just at the margin of triggering a counter-offer on the part of the worker. As a result, no back-and-forth negotiations occur (Fudenberg and Tirole 1983; Chatterjee and Samuelson 1983). While many studies have documented the existence of back-and-forth negotiations, this does not imply that firms make uniform initial offers. Whether firms vary initial

which facilitate such behavior (see, e.g., Agan, Cowgill, and Gee 2020). While 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. In Section 4.4 we document that it is common for firms to ask, and for workers to provide, this information.

3.2 Survey Measures of Firm Bargaining Strategies

We designed a survey instrument to elicit firms' strategies for bargaining with new full-time hires and with existing full-time workers who had received an outside offer. Appendix Figure B1 provides an overview of the survey. Appendix B.5 provides the original questionnaire, as well as an English translation.

In order 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.[14] 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 capture firms in different sectors. We asked respondents to name the bottleneck occupation that was most relevant for their firm. Appendix Table B7 documents significant variation in stated occupations, ranging from white-collar management and IT positions to blue-collar jobs as technicians or service workers.

External Hires. We elicited firms' strategies for 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?"

offers to workers they perceive to have the same productivity cannot be observed in worker surveys.

[14]The 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.

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 Section 4 we define a firm as 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 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 therefore captures both whether and the extent to which a firm is willing to vary the wages it offers to workers it perceives to have equal 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.[15] To probe robustness of our main bargaining measure, 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 stage. We did this by prompting respondents to consider (separately

[15] Non-CBA covered workers in Germany who do not hold management positions receive, on average, 88% of their pay in form of base wages ("Hkp Top Management Survey 2021" 2021). Even in sectors where special and variable pay are common, they 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 due to 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.

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.[16]

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?"

We asked firms how much they could change wages without changing tasks because it is hard to interpret wage changes that occur coincident with a change in productivity or in the nature of work. To the extent to which renegotiations lead to promotions, responses to our question provide us with a conservative measure of firms' renegotiation strategies.[17]

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.

[16] In the protocol question, we asked for the maximum by which wages could be adjusted *upward*. This wording was motivated by the fact that HR professionals rarely reported wage offers—at the initial or final stage—being adjusted *downward.* One potential explanation for this pattern is that most firms, including those without CBA agreements, have formal pay structures which often place lower bounds on the wages offered to workers of a given job title. Because the incidence question is not subject to this concern, we use this question to probe robustness.

[17] Promotions are difficult to accurately measure and compare across occupations and firms. In addition, 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.

Stability. 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 for 37 firms we have responses from multiple individuals.[18] Appendix Table A3 documents that we find a high overlap between independent responses from the same firm. This finding further corroborates feedback we received from practitioners who highlighted the fact that wage-setting strategies are typically determined at the firm level.

Reliability. We next gauge intra-respondent reliability: whether respondents' answers to distinct questions within the survey align with each other. When comparing the protocol and the incidence question, internal consistency would require that individuals report an expected variation in final offers (incidence question) that is weakly less than the amount of flexibility they have in giving these offers (protocol question).[19] Appendix Table A4 shows the cross-tabulations between the protocol and incidence question and finds that most of the mass is on or below the diagonal, corroborating internal consistency. As an additional test, we compare responses to the protocol question for firms that are covered by CBA agreements—and who should by design be restricted in their ability to set wages flexibly—to those who are not covered by CBA. Appendix Table A5 shows that when focusing on recent labor market entrants, which represent the group that is most likely covered by CBAs, we indeed find less flexibility for these workers in CBA-covered firms.

Validity. Finally, we test whether respondents provided valid information about their firms' bargaining strategies. Because the survey was explicitly designed to collect information that is not otherwise available, validating the bargaining measures using external data is inherently difficult. However, three distinct exercises suggest that respondents provided accurate information. First, we document that their answers to questions for which we were able to collect publicly available data—(1) whether at least some workers were covered by a collective bargaining agreement, (2)

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

[19] For instance, a firm that reports wages can be adjusted up to 20% upward should expect the gap between the highest and lowest offers to be at most 20%. If offers can also be adjusted downward, this need not be true. However, conversations with HR professionals suggest downward adjustments are rare.

whether pay information is posted in external job ads, and (3) whether the firm elicits salary expectations during the application process—align with our survey responses.[20] For 90% of firms who report that no workers are covered by a CBA, we cannot find any evidence of a CBA. For 99% of firms that report that they do not provide pay information in job ads, we cannot find pay information in online job postings. For 77% of firms who report not eliciting candidates' salary expectations, we find no indication of such elicitations in their online application forms.

Second, the elicited firm strategies are highly correlated with the survey responses of workers who work at those firms. Appendix Table A6 shows that there is a positive relationship between worker and firm responses along several dimensions. While measurement error in firm responses would inflate the standard errors, measurement error in worker responses would attenuate the effects. Columns 1 and 2 show that, at firms where some workers are covered by a CBA, workers are significantly more likely to state that they are covered by such an agreement. At firms that ask or mandate that applicants provide their salary expectations, workers are significantly more likely to report having provided this information (Column 3). Workers at firms that are willing to negotiate are also more likely—conditional on having received an outside offer—to have used such an offer to negotiate their pay (Columns 4 to 7).

Third, in the Social Security records, there is more unexplained wage variation among workers subject to bargaining. Specifically, when we regress log base wages on education dummies, on a quadratic for experience, and on occupation-establishment fixed effects, we find that the adjusted R-squared of the regression model is higher at posting firms than it is at bargaining firms. Appendix Table A7 presents these results and shows that this pattern arises both when using the protocol and incidence question and when using more detailed measures of fixed effects.[21] In a companion paper, we document that gender pay gaps are 3 percentage points larger at firms that engage in bargaining and that, among surveyed workers (for whom we observe hours), there is no gender pay

[20] Appendix Section C.3 provides information on how we assembled these data.

[21] Two common features of the Social Security records make it difficult to interpret magnitudes (and to test whether variation at bargaining firms is higher than that at posting firms). First, occupational codes are a noisy proxy for workers' job titles, and a single occupational code can refer to dozens of distinct job titles within a firm (Haegele 2023). Second, a large share of wages are top-coded at the Social Security maximum.

gap at posting firms once we control for occupation-establishment fixed effects (Caldwell, Haegele, and Joerg Heining 2023a). The results in Section 5, which indicate a link between workers' outside options and their wages, can be seen as a further validation of our bargaining measure.

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. We document that most firms are willing to differentiate pay between external hires they perceive to have identical 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. Most bargaining events begin with the worker providing their salary expectations. While most outside offers are rejected, a large fraction of workers use these offers to improve their position at the incumbent firm.

4.1 Individual Bargaining is Pervasive

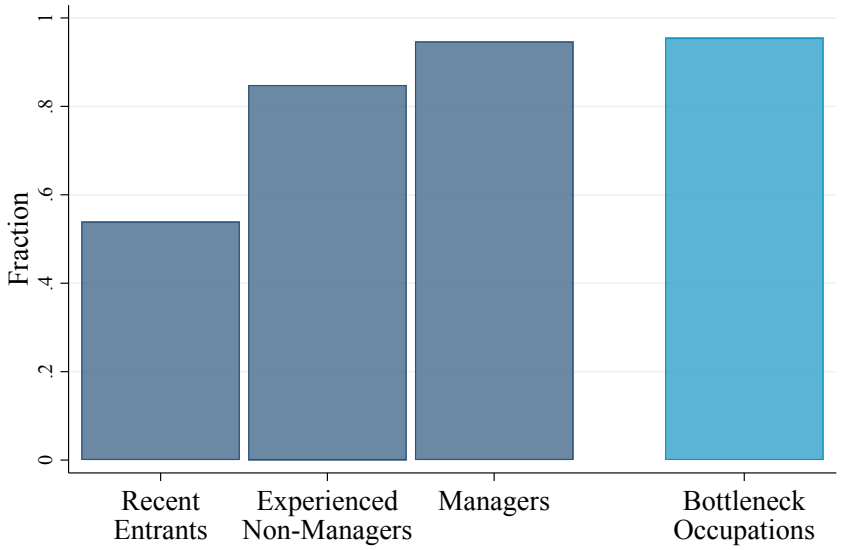
New External Hires. Panel A of Figure 1 shows that roughly 50% of surveyed firms are able to differentiate base wages between recent labor market entrants they perceive to have identical qualifications and fit. Over 80% are able to differentiate wages for experienced non-managers and for managers. These three groups are mutually exclusive and exhaustive. When asked specifically about workers in the bottleneck occupation the firm said they were struggling to fill, nearly all firms say they are willing to adjust base wages to hire a worker.

The amount by which base wages can be increased is sizable, particularly for workers in higher-level positions (Figure 2). While only seven percent of firms would increase base wages for external hires that are recent labor market entrants by more than 10%, 22% of firms are willing to do so for experienced non-managers, and 63% are willing to do so for managers.

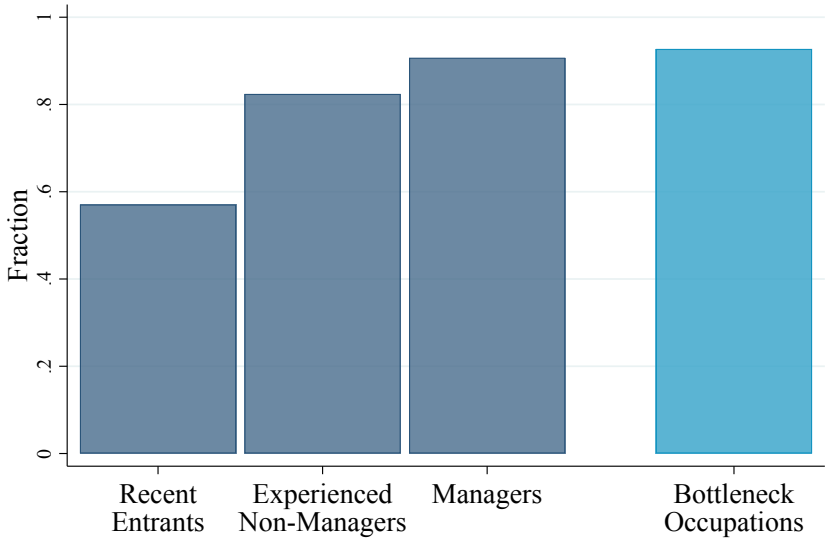
These differences across groups do not mechanically reflect differences in the variance of productivity across employee groups. When eliciting firms' bargaining strategies, we specifically

Figure 1: Share of Firms with Individual Bargaining Strategies

A. Base Wages for External Hires



B Base Wages for Incumbents with Outside Offers



Note: This figure documents the prevalence of individual bargaining strategies based on the protocol question. Panel A shows the share of firms that say they could increase base wages for 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.

prompted respondents to focus on adjustments between individuals with equal qualifications and fit. In our conversations with HR professionals, this was the phrase that most closely aligned with productivity.

Incumbent Workers. The bargaining patterns are similar for incumbent workers: Panel B of Figure 1 shows that, for recent labor market entrants, 57% of firms say they would be willing to increase an existing worker's base wages if they received an outside offer. Over 80% would be willing to do so for experienced incumbents, for managers, and for workers in bottleneck occupations. 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 changes in the worker's productivity. Rather, they suggest that firms expect to earn rents on workers: they are able to increase pay without it becoming unprofitable to employ the worker. This is true in models in which firms have market power, either due to search frictions, size, or preference heterogeneity (see, e.g., Manning 2003; Cahuc, Postel-Vinay, and Robin 2006).

The magnitude by which firms are willing to adjust wages is somewhat lower for incumbent workers than it was for new hires is in line with explanations HR professionals gave during the development of our survey. The professionals pointed out that equity considerations are typically more binding when setting pay for incumbent workers.[22]

Robustness. Figures 1 and 2 present strategies for base wages. However, focusing on base wages does not mean we miss other dimensions of bargaining. Panel B of Appendix Table A8 documents similar patterns in bargaining with external hires once we use information on bargaining over either base wages or special payments, such as bonus or stock payments. 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.[23] Panel C of Appendix

[22]Under the assumption that firms do not raise wages above a worker's marginal product, these results suggest that firms may earn substantial rents.

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

Figure 2: Variation in the Intensive Margin of Bargaining

Note: This figure describes the extent to which firms can adjust base wages for external hires. This uses our main protocol question, as described in Section 3. Table A8 presents additional tabulations. The sample contains 772 firms.

Table A8 shows that even when we focus on the subset of firms that indicate more flexibility regarding these amenities, we find similar patterns in terms of bargaining for base wages.

4.2 Wage Differentiation Occurs In Both the Initial and Final Offer

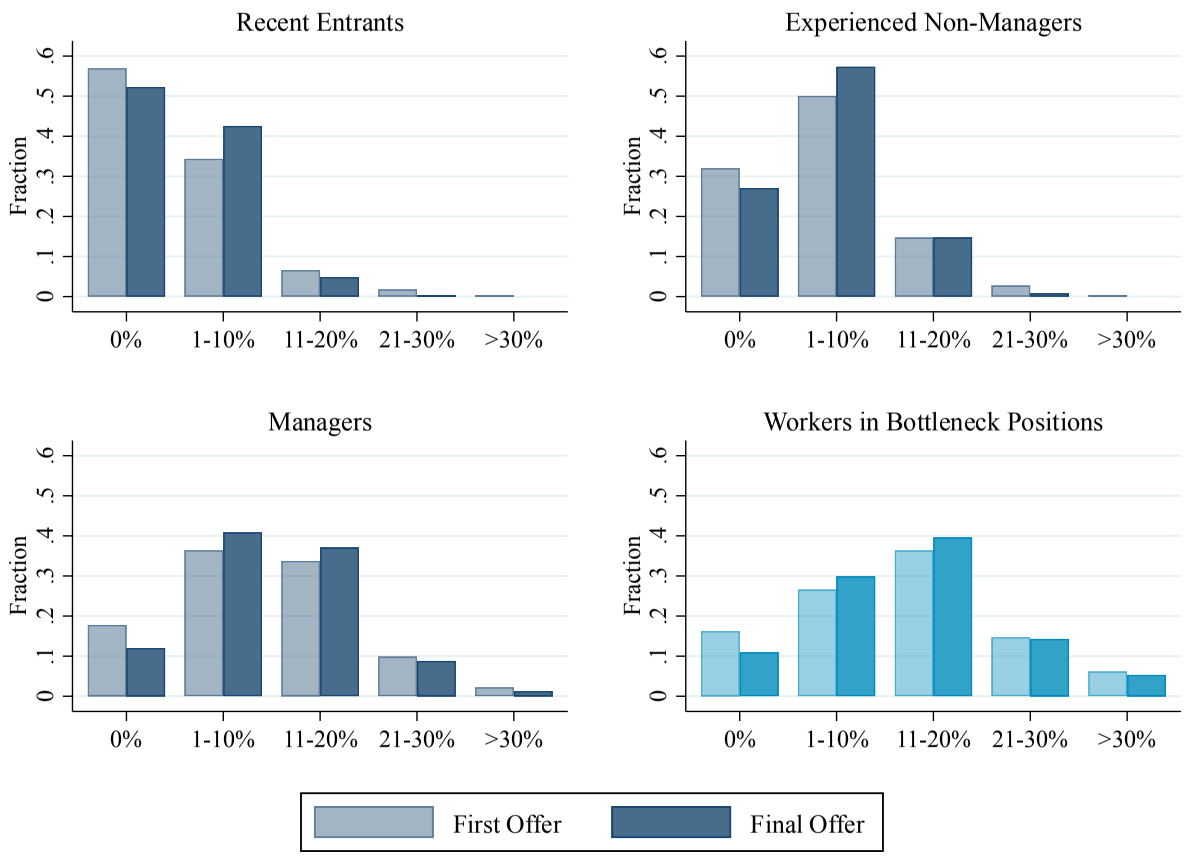
The prevalence of bargaining strategies we document is somewhat larger than that documented in the previous literature (Hall and Krueger 2012b; Brenzel, Gartner, and Schnabel 2014). This may, in part, reflect changes over time: a large literature has documented a decline in collective bargaining and a coinciding increase in the importance of individual-specific factors in wage-setting (Card, Jörg Heining, and Kline 2013; Bhuller et al. 2022). As we document in Section 5, these individual-specific factors may include differences in how effectively workers negotiate. However, the increased prevalence we document also likely reflects how we define bargaining. In particular, our definition captures wage differentiation that occurs both as a result of workers asking for (and receiving) more after a firm makes its initial offer and differentiation that occurs in the initial offers themselves.

Indeed, differences in the wages firms offer to workers they perceive to have identical 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 3 presents the expected gap between the highest and lowest offers a firm would make to ten candidates for a position who have identical qualifications and fit, but "vary in stated salary expectations and offers from other firms". 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 these candidates. Forty-four percent report that this initial stage of bargaining is at least as important as the subsequent back-and-forth negotiations in determining workers' pay.[24]

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

[24] In conversations with HR professionals, many often pointed to norms regarding how much pay could adjust during one round of back-and-forth offers.

Figure 3: 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, which are identical in qualifications and fit, but which potentially vary in 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.

candidates to 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 2020).

4.3 Predicting Firm Bargaining Strategies is Difficult

We next examine whether there are particular firm or market characteristics that are associated with firms' decisions to set pay via individual bargaining. We focus on characteristics that have previously been highlighted in the literature: firm productivity (see, e.g., Doniger 2015; Postel-Vinay and Robin 2004; Flinn and Mullins 2021), firm norms (see, e.g., Bertrand and Schoar 2003; Hjort, X. Li, and Sarsons 2020), and market factors (see, e.g., Ellingsen and Rosen 2003; Michelacci and Suarez 2006).[25]

Productivity. We first examine the correlation of firm bargaining strategies with common proxies for firm productivity.[26] Figure 4 presents binned scatterplots of firms' bargaining strategies 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 external hires or with incumbents. We also do not find that it is easy to predict a firm's bargaining strategy using its AKM wage premium (Figure 4). Table 2 reports p-values from corresponding tests of equality of means; these confirm that firms that do and do not set pay via individual bargaining 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.

[25]The literature emphasizing firm productivity largely predicts that more productive firms will be more likely to set pay by bargaining. The literature that emphasizes 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. See Hall and Krueger (2012b) for a summary of the earlier literature.

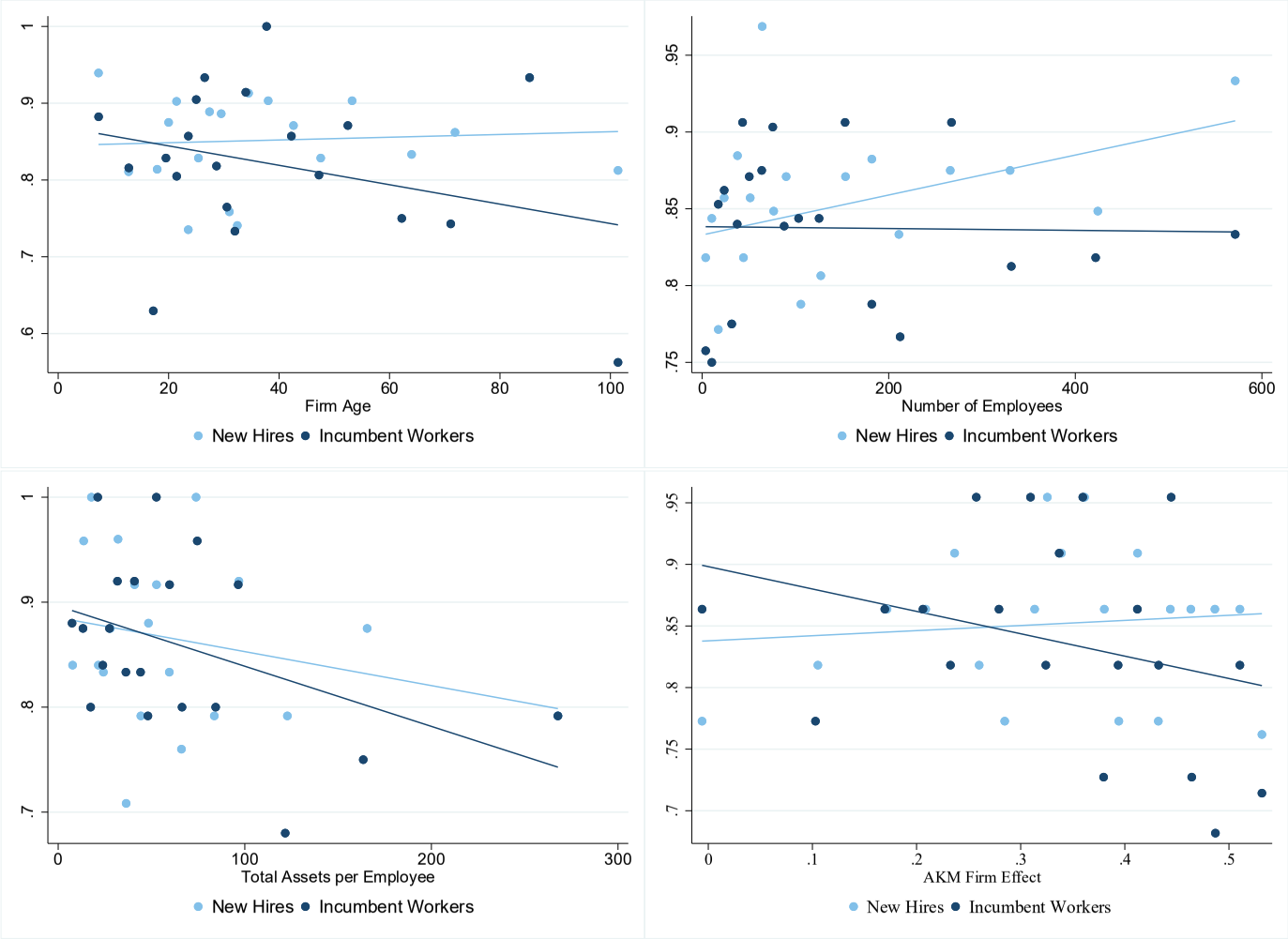
[26]The choice of wage protocol may both be influenced by and influence firm productivity. However, because firms should choose the wage-setting protocol that maximizes their profits, we would expect that ex post measures of productivity, including firm size, firm age, and total assets per employee,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

Table 2: Comparison Between Posting and Bargaining Firms

	Bargain with Recent Entrants			Bargain with Experienced Non-Managers			Bargain with Managers		
	No	Yes	p-value	No	Yes	p-value	No	Yes	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial Status									
Total Assets per Employee	1041.9	191.9	0.21	250.45	641.79	0.69	378.93	602.74	0.89
(std.dev)	(11521.90)	(864.58)		(568.06)	(8480.20)		(781.30)	(8111.73)	
Fixed Assets per Employee	727.4	138.7	0.25	124.71	454.97	0.66	195.57	423.09	0.86
(std.dev)	(8736.26)	(817.97)		(317.92)	(6398.10)		(410.67)	(6124.16)	
Number of Employees									
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
Other Firm Characteristics									
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
Year of Incorporation	1969.2	1974.0	0.12	1974.29	1971.40	0.50	1973.70	1971.53	0.76
(std.dev)	(43.55)	(39.27)		(36.55)	(42.19)		(39.59)	(41.76)	
First Year in ifo Panel	2013.8	2013.8	0.98	2013.34	2013.84	0.37	2013.41	2013.80	0.66
(std.dev)	(5.25)	(5.52)		(5.49)	(5.39)		(5.95)	(5.38)	
Legal Form									
Stock corporation	0.06	0.11	0.03	0.04	0.10	0.07	0.05	0.09	0.38
Limited liability company	0.83	0.80	0.32	0.82	0.82	0.90	0.74	0.82	0.23
Sector									
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
Bargain With									
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	---
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. Information on the first year respondents participated in the ifo panel is provided by the ifo Institute. All other firm characteristics are collected from Orbis. See Appendix Section C.2 for a detailed description of these variables. Levels of significance: *10%, ** 5%, and *** 1%.

Figure 4: 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 531 firms that are linked to the Social Security records and for which we have AKM firm effects. 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 the variables.

Norms. While we do not find systematic heterogeneity with regard to firm productivity, the results in Table 2 are consistent with a recent empirical literature which has emphasized the role that firm and manager culture plays in determining pay strategies (see, e.g., Hjort, X. Li, and Sarsons 2020; Acemoglu, He, and Le Maire 2022). This table 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 CBA-agreements).[27] 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 or culture is important for firms' wage-setting strategies (e.g., Bertrand and Schoar 2003; Acemoglu, He, and Le Maire 2022).

Market Characteristics. The group-level variation documented in Figures 1 and 2 is consistent with the idea that workers' job characteristics and labor market factors such as market tightness also drive variation in wage-setting strategies. Figure 2 shows that there is more scope to adjust pay for managers than for experienced non-managers; and more scope to adjust wages for experienced non-managers than for recent labor market entrants. Further, we find that firms are most willing to make adjustments for workers in the occupation they specify they are having a hard time filling (i.e. workers in bottleneck positions). As Appendix Table B7 documents, the firm-provided bottleneck occupations span a large range of occupations and are not limited to higher-level positions. Firms' increased willingness to bargain with workers in positions they are struggling to fill suggests that market tightness may affect the choice of wage-setting strategy.

[27] In our sample, 41% of firms are covered by a collective bargaining agreement, 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 collective bargaining agreement 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.

Relative Importance of Firm and Market Factors. We conclude our analysis of firm heterogeneity using a simple variance decomposition. This decomposition suggests that employee group characteristics within firms, rather than firm characteristics, explain more of the variation in bargaining strategies. Further, it is not easy to predict firm bargaining strategies using observed characteristics.

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 entrants) and the dependent variables include different sets of covariates and fixed effects. Column 1 of Table 3 shows that the four employee group dummies alone explain 35% 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 6 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.

These results suggest that while there is a firm component to bargaining strategies, it cannot easily be captured by observable characteristics. Panel C documents similar results for the bargaining strategies for incumbent workers. Appendix Table A9 shows that we obtain similar results when we use alternative definitions of bargaining or drop the strategies for workers in bottleneck occupations, which are harder to compare across firms.

4.4 Implications of Worker-Firm Dynamics

We conclude this section by examining how worker-firm bargaining events unfold. The patterns we document place empirical restrictions on the types of models appropriate for the labor market. They also provide guidance for empirical researchers interested in studying heterogeneity in worker bargaining behavior or in the consequences of bargaining.

Our data on worker-firm interactions come from the worker survey described in Section 2.3. In this survey, we asked workers whether they had received an outside offer or had switched firms

Table 3: 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
	(1)	(2)	(3)	(4)	(5)	(6)		(7)
				A. Bargaining with New Hires (Protocol Question)				
R-Squared	0.35	0.39	0.73	0.35	0.36	0.36	0.38	0.52
Adjusted R-Squared	0.35	0.18	0.64	0.35	0.35	0.36	0.37	0.46
				B. Bargaining with New Hires (Incidence Question)				
R-Squared	0.26	0.44	0.70	0.26	0.27	0.27	0.29	0.46
Adjusted R-Squared	0.26	0.25	0.59	0.26	0.26	0.26	0.28	0.39
				C. Renegotiating with Incumbent Workers				
R-Squared	0.22	0.48	0.69	0.22	0.22	0.22	0.24	0.42
Adjusted R-Squared	0.21	0.30	0.59	0.22	0.22	0.22	0.23	0.35
Industry Dummies							1-digit	4-digit

Note: This table presents the R-squared and adjusted R-squared from regressions of the firm-group bargaining protocol for external hires (Panel A), the expected variation in final offers to external hires (Panel B), and the amount of adjustment for incumbent workers (Panel C) in each firm-group on the covariates indicated at the bottom of the table. There are up to four observations for each firm.

in the previous six months. If a worker said yes to either question, we then posed a series of follow-up questions about the offer and subsequent bargaining process. We use these questions to construct the extensive-form bargaining tree displayed in Figure 5. For workers who accepted an offer, the firm that provided the offer is their new firm. For workers who rejected an offer, this was the outside firm.[28] Table 4 provides summary statistics for these bargaining dynamics, separately by whether a bargaining event ended with an accepted offer.[29]

The first branch of the tree shows that the majority (58%) of worker-firm interactions begin with the worker providing his or her salary expectations. This stage is not typically captured in surveys of bargaining. It is common for a worker to ask a firm to improve its initial offer, even when these expectations are met: 31% of workers ask for more money. Conditional on a worker asking for more, it is also common for firms to counter by offering the worker more than they initially offered, but less than the worker asked for.

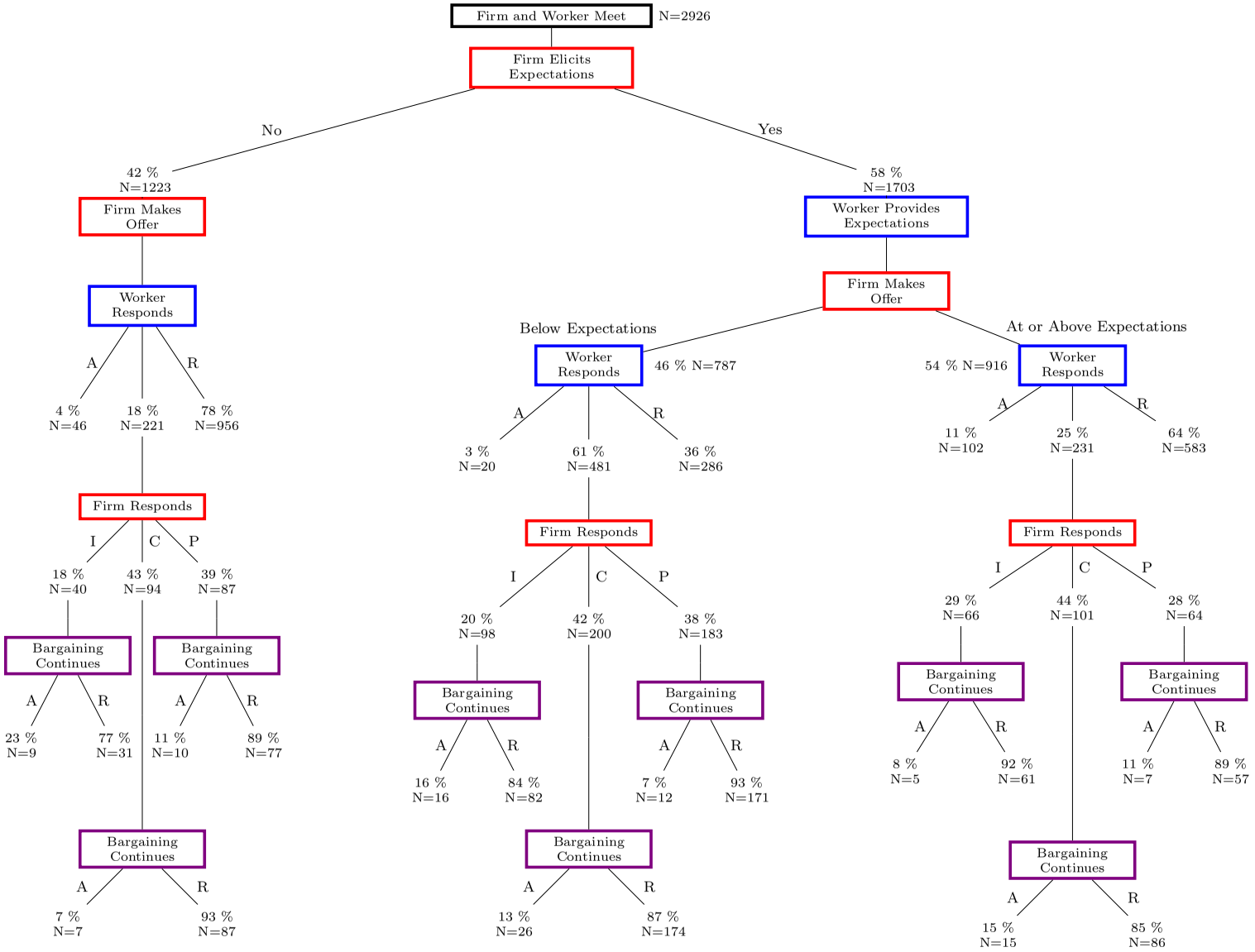
Most offers are rejected, with the worker remaining at the incumbent firm. The tree indicates that only twelve percent of workers who received one or more outside offers in the past six months chose to move to a new firm. However, even when an offer is rejected, it sometimes takes several rounds: after providing an initial offer, a worker may counter the firm's offer, and the firm may in turn counter the worker's offer.

The fact that many offers are rejected rules out models in which complete information leads to a situation where all first offers are immediately accepted, including both the Nash (1950) and Rubinstein (1982) models of bargaining. Models of bargaining in which only firms are perfectly informed can rationalize the events which end in the worker joining the firm, but not the large share of rejected offers (see, e.g., Grossman and Perry 1986; Gul and Sonnenschein 1988). Models of two-sided incomplete information, such as the Perry (1986) and Chatterjee and Samuelson (1983)

[28] We use at most one event per worker. If a worker reports both switching firms and receiving an outside offer in the previous six months, we use data from the event that led to the change in firm. We do not restrict the sample to workers at surveyed firms because, in most cases, we do not observe the bargaining strategies of these outside firms.

[29] One distinction between this setting and that 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.

Figure 5: Dynamics of Bargaining Events



Note: This figure summarizes the worker-offer data elicited in the worker survey. The data include all surveyed workers who have received an offer in the previous six months. An accepted offer is one in which the respondent joined the firm as an external hire. A rejected offer is one in which the respondent remained at their incumbent firm. At each stage, workers can choose to accept an offer, counter an offer, or reject an offer. Firms can choose to improve the offer (match the worker's counter), counter the offer, or persist at their original offer.

Table 4: 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 have 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 5. Table A1 describes the characteristics of workers in this sample.

models would rationalize such patterns.[30] These patterns are consistent with a growing literature which has documented (separately) 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 (Cullen, S. Li, and Perez-Truglia 2022; Cullen 2023). Indeed, when asked what information decision-makers have, 71% of surveyed HR professionals said that their firm only has market-level information on wages, not specific information on what their competitors pay.

The observed dynamics also highlight the importance of on-the job renegotiation. In the majority of cases in which a worker remains at the incumbent firm, the worker does not report that they re-negotiated their salary at the incumbent firm. However, it is much more common for workers to receive and reject outside offers than it is for them to receive and accept them. As a result, workers are more likely to have used an outside offer to renegotiate than they are to have moved firms.

5 Bargaining and Wage Inequality

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 explore heterogeneity in how workers behave, both before and after a firm makes its initial offer. We conclude by examining implications for wage inequality.

5.1 Dimensions of Heterogeneity

We examine heterogeneity in bargaining actions both at the beginning of and during an employment spell. We focus on two dimensions of heterogeneity highlighted by the bargaining literature—outside options and risk preferences—and one dimension highlighted by the recent literature on wage inequality—AKM person effects. We measure outside options and risk prefer-

[30] These models cannot explain that rejections sometimes occur only after several rounds of bargaining. One possibility is that that early-round offers are non-serious, or that there are constraints on how offers can be adjusted between rounds (see, e.g., P. C. Cramton 1991). These results mirror the product market findings of Backus et al. (2020).

ences in our survey. We take the AKM person effects from Bellmann et al. (2020); these estimates were produced using population data covering 2010-2017.

For each characteristic, we run regressions of different bargaining outcomes y_i on the characteristic X_i, a quadratic in experience, tenure (four dummies), education dummies, and three-digit occupation by establishment fixed effects:

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

We include occupation-establishment fixed effects ($\lambda_{o(i),est(i)}$) to ensure that heterogeneity in bargaining behavior is not driven by heterogeneity in bargaining opportunities.[31] We cluster standard errors at the firm level. Our baseline analysis focuses on individuals who worked at surveyed firms in 2020. In Appendix Figure A2 we show that our results are robust to including workers at non-surveyed firms.

We focus on workers' outside options as they are influential in many models of wage determination (see, e.g., Cahuc, Postel-Vinay, and Robin 2006; Caldwell and Danieli 2021); previous papers have documented a causal relationship between changes in workers' outside options and their mobility and wage growth (Caldwell and Harmon 2019). We identify across-worker variation in outside options using each worker's perception of how difficult it would be to obtain an offer from an outside company that they would prefer to their current position. We elicit workers' perceived outside options—rather than attempting to define them on the basis of a worker's occupation or firm—both because this generates variation across workers within the same establishment and occupation and because differences in how workers value otherwise identical outside options (e.g., based on the non-wage characteristics of these options) may generate heterogeneity in how they negotiate.[32]

Similarly, we focus on workers' risk preferences as risk preferences are often thought to deter-

[31] To the extent that individuals differ in how they are—or anticipate being—treated by the firm during bargaining interactions, such differences will also be absorbed in β.

[32] Another possibility is that some workers have biased beliefs about their outside options, and that such biases affect their behavior (Jäger et al. 2022). We do not attempt to distinguish between these explanations. However, Appendix Table A10 documents that workers' perceptions are positively correlated with other measures of their outside options.

mine bargaining outcomes. We identify across-worker variation in risk preferences using workers' answers to a standard question in the literature (Dohmen et al. 2011): we asked workers whether they were "generally [someone] who is willing to take risks or [whether they tried] to avoid taking risks". Workers were asked to provide their responses on a ten-point scale; we define someone as having high risk preferences if they selected seven or above.

Finally, we examine heterogeneity across high and low AKM person-effect individuals. Previous work has documented that the rise in variance of these person effects explains a large share (forty percent) of the growth in German wage inequality over the past several decades (Abowd, Kramarz, and Margolis 1999; Card, Jörg Heining, and Kline 2013)[33] While a common interpretation of these person effects is that they capture workers' unobserved skills, they capture all worker characteristics that are valued across firms and which do not vary over the time window used for estimation. Because the growth in variance of these person effects coincides with the decline in collective bargaining, it is plausible that they reflect differences in bargaining skill (Ellguth and Kohaut 2019). Because the person effects are estimated using population data from 2010-2017 data (Bellmann et al. 2020), they are not mechanically related to success (or lack of success) in the bargaining events elicited in our survey, which only captures bargaining events dating back to 2019.

5.2 Heterogeneity in Bargaining Behavior

Each entry in Table 5 presents an estimate of β corresponding to a regression where y_i is the outcome provided in that row and X_i is the characteristic provided at the top of the column.

Provision of Salary Expectations. Many bargaining events begin with the worker facing the choice of whether to provide their salary expectations. We elicited workers' realized behavior during the application and hiring process of their current job. The first row in Panel A of Table 5 shows that, among recent hires, 69% report having provided their salary expectations during the

[33]These AKM person effects stem from regressions of log wages on worker and firm fixed effects, on demographic controls, and on occupation fixed effects.

Table 5: Heterogeneity in Worker Bargaining Behavior

		Outside Options		Risk Preferences		AKM Person Effect	
	Mean	Binary	Cont.	Above Midpoint	Cont.	Above Median	Cont.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Bargaining at the Start of the Spell							
Provided Expectations	0.69	0.010	0.030	-0.004	0.010	0.228***	0.143***
		(0.033)	(0.019)	(0.009)	(0.030)	(0.052)	(0.048)
Asked for More	0.36	0.072**	0.048**	0.015	0.022	0.090*	0.052
		(0.030)	(0.021)	(0.011)	(0.037)	(0.050)	(0.053)
Asked for More (Percentage Points)	2.8	0.770**	0.592**	0.167*	0.321	0.716	0.529
		(0.351)	(0.283)	(0.098)	(0.342)	(0.509)	(0.466)
Negotiated Offer Upward (Binary)	0.26	0.073**	0.060***	0.018**	0.047	0.147**	0.131***
		(0.032)	(0.022)	(0.009)	(0.035)	(0.066)	(0.045)
Negotiated Offer Upward (Percentage Points)	1.46	0.526**	0.494***	0.088	0.207	1.094**	0.883**
		(0.201)	(0.162)	(0.058)	(0.221)	(0.531)	(0.393)
B. Events in Previous Six Months							
Asked for More (Binary)	0.31	0.078***	0.052***	0.022***	0.086***	-0.022	-0.030*
		(0.014)	(0.007)	(0.004)	(0.014)	(0.018)	(0.017)
Received More (Binary)	0.24	0.059***	0.040***	0.021***	0.085***	0.001	-0.014
		(0.009)	(0.005)	(0.004)	(0.014)	(0.015)	(0.013)
Asked for More | No Outside Offer (Percentage Points)	0.32	0.117*	0.066	0.044***	0.188**	0.053	-0.017
		(0.068)	(0.048)	(0.016)	(0.080)	(0.086)	(0.066)
Received More | No Outside Offer (Percentage Points)	0.15	0.025	0.013	0.017*	0.077*	0.040	-0.004
		(0.048)	(0.035)	(0.010)	(0.044)	(0.046)	(0.039)

Note: This table reports OLS regressions which shed light on worker differences in bargaining behavior. 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. The third outcome captures the intensive margin of asking for more, including zeros for those who do not ask. The fourth outcome is an indicator for whether the worker negotiated successfully, which equals one if they asked the firm to increase the salary provided in their initial offer and the firm increased the offer. The fifth 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. The third and fourth outcomes capture the intensive margins of asking for more and successfully negotiating up, respectively, conditional on not having received an outside offer. In order to reduce the burden of the survey, we only elicited the magnitude of the adjustment for these workers. Each regression controls for an individual's level of education, a quadratic in experience, age (linearly), and (3-digit) occupation-establishment fixed effects. Standard errors are clustered at the firm level. Additional outcomes are presented in Appendix Table A11. Appendix Figure A2 presents robustness checks. Levels of significance: *10%, ** 5%, and *** 1%.

application process.[34] We do not find any differences by risk preferences. Workers who say they have better outside options were more likely to have provided their salary expectations, relative to their same-occupation colleagues, though the gap is not statistically significant. Higher person-effect individuals are 14% more likely to have provided salary expectations relative to workers with below-median person effects.

Back and-Forth Negotiations. After an initial offer is made, 36% of workers report asking the firm to increase the initial offer. The second row in Panel A of Table 5 shows that some workers are much more likely to do so than others. Workers with better outside options, higher risk preferences, or higher person effects are more likely to have asked for more. This is true on both the extensive margin (whether they ask) and on the intensive margin (including 0 for those who do not ask). We find similar patters for the likelihood of having successfully negotiated their offer up. While roughly a quarter of workers succeed in their negotiations, the fourth row in Panel B of Table 5 documents substantial heterogeneity across worker groups. These gaps are somewhat larger than the gaps in whether workers asked, suggesting that these workers may be more effective in negotiating.

The gaps in behavior we see do not reflect that these workers negotiate less on other dimensions. Panel A of Appendix Table 5 documents that the two non-wage amenities that workers most frequently report having negotiated over are vacation days (listed by 27%), bonus and stock payments (listed by 23%), and training opportunities (listed by 18%). The table shows no evidence that workers with worse outside options, lower risk preferences, or lower person effects are negotiating more on non-wage dimensions.

Panel B of Table 5 shows that heterogeneity in workers' behavior after they have joined a firm mirrors the heterogeneity at the beginning of the spell. The same groups of individuals that stated higher salary expectations and negotiated their offer upward receive raises on the job. Though we do see that high person effect workers are somewhat less likely to have asked for a raise in the pre-

[34]This differs from the number presented in Table 4 as it includes data on offers that were accepted within the previous three years. Table 4 focuses on events that occurred within the previous six months.

vious six months, such differences are insignificant. 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 do so.

In the Appendix, we present several checks which show that the results in this section are not specific to the sample or specification used. Appendix Figure A2 shows that we obtain similar results when we expand our sample to include workers who did not recently work at surveyed firms, but were randomly sampled from other firms in Germany. This figure also shows that we obtain similar results when we include level-occupation-establishment fixed effects rather than occupation-establishment fixed effects.

5.3 Discussion and Implications for Wage Inequality

Two pieces of evidence suggest that individual bargaining has a substantial impact on wage inequality. First, we document that, when pay is set by bargaining, the quality of an individual's firm continues to predict their pay after they have switched firms. To relate the wage that an individual earns to the premium offered by her previous employer, we run regressions of the form:

$$\log w_i = \beta \psi_{i,j^{prev}(i)} + X_i + \gamma_{i(\text{occ}),j} + \epsilon_i.$$

We control for demographic characteristics and for occupation-by-establishment fixed effects. We cluster standard errors at the firm level. Table 6 provides estimates of β, separately by whether workers are exposed to individual bargaining.

Column 1 of Panel A shows that, when pay is not set via individual level bargaining, the wage premium offered by an individual's previous firm has no statistically significant relationship with her current wage after we control for occupation-by-establishment fixed effects. However, when individual bargaining is possible, a ten percentage point higher wage premium is associated with 0.5 percent higher pay (Column 2). We see a similar pattern both among all workers at surveyed

Table 6: 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. Prior Firm Effect (Current Wages)			
Prior Firm Effect	0.006	0.056***	-0.036	0.051***
	(0.013)	(0.010)	(0.058)	(0.018)
Clusters	168	437	25	111
Observations	36155	139082	1018	3200
	B. Prior Firm Effect (Wages at Start of Spell)			
Prior Firm Effect	0.137*	0.209***	-0.036	0.051***
	(0.078)	(0.026)	(0.058)	(0.018)
Clusters	73	227	25	111
Observations	4190	6820	1018	3200

Note: This table reports results from regressions of an individuals current salary (Panel A) or starting salary (Panel B) on demographic characteristics (age, education dummies, and a quadratic in experience), occupation-by-establishment fixed effects, and prior firm wage effects. We run these regressions separately by whether an individual is in a position in which individual wage bargaining could determine their wage. We cluster standard errors at the firm level. Levels of significance: *10%, ** 5%, and *** 1%.

firms (Columns 1-2) and among surveyed workers (Columns 3-4) at these firms. In addition, Panel B shows similar results when we focus on the wage a worker received when they first joined their current firm. These results suggest that when pay is set via individual bargaining, the quality (as measured by wages) of an individual's firm matters even after he or she has left the firm.[35]

Second, our findings suggest that AKM person effects, which have been shown to be important contributors of wage inequality, likely capture differences in bargaining skill. While these person effects are typically interpreted as a measure of unobserved skill, they capture any time-invariant worker characteristic that is valued across firms. Our results in the previous section suggest that these person effects indeed capture meaningful differences in bargaining behavior. Given that the growth in variance of these person effects is a major contributor to the rise in wage inequality in Germany and other countries (Card, Jörg Heining, and Kline 2013; Song et al. 2019), this

[35]Di 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.

interpretation suggests that between-worker heterogeneity in bargaining skills translates into wage dispersion.

Two sets of results suggest that the observed differences in bargaining behavior across AKM person effects do not solely reflect heterogeneity in skill. First, if heterogeneity in worker-specific premia simply reflected heterogeneity in skill, we would expect that high AKM person-effect workers would be more likely to get raises (e.g., because they are promoted) without asking. Appendix Table A11 suggests this is not the case.[36] Second, if heterogeneity in person effects simply reflected heterogeneity in skill, we would not expect high person-effect individuals to differ from low-person effect individuals in how they respond to hypothetical bargaining questions once we condition on their current wage. We confirm that individual wage premia are related to bargaining behavior using the following question, which we posed to all survey respondents:

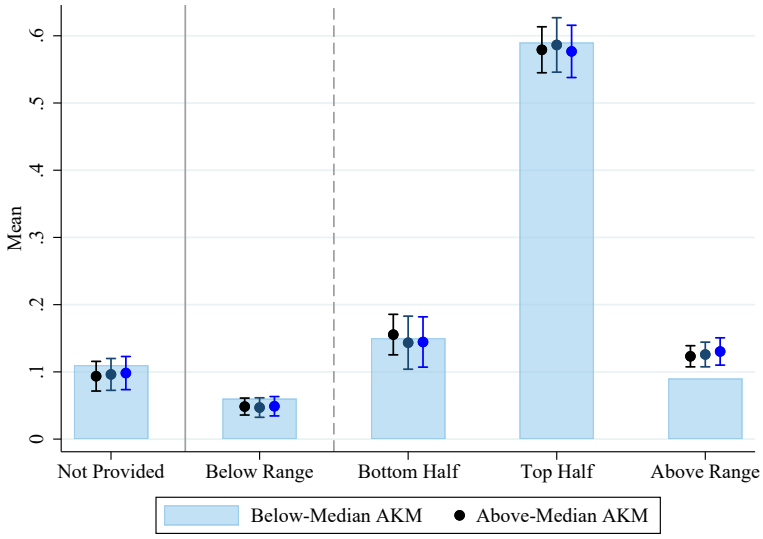
> "Suppose you wanted to change jobs and were applying to a new position in a different company. The job ad lists a salary range, which goes from {90/110}% to {120/140}% of your current salary. You are asked for your salary expectations. Relative to your salary, what do you say?"

We randomized the range provided across workers. Workers could provide a number or could select the option "I would not provide my salary expectations, even if asked". We specified the provided range in order to examine heterogeneity in worker behavior, conditional on an information set.

Figure 6 documents that workers with a higher AKM person effect are significantly more likely to provide a salary expectation above the listed range relative to their lower person-effect peers in the same occupation and establishment. Because the question asks respondents to provide their expectations as a percent of their current salary, this finding does not reflect the fact that these individuals earn higher salaries at their current firms. Rather, it suggests that conditional on their

[36] While a large number of previous papers have documented that firm wage premia are correlated with factors, including management skill (Bender et al. 2018), there is less research into the determinants of individual wage premia. This is somewhat surprising given the importance of the rise of variance of these premia (and the rise of sorting of high person-effect workers to high firm-effect firms) in explaining trends in wage inequality across countries.

Figure 6: Hypothetical Provision of Salary Expectations



Note: This figure examines heterogeneity in how workers respond to a hypothetical scenario which asks them to provide their salary expectations in response to a stated salary range, specified as a fraction of the worker's salary. Workers could provide a number or could select the option "I would not provide my salary expectations, even if asked". We construct indicators for whether an individual did not provide their expectations, or provided expectations that were below (exclusive of), in the bottom or top half of, or were above (exclusive of) the provided range. The bars report the mean of each indicator for individuals with below-median AKM person effects. The dots and whiskers come from regression-adjusting the differences between the two groups. Each regression controls for an individual's level of education, a quadratic in experience, age (linearly), and (3-digit) occupation-establishment fixed effects. Standard errors are clustered at the firm level.

wage these individuals ask for more. These results are inconsistent with the idea that variation in AKM person effects solely reflects variation in skill.[37]

6 Conclusion

In this paper we develop and validate a survey instrument to identify whether firms bargain with individual workers. Using data on 772 firms, which span all major sectors and states in Germany, we document that most workers work at firms that indicate they would differentiate pay between workers they believe have identical qualifications and fit and which indicate they could adjust pay for workers who receive an outside offer (without changing the worker's tasks). These results suggest that individual bargaining is pervasive and confirm that workers' wages are typically below their marginal product.

The firm-level results suggest that firm characteristics such as productivity and size do not predict a firm's bargaining policy. However, characteristics related to norms and market characteristics do. In addition, firms are more likely to bargain with managers than they are with experienced non-managers, who they are more likely to bargain with than inexperienced hires. Firms are most willing to bargain with workers in positions that they are struggling to fill: workers in tighter labor markets. These results suggest that researchers modeling wage dynamics among young workers may find wage posting models more appropriate; researchers focusing on managers or workers in higher-level positions may find individual bargaining models more appropriate.

The dynamics of worker-firm interactions suggest that both workers and firms have imperfect information about the bargaining positions of their counter-parties. Further, behavior that occurs before a firm makes its initial offer (i.e. during the salary expectations stage) and while on the job (i.e. renegotiating on the basis of an outside offer) is empirically important. Workers' outside options are a better predictor of their behavior than their risk preferences. Differences in bargaining

[37] Work by Agan, Cowgill, and Gee (2020) confirms that asking for more pays off: firms provide higher offers to workers who ask for more. In addition, firms interpret higher asks as being more informative about a worker's outside options than their productivity.

behavior lead to wage inequality within the firm, and may explain trends in wage inequality over the past several decades: when we examine the correlation between workers' AKM person effects and their bargaining behavior—in both realized and hypothetical bargaining events—we find that high AKM effect workers ask for more, conditional on their current wage.

There are, of course, several limitations in our analysis. First, due to our design, we are not able to decompose the individual effects into the portion that is due to individual-specific bargaining factors and the portion that is due to individual-specific productivity. Understanding the relative importance of each factor is an important open question. Second, because we use data from a single cross-section, we are unable to examine whether individual bargaining has become more important or influential in wage determination over time. Finally, in order 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; B. J. Larsen 2021). Such data could also be used to estimate the relative bargaining power of firms and workers (B. Larsen and Zhang 2021). Each of these avenues seems a promising direction for future research.

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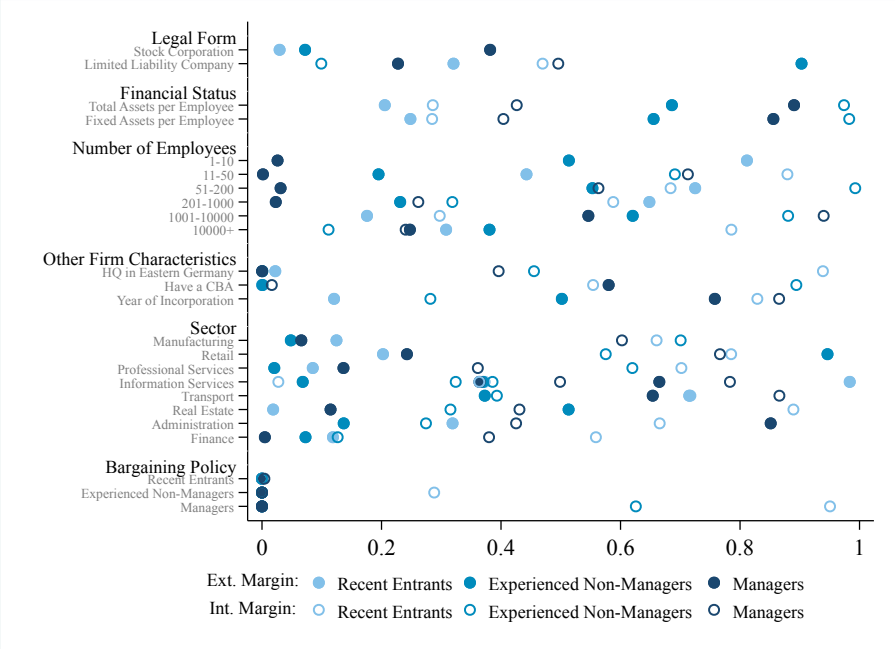
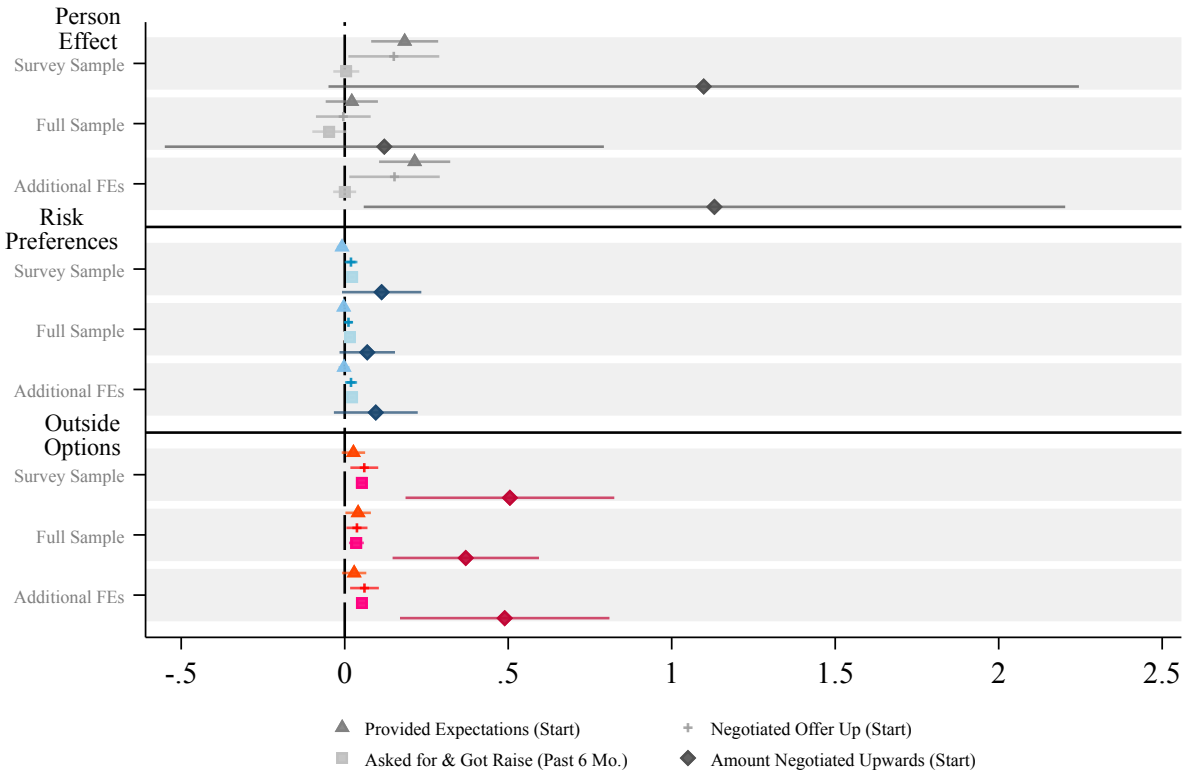
A Appendix Figures and Tables

Figure A1: Additional Comparisons Between Posting and Bargaining Firms



Note: This figure compares firms based on the bargaining protocol reported for three employee groups: recent labor market entrants, experienced non-managers, and managers. The solid dots are from tests of heterogeneity on the extensive margin. Each solid dot is the p-value from a test of equality between the means of posting and bargaining firms. Posting firms are those that report zero wage flexibility, while bargaining firms are those that report non-zero wage flexibility for a given employee group. The hollow dots represent tests of heterogeneity on the intensive margin. Each hollow dot is the p-value from a regression of the bargaining protocol for a specific employee group on the firm characteristic indicated on the y-axis. The bargaining protocol for each firm and employee group is either 0%, 1-10%, 11-20%, 21-30%, 31-40%, or more than 40%. CBA-coverage and bargaining strategies are elicited in the firm survey. Information on the first year respondents participated in the ifo panel is provided by the ifo Institute. All other firm characteristics are collected from Orbis.

Figure A2: Heterogeneity in Worker Bargaining Behavior: Additional Specifications



Note: This figure presents additional specifications that test for heterogeneity in worker bargaining behavior. We focus on heterogeneity along three worker dimensions: AKM person effect, risk preferences, and outside options. Each panel (in grey) uses a different sample or specification. The first panel for each of the three worker dimensions presents our baseline estimates. The second panel also includes the random sample of workers from non-surveyed firms. The third panel uses finer fixed effects (level-occupation-establishment). Each coefficient is based on a separate regression. The outcome variables are listed below the figure. Each regression controls for an individual's level of education, a quadratic in experience, age (linearly), and (3-digit) occupation-establishment fixed effects. Standard errors are clustered at the firm level; for individuals not at surveyed firms we use the establishment, rather than firm (which is unavailable). Whiskers denote 95% confidence intervals.

Table A1: Additional Characteristics of Surveyed Firms

	Mean (1)	Std. Dev (2)	N (3)
Legal Form			
Stock corporation	0.09	0.29	772
Limited liability company	0.81	0.39	772
First year participated in ifo survey	2014	5.40	772
Bargain With			
Recent Entrants	0.54	0.50	740
Experienced Non-Managers	0.85	0.36	739
Managers	0.95	0.23	730
Renegotiate With			
Recent Entrants	0.57	0.50	741
Experienced Non-Managers	0.82	0.38	740
Managers	0.91	0.29	734
Provided Wage Information			
Exact amount (public ad)	0.02	0.14	772
Range (public ad)	0.04	0.20	772
Exact amount (internal ad)	0.04	0.20	486
Ask Candidate for Salary Expectations			
Mandatory	0.29	0.45	772
Optional	0.62	0.48	772
Initial bargaining stage is important	0.44	0.50	772

Note: This table provides additional information on the firms in the firm survey. Information on firms legal form and on the first year a firm participated in an ifo survey was collected by the ifo Institute. The remainder of information is based on firms' survey responses. Bargaining is defined based on firms reporting that they can adjust base wages for equally productive external candidates by a non-zero amount, as defined by our protocol question. Renegotiation is defined based on firms reporting that they can adjust base wages for incumbents who have an outside offer by a non-zero amount while holding tasks constant. Whether firms report wage information in internal job ads is only available for those who have such internal ads. Whether the initial stage of bargaining is important is defined based on firms reporting that variation at the initial is stage is either more important or at least as important as subsequent information.

Table A2: Worker Characteristics

	Social Security Sample		Surveyed Workers				Core with Bargaining Events	
			Core Sample		Random Sample			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Demographics								
Female	0.28	0.45	0.27	0.45	0.41	0.49	0.27	0.44
Age	37.86	7.34	34.23	6.40	31.00	5.09	34.33	6.30
German Citizen	0.91	0.29	0.94	0.24	0.88	0.32	0.94	0.24
College Degree	0.38	0.49	0.63	0.48	0.52	0.50	0.72	0.45
Apprenticeship	0.54	0.50	0.32	0.47	0.37	0.48	0.23	0.42
Employment								
Daily Wage (Allocated)	167.91	63.69	182.94	53.73	134.04	46.36	187.47	52.83
Censored Wages	0.24	0.43	0.28	0.45	0.05	0.23	0.32	0.47
Manufacturing Sector	0.65	0.48	0.57	0.49	0.20	0.40	0.50	0.50
Retail Sector	0.08	0.26	0.08	0.28	0.10	0.29	0.11	0.32
Professional Sector	0.08	0.28	0.12	0.33	0.16	0.36	0.14	0.34
Observations	296919		7079		2677		2926	

Note: This table provides worker characteristics for different samples we use. Columns 1 and 2 describe all workers between the ages of 25 and 50 at the firms who participated in the firm survey. Columns 3 and 4 describe the subset of these workers who were invited and responded to our worker survey. Columns 5 and 6 describe surveyed workers drawn from the random set of workers who did not work at surveyed firms in 2020. Columns 7 and 8 describe the subset of surveyed workers at surveyed firms for whom we observe bargaining events in the past six months.

Table A3: Comparing Responses for Multi-Respondent Firms

	Share Agreement (1)
CBA Coverage	0.89
Announce Wages in Public Ads	0.97
Announce Wages in Internal Ads	0.88
Elicit Salary Expectations	0.70
Key Bargaining Definitions	
Bargaining Policy for IC's	0.88
Bargaining Policy for Entrants	0.50
Bargaining Policy for Managers	0.88
Bargaining Policy for Bottleneck Jobs	0.92
Auxiliary Questions	
Overall First vs. Final Offer Importance	0.73
Systematic Compensation Structure	0.76

Note: This table assesses the validity of the firm survey by examining the agreement among respondents for the 37 firms in which we have multiple respondents. The rows indicate different questions within the firm survey. Column 1 presents the average share of agreement in the responses.

Table A4: Cross-Tabulation of Bargaining Strategies with Expected Variation in Final Offers

A. Recent Labor Market Entrants

Bargaining Policy \ Expected Variation in Final Offers	0%	1-10%	11-20%	21-30%	>30%
0%	80%	19%	1%	0%	0%
1-10%	29%	66%	5%	0%	0%
11-20%	25%	51%	24%	0%	0%
21-30%	--	--	--	--	--
31-40%	--	--	--	--	--
>40%	--	--	--	--	--

B. Experienced Non-Managers

Bargaining Policy \ Expected Variation in Final Offers	0%	1-10%	11-20%	21-30%	>30%
0%	82%	16%	2%	0%	0%
1-10%	20%	71%	9%	0%	0%
11-20%	10%	49%	38%	3%	0%
21-30%	0%	36%	64%	0%	0%
31-40%	--	--	--	--	--
>40%	--	--	--	--	--

C. Managers

Bargaining Policy \ Expected Variation in Final Offers	0%	1-10%	11-20%	21-30%	>30%
0%	70%	27%	3%	0%	0%
1-10%	16%	68%	15%	1%	0%
11-20%	4%	34%	54%	8%	1%
21-30%	7%	15%	43%	32%	3%
31-40%	0%	0%	33%	50%	17%
>40%	43%	29%	14%	0%	14%

D. Workers in Bottleneck Occupations

Bargaining Policy \ Expected Variation in Final Offers	0%	1-10%	11-20%	21-30%	>30%
0%	85%	15%	0%	0%	0%
1-10%	14%	71%	13%	2%	0%
11-20%	6%	28%	56%	9%	1%
21-30%	4%	14%	41%	33%	8%
31-40%	0%	6%	31%	31%	31%
>40%	19%	13%	0%	6%	63%

Note: This table presents the cross-tabulation between firms' bargaining protocols (rows) and expected variation in final offers (columns). For each group (panel) and bargaining protocol (row), we compute the share of firms that say they expect 0%, 1-10%, 11-20%, 21-30% or >30% variation in final offers to candidates in that group. The numbers in each row therefore sum to 100% (subject to rounding). Rows with fewer than 4 observations are suppressed.

Table A5: Bargaining Strategies at CBA and Non-CBA Firms

	Employee Groups			
	Recent Graduates (1)	Experienced Non-Managers (2)	Managers (3)	Workers in Bottleneck Positions (4)
	A. Firm Has a CBA Agreement			
0%	55%	20%	6%	6%
1-10%	39%	59%	25%	16%
11-20%	6%	19%	53%	42%
21-30%	0%	2%	12%	30%
31-40%	0%	0%	2%	4%
>40%	0%	0%	1%	3%
Firms	308	309	305	308
	B. Firm Does Not Have a CBA Agreement			
0%	40%	11%	5%	4%
1-10%	51%	66%	36%	21%
11-20%	9%	21%	44%	45%
21-30%	0%	1%	13%	23%
31-40%	0%	0%	1%	6%
>40%	0%	0%	1%	2%
Firms	430	428	423	422

Note: This table describes the bargaining protocols for external hires in four employee groups—recent labor market entrants, experienced non-managers, managers, and employees in bottleneck occupations. Panel A presents the strategies for firms with a CBA agreement that covers at least some workers within the firm. Panel B presents the strategies for firms without a CBA agreement.

Table A6: Comparing Firm and Worker Responses

	CBA Coverage		New Hire Bargaining				
				Binary Definition		Continuous Definition	
	All	Recent Entrants	Provided Salary Expectations	Asked for More	Asked and Got More	Asked for More	Asked and Got More
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Firm Policy	0.619***	0.645***	0.165***	0.075**	0.104***	0.041**	0.058***
	(0.049)	(0.058)	(0.055)	(0.036)	(0.033)	(0.017)	(0.020)
Constant	0.121***	0.145***	0.480***	0.288***	0.170***	0.259***	0.130***
	(0.021)	(0.037)	(0.048)	(0.024)	(0.023)	(0.039)	(0.042)
Observations	6055	731	715	681	678	681	678
Firms (Clusters)	324	122	156	146	146	146	146

Note: This table validates firms' survey responses by comparing firms' responses with those of workers at the same firm. Each column presents results from a different regression of worker responses (indicated in the column) on the relevant firm strategy. Columns 1 and 2 include individuals who have not changed firm in the previous two years (and who are still at the firm indicated in the firm survey). Because we only elicited bargaining histories for workers who had joined their firm within the previous three years, the remaining columns include individuals who have been at their firm for between two and three years. Standard errors are clustered at the firm level. Levels of significance: *10%, ** 5%, and *** 1%.

Table A7: Residual Wage Variation

	Protocol Question		Incidence Question	
	Posting	Bargaining	Posting	Bargaining
	(1)	(2)	(3)	(4)
	A. All Observations			
Occ-Estab Model				
R-squared	0.54	0.55	0.50	0.55
Adjusted R-squared	0.62	0.57	0.61	0.56
Observations	107636	407032	148340	363482
Level-Occ-Estab Model				
R-squared	0.62	0.56	0.60	0.56
Adjusted R-squared	0.63	0.58	0.62	0.57
Observations	107048	404225	147418	361170
	B. Non-Censored Observations			
Occ-Estab Model				
R-squared	0.58	0.53	0.57	0.52
Adjusted R-squared	0.60	0.54	0.59	0.54
Observations	88713	301649	123000	264672
Level-Occ-Estab Model				
R-squared	0.60	0.54	0.58	0.53
Adjusted R-squared	0.61	0.56	0.60	0.55
Observations	88189	299376	122196	262778

Note: This table examines the unexplained wage variation in firms that we classify as bargaining or posting in order to assess the validity of our firm survey. To describe the explanatory power we h regress log base pay on a quadratic in labor market experience, on dummies for educational attainment, and on occupation-establishment or level-occupation-establishment fixed effects, as indicated in each row. The first panel uses all worker-firm observations. The second uses those observations where wages are not top-coded.

Table A8: Variation in the Intensive Margin of Bargaining

	Employee Groups			
	Recent Graduates	Experienced Non-Managers	Managers	Workers in Bottleneck Positions
	(1)	(2)	(3)	(4)
	A. Bargaining Over Base Pay with New Hires			
0%	46%	15%	5%	5%
1-10%	46%	63%	32%	19%
11-20%	7%	20%	48%	44%
21-30%	0%	1%	13%	25%
31-40%	0%	0%	2%	5%
>40%	0%	0%	1%	2%
Firms	740	739	730	732
	B. Bargaining Over Base Pay or Special Pay with External Hires			
0%	38%	12%	3%	4%
1-10%	48%	59%	27%	16%
11-20%	9%	23%	45%	41%
21-30%	1%	2%	16%	25%
31-40%	0%	0%	3%	6%
>40%	1%	1%	3%	4%
Firms	772	772	772	772
	C. Bargaining Over Base Pay With External Hires (Flexible-Amenities Firms)			
0%	43%	13%	4%	3%
1-10%	48%	63%	29%	16%
11-20%	8%	22%	49%	44%
21-30%	1%	2%	14%	27%
31-40%	0%	0%	2%	6%
>40%	0%	0%	1%	3%
Firms	591	591	585	585
	D. Renegotiating Base Salary			
0%	43%	18%	9%	7%
1-10%	51%	65%	46%	38%
11-20%	6%	16%	35%	37%
21-30%	1%	1%	7%	12%
31-40%	0%	0%	1%	3%
>40%	0%	0%	1%	2%
Firms	741	740	734	731

Note: This table describes the bargaining protocols for four groups of employees: recent labor market entrants, experienced non-managers, managers, and employees in bottleneck occupations. Panel A presents the bargaining protocols for external hires with respect to base wages. Panel B presents bargaining protocols that include flexibility in either base wages or special payments for external hires. Panel C presents the base wage strategies for external hires in the subset of firms that indicated having a high flexibility with respect to either of the following non-wage amenities: flexible work, commute and moving costs, further education and training, and childcare subsidies. Panel D presents the renegotiation protocols for incumbent workers who have received an external offer.

Table A9: Explaining Variation in Bargaining Strategies

	Fixed Effects Only			Group Fixed Effects and Firm Characteristics				
	Group	Firm	Group + Firm	Size, Productivity	Norms	Size, Productivity, Norms	Size, Productivity, Norms	Size, Productivity, Norms
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				A. Bargaining with New Hires (Protocol Question)				
R-Squared	0.28	0.46	0.74	0.28	0.29	0.29	0.32	0.47
Adjusted R-Squared	0.28	0.18	0.60	0.28	0.29	0.29	0.31	0.39
				B.Bargaining with New Hires (Incidence Question)				
R-Squared	0.23	0.49	0.72	0.23	0.24	0.24	0.26	0.45
Adjusted R-Squared	0.23	0.23	0.58	0.23	0.24	0.24	0.25	0.36
				C. Renegotiating with Incumbent Workers				
R-Squared	0.19	0.54	0.73	0.20	0.20	0.20	0.23	0.43
Adjusted R-Squared	0.19	0.31	0.59	0.20	0.20	0.20	0.21	0.34
				D. Bargaining with New Hires (Special Pay)				
R-Squared	0.14	0.63	0.77	0.15	0.16	0.16	0.18	0.48
Adjusted R-Squared	0.14	0.45	0.66	0.14	0.15	0.16	0.17	0.39
Industry Dummies							1-digit	4-digit

Note: This table presents R-squared and adjusted R-squared from regressions of the firm-group bargaining protocol in each firm-group on the covariates indicated at the bottom of the table. To probe robustness, this table drops the strategies for workers in bottleneck occupations, which are harder to compare across firms. Panel A uses our main bargaining measure that elicits bargaining protocols. Panel B uses the incidence question to define bargaining. Panel C uses renegotiation with incumbents as measure of bargaining. Panel D uses the protocol question, but focuses on bargaining over special payments. Results that include all four groups of workers are presented in Table 3.

Table A10: Correlation Between Perceived Outside Options and Other Measures

	Easy to Find a Better Job (Binary)			Ease of Finding a Better Job		
		Search in Past 6 Months?			Search in Past 6 Months?	
	Full Sample	Yes	No	Full Sample	Yes	No
	(1)	(2)	(3)	(4)	(5)	(6)
	A. Geographic Market Size					
Log Search Radius	-0.000	0.000	-0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.444***	1.420***	0.482***	1.495***	0.344***	1.223***
	(0.006)	(0.009)	(0.007)	(0.010)	(0.010)	(0.018)
Observations	9497	9497	6907	6907	2590	2590
	B. Received an Offer in Previous 6 Months					
Any Offers	0.131***	0.229***	0.124***	0.196***	0.085***	0.197***
	(0.010)	(0.017)	(0.012)	(0.019)	(0.021)	(0.039)
Constant	0.391***	1.331***	0.425***	1.407***	0.322***	1.177***
	(0.006)	(0.010)	(0.008)	(0.012)	(0.011)	(0.019)
Observations	9641	9641	7008	7008	2633	2633
	C. Number of Job Offers in Previous Six Months					
Number of Offers	0.058***	0.100***	0.056***	0.089***	0.038***	0.086***
	(0.004)	(0.007)	(0.005)	(0.007)	(0.009)	(0.016)
Constant	0.390***	1.330***	0.422***	1.402***	0.322***	1.177***
	(0.006)	(0.010)	(0.008)	(0.012)	(0.010)	(0.019)
Observations	9619	9619	6996	6996	2623	2623
	D. Was Contacted with Job Information in Previous Six Months					
1{Contacted}	0.126***	0.224***	0.119***	0.196***	0.071***	0.147***
	(0.010)	(0.017)	(0.012)	(0.020)	(0.019)	(0.034)
Constant	0.367***	1.288***	0.401***	1.364***	0.314***	1.166***
	(0.008)	(0.013)	(0.010)	(0.016)	(0.012)	(0.021)
Observations	9649	9649	7015	7015	2634	2634
	E. Risk Preferences					
Above-Median	0.028***	0.053***	0.025***	0.046***	0.025***	0.049***
	(0.002)	(0.004)	(0.003)	(0.005)	(0.004)	(0.008)
Constant	0.268***	1.097***	0.319***	1.204***	0.202***	0.951***
	(0.016)	(0.028)	(0.019)	(0.033)	(0.026)	(0.050)
Observations	9587	9587	6961	6961	2626	2626

Note: This table examines the correlation between workers' stated outside options and other characteristics. The dependent variable in Columns 1-3 is an indicator for whether the worker said it would be "easy" or "very easy" to get an offer from a firm they preferred. The dependent variable in Columns 1-4 is a continuous measure, which ranges from 1-4 where 1 is "very difficult" and 4 is "very easy". Each panel presents results from a bivariate regression, with robust standard errors. The sample in Columns 1 and 4 workers at surveyed firms. The remaining columns look at the subset of these workers who report they did (Columns 2 and 5) or did not (Columns 3 and 6) search for a job in the previous six months. Levels of significance: *10%, ** 5%, and *** 1%.

Table A11: Heterogeneity in Worker Bargaining Behavior: Additional Outcomes

		Outside Options		Risk Preferences		AKM Person Effect	
	Mean	Binary	Cont.	Above Midpoint	Cont.	Above Median	Cont.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Bargaining at the Start of the Spell							
Negotiated over Amenities							
Vacation Days or Remote Work	0.27	0.023	0.018	-0.000	-0.003	-0.034	0.024
		(0.041)	(0.029)	(0.010)	(0.041)	(0.070)	(0.066)
Commuting	0.07	-0.022	-0.007	0.006	0.014	-0.001	0.029
		(0.014)	(0.010)	(0.007)	(0.020)	(0.027)	(0.026)
Training	0.18	0.006	0.014	0.007	-0.004	-0.014	0.010
		(0.027)	(0.015)	(0.006)	(0.029)	(0.045)	(0.052)
Childcare	0.02	-0.032**	-0.015*	-0.001	-0.017	0.018	0.011
		(0.015)	(0.008)	(0.003)	(0.013)	(0.015)	(0.028)
Bonuses or Stocks	0.23	0.007	0.021	0.010	0.010	0.005	0.043
		(0.039)	(0.025)	(0.008)	(0.033)	(0.063)	(0.055)
B. Events in Previous Six Months							
Received a Raise Without Asking	0.32	-0.023**	-0.019***	0.001	0.017	-0.028	-0.005
		(0.011)	(0.005)	(0.004)	(0.015)	(0.017)	(0.016)
Any Search Activity	0.72	0.087***	0.068***	0.021***	0.063***	-0.019	-0.024**
		(0.012)	(0.007)	(0.003)	(0.013)	(0.018)	(0.012)
C. Hypothetical Bargaining Scenario							
Provided Expectations	0.93	-0.004	-0.000	0.002	-0.000	0.010	0.012
		(0.009)	(0.006)	(0.002)	(0.007)	(0.009)	(0.012)
Level of Expectations	119.16	-1.480	-0.804*	-0.033	0.474	2.300**	1.358*
		(0.931)	(0.455)	(0.194)	(0.842)	(0.954)	(0.742)

Note: This table examines heterogeneity in worker bargaining behavior using additional outcomes for the specifications presented in Table 5. Panel A uses data on individuals who joined their firm in the previous three years. Each outcome is an indicator for whether individuals negotiated over the respective amenity. Panels B and C include all workers. The first outcome is an indicator for whether the worker said their firm offered them a salary increase in the previous six months without the worker asking for it. The second outcome is an indicator for whether an individual reported any job search activity. 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 outcome captures the intensive margin of the provided expectations as fraction of the worker's current salary. This outcome is missing for individuals who did not provide their expectations. Standard errors are clustered at the firm level. Levels of significance: *10%, ** 5%, and *** 1%.

B Firm Survey

This section provides additional information on how the firm survey was implemented and validated. We discuss selection into non-response and the extent to which the firm survey covers the different parts of the German labor market. We also provide detailed information about the elicited bottleneck occupations, as well as the original survey instrument and its English translation.

B.1 Implementation Details

Our firm survey was fielded by the ifo Institute and was pitched to participants as a new survey aimed at eliciting wage-setting strategies. The sampling frame included two survey panels housed at the ifo Institute. The first panel contains over 1000 HR professionals which participate in quarterly HR surveys. Most of these HR professionals participate online, but some only participate via mail. Because our survey was a special edition survey, we conducted the survey online and invited participants via e-mail.[38] We included all HR professionals with regular online access as well as those HR professionals who typically respond via mail, but for whom e-mail addresses were available. From this first panel, we invited 1,061 HR professionals. The second panel contains 654 senior managers, all of whom normally participate online. The majority of these panelists hold higher-level management positions, such as company owner, CEO, or segment head.

We complemented these two existing panels (continuing respondents) with a second sample of HR professionals (new respondents) through a targeted outreach. We advertised the survey through HR newsletters, social media posts, articles, and HR events. Interested HR professionals were invited to register online through the ifo Institute. In total, 126 individuals registered and received their invitation via e-mail together with the continuing respondents. 64% of newly registered individuals responded to the survey.

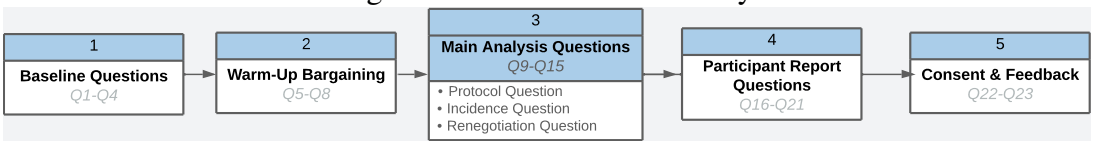
The ifo Institute sent the invitations to participate in the survey in two waves: in September 2021 and in January 2022. We invited a randomly selected half of HR professionals to participate

[38] Participation via mail requires a specific question format that would have imposed severe limitations on the breadth and content of our questionnaire.

in the first wave and invited the remainder in the second wave. We invited all managers in the second wave. The survey was open for two weeks, and a reminder e-mail was sent after 1.5 weeks.

The survey included 23 questions and practitioners were told that responding to the survey would take approximately 15 minutes. Appendix Figure B1 provides an overview of how the firm survey was organized. First, participants were asked a few simple questions about their firm's wage-setting strategies. Next, we used a series of warm-up questions to introduce the concept of wage bargaining. These questions were not intended to be used for our analysis. Instead, their purpose was to introduce our definition of bargaining and to make sure participants are familiar with answering this type of questions. For simplicity, these warm-up questions do not distinguish between employee groups and are therefore not used in our analysis. The main questions used for our analysis—our protocol question, incidence question, and renegotiation question—are elicited in the third survey block. In order to encourage individuals to participate, we also included several questions that practitioners had expressed interest in during piloting. In the survey invitation we told potential participants that we would send aggregated survey results to participants after the survey was closed. We included these questions in the survey and prepared a report using these questions. In the last module we elicited participants' consent to have their responses linked to the IAB data. We also included a space for feedback, which is a standard practice at the ifo Institute.

Figure B1: Flow of Firm Survey



Note: This figure provides an overview over the modules in the firm survey. The main questions used for our analysis are elicited in the third survey block. See Appendix B.5 for the exact wording of our questions.

For the majority of our analysis, we pool new respondents and respondents from both of the ifo Institute's panels. This decision was motivated by two findings. First, we do not detect meaningful differences in response behavior between these groups along several margins. Ex ante we were concerned that the quality of responses would differ between the two groups. However, completion rates are similar: 82.05% of continuing and 83.93% of new respondents complete the survey.

In addition, the shares of continuing (70.63%) and new respondents (73.53%) who provide linkage consent are similar. We also find that the share of responses that are missing throughout the survey and the amount of time it took respondents to complete the survey are similar. The median continuing respondent spent 10.67 minutes, while the median new respondent spent 10.32 minutes. Second, in unreported results we find that our main results look similar across samples.

B.2 Non-Response and Linkage Consent

A standard concern in the survey literature is that of selection into response. While it is difficult to examine selection among new respondents (who were drawn from a variety of channels), we are able to examine response behavior systematically for the 878 continuing respondents who were part of the ifo Institute's existing panels.

We first follow standard practices of the ifo Institute and use internal data that ifo collects as part of the maintenance of its survey panel to compare respondents and non-respondents. We conduct this exercise separately for three respondent subgroups: HR professionals who normally participate online, HR professionals who normally participate via mail, and managers (all of whom normally participate online). We distinguish between the two subgroups of HR professionals because participation in our survey is only possible online. HR professionals who normally respond via mail may be less likely to respond via e-mail.

Appendix Table B1 shows that there are no systematic patterns of selection into response. This table displays the means of non-respondents and respondents as well as p-values from a test of equality between those means, separately for the three subgroups. As the first three rows indicate, respondents and non-respondents work in similar sectors. We find that, among HR professionals who normally participate online, medium-sized firms are more likely to participate. However, the opposite is true for the manager panel. For HR professionals, we detect some differences in the likelihood to respond based on their firm's sales. In the manager panel, however, respondents and non-respondents work at firms with similar levels of sales. We also do not find any evidence that firms are more likely to respond if they have participated for longer in surveys conducted by the ifo

Institute, which could have altered the sample of respondents. Firms that have participated in ifo surveys find no differences in response among long-time ifo participants; the ifo Institute typically monitors selection on this dimension.[39]

[39] In our main analysis we use more detailed information on firms (e.g., age, size, total assets sales, etc.) from Orbis. We do not use Orbis data for this exercise as we do not have permission to merge these data for non-respondents.

Table B1: Selection into Response

	Panel A HR Panel Online Respondent			Panel B HR Panel Mail Respondent			Panel C Manager Panel		
	Non-Respondent (1)	Respondent (2)	p-value (3)	Non-Respondent (4)	Respondent (5)	p-value (6)	Non-Respondent (7)	Respondent (8)	p-value (9)
Sector									
Manufacturing	0.38	0.35	0.42	0.37	0.35	0.78	0.34	0.35	0.85
Service	0.42	0.41	0.83	0.41	0.44	0.63	0.10	0.07	0.18
Retail	0.20	0.23	0.23	0.23	0.21	0.80	0.16	0.11	0.03
Number of Employees									
1-49	0.40	0.32	0.02	0.46	0.45	0.89	0.43	0.58	0.08
50-249	0.36	0.44	0.01	0.39	0.38	0.82	0.41	0.26	0.06
250-449	0.14	0.13	0.46	0.06	0.09	0.48	0.02	0.14	0.02
Sales									
1-<5 M €	0.32	0.25	0.05	0.38	0.29	0.24	0.15	0.11	0.24
5-<25 M €	0.28	0.34	0.10	0.28	0.47	0.01	0.25	0.21	0.41
25-100 M €	0.21	0.23	0.59	0.20	0.07	0.04	0.33	0.35	0.65
Other									
In ifo panel >10 years	0.37	0.40	0.39	0.46	0.45	0.95	0.29	0.31	0.65
Family firm	0.63	0.64	0.86	0.64	0.78	0.08	-	-	-
Observations	375	435		185	66		277	377	

Note: This table compares the firm characteristics of respondents and non-respondents from the ifo Institute's HR panel and manager panel. The data used to construct this table come from the ifo Institute and are regularly used to examine selection into response. Panel A contains HR professionals who normally participate in surveys online. Panel B contains HR professionals who normally participate via mail, but for whom e-mail addresses are available. Panel C contains all individuals from the manager panel. Sales values are reported in millions. Note that this table does not contain the 81 new respondents that were not part of the ifo panel at the time we conducted the survey.

We also analyze selection into response by comparing the characteristics of respondents who participate before and after a reminder is sent. The goal of this exercise is to test whether firms' (unobservable) propensity to respond, as measured by whether they responded before a reminder was sent, is correlated with their bargaining strategy and other firm characteristics. Appendix Table B2 presents characteristics of respondents who respond before and after the reminder was sent, as well as p-values of a test for equality between the two means. We do not find any indication that our elicited bargaining strategies are correlated with firms' propensity to respond. We also do not find that firms different propensities to respond respond differ in key observable characteristics.

Finally, we examine the extent to which respondents left questions blank. In this exercise we focus on the 772 respondents who completed the survey, which is based on whether a respondent has clicked through to the final question in the survey. Even though we did not enforce responses to individual questions, Appendix Table B3 shows that the share of respondents who leave an answer blank is low throughout the survey.

Some of our analysis relies on a linkage with the Social Security records housed at the IAB. Sample selection may also occur due to differential rates of linkage consent, which is necessary under German privacy laws in order to link firms' survey responses to Social Security records. Out of the 772 firms with complete responses, 552 (72%) respondents provided this consent. Appendix Table B4 compares respondents who do not provide linkage consent (Column 1) to those who do (Column 2). Column 3 presents p-values from a test of equality between the two means. Both groups are similar with respect to the length of their participation in the ifo panel, whether they are covered by a CBA agreement, firm size, firm age, and other measures of firm productivity.

The only differences we detect when it comes to the likelihood of providing linkage consent are with respect to sector. Manufacturing firms are somewhat under-represented among consenting firms, while professional services firms are somewhat over-represented among these firms. Because manufacturing firms are over-represented in our firm survey, this pattern has the effect of making the final sample more representative of the overall sectoral composition of Germany.

Table B2: Comparison Between Early and late Responders

	Responded Before Reminder		
	No	Yes	p-value
	(1)	(2)	(3)
Have a CBA	0.39	0.42	0.45
Number of Employees			
1-10	0.06	0.09	0.20
11-50	0.23	0.27	0.20
51-200	0.33	0.33	0.97
201-1000	0.27	0.21	0.10
1001-10000	0.05	0.04	0.66
10001+	0.03	0.03	0.99
Sector			
Manufacturing	0.36	0.34	0.61
Retail	0.19	0.16	0.28
Professional Services	0.09	0.09	0.87
Information Services	0.08	0.07	0.55
Transport	0.06	0.06	0.81
Real Estate	0.02	0.06	0.02
Administration	0.03	0.05	0.18
Finance	0.04	0.04	0.71
Other Firm Characteristics			
HQ in Eastern Germany	0.11	0.13	0.37
Year of Incorporation	1975.95	1970.99	0.15
Total Assets per Employee	197.18	692.15	0.50
Fixed Assets per Employee	70.50	505.07	0.44
Legal Form			
Stock corporation	0.11	0.09	0.42
Limited liability company	0.79	0.82	0.40
First Year in ifo Panel	2014.72	2013.45	0.00
Bargain With			
Recent Entrants	0.57	0.53	0.40
Experienced Non-Managers	0.86	0.84	0.51
Managers	0.97	0.94	0.14
Renegotiate With			
Recent Entrants	0.53	0.58	0.19
Experienced Non-Managers	0.81	0.83	0.44
Managers	0.92	0.90	0.57
Provided Wage Information			
Exact amount (public ad)	0.01	0.02	0.25
Range (public ad)	0.03	0.04	0.64
Exact amount (internal ad)	0.04	0.05	0.66
Ask Candidate for Salary Expectations			
Mandatory	0.27	0.30	0.43
Optional	0.64	0.62	0.51
Observations	202	570	

Note: This table documents which share of the 772 respondents who completed the survey left the answer to a given question blank. We focus on the subset of questions that are most relevant for our analysis.

Table B3: Question Non-Response in Firm Survey

Question (1)	Non-Response Rate (2)
Collective Bargaining Agreement	0%
Policy for External Job Ads	0%
Policy for Internal Job Ads	0%
Elicit Worker Expectations	0%
Bargaining Policies (Base Pay)	
Recent Labor Market Entrants	4%
Experienced Non-Managers	4%
Managers	5%
Workers in Bottleneck Positions	5%
Bargaining Policies (Special Payments)	
Recent Labor Market Entrants	6%
Experienced Non-Managers	5%
Managers	6%
Workers in Bottleneck Positions	7%
Hypothetical Variation in First Offers	
Recent Labor Market Entrants	6%
Experienced Non-Managers	6%
Managers	7%
Workers in Bottleneck Positions	7%
Hypothetical Variation in Final Offers	
Recent Labor Market Entrants	7%
Experienced Non-Managers	7%
Managers	7%
Workers in Bottleneck Positions	8%
Renegotiation Policy	
Recent Labor Market Entrants	4%
Experienced Non-Managers	4%
Managers	5%
Workers in Bottleneck Positions	5%
Observations	772

Note: This table documents which share of the 772 respondents who completed the survey left the answer to a given question blank. We focus on the subset of questions that are most relevant for our analysis.

Table B4: Differences Between Consenting and Non-Consenting Firms

	Provided Consent		
	No	Yes	p-value
	(1)	(2)	(3)
First Year in ifo Panel	2013.47	2013.91	0.31
Have a CBA	0.42	0.41	0.68
Number of Employees			
1-10	0.08	0.08	0.90
11-50	0.24	0.27	0.44
51-200	0.31	0.33	0.52
201-1000	0.23	0.22	0.75
1001-10000	0.06	0.04	0.09
10000+	0.03	0.03	0.81
Sector			
Manufacturing	0.39	0.32	0.06
Retail	0.20	0.16	0.13
Professional Services	0.06	0.10	0.05
Information Services	0.04	0.08	0.05
Transport	0.05	0.07	0.27
Real Estate	0.03	0.06	0.14
Administration	0.04	0.05	0.65
Finance	0.03	0.05	0.26
Other Firm Characteristics			
HQ in Eastern Germany	0.10	0.13	0.23
Year of Incorporation	1970.85	1972.85	0.55
Total Assets per Employee	256.01	686.03	0.55
Fixed Assets per Employee	163.22	484.05	0.55
Observations	219	553	

Note: This table compares firm characteristics of respondents that did and did not provide consent for their responses to be linked to Social Security records out of our firm-level sample of 772 respondents. Column 1 describes the firms of non-consenting respondents. Column 2 describes the firms of consenting respondents. Column 3 presents the p-value from a test of equality of means. CBA coverage is elicited in the survey. Information on the years respondents have been in the ifo panel is provided by the ifo Institute. All other variables stem from Orbis. See Appendix Section C.2 for a detailed description of these variables.

B.3 Coverage of German Labor Market

We assembled a sampling frame with the goal of eliciting bargaining strategies for a broad set of German firms. In order to assess the coverage of our sample, we begin by following standard practices of the ifo Institute and compare the regional and sectoral coverage of the firms in our survey to that of the overall German labor market (Hiersemenzel, Sauer, and Wohlrabe 2022). We also compare the manufacturing firms in our sample to those that participated in the well-studied World Management Survey (Bender et al. 2018).

B.3.1 Coverage Relative to All German Firms

Appendix Table B5 compares the distribution of firms in the German labor market across regions, sectors, and firm size classes, to the firms in our firm-level sample of 772 respondents. We find that our firm survey is similar in terms of regional coverage to the overall labor market. The key difference is that we under-sample small firms. This also means that a relatively large fraction of firms in our sample are manufacturing firms. Nevertheless, our firm survey captures all major sectors in Germany. Among large firms, our sample coverage is high. For instance, our sample sample covers 38% of the top publicly listed firms in Germany (the "Dax 40").

B.3.2 Comparison with World Management Survey Firms

To further probe the coverage of the firm survey, we next leverage the fact that our survey sample contains a relatively high share of manufacturing firms. We compare the manufacturing firms in our survey that we can link to the Social Security records to the manufacturing firms who participated in the well-studied World Management Survey and whose responses were linked to these same records by other researchers (Bender et al. 2018). We collect the location of the firm's headquarters, the incorporation date, the amount of fixed assets, and material costs from Orbis. We use two industry-level measures from the OECD ISIC4 Database: the labor revenue share and the intermediate input revenue share. The former is based on the share of wage bill out of total revenue. The latter is constructed by dividing industry-level inputs by industry-level revenue. Both

Table B5: Comparison to Set of All German Firms

	German Labor Market	Firm Survey Sample
	(1)	(2)
Region		
Baden-Württemberg	13.7	16.3
Bavaria	18.8	22.5
Berlin	5.0	1.8
Brandenburg	2.8	1.6
Bremen	0.7	1.1
Hamburg	2.8	2.7
Hesse	7.6	8.0
Lower Saxony	8.7	7.8
Mecklenburg Western Pomerenia	1.7	0.8
Northrhine-Westphalia	20.2	18.8
Rhineland Palatinate	4.7	5.3
Saarland	1.0	0.8
Saxony	4.4	4.3
Saxony-Anhalt	1.9	2.3
Schleswig Holstein	3.6	3.6
Thuringia	2.2	2.3
Sector		
Accomodation and Food Services	9.2	3.6
Administrative Services	8.4	4.7
Construction	14.6	4.1
Electricity, Water, and Waste Managem	3.2	1.5
Information and Communication	4.9	7.1
Manufacturing	8.2	34.7
Professional Services	18.9	9.3
Real Estate	6.2	5.1
Retail	22.3	17.1
Transportation	4.1	6.2
Number of Employees		
1-49	96.8	34.4
50-249	2.6	38.2
250+	0.6	27.4

Note: This table compares firm characteristics from the universe of all German firms to our sample of 772 firms. Information on all German firms stems from (Hiersemenzel, Sauer, and Wohlrabe 2022). The firm characteristics for firms in our survey stems from Orbis. See Appendix Section C.2 for a detailed description of these variables.

are available at the industry-level in 2019. We use the Social Security data to compare the number of employees, the median daily wages (in Euros), the share of female workers, and the share of workers with a university degree. Because only 19 firms in our sample are also contained in the 361 firms that Bender et al. (2018) study, we refrain from making comparisons using the World Management Survey itself.

Appendix Table B6 provides summary statistics for our firm sample (Columns 1-3) and the sample from the World Management Survey (Columns 4-6). Manufacturing firms in our sample do not appear to be substantially different from those studied by Bender et al. (2018). Given that the World Management Survey was fielded to different individuals in each firm (plant managers, rather than human resource professionals), used a different interview technology (lengthy phone conversations, rather than an online questionnaire), and focused on different topics (primarily productivity-related, rather than bargaining-related), the similarity in the firm characteristics across these two different samples is reassuring. If there were systematic selection into our sampling frame based on the topics covered, we would not expect this similarity.

Table B6: Comparison to Linked World Management Survey Data

	Manufacturers in Bargaining Survey			World Management Survey		
	Mean (1)	Std. Dev. (2)	Median (3)	Mean (4)	Std. Dev. (5)	Median (6)
Orbis data						
HQ in East Germany	0.16	(0.37)	0.00	0.13	(0.34)	0.00
Log Fixed Assets	8.24	(2.80)	7.80	9.89	(1.69)	10.18
Log Materials Cost	9.82	(1.40)	9.54	11.29	(1.07)	11.78
Firm Age (years)	55.15	(47.69)	35.00	64.34	(62.79)	42.50
OECD data (industry level)						
Intermediate Input Revenue Share	0.64	(0.07)	0.64	0.67	(0.05)	0.67
Labor Revenue Share	0.20	(0.04)	0.21	0.23	(0.04)	0.23
IEB data						
Number of workers	1615.00	(7055.88)	166.00	440.02	(642.90)	238.00
Median Daily Wage (Euros)	123.25	(36.73)	116.25	101.58	(28.46)	99.51
Share Female Workers	0.24	(0.17)	0.19	0.27	(0.17)	0.22
Share Workers With University Degree	0.15	(0.14)	0.11	0.12	(0.13)	0.08
Observations		178			361	

Note: This table compares the characteristics of manufacturing firms in our survey that are linked to the IAB data to the manufacturing firms analyzed by Bender et al. (2018) that are linked to the IAB data. The last three columns come from Bender et al. (2018). Fixed assets are referred to by Bender et al. (2018) as book value of capital. Material costs are referred to by Bender et al. (2018) as intermediate inputs. From Orbis, we collect the most recently available data. Industry-level data from the OECD ISIC4 Database is available for 2019. The IEB data are from 2020. The top panel includes the 178 manufacturing firms which provided consent to be linked to the IAB records, the estimates based on IEB data are based on the 175 firms that provided consent and we were able to link to the IEB records.

B.4 Elicited Bottleneck Occupations

Our bargaining questions elicit strategies for four groups of employees: recent labor market entrants, experienced non-managers, managers, and workers in bottleneck occupations. The German Federal Employment agency has published official statistics about bottleneck occupations since 2011 (Bundesagentur fuer Arbeit 2021). Bottleneck occupations are defined as positions that are hard to fill. Official measures of bottleneck occupations include the time it takes to fill a vacancy, the ratio of job seekers to vacancies for a given occupation, and the occupation-level unemployment rates.

To capture bargaining strategies for this specific set of occupations, we prompt respondents to list the bottleneck occupation that is most relevant for their firm. Appendix Table B7 presents the most commonly named bottleneck occupations, categorized into groups. We find that respondents name a wide range of occupations, both spanning higher-level positions such as management occupations and IT jobs, as well as lower-level positions including food and service workers or blue-collar technicians and mechanics. Because bottleneck occupations may fall into one of the other three categories (which are mutually exclusive), most of our analysis focuses on the distinction between labor market entrants, experienced non-managers, and managers.

Table B7: Frequency of Reported Bottleneck Occupations

	Share
IT occupation	18%
Manager	16%
Technician	11%
Sales occupation	6%
Food/service worker	4%
Engineer	3%
Driver	3%
Consultant	3%
HR professional	1%
Purchaser	1%
Lawyer	1%
Other	20%
No occupation provided	13%
Observations	772

Note: This table shows the frequency with which different bottleneck occupations were named in our firm survey. We categorized bottleneck occupations that respondents reported as most relevant for their firm into different occupational groups. 13% of respondents do not provide a bottleneck occupation.

B.5 Survey Instrument

B.5.1 English Translation of Questionnaire

We'll begin by asking you general questions about compensation strategies at your company. For the entire survey, please focus your responses on full-time positions only.

1. Are there some positions at your company that are covered by a collective bargaining agreement?
   (a) Yes
   (b) No
2. When your company advertises a job, what type of compensation information is usually included in the public job posting?
   (a) No information is provided
   (b) Compensation level (e.g. CBA group)
   (c) Compensation range (in Euros)
   (d) Exact compensation amount (in Euros)
3. When your company advertises a job, what type of compensation information is usually included in the internal job posting?
   (a) Not applicable: we do not have a separate internal job board
   (b) No information is provided
   (c) Compensation level (e.g. CBA group)
   (d) Compensation range (in Euros)
   (e) Exact compensation amount (in Euros)
4. Are external candidates usually asked to specify their salary expectations in the application/interview process?
   (a) Yes, it is mandatory for candidates to specify their salary expectations
   (b) Yes, but it is optional for candidates to specify their salary expectations
   (c) No

Companies use different compensation strategies to determine the fixed compensation for external candidates.

First, we are interested in how your company usually determines the first salary offer made to a candidate for a specific position. We are only interested in positions not covered by collective bargaining agreements.

5. Can you make a higher-than-usual first salary offer if the person has high qualifications/fit for the position?

   (a) Yes

   (b) No

6. Can you make a higher-than-usual first salary offer if the recruitment appears difficult (e.g. because the person states high compensation expectations or has offers from other companies) ?

   (c) Yes

   (d) No

7. Is there usually scope for negotiation after your company has made the first offer

   (e) Yes

   (f) No

8. Now, please think back to the last 10 external candidates that you have knowledge of and to whom your company made offers. What do you guess is the share of these external candidates who ultimately received a final compensation offer that was higher than your company's first offer?

   (g) 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

   Now we'll focus on how your company conducts salary negotiations.

   We are interested in four specific employee groups: 1. Job entrants with no or little prior work experience 2. Employees with work experience, but without managerial responsibility 3. Managers 4. Employees in hard-to-fill bottleneck occupation (excluding top executives)

9. Since the definition of group 4 is very company-specific, we would like to know which position in your company is most likely to represent a hard-to-fill bottleneck occupation (e.g. IT specialists, sales management).

   (a) Please indicate the job title of that position: _____

   We ask you to answer the following four questions separately for each group. Please focus your answers only on full-time positions.\

   We are first interested in the scope of salary negotiations with external candidates.

10. 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?

	0% No adjustment possible	1-10%	11-20%	31-40%	More than 40%
Labor market entrants					
Employees without managerial responsibility					
Managers					
Employees in bottleneck occupations([Q89_Job_title])					

11. Now, we are interested in how much wage offers for a given position differ at your company.

    For each employee group, imagine 10 candidates. All of the candidates have the same qualification and fit. However, they differ in their stated salary expectations and in offers from other companies.

    What is the most your company could possibly offer in terms of an additional special payment to recruit external candidates (e.g. bonus, stock grant)? Please exclude any such special payments that are typically provided to all candidates. Please indicate the maximum amount of the special payment in percent, compared to the annual fixed compensation of the position.

	0% No special payment	1-10%	11-20%	31-40%	More than 40%
Labor market entrants					
Employees without managerial responsibility					
Managers					
Employees in bottleneck occupations([Q89_Job_title])					

12. What do you think the gap would be between the highest and lowest final offer your company would make to these candidates (i.e. after incorporating potential negotiations)?

	0% All offers are the same	Highest offer is 1-10% higher than the lowest	Highest offer is 11-20% higher than the lowest	Highest offer is 21-30% higher than the lowest	Highest offer is more than 30% higher than the lowest
Labor market entrants					
Employees without managerial responsibility					
Managers					
Employees in bottleneck occupations([Q89_Job_title])					

13. What do you think the gap would be between the highest and lowest final compensation offer your company would make to these candidates?

	0% All offers are the same	Highest offer is 1-10% higher than the lowest	Highest offer is 11-20% higher than the lowest	Highest offer is 21-30% higher than the lowest	Highest offer is more than 30% higher than the lowest
Labor market entrants					
Employees without managerial responsibility					
Managers					
Employees in bottleneck occupations([Q89_Job_title])					

14. In your opinion, what contributes the most to the differences between final compensation offers for equally qualified candidates? We are only interested in experienced employees without managerial responsibility. The majority of differences in final offers result ...

    (a) from differences in first offers

    (b) from negotiations following the first offer

    (c) equally from differences in first offers and from negotiations

    (d) There usually are no differences in final offers.

15. At your company, are the following job benefits more negotiable than fixed compensation? If a benefit is not relevant for your company, please choose "Not applicable."

	Yes, more negotiable than fixed compensation	No, not more negotiable than fixed compensation	Not applicable
Flexible work/ vacation days			
Commute and moving costs/ company car			
Further education and training			
Childcare subsidy			

- Now we'll focus on salary negotiations with existing employees.

16. 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?

	0% No adjustment possible	1-10%	11-20%	31-40%	More than 40%
Labor market entrants					
Employees without managerial responsibility					
Managers					
Employees in bottleneck occupa-tions([Q89_Job_title])					

In the final part of the survey, we are interested in how your company adjusts compensation in practice.

17. Suppose your company's financial situation has not changed relative to the preceding year, but prices are rising relatively quickly (i.e. inflation is high). In this situation, how would your company adjust the fixed compensation for employees not covered by collective bargaining agreements? Fixed compensation is ...

(a) not adjusted

(b) adjusted at the next date specified in a pre-determined schedule

(c) adjusted as soon as possible

(d) only adjusted if other firms in your sector/region adjust their compensation

18. When determining compensation for new hires, how much information do decision makers at your company have about how much your competitors pay? The decision makers ...

(e) do not know how our compensation ranges compare to competitors

(f) have information on whether our compensation ranges are high or low relative to the market

(g) have information on whether our compensation ranges are high or low relative to specific competitors

(h) have detailed information on compensation ranges for specific competitors

19. Which sources does your company regularly use to collect information on compensation paid in your industry or region? Please select all that apply.

- We do not compare our compensation to other companies
- Informal discussions with previous coworkers or industry contacts
- Free sources (e.g. Glassdoor, kununu)
- Paid sources (e.g. consulting companies)
- Internal research

20. Which of the following describes common practices at your company?Please select all that apply.

- Employees are asked to treat their salary as confidential (e.g. in interactions with colleagues)
- At the request of employees, HR provides information about the procedures / rules used to determine compensation in the company
- At the request of employees, HR provides information on the compensation structure in the company (e.g. compensation amount in certain salary ranges)
- At the request of employees, HR provides specific figures on compensation in certain positions

21. Does your company have a company-wide compensation structure used to systematically grade positions?

(i) Yes

(j) No

22. Does your company regularly evaluate the internal compensation structure?

(k) Yes

(l) No, not yet but planned

(m) No, and also not planned

23. In order to complete the information collected, the Ifo Institute would like to include data in the evaluation of the survey that is already available at the Institute for Employment Research (IAB) in the form of company and personal data. The IAB is a special department of the Federal Employment Agency (BA) which, as part of its statutory mandate, examines the functioning of the labor market, as well as employment opportunities and living conditions in a dynamically changing world from a purely scientific point of view. The linking of the data shortens the scope of this survey. All information is treated with strict confidentiality and statutory data protection is fully guaranteed at all times, even when the data is linked. I agree to the linking of my details with company and personal data available at the Institute for Employment Research (IAB).

    (n) Yes

    (o) No

24. If you have any suggestions or criticism about the survey, you can insert them here: : _____

    Thank you for your participation!

    We would like to thank you very much for your help. Your answers have been saved. You can now close the browser window. We will inform you of the results after the evaluation has been completed.

    Contact: ifo institute Ifo Center for Macroeconomics and Surveys Poschingerstraße 5 81679 Munich

    Ingrid Hägele haegele@ifo.de

B.5.2 Original German Questionnaire

Wir beginnen mit allgemeinen Fragen zu Vergütungsstrategien in Ihrem Unternehmen. Bitte beachten Sie, dass sich die gesamte Umfrage ausschließlich auf Vollzeitstellen bezieht.

1. Gibt es Stellen in Ihrem Unternehmen, die eine Tarifbindung haben?
   (a) Ja
   (b) Nein
2. Wenn Ihr Unternehmen eine Stelle ausschreibt, welche Art von Vergütungsinformationen enthält die öffentliche Stellenausschreibung üblicherweise?
   (a) Es werden keine Informationen bereitgestellt
   (b) Vergütungsstufe (z.B. Tarifgruppe)
   (c) Vergütungsspanne (in Euro)
   (d) Konkrete Vergütung (in Euro)
3. Wenn Ihr Unternehmen eine Stelle ausschreibt, welche Art von Vergütungsinformationen enthält die interne Stellenausschreibung üblicherweise?
   (a) Nichtzutreffend: Wir haben keine interne Jobbörse
   (b) Es werden keine Informationen bereitgestellt
   (c) Vergütungsstufe (z.B. Tarifgruppe)
   (d) Vergütungsspanne (in Euro)
   (e) Konkrete Vergütung (in Euro)
4. Werden in Ihrem Unternehmen externe Kandidat*innen in der Regel im Bewerbungs-/Interviewprozess gebeten, ihre Gehaltsvorstellungen anzugeben?
   (a) Ja, die Angabe von Gehaltsvorstellungen ist verpflichtend
   (b) Ja, aber die Angabe von Gehaltsvorstellungen ist optional
   (c) Nein

Unternehmen verfolgen unterschiedliche Strategien, um die feste Vergütung für externe Kandidat*innen zu bestimmen.

Zunächst interessiert uns, wie Ihr Unternehmen in der Regel das erste Vergütungsangebot ermittelt, das einer Person für eine bestimmte Stelle gemacht wird. Wir interessieren uns hierbei nur für Stellen ohne Tarifbindung.

5. Ist es möglich, ein überdurchschnittliches erstes Vergütungsangebot zu machen, falls die Person eine hohe Qualifikation/Eignung für die Stelle hat?
   (a) Ja

(b) Nein

6. Ist es möglich, ein überdurchschnittliches erstes Vergütungsangebot zu machen, falls die Rekrutierung schwierig erscheint (z.B. weil die Person hohe Gehaltserwartungen äußert oder der Person Angebote anderer Unternehmen vorliegen).

   (c) Ja

   (d) Nein

7. Besteht nach dem ersten Angebot Ihres Unternehmens in der Regel noch Verhandlungsspielraum? Wir interessieren uns hierbei nur für Stellen ohne Tarifbindung.

   (e) Ja

   (f) Nein

8. Denken Sie nun bitte an die letzten 10 externen Kandidat*innen, von denen Sie Kenntnis haben und denen Ihr Unternehmen ein Angebot gemacht hat. Was schätzen Sie, welcher Anteil der externen Kandidat*innen hat letztendlich ein finales Vergütungsangebot erhalten, das höher war als das erste Angebot Ihres Unternehmens?

   (g) 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Jetzt geht es darum, wie Ihr Unternehmen Gehaltsverhandlungen führt.

Wir interessieren uns dabei für vier bestimmte Mitarbeitergruppen: 1. Berufsanfänger ohne oder mit wenig vorheriger Berufserfahrung 2. Mitarbeiter mit Berufserfahrung, aber ohne Führungsverantwortung 3. Führungskräfte 4. Mitarbeiter in schwer besetzbaren Engpassberufen (außer Top Management)

9. Da die Definition von Gruppe 4 sehr unternehmensspezifisch ist, möchten wir gerne wissen, welche Stelle in Ihrem Unternehmen am ehesten einen schwer besetzbaren Engpassberuf darstellt (z.B. Fachinformatik, Vertriebsleitung).

   (a) Bitte geben Sie den Job-Titel dieser Stelle an: _____

Wir bitten Sie, die folgenden vier Fragen separat für jede Gruppe zu beantworten.
Bitte beziehen Sie Ihre Antworten dabei ausschließlich auf Vollzeitstellen.

10. Wie viel mehr könnte eine Person maximal erhalten, verglichen mit der festen Vergütung, die Sie allein aufgrund der Qualifikation/Eignung der Person für die Stelle angeboten hätten?

	0% Keine Anpassung möglich	1-10%	11-20%	31-40%	Mehr als 40%
Berufsanfänger					
Mitarbeiter ohne Führungsverantwortung					
Führungskräfte					
Mitarbeiter in Engpassberufen ([Q9_Job-Titel])					

11. Was könnte Ihr Unternehmen maximal als zusätzliche Sonderzahlung (z.B. Bonus, Aktienpaket) bieten, um externe Kandidat*innen zu rekrutieren? Bitte beziehen Sie nicht solche Sonderzahlungen mit ein, die üblicherweise allen Kandidat*innen angeboten werden. Bitte geben Sie die maximale Höhe der Sonderzahlung in Prozent, bezogen auf die jährliche feste Vergütung der Stelle, an.

	0% Keine Anpassung möglich	1-10%	11-20%	31-40%	Mehr als 40%
Berufsanfänger					
Mitarbeiter ohne Führungsverantwortung					
Führungskräfte					
Mitarbeiter in Engpassberufen ([Q9_Job-Titel])					

Nun interessiert uns, wie sehr sich Vergütungsangebote für eine bestimmte Stelle in Ihrem Unternehmen unterscheiden.

Stellen Sie sich bitte 10 Kandidat*innen pro Mitarbeitergruppe vor. Alle Kandidat*innen haben die gleiche Qualifikation und Eignung. Sie unterscheiden sich jedoch in den angegebenen Gehaltsvorstellungen und in Angeboten anderer Unternehmen.

12. Wie groß wäre Ihrer Meinung nach wohl der Abstand zwischen dem höchsten und niedrigsten ersten Vergütungsangebot, das Ihr Unternehmen diesen Kandidat*innen machen würde?

	0% All Angebote sind gleich hoch	Das höchste Angebot ist 1-10% höher als das niedrigste	Das höchste Angebot ist 11-20% höher als das niedrigste	Das höchste Angebot ist 21-30% höher als das niedrigste	Das höchste Angebot ist mehr als 30% höher als das niedrigste
Berufsanfänger					
Mitarbeiter ohne Führungsver-antwortung					
Führungskräfte					
Mitarbeiter in Engpass-berufen ([Q9_Job-Titel])					

13. Wie groß wäre Ihrer Meinung nach der Abstand zwischen dem höchsten und niedrigsten finalen Vergütungsangebot, das Ihr Unternehmen diesen Kandidat*innen machen würde (d.h. nach Abschluss potentieller Verhandlungen)?

	0% All Angebote sind gleich hoch	Das höchste Angebot ist 1-10% höher als das niedrigste	Das höchste Angebot ist 11-20% höher als das niedrigste	Das höchste Angebot ist 21-30% höher als das niedrigste	Das höchste Angebot ist mehr als 30% höher als das niedrigste
Berufsanfänger					
Mitarbeiter ohne Führungsver-antwortung					
Führungskräfte					
Mitarbeiter in Engpass-berufen ([Q9_Job-Titel])					

14. Welche Ursachen sind Ihrer Meinung nach für den Großteil der Unterschiede zwischen finalen Vergütungsangeboten für gleichermaßen geeignete Kandidat*innen verantwortlich? Wir interessieren uns hierbei nur für erfahrene Mitarbeiter ohne Führungsverantwortung. Der Großteil der Unterschiede in finalen Angeboten entsteht ...

    (a) durch Unterschiede zwischen den Erstangeboten

    (b) durch Verhandlungen im Anschluss an das Erstangebot

(c) gleichermaßen durch Unterschiede zwischen den Erstangeboten und durch Verhandlungen

(d) Es gibt normalerweise keine Unterschiede zwischen finalen Angeboten.

15. Sind folgende sonstige Vergütungsbestandteile und Nebenleistungen in Ihrem Unternehmen verhandelbarer als die feste Vergütung? Wenn ein Bestandteil für Ihr Unternehmen nicht relevant ist, wählen Sie bitte "Nicht zutreffend".

	Ja, verhandelbarer als feste Vergütung	Nein, nicht verhandelbarer als feste Vergütung	Nicht zutreffend
Flexible Arbeitszeiten/ Urlaubstage			
Fahrt- und Umzugskosten/ Firmenwagen			
Fort- und Weiterbildung			
Kinderbetreuungszuschuss			

- Jetzt geht es um Gehaltsverhandlungen mit bestehenden Mitarbeiter*innen.

16. Angenommen, ein Mitarbeiter oder eine Mitarbeiterin Ihres Unternehmens erhält ein externes Angebot eines anderen Unternehmens und fordert eine Gehaltserhöhung. Um wie viel Prozent könnte Ihr Unternehmen die feste Vergütung maximal erhöhen (ohne die Aufgaben der Person zu ändern), um die Person zu halten?

	0% Keine Anpassung möglich	1-10%	11-20%	31-40%	Mehr als 40%
Berufsanfänger					
Mitarbeiter ohne Führungsverantwortung					
Führungskräfte					
Mitarbeiter in Engpassberufen ([Q9_Job-Titel])					

Im letzten Teil der Umfrage interessieren wir uns dafür, wie Ihr Unternehmen Vergütung in der Praxis anpasst.

17. Angenommen, die finanzielle Situation Ihres Unternehmens hat sich im Vergleich zum Vorjahr nicht verändert, aber die Preise steigen relativ schnell (d.h. die Inflation ist hoch). Wie würde Ihr Unternehmen in dieser Situation die feste Vergütung für Mitarbeiter*innen ohne Tarifbindung anpassen? Die feste Vergütung wird ...

    (a) nicht angepasst

    (b) zum nächsten Termin im vorgegebenen Zeitplan angepasst

    (c) so schnell wie möglich angepasst

    (d) nur angepasst, falls andere Unternehmen in der Branche/Region ihre Vergütung anpassen

18. Wenn die Vergütung für Neueinstellungen festgelegt wird, wie viele Informationen haben Entscheidungsträger*innen in Ihrem Unternehmen darüber, wie viel Ihre Wettbewerber bezahlen? Die Entscheidungsträger*innen ...

    (e) wissen nicht, wie unsere Vergütungsspannen im Vergleich zu Wettbewerbern abschneiden

    (f) wissen, ob unsere Vergütungsspannen im Verhältnis zum Markt hoch oder niedrig sind

    (g) wissen, ob unsere Vergütungsspannen im Vergleich zu spezifischen Wettbewerbern hoch oder niedrig sind

    (h) haben detaillierte Informationen zu Vergütungsspannen spezifischer Wettbewerber

19. Welche Quellen nutzt Ihr Unternehmen regelmäßig, um Informationen über Vergütung in Ihrer Branche oder Region zu sammeln? Bitte wählen Sie alle zutreffenden Antworten aus.

    - Wir vergleichen unsere Vergütung nicht mit anderen Unternehmen
    - Informelle Gespräche mit früheren Mitarbeiter*innen oder Branchenkontakten
    - Kostenlose Quellen (z.B. Glassdoor, kununu)
    - Kostenpflichtige Quellen (z.B. Beratungsunternehmen)
    - Interne Recherche

20. Welche Aussagen beschreiben gängige Praktiken in Ihrem Unternehmen? Bitte wählen Sie alle zutreffenden Antworten aus.

    - Mitarbeiter*innen werden gebeten, ihre Vergütung vertraulich zu behandeln (z.B. im Umgang mit Kollegen)
    - Auf Anfrage teilt HR Informationen mit Mitarbeiter*innen darüber, mit welchen Verfahren/Regeln Vergütung im Unternehmen festgelegt wird
    - Auf Anfrage gibt HR Mitarbeiter*innen Auskunft zur Vergütungsstruktur im Unternehmen (z.B. Informationen zu Gehaltsspannen)
    - Auf Anfrage stellt HR Mitarbeiter*innen konkrete Zahlen zur Verfügung, wie hoch Gehälter für bestimmte Stellen sind

21. Existiert in Ihrem Unternehmen eine unternehmensweite Vergütungsstruktur, mit der Stellen systematisch bewertet werden?

    (i) Ja

    (j) Nein

22. Führt Ihr Unternehmen regelmäßig Bewertungen der internen Vergütungsstruktur durch?

    (k) Ja

    (l) Nein, noch nicht, aber geplant

    (m) Nein, und auch nicht geplant

23. Zur Vervollständigung der erhobenen Informationen möchte das ifo Institut Betriebs- und Personendaten einbeziehen, die bereits am Institut für Arbeitsmarkt- und Berufsforschung (IAB) vorliegen. Das IAB ist dabei eine besondere Dienststelle der Bundesagentur für Arbeit (BA), die im Rahmen ihres gesetzlichen Auftrags die Funktionsweise des Arbeitsmarkts, sowie die Erwerbschancen und Lebensbedingungen in einer sich dynamisch verändernden Welt aus rein wissenschaftlicher Sicht untersucht. Durch die Verknüpfung der Daten verkürzt sich der Umfang dieser Befragung. Alle Angaben werden streng vertraulich behandelt und der gesetzliche Datenschutz ist auch bei Verknüpfung der Daten zu jedem Zeitpunkt in vollem Umfang gewährleistet. Ich stimme der Verknüpfung meiner Angaben mit Betriebs- und Personendaten, die am Institut für Arbeitsmarkt- und Berufsforschung (IAB) vorliegen, zu.

    (n) Ja

    (o) Nein

24. Was möchten Sie uns noch mitteilen? Hier finden Sie Platz für Anregungen oder Kritik zur Befragung: _____

    Vielen Dank für Ihre Teilnahme!

    Wir möchten uns ganz herzlich für Ihre Mithilfe bedanken. Ihre Antworten wurden gespeichert, Sie können das Browser-Fenster nun schließen. Über die Ergebnisse werden wir Sie nach Abschluss der Auswertung informieren.

    Kontakt: ifo Institut ifo Zentrum für Makroökonomik und Befragungen Poschingerstraße 5 81679 München

    Ingrid Hägele haegele@ifo.de

C Additional Data Sources

This section provides detailed descriptions of how we collect and construct variables from the IEB data, the Orbis database, and other publicly available data sources.

C.1 Social Security Records

Wages. We construct our wage measure in the IEB data in three steps. First, we distinguish between earnings comprised of base wages and earnings in the form of special payments. The IAB records allow us to distinguish base pay from any special payments based on the stated reason for the payment. Second, we account for the fact that earnings in the IEB data are censored at the social security maximum. We therefore stochastically impute the upper tail of the wage distribution, following Dustmann, Ludsteck, and Schönberg (2009). Third, we use total earnings to calculate the average daily wage by dividing total earnings by the duration of the job spell.

Labor market experience. We define workers' labor market experience at each point in time by the cumulative duration that they have been observed as employed in the IEB data up to that point, excluding spells as student worker, intern, and apprentice. This measure does not restrict to tenure at a given firm. Part-time spells are counted as half spells. Our final variable is measured as experience in years.

Employee groups. We construct indicators for our three employee groups of interest—recent labor market entrants, experienced non-managers, and managers—using occupation codes and individuals' work experience in the IEB data. We identify employees as managers if the 4th digit of the 5-digit occupation code is a "9". We identify individuals as experienced non-managers if the 4th digit of the 5-digit occupation code is not a "9" and if they have at least three years of labor market experience. We identify individuals as recent labor market entrants if the 4th digit of the 5-digit occupation code is not a "9" and if they have less than three years of labor market experience.

To validate whether our measure for manager is correct, we asked workers in a pilot survey, conducted through the IAB in Spring 2022, whether they have leadership responsibility over employees, for instance in the form of leading a team. When we compare our indicator for managers from the IEB occupation code to workers' survey responses, we find that 85% of manager assignments we make based on the IEB data align with workers' survey reports.

C.2 Orbis

We link our firm survey to information from the Orbis database, compiled by the Bureau van Dijk based on firm balance sheet information. In order to find our 772 firms in the Orbis database, we manually match every firm based on firm name and address to the firm records in Orbis. We are able to match 99% of the firms in our survey sample.

From Orbis we collect following firm characteristics: year of incorporation, sector based on the 4-digit NACE industry code, whether the firm's headquarters are based in East Germany using information about the zip-code of the headquarters, and the number of employees. Note that because Orbis draws on firms' balance sheet information, the number of employees may include employees outside of Germany.

The previous literature has used information in Orbis as proxies for firm productivity (Bender et al. 2018). We use information on firms' fixed assets per employee and total assets per employee as our preferred proxies for productivity because they have the lowest share of missing values.[40] Fixed assets refer to the total amount (after depreciation) of non-current assets (intangible assets, tangible assets, other fixed assets) and thus represent long-term assets that are not likely to be converted into cash anytime soon. Total assets are the sum of fixed assets and current assets (e.g. cash and any assets that will be converted into cash within the year). For each variable from Orbis, we select the last year that the data is available. For over 90% of our firms, the most recent

[40]Productivity measures from Orbis are typically characterized by a high share of missing values. For the sample of our 772 firms, we have information on total assets for 576 (75%) and fixed assets for 571 (74%), while alternative productivity measures used in the literature, such as firms' operating revenue or profit-loss-ratio, are only available for 294 (38%) and 318 (42%) of the firms, respectively.

information is not older than three years. For fixed and total assets, we CPI-adjust our variables based on the reference year.

C.3 Other Publicly Available Firm Data

In order to create an external benchmark that allows us to validate our firm survey, we also collected publicly available data on the 772 firms in our sample. We focused our data collection on three dimensions of firm strategies that are relevant for the validity of our bargaining measures and are feasible to collect using publicly available data. First, we manually collected information on whether a firm is covered by a CBA agreement. To do so, we searched for whether the firm name is mentioned with respect to a CBA agreement in the news or in any other online source. Firms for which we can find any such information are identified as covered by a CBA agreement. Firms for which we can not find any information online about a CBA agreement are identified as not covered by any CBA agreement.

Second, we collected information on whether firms require applicants to provide salary expectations, which is a common practice in Germany and many other countries, like the United States. To do so, we searched for the firm's online application portal and set up an application account in order to receive access to the input screen that applicants are required to use. For smaller firms that do not have online application systems, we looked for instructions for how to apply by email; these often prompt respondents to provide their salary expectations. This measure of salary expectations is likely a lower bound, since it only captures whether expectations are elicited at the first step of applying, but does not include whether firms ask about expectations in the interview or in subsequent application rounds. In our firm survey we asked whether firms elicited this information at any stage of the application or interview process, without specifying it must be done at the application stage. We define a firm as not requiring salary expectations if none of the job openings we consider prompts applicants to provide such information. For each firm, we looked up the first five job ads that come up when we searched for the firm.

Third, we collected data on whether firms provide salary information in their external job ads. To collect this information, we looked up the first five job ads that come up when searched for the firm. We then identified whether any salary information was provided in the job ad. For ads with this information, we also recorded how coarse the information was (e.g. salary group such as CBA

group, salary range, precise salary). We define a firm as not providing any salary information if none of the job ads we collect provides any salary information.

D Worker Survey

This appendix provides a short overview of the worker survey. A more detailed description is provided in the appendix to Caldwell, Haegele, and Joerg Heining (2023b).

D.1 Sample Construction

We used German Social Security records to identify participants for the survey. Workers were eligible for inclusion in the survey if they were—as of December 30, 2020—between the ages of 25 and 50, employed at a full-time job, and if they had been at their current establishment for fewer than eight years. In order to manage the large number of letters, the survey was mailed out in batches. For the first batch, we selected 75% percent of the sample (N=82,500) by randomly sampling from the set of eligible workers at firms in the matched IAB-firm survey sample (as of end of 2020). We over-sampled these workers so that we would have appropriate power for our main analysis. We selected the remaining 25% (N=27,500) at random from (a random five percent sample of) workers at non-surveyed firms. We selected all of the workers (N=25,000) for the second batch from the random 5% sample of eligible workers at non-surveyed firms. We mailed invitations for the first batch between June and August 2022. We mailed reminders and invitations for the second batch in November 2022. The reminders were sent to a random 25% subset of individuals in the first batch who had not responded to the initial invitation at the time of the second mailing.

D.2 Implementation Details

After we identified workers for inclusion in the survey, a specialized department at the IAB pulled their addresses. This approach followed the standard protocol for surveys through the IAB. The survey was fielded by the IAB and the invitation to participate was signed by the director of the IAB. Invitations were mailed to respondents between June 2022 and December 2022. The survey was described to potential respondents as a scientific study on salary progression in Germany. In

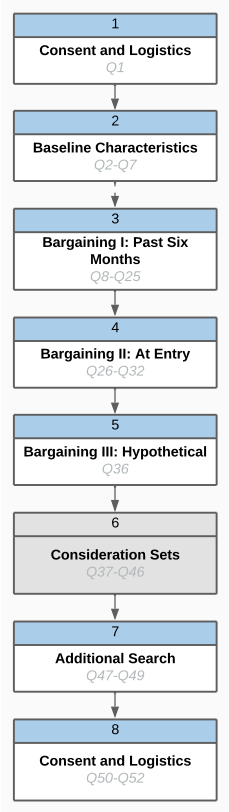
order to manage the large number of letters, we staggered the mailings. We chose to invite respondents via mail instead of e-mail or phone because the Federal Employment Agency in Germany ("Bundesagentur für Arbeit") only has e-mail and phone numbers of individuals who have recently been unemployed or have participated in re-employment measures. Postal addresses are available for all workers.

The invitation informed respondents that the survey would take approximately 10 minutes to complete. While the survey includes several distinct modules, the focus of this paper is on the three bargaining modules of the worker survey (see Appendix Figure E1 for an overview). The first of these modules 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. The third asked individuals to provide their salary expectations in response to a hypothetical prompt. We also elicited workers' risk preferences, following Dohmen et al. (2011) by asking individuals:

> "Are you generally a person who is willing to take risks or do you try to avoid taking risks? Please choose a value on the scale below, where the value 0 means 'not at all willing to take risks' and the value 10 means 'very willing to take risks'."

When we split individuals according to risk preferences, we group individuals who provided answers of 0-6 and 7-10.

Figure E1: Flow of Worker Survey



Note: This figure provides an overview over the modules in the worker survey. The main questions used for our analysis are elicited in the three bargaining modules. See Appendix D.3 for the questionnaire.

D.3 Worker Bargaining Modules

D.3.1 English Translation of Questionnaire

Background Questions [The following questions were asked of individuals who reported they were not self-employed or non/un-employed]

1. When did you first join your current company?
   (a) In the past 6 months
   (b) 6-12 months ago
   (c) 1-2 years ago
   (d) 2-3 years ago
   (e) >3 years ago
2. Is your current position covered by a CBA agreement (i.e. are you paid according to CBA)?

(a) Yes

(b) No

(c) I don't know

3. How many hours do you work in a typical week?

   (a) {fill in}

4. During the past six months ...

   ... have you done any of the following? Please select all that apply.

   (a) Looked at job postings

   (b) Updated public resume or employment information (e.g. Xing, LinkedIn)

   (c) Reached out to people in my network for information about potential job opportunities

   (d) Applied to a job at another company

5. During the past six months ...

   ... did anyone reach out to you to provide information about potential job opportunities (e.g. sent you a job opening or offered to provide a referral)?

   (a) Yes

   (b) No

6. During the past six months ...

   ... did you receive any job offers from other companies?

   (a) Yes

   (b) No

7. During the past six months ...

   ... did your company offer you a salary increase without you asking?

   (a) Yes

   (b) No

8. During the past six months ...

   ... did you actively ask for an increase in salary?

   (a) Yes

   (b) No

9. Finally, we would like to ask you to assess yourself. Are you generally a person who is willing to take risks or do you try to avoid taking risks?

   Please choose a value on the scale below, where the value 0 means "not at all willing to take risks" and the value 10 means "very willing to take risks".

   (a) 0 (Not at all willing to take risks) 1 2 3 4 5 6 7 8 9 10 (Very willing to take risks)

New Hire Module [The following questions were asked of individuals who reported they were not self-employed or non/un-employed and who had been in their current company for 3 or fewer years.]

We are now interested in how you started your **first** position at your **current** company.

1. During the application and hiring process, who suggested a concrete salary first?
   (a) I mentioned my salary expectations first without the company asking me to
   (b) I mentioned my salary expectations after the company asked me to
   (c) The company suggested a concrete salary first
2. [Q1==a | Q1==b] Once the company made a first offer, how did the offer compare to your salary expectations?
   (a) Lower
   (b) The same
   (c) Higher
3. After the company made you a salary offer, did you ask them to increase the salary?
   (a) Yes
   (b) No
4. [Q3 == Yes] By how much did you ask them to increase the salary (compared to the company's offer)?
   (a) 1-5%
   (b) 6-10%
   (c) 11-20%
   (d) More than 20%
5. [Q3 == Yes]Did the company implement the salary increase you asked for?
   (a) Yes, fully
   (b) Yes, but only partially
   (c) No
6. [Q3 == No]Why didn't you ask for a salary increase? Please select all that apply.
   (a) I haven't thought about asking for a salary increase
   (b) I had the impression that the company does not typically negotiate
   (c) I was pretty sure I would not have been successful in getting a meaningful salary increase
   (d) I wanted to avoid a potentially uncomfortable situation

(e) I was satisfied with the offered salary

7. Did your company improve your position in other ways (relative to the company's first offer)? Please select all that apply

   (a) Vacation days or remote work

   (b) Company car or commuting subsidy

   (c) Training

   (d) Childcare subsidy

   (e) Bonus payment or stock options

   (f) **No**, my position was not improved

Outside Offer Module [The following questions were asked of individuals who were not self-employed or non/-unemployed and who reported they had received an outside offer in the previous six months.]

1. How many job offers from other companies did you receive in the past six months?

   (a) 1

   (b) 2

   (c) 3 or more

2. Think about the most recent offer from another company that you received. Who suggested a specific salary first?

   (a) I mentioned my salary expectations first without the company asking me to

   (b) I mentioned my salary expectations after the company asked me to

   (c) The company made the first salary offer

3. [Q2==a | Q2==b] How did the first offer the company made you compare to your salary expectations?

   (a) Lower

   (b) The same

   (c) Higher

4. How did the first offer compare to your salary at the time?

   (a) Lower

   (b) The same

   (c) Higher

5. After that company made you a salary offer, did you ask them to increase the salary?

(a) Yes

(b) No

6. [Q5 == Yes] By how much did you ask them to increase the salary (compared to the company's offer)?

   (a) 1-5%

   (b) 6-10%

   (c) 11-20%

   (d) More than 20%

7. [Q5 == Yes] Did the company implement the salary increase you asked for?

   (a) Yes, fully

   (b) Yes, but only partially

   (c) No

8. Did you ask your employer at the time to increase your salary?

   (a) Yes

   (b) No

9. [Q8==Yes] Did that company then increase your salary?

   (a) Yes, my employer at the time offered more than the other company

   (b) Yes, my employer at the time matched the offer of the other company

   (c) Yes, but my employer at the time offered less than the other company

   (d) No

Hypothetical Module [The following was asked of all workers. The range was randomized across workers.]

1. 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}% of your current salary.

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

   (a) {fill in}%

   (b) I would not provide my salary expectations, even if asked

D.3.2 Original German Questionnaire

Background Questions [The following questions were asked of individuals who reported they were not self-employed or non/un-employed]

1. Seit wann sind Sie in Ihrem jetzigen Unternehmen beschäftigt?

   (a) Seit weniger als 6 Monaten

   (b) Seit 6-12 Monaten

   (c) Seit 1-2 Jahren

   (d) Seit 2-3 Jahren

   (e) Seit mehr als 3 Jahren

2. Ist Ihre Stelle tarifgebunden (d.h. werden Sie nach Tarifvertrag bezahlt)?

   (a) Ja

   (b) Nein

   (c) Ich weiß nicht

3. Wie viele Stunden arbeiten Sie in einer typischen Woche?

   (a) {fill in}

4. In den vergangenen sechs Monaten...

   ... haben Sie Folgendes getan? Bitte wählen Sie alle zutreffenden Antworten aus.

   (a) Stellenausschreibungen angesehen

   (b) Aktualisierten Lebenslauf oder Beschäftigungsinformationen online gestellt (z.B. über Xing, LinkedIn)

   (c) Personen in meinem Netzwerk kontaktiert, um Informationen zu potentiellen Jobangeboten zu erhalten

   (d) Sich auf eine Stelle in einem anderen Unternehmen beworben

5. In den vergangenen sechs Monaten ...

   ... hat Sie jemand mit Informationen zu potentiellen Jobangeboten kontaktiert (z.B. Stellenausschreibungen zugeschickt oder Ihnen angeboten, eine Empfehlung für Sie auszusprechen)?

   (a) Ja

   (b) Nein

6. In den vergangenen sechs Monaten ...

   ... haben Sie Stellenangebote von anderen Unternehmen erhalten?

   (a) Ja

(b) Nein

7. In den vergangenen sechs Monaten ...

   ... hat Ihr Unternehmen Ihnen eine Gehaltserhöhung angeboten, ohne dass Sie danach gefragt haben?

   (a) Ja

   (b) Nein

8. In den vergangenen sechs Monaten ...

   ... haben Sie proaktiv nach einer Gehaltserhöhung gefragt?

   (a) Ja

   (b) Nein

9. Abschließend interessiert uns Ihre Selbsteinschätzung. Sind Sie generell ein risikobereiter Mensch oder versuchen Sie Risiken zu vermeiden?

   Verwenden Sie dazu bitte eine Skala von 0 bis 10. Der Wert 0 bedeutet „gar nicht risikobereit" und der Wert 10 „sehr risikobereit". Mit den Werten dazwischen können Sie Ihre Einschätzung abstufen.

   (a) 0 (gar nicht risikobereit) 1 2 3 4 5 6 7 8 9 10 (sehr risikobereit)

New Hire Module [The following questions were asked of individuals who reported they were not self-employed or non/un-employed and who had been in their current company for 3 or fewer years.]

Jetzt geht es darum, wie Sie Ihre **erste** Stelle in Ihrem **jetzigen** Unternehmen angetreten haben.

1. Wer hat im Bewerbungs- und Einstellungsprozess zuerst ein konkretes Gehalt vorgeschlagen?

   (a) Ich habe zuerst Gehaltsvorstellung geäußert, **ohne** dass mich das Unternehmen darum gebeten hat.

   (b) Ich habe Gehaltsvorstellung geäußert, **nachdem** mich das Unternehmen darum gebeten hat.

   (c) Das Unternehmen hat zuerst ein konkretes Gehalt vorgeschlagen.

2. [Q1==a | Q1==b] Als das Unternehmen Ihnen ein erstes Angebot gemacht hat, wie hoch war das Angebot im Vergleich zu Ihren Gehaltsvorstellungen?

   (a) Niedriger

   (b) Gleich hoch

   (c) Höher

3. Nachdem das Unternehmen Ihnen ein Gehaltsangebot gemacht hat, haben Sie nach einem höheren Gehalt gefragt?

   (a) Ja

   (b) Nein

4. [Q3 == Ja] Wie hoch war die Gehaltserhöhung, nach der Sie gefragt haben (im Vergleich zum Angebot des Unternehmens)?

   (a) 1-5%

   (b) 6-10%

   (c) 11-20%

   (d) Mehr als 20%

5. [Q3 == Ja] Hat das Unternehmen die Gehaltserhöhung umgesetzt, nach der Sie gefragt haben?

   (a) Ja, vollständig

   (b) Ja, aber nur teilweise

   (c) Nein

6. [Q3 == Nein] Warum haben Sie nach keiner Erhöhung des Gehalts gefragt? Bitte wählen Sie alle zutreffenden Antworten aus.

   (a) Ich habe nicht darüber nachgedacht, nach einer Gehaltserhöhung zu fragen.

   (b) Mein Eindruck war, dass das Unternehmen normalerweise nicht verhandelt.

   (c) Ich war mir ziemlich sicher, dass ich keine wesentliche Erhöhung bekommen hätte.

   (d) Ich wollte eine womöglich unangenehme Situation vermeiden.

   (e) Ich war mit dem angebotenen Gehalt zufrieden.

7. Hat das Unternehmen Ihre Stelle in anderer Weise verbessert (im Vergleich zum ersten Angebot des Unternehmens)? Bitte wählen Sie alle zutreffenden Antworten aus.

   (a) Urlaubstage/Homeoffice

   (b) Firmenwagen/Fahrtkostenzuschuss

   (c) Training/Weiterbildung

   (d) Zuschuss zur Kinderbetreuung

   (e) Bonuszahlung/Aktienoptionen

   (f) **Nein,** meine Stelle wurde nicht verbessert.

Outside Offer Module [The following questions were asked of individuals who were not self-employed or non/-unemployed and who reported they had received an outside offer in the previous six months.]

1. Wie viele Stellenangebote von anderen Unternehmen haben Sie in den vergangenen sechs Monaten erhalten?

   (a) 1

   (b) 2

   (c) 3 oder mehr

2. Denken Sie nun an das letzte Stellenangebot, das Sie von einem anderen Unternehmen erhalten haben. Wer hat zuerst ein konkretes Gehalt vorgeschlagen?

   (a) Ich habe zuerst Gehaltsvorstellung geäußert, **ohne** dass mich das Unternehmen darum gebeten hat.

   (b) Ich habe Gehaltsvorstellung geäußert, **nachdem** mich das Unternehmen darum gebeten hat.

   (c) Das Unternehmen hat zuerst ein konkretes Gehalt vorgeschlagen.

3. [Q2==a | Q2==b] Wie hoch war das erste Angebot des Unternehmens im Vergleich zu Ihren Gehaltsvorstellungen?

   (a) Niedriger

   (b) Gleich hoch

   (c) Höher

4. Und wie hoch war das erste Angebot des Unternehmens im Vergleich zu Ihrem damaligen Gehalt?

   (a) Niedriger

   (b) Gleich hoch

   (c) Höher

5. Nachdem das Unternehmen Ihnen ein Gehaltsangebot gemacht hat, haben Sie nach einem höheren Gehalt gefragt?

   (a) Ja

   (b) Nein

6. [Q5 == Ja] Wie hoch war die Gehaltserhöhung, nach der Sie gefragt haben (im Vergleich zum Angebot des Unternehmens)?

   (a) 1-5%

   (b) 6-10%

(c) 11-20%

(d) Mehr als 20%

7. [Q5 == Ja] Hat das Unternehmen die Gehaltserhöhung umgesetzt, nach der Sie gefragt haben?

   (a) Ja, vollständig

   (b) Ja, aber nur teilweise

   (c) Nein

8. Haben Sie Ihren damaligen Arbeitgeber nach einer Gehaltserhöhung gefragt

   (a) Ja

   (b) Nein

9. [Q8==Ja] Konnten Sie eine Gehaltserhöhung bei Ihrem damaligen Arbeitgeber erreichen?

   (a) Ja, mein damaliger Arbeitgeber hat das andere Unternehmen überboten.

   (b) Ja, mein damaliger Arbeitgeber hat gleichviel geboten wie das andere Unternehmen.

   (c) Ja, aber mein damaliger Arbeitgeber hat weniger geboten als das andere Unternehmen.

   (d) Nein

Hypothetical Module [The following was asked of all workers. The range was randomized across workers.]

1. Angenommen, Sie wollten den Job wechseln und bewerben sich auf eine neue Stelle in einem anderen Unternehmen. Die Stellenanzeige listet eine Gehaltsspanne, die von {90/110}% bis {120/140}% Ihres aktuellen Gehalts reicht.

   Sie werden nach Ihren Gehaltsvorstellungen gefragt. Was geben Sie an, relativ zu Ihrem aktuellen Gehalt?

   (a) {fill in}%

   (b) Ich würde meine Gehaltsvorstellungen nicht angeben, auch wenn ich danach gefragt werde.

D.4 Non-Response

The survey stayed open until January 15, 2023. We received 13,680 total responses. 16,164 letters were returned because of incorrect addresses, yielding an effective response rate of 11.7%. Among the 13,680 individuals who started the survey, 11,868 completed it, which yields a completion rate of 87%. We define a response as complete if a respondent has clicked through to the (second to last)

question eliciting consent for participating in another survey wave. We do not require respondents to have answered every question to be counted an individual who completed the survey. We linked the 10,134 complete responses with linkage consent to the IAB records.