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## ABSTRACT

### **Wage Formation between Newly Hired Workers and Employers: Survey Evidence<sup>\*</sup>**

Some workers bargain with prospective employers before accepting a job. Others could bargain, but find it undesirable, because their right to bargain has induced a sufficiently favorable offer, which they accept. Yet others perceive that they cannot bargain over pay; they regard the posted wage as a take-it-or-leave-it opportunity. Theories of wage formation point to substantial differences in labor-market equilibrium between bargained and posted wages. The fraction of workers hired away from existing jobs is another key determinant of equilibrium, because a worker with an existing job has a better outside option in bargaining than does an unemployed worker. Our survey measures the incidences of wage posting, bargaining, and on-the-job search. We find that about a third of workers had precise information about pay when they first met with their employers, a sign of wage posting. We find that another third bargained over pay before accepting their current jobs. And about 40 percent of workers could have remained on their earlier jobs at the time they accepted their current jobs.

JEL Classification: E24, J3, J64

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# 1 Introduction

Labor is one of the most heterogeneous products traded in a modern economy. The competitive market for a commodity, where all units are interchangeable and all trade for the same price, could hardly be a worse description of the labor market. No Walrasian auctioneer determines the wage. We describe survey evidence on the ways that an employer and a worker determine the wage at the outset of their relationship.

The extensive literature on this topic considers two main cases. The first is *wage posting*. Here an employer defines a job in terms of duties and qualifications, and commits to a wage. If a candidate is found qualified and interested, the employer offers the wage on a take-it-or-leave-it basis. The second is *bargaining*. The employer makes an initial offer, but the candidate can make a counteroffer for a higher wage, if so inclined. A key difference between the two modes is the employer's commitment not to entertain a counteroffer.

In the United States, a small fraction of workers in private employment and a larger fraction in government employment receive pay under the terms of collective bargaining agreements. From the point of view of an individual worker, the resulting wage is posted rather than bargained individually. We identify unionized and government workers in our analysis of the survey data.

In addition to wage posting and bargaining, one could imagine a labor market where employers can commit to ignore counteroffers, on the one hand, but make a custom offer to the applicant rather than offering the same wage to all qualified applicants, on the other hand. This market would encounter the Diamond paradox. An employer would make an offer that just meets a worker's reservation wage. The worker knows that the wage is below the maximum that would be acceptable to the employer, but also knows that the employer will not consider a counteroffer that is below that maximum but better than the employer's original offer. The worker will accept the original offer. The only equilibrium in the labor market under these conditions is for workers to earn the bare minimum needed to attract them to the market. Workers would not earn the Ricardian rents that normally make up a substantial fraction of wages. We will discuss this point in the next section.

Wage formation has a central role in the theory of unemployment. A positive level of unemployment is inevitable given the frictions in the labor market—some workers will always be in the process of locating a better use for their services after a decline in their value at an earlier job. The anticipated wage determines the payoff to workers to search for new jobs

and to employers to recruit new workers.

Our survey has about 1400 respondents who took a job sufficiently recently that we believe that their answers about wage formation at the beginning of the job were reasonably reliable. In addition to many questions about their backgrounds, we asked four questions that bear specifically on wage formation. The first determined how much a respondent knew about pay before being interviewed for the job. This question bears on the public nature of the wage in a wage-posting market. The second asked if the wage offer for the current job was take-it-or-leave-it or if bargaining occurred. The third asked if the respondent could have kept an existing job at the time he or she took the current job. The option to keep an existing job is valuable in a bargaining setting. The fourth asked if the employer learned the respondent's earlier pay rate during the evaluation process. This knowledge would improve the employer's expected benefit in a setting with bargaining.

Our results show that both major models of wage formation have important roles in the U.S. labor market. We find a fairly high level of knowledge among job-seekers prior to their job interviews, an indication that public wage posting is important. We confirm that this information is particularly common among union members and those who took government jobs. We document a sharply negative relation between education and precise information about pay—non high-school graduates are almost twice as likely as those with professional education to know prospective pay exactly. Thus wage posting appears to be much more important in the less heterogeneous jobs available to those with less education.

We find that about a third of all workers bargained with their current employers rather than treating their job offer as take-it-or-leave-it. Bargaining is more common by minority workers and less common by women. The education gradient for bargaining is remarkably steep, rising from 26 percent for those who did not graduate from high school to 75 percent for those with professional degrees. Individual bargaining is rare for union or government jobs.

The respondents who knew the wage in advance and who understood the wage offer to be take-it-or-leave-it are the most likely to have taken jobs in a market with posted wages. We find that this group is 22 percent of workers if we interpret knowing as knowing exactly the wage when first interviewed by the employer and 54 percent if we interpret knowing as including having a pretty good idea. We view these figures as placing rough bounds on the incidence of posted wage jobs. We find that minorities are somewhat less likely to be in

the posted-wage sector and women more likely. Participation in the posted-wage sector falls strongly with education. Union members and government workers are highly likely to hold posted-wage jobs.

We find that about 39 percent of workers could have kept their earlier jobs at the time they were considering their current jobs. This figure is essentially the same among those who bargained for pay and varies only slightly among the categories of respondents. We conclude that models of on-the-job search are highly relevant for understanding wage formation and that, for jobs with wage bargaining, the option to stay in the earlier job should have an important influence on the wage bargain.

Finally, we find that 53 percent of workers reported that their employers had learned their pay in their earlier jobs before making the offer that led to the current job. This fraction is slightly higher for jobs where actual wage bargaining occurred. It is about the same in situations where the respondent could have kept an earlier job. The fraction varies only a little among categories of workers.

## 2 Research on Wage Formation

Pissarides (2000), Mortensen (2003), and Rogerson, Shimer and Wright (2005) discuss much of the relevant research on wage formation for individual workers. In the brief summary in this section, we will discuss all of the research as if it had originally referred to the labor market, though a number of important papers were actually stated in terms of product markets.

Stigler (1961, 1962) launched modern thinking about trade in markets for heterogeneous products. He observed that, in the presence of variation in wages, a job-seeker should sample from the distribution of available wages. The choice of the number of samples balances the benefit of finding a higher wage, where the marginal benefit falls with sample size, against the cost of sampling, which is constant. McCall (1970) provided a technical solution to this problem, based on class notes from Kenneth Arrow. Unemployment depends on the amount of sampling job-seekers find optimal.

Diamond (1971) tackled the problem of equilibrium in a search market. He considered the optimal policy of an employer confronted by searchers who follow the Stigler-McCall prescription. He observed that, if all other employers set the same wage, one employer could still hire a random visitor by setting a wage below the common wage, but not so

far below as to cause the visitor to incur the cost of visiting another employer. This logic shows that a common wage cannot be an equilibrium in the market, with one exception: the monopsony wage could be an equilibrium, because the employer, though able to get a lower wage, would choose not to, as a wage below the monopsony level would yield a lower profit. Diamond concluded that the only common wage in equilibrium would be the monopsony wage, a proposition known as the Diamond paradox. In a simple model where hours of work for those choosing to participate in the labor market are fixed at a standard level or are fairly inelastically supplied, the monopsony wage is the reservation wage that is just sufficient to induce workers to participate in the labor market. This wage level is the value of some alternative activity available to the job-seeker. If the wages for all jobs for which a worker is qualified are set in the way Diamond contemplated, the only equilibrium common wage leaves the worker indifferent between work and non-work. That is, the common wage deprives the worker of all of the Ricardian rents that we normally associate with the labor market, where the elasticity of supply for most workers is relatively low and the area above the supply curve describing the rents is correspondingly large. The supply curve is perfectly elastic at the indifference point, so the area is zero in the Diamond paradox.

The Diamond paradox rests on a strong assumption: The hapless job-seeker cannot strike back by making a counteroffer. The same logic that permits the employer to make a low offer that is still acceptable applies equally to the job-seeker, whose higher counteroffer could leave the employer better off than not hiring the job-seeker. In the Diamond paradox, the employer has all of the bargaining power. Somehow the employer has the power to disregard a counteroffer. It is an open question whether disregarding a counteroffer is credible. The general standard for credibility is on-the-spot rationality or subgame perfection. There is no general answer as a matter of theory to the question of whether an employer holds all the bargaining power. We regard the wage-formation process that leads to the Diamond paradox as unrealistic, not because we know that it is impossible for an employer to have all the bargaining power, but because we believe that wages are well above the indifference level for many workers.

Butters (1977) responded to Diamond's challenge in a way directly relevant to this paper: In Butters's model, the employer offers the *same* wage to all job-seekers, but the job-seekers differ among themselves with respect to information about other wages, so they have diverse reservation wages. By failing to customize the offer, the employer gives some of the surplus

to all but the applicant with a reservation wage equal to the common value of all of the employer's offers. The Diamond paradox arises from a situation where the wage offered to each job-seeker is at the reservation level of that person. Butters launched the posted-wage model that we investigate here. In his model, job-seekers learn randomly about the wages of some but not all jobs. In equilibrium, the distribution of wages does not collapse to a single value. Burdett and Judd (1983) extended Butters's and other formulations and discusses other models that portray heterogeneous reservation wages but a common offered wage. Burdett and Mortensen (1998) developed a complete equilibrium model of the labor market along these lines in which the needed heterogeneity arises from job search by employed workers. Because they retain the option of keeping their current jobs, their reservation wages are equal to their current wages and are above the common reservation wage of unemployed job-seekers. Burdett and Mortensen's paper demonstrated the importance of on-the-job search as a matter of theory. Quantification of its importance has proven difficult, as it rests on the fraction of workers who retain the option to stay on their current jobs as they investigate a possible new job. On-the-job search is easy to define in a model but hard to measure in practice.

Within posted-wage models, there is an interesting question as to the public information about wages. Models of *directed search* give job-seekers partial or complete information about the terms of employment. The simplest setup of this type, with full information available for free to all job-seekers about all job openings, collapses to perfect competition. Rogerson et al. (2005) discusses models where frictions remain.

The other main branch of individual wage-formation theory attributes more symmetric roles to the job-seeker and employer by assuming that they bargain with each other. Mortensen (1978) and Diamond and Maskin (1979) began this line of thought in the context of the formation of symmetric pairs. Diamond (1982) applied it to the labor market with job-seeker-employer matching and wage formation. This literature applied the Nash bargain in all cases. The modern canon is Mortensen and Pissarides (1994).

Nash's development of his eponymous bargain does not tell a story about how the bargainers reach their bargain. Alternating-offer bargaining seems an approach closer to the way that bargains are actually made in the labor market and elsewhere. Hall and Milgrom (2008) apply Binmore, Rubinstein and Wolinsky's (1986) version of the alternating-offer bargaining model to the setting of the Mortensen-Pissarides model (the paper also discusses



earlier applications of alternating-offer bargaining in the labor market). The convention of the labor market appears to be that the employer makes the first offer, just as the seller in the housing market makes the first offer in the form of an asking price. But the wage offer is not a posted wage—the applicant is free to respond with a counteroffer, just as the potential buyer may offer to pay less than the asking price for a house. The parties continue to exchange offers until the prospective benefit from continuing falls short of the cost of delaying the deal, at which point one side accepts the other’s offer and the deal is done.

A key point is that the unique equilibrium of an alternating-offer bargaining process with full information is for the employer to offer an acceptable wage as the first offer—one just at the margin between triggering a counteroffer and not triggering one. Thus with full information, one never observes parties actually making counteroffers. One could easily confuse a posted wage setup with an alternating-offer setup, because in both cases, the employer would say, “The job pays X. Do you accept it?” and the prospect would just say yes or no, without a counteroffer.

Hall and Milgrom (2008) show a key difference between the Nash bargain and alternating-offer bargaining. With Nash, the worker’s threat point is to disclaim any match with the immediate prospective employer and to re-enter the search process to find another job opening. The value of this threat depends on the tightness of the labor market—the job-seeker’s bargaining position from the Nash perspective is much stronger if the next job prospect is easy to find. By contrast, with alternating-offer bargaining, the threat is to delay the formation of the job match. The value of this threat is not diminished when unemployment is higher. Thus the wage is not as sensitive to unemployment. The paper explains why the lower sensitivity helps explain the large increases in unemployment that occur in recessions.

With imperfect information, bargaining models become more complicated and prone to indeterminacy. Hall and Lazear (1984) lay out some of the issues in the setting of individual wage formation. See Ausubel, Cramton and Deneckere (2002) for a survey and Menzio (2007) for an application with individual wage formation. Our survey shows that many job-seekers actively bargain with employers, contrary to the full-information bargaining model, so this is an appropriate area for further development.

Figure 1 summarizes the types of model of wage formation between individuals and employers. At the top we put the issue that divides wage posting from bargaining—can the employer commit not to respond to a counteroffer from a job-seeker or otherwise avoid

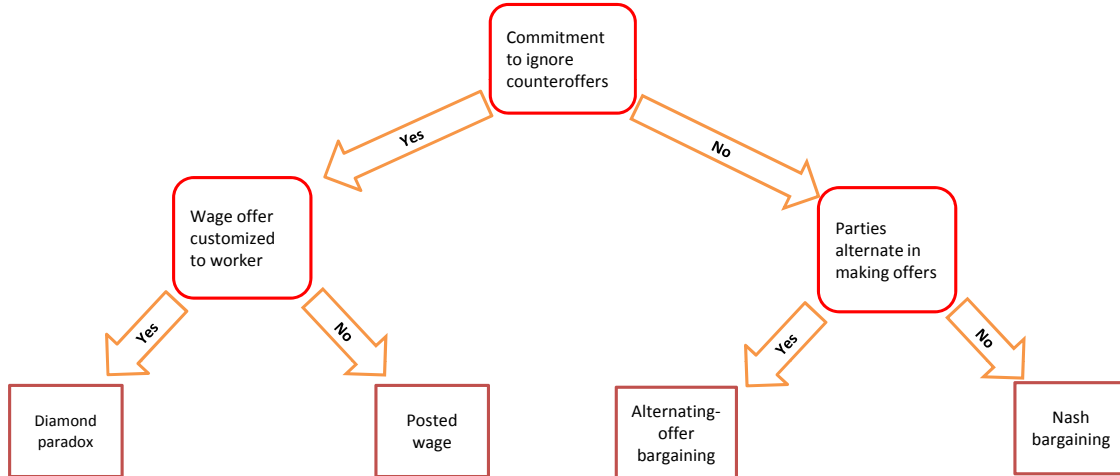


Figure 1: Models of Wage Formation

bargaining. If so, the second issue is whether the employer can make a customized offer to the job-seeker that captures all of the surplus from the match. If so, and if the job-seeker has no opportunities in labor markets where workers share the surplus, workers will be paid only enough to bring them into the labor market and will enjoy no Ricardian rents. This condition is the Diamond paradox. If wage offers are not customized and a force such as on-the-job search causes reasonable heterogeneity in reservation wages among applicants who will be paid the same wage, the employer’s choice of that wage will result in a sharing of the surplus by all but those with a reservation wage equal to the wage paid.

On the right side of Figure 1, we distinguish between alternating-offer and Nash bargaining.

### 3 Objectives of the Survey

Our survey makes some progress in improving understanding of the facts underpinning the two leading types of models of individual wage formation. The most obvious area of investigation is whether employers post wages which, to the individual, are take-it-or-leave-it offers, as opposed to engaging in any type of bargaining. We address this directly by asking if respondents perceived the wage as take-it-or-leave-it, on the one hand, or if they bargained, on the other hand. In formulating this question we were quite aware that there was an omitted intermediate case, that, while the offer was not take-it-or-leave-it, the respondent did not believe that it would be worth the effort to make a counteroffer. We regarded this

as beyond the reach of our survey techniques, though this issue is ripe for reconsideration in future work.

A second objective is to probe for information known in advance about the wage a job paid. In the directed search model, respondents would have known the wage before sinking any cost in applying for a job. We used two standards for assessing this knowledge: we asked if the respondent knew the pay exactly and if the respondent had a pretty good idea. We note later that a large fraction of the respondents picked the “pretty good idea” answer and that future work might benefit from an intermediate phrasing.

A third objective is to measure the incidence of on-the-job search. Previous work, such as Moscarini and Postel-Vinay (2008), has tried to answer this question from data on job flows, but the evidence from that source is at best indirect because it does not report on the issue of the option to keep the current job that is so central in wage formation theory. Also, earlier work measures the fraction of *hires* that came directly from other jobs while in this paper we measure the fraction of *workers* with tenure less than 10 years who retained the option to remain on an earlier job when they were hired. The focus on hires rather than workers greatly over-weights high-turnover workers, compared to using an approach based on workers directly. We find that on-the-job search is quite a bit more important than appears from Moscarini and Postel-Vinay’s work.

A fourth objective is to study the information that employers have about a prospect’s current or recent wage. This information has a key role in bargaining, especially when the prospect has the option of keeping the job rather than taking a new job with the employer. Of course, in a survey of workers, we are limited to inquiring about what the worker thinks the employer knew when the worker was hired.

## 4 Survey Design

Our survey is part of the Princeton Data Improvement Initiative, a project to develop new questions for labor force surveys. The questionnaire was patterned after the Current Population Survey and included questions on career experience, job tasks, and occupational licensing. We designed a module to assess the prevalence of wage posting and employer-employee bargaining at the time employees were hired. Based on a focus group, we concluded that individuals who were hired within the past 10 years could recall how knowledgeable they were about the pay on their job when they first interviewed for it, whether the employer

made a take-it-or-leave-it offer, whether they could have remained on their previous job if they had wanted to, and whether their employer was aware of their pay on their previous job prior to making them an offer. Those who were employed at the time of the survey were asked about their current job (87 percent), and those who were unemployed at the time of the survey were asked about their last jobs (13 percent). The unemployment rate for the (weighted) sample as a whole was 5.3 percent.

The survey organization Westat conducted the survey from June 5 to July 20, 2008. Individuals age 18 or older who were in the labor force were eligible for the survey. A total of 2,513 individuals were interviewed, 1,435 of whom were hired in the previous 10 years. Westat used a random digit dial sampling design constructed from a national sampling frame of residential exchanges. The selected numbers were then called and screened to identify households with eligible respondents. One respondent was randomly selected from each eligible household for the interview using the nearest birthday procedure. Up to 15 callbacks were made to try to elicit responses. Some 28 percent of sampled eligible households agreed to participate in the screening questions, and 64 percent of the selected individuals in screened households completed the questionnaire. Thus the response rate was 17.9 percent, using the American Association for Public Opinion Research response rate definition 3 (see [aapor.org/uploads/Standard\\_Definitions\\_04\\_08\\_Final.pdf](http://aapor.org/uploads/Standard_Definitions_04_08_Final.pdf), p. 35).

Westat developed survey weights to compensate for variation in selection probabilities, differential response rates, and possible under-coverage of the sampling frame. The derivation of the sample weights focused primarily on matching the marginal distributions of the Current Population Survey by sex, age, educational attainment, census region, urbanization, race, Hispanic ethnicity, employment status, and class of employer (private, government, etc.). See [irs.princeton.edu/PDIIMAIN.htm](http://irs.princeton.edu/PDIIMAIN.htm) for a detailed description of the derivation of the sample weights and the questionnaire.

Although the survey response rate is low compared to many government labor force surveys, it is comparable to that in commercial surveys. Groves and Peytcheva (2008) show that survey nonresponse rates by themselves are not associated with significant bias. Low response rates are a concern when the causes of participation in the survey are correlated with the survey variables of interest. We do not believe that wage-formation practices from years earlier would be correlated with survey participation. The response rate was low in large part because many households declined to participate in the screener questions, which

did not mention wages or job search at all. Another reason for placing some confidence in the representativeness of our sample is that a standard Mincerian wage regression using data from the survey closely matched the corresponding regression from the Current Population Survey. Although we would have preferred a higher response rate, we have no reason to believe that nonresponse skews our results in favor or against any particular wage formation model.

## 5 Findings

### 5.1 Descriptive logit model

To describe our survey findings, we use a logit probability model for yes-no variables constructed from the respondents' answers. The model predicts the probability of a yes answer, given a set of variables describing the individual and the job. These variables are

- Indicator for African-American individual
- Indicator for Latino or Latina individual
- Indicator for a woman
- A set of indicators for education, in five categories
- An indicator for union membership
- A set of indicators for private, government, and non-profit employer
- A constant

We use a weighted logit estimator because the purpose of estimation is to describe the responses, not estimate underlying parameters. We use the resulting logit model to make statements about responses in different subsets of the population.

We experimented with additional right-hand variables, including years of work experience, but found only small variations in estimated probabilities for groups defined by these variables.

We consider a base case: individual not African-American, not Latino or Latina, a man, high-school education but no college, not a union member, and working for a private employer. We display the results as probabilities of a yes answer for alternative groups from the

base case involving only one of the indicator variables at a time. The logit model permits calculations of estimated probabilities for any combination of the characteristics.

## 5.2 Evidence about the Relative Importance of Wage Posting and Bargaining

Table 1 describes the answers to the question, “At the time that you were first interviewed for your job, did you already know exactly how much it would pay, have a pretty good idea of how much it would pay, or have very little idea of how much it would pay if you got it?” In the left panel, we consider the probability of the answer that the respondent knew exactly how much it would pay. We believe that this answer would be chosen by individuals who had applied for a job after seeing a formal description that included a committed rate of pay. In the right-hand panel, we consider the group who responded that they knew exactly or had a pretty good idea.

On the left, in the base case, 34 percent of the respondents in the base group reported that they knew exactly how much the job paid before the employer learned about the respondent. The weighted unconditional sample mean is 31 percent. The difference arises from the fact that the base group is not representative of the entire sample.

On its face, this evidence suggests that nearly a third of jobs involve posted wages. We do not push this interpretation too far, because, on the one hand, another 50 percent of the respondents in the base group said they had a pretty good idea of what the job would pay, and, on the other hand, job-seekers could know the wage even if it were not a committed, posted wage. In standard bargaining models with no private information, either Nash or alternating offer, the worker knows in advance what wage will result from bargaining.

The left panel of Table 1 shows that an African-American worker otherwise in the base group has a somewhat lower likelihood, 30 percent, of knowing the pay in advance, while a Latino or Latina has an even lower likelihood, 26 percent. Women have essentially the same likelihood as men. The probability of knowing pay in advance falls substantially with education. Union members and those who took government jobs report knowing the wage exactly with substantially higher frequency.

The right panel of Table 1 tabulates the combined frequency of the two answers, “knew exactly” and “had a pretty good idea” about wages at the time of the first interview. In the base category, 84 percent of the workers chose one of these two responses. The remaining

	<i>Based on response, knew pay exactly</i>		<i>Based on responses, knew pay exactly or had pretty good idea</i>	
	<i>Coefficient (standard error)</i>	<i>Probability of knowing pay before interview (percent)</i>	<i>Coefficient (standard error)</i>	<i>Probability of knowing pay before interview (percent)</i>
Base case		34		84
African-American	-0.17 (0.36)	30	-0.31 (0.32)	79
Latino/a	-0.37 (0.32)	26	-0.45 (0.28)	76
Woman	-0.08 (0.17)	32	-0.22 (0.21)	80
Education				
Not HS graduate	-0.16 (0.37)	30	0.05 (0.41)	84
Some college	-0.16 (0.22)	30	0.06 (0.27)	84
College graduate	-0.61 (0.24)	22	0.28 (0.27)	87
Professional training	-0.71 (0.29)	20	0.41 (0.34)	88
Union member	0.66 (0.23)	50	0.68 (0.34)	91
Government job	0.68 (0.24)	50	0.27 (0.32)	87
Non-profit job	0.23 (0.24)	39	-0.20 (0.26)	81
Constant	-0.67 (0.22)		1.63 (0.23)	
Number of observations	1368		1368	

Table 1: Probability of Knowing What the Job Would Pay

answer, “very little idea of how much it would pay,” appealed to only a minority of the respondents. It would have been useful to suggest another response somewhere between “exactly” and “pretty good idea.” Except for a reversal of the pattern of education effects, the differences among respondents captured by the variables are similar. Apparently the most educated workers are the least likely to admit they were clueless about pay when they applied for a job.

Table 2 summarizes the responses to the question, “When you were offered your (current/previous job), did your employer make a ‘take-it-or leave-it’ offer or was there some bargaining that took place over the pay?” The table describes the probability that a respondent would answer that some bargaining occurred. A respondent with the base characteristics has a probability of 35 percent of that response. As we discussed earlier, the absence of bargaining implied by that response does not necessarily mean that the respondent believed that the employer was committed to the wage offer and would not have entertained a counter-offer. In an alternating-offer equilibrium, the job-seeker can make a counter-offer and the employer would consider it, but the job-seeker never does, because the original offer was made with that possibility in mind and was high enough to make a counter-offer not worth the effort. Thus, in some ways, it is a surprise that 35 percent in the base group replied that some bargaining did take place. The observed incidence of bargaining arises from departures from the assumptions of the full-information alternating-offer bargaining game. The departures could include private information, potentially on both sides, and biased assessments of worker and job characteristics.

The frequency of no-bargaining responses varies substantially among job-seekers. It is higher than the base-case level among African-Americans (42 percent) and Hispanics (44 percent). Women, at 23 percent, are rather less likely than the men in the base case to bargain. The incidence of wage bargaining rises dramatically with education. Respondents with professional education had a probability of 75 percent of a bargaining during hiring. Finally, and not surprisingly, union members (16 percent) and government workers (20 percent) had low propensities to report bargaining over pay.

Do employers determine and post wages prior to screening workers or do they make an offer to a worker after screening that is, in principle, negotiable via a counter-offer? No single question in the survey answers this important question. The results above showed that about a third of workers know wages exactly prior to their interviews and that about two-thirds



	<i>Coefficient (standard error)</i>	<i>Probability of bargaining (percent)</i>
Base case		35
African-American	0.31 (0.35)	42
Latino/a	0.39 (0.27)	44
Woman	-0.59 (0.17)	23
Education		
Not HS graduate	-0.43 (0.43)	26
Some college	0.54 (0.25)	48
College graduate	1.02 (0.24)	60
Professional training	1.73 (0.28)	75
Union member	-1.06 (0.31)	16
Government job	-0.76 (0.26)	20
Non-profit job	-0.21 (0.23)	30
Constant	-0.63 (0.24)	
Number of observations	1321	

Table 2: Probability that Some Bargaining Occurred over Pay

viewed their pay offer as having a take-it-or-leave-it character. The left panel of Table 3 describes the respondents who said they knew the pay exactly prior to being interviewed and that there was no bargaining over pay. The likelihood that a base-case respondent gave these two answers is 22 percent. As an estimate of the fraction of workers whose wages were posted, this estimate has biases in both directions. It is an underestimate if workers felt they did not know the pay exactly, even though they were well informed. It is an overestimate on account of workers who anticipated how bargaining would later come out, but received a customized wage influenced by the employer’s inability to disregard a job-seeker’s counter-offer. The essence of the posted-wage model is the employer’s commitment to disregard counter-offers.

The right-hand panel of Table 3 describes the respondents who knew the pay exactly or had a pretty good idea about the pay, prior to the interview with the employer, and who reported the absence of bargaining over pay. This set of estimates probably over-corrects for the bias associated the word “exactly” in the survey question—some of the respondents who said they had a pretty good idea probably learned quite a bit about pay when they received their offers. Just over half of the respondents in the base group (54 percent) gave the responses consistent with wage posting according to the more inclusive criterion in the right-hand panel. We noted earlier that it would be useful to develop a way to ask about advance pay knowledge somewhere between exact and pretty good knowledge.

The left-hand panel of Table 3 shows large variations across categories of workers in the estimated incidence of wage posting based on the less inclusive criterion. African-Americans and Hispanics face slightly lower likelihoods, at 18 percent and 16 percent. Women are higher than the base value, at 26 percent. The incidence of wage posting declines dramatically with education, from 19 percent for those who did not complete high school to 6 percent for those with professional training. The higher incidence of wage posting for the least educated is consistent with the view that a wage constrained by the minimum wage is inherently posted. Somewhat more than 10 percent of the respondents earned the minimum wage.

At 41 percent, wage posting is far more common for union members. Similarly, government jobs, at 43 percent, are substantially more likely to have posted pay, compared to the base case. The logit coefficients in the right-hand panel are generally similar to those in the left-hand panel. Most of the difference comes from the much higher constant for the more inclusive criterion, so the probabilities on the right are roughly proportionally higher than

those on the left.

We believe this evidence indicates a higher incidence of wage posting in the more standardized jobs available to those who have not graduated from college and the lower incidence among college graduates and those with professional education. A finding that supports this interpretation is that workers who reported that their workday mainly involved carrying out short, repetitive tasks were much more likely to be in jobs classified as wage posting.

### 5.3 Evidence about Factors that Influence Bargaining

Table 4 summarizes the responses to the question, “Think back to the time when you were offered your (current/most recent) job. When you were offered this job, was it possible for you to keep your previous job instead if you wanted to?” Our interest in this topic derives from the value of the option to keep a current job in a bargaining setting, so we have a particular interest in learning the frequency of the option among those who can benefit from it. The sample includes those who were not employed immediately prior to obtaining their most recent job (coded as unable to keep their previous job). The left panel describes the answers among all respondents and the right panel those who said that they had bargained over pay for the new job.

Among all respondents, in the left-hand panel, the table shows that an individual in the base category had a 39 percent chance of answering yes. Thus a substantial minority of job-seekers has the bargaining advantage of the option of keeping an existing job. This figure is essentially the same among the respondents who said they actually bargained for pay in the process of taking their current jobs.

Variations from the base-case probability of retaining a previous job are relatively small, according to Table 4. Minority members are slightly more likely to retain the option and women slightly less likely. The likelihood of the option is a bit lower for the least educated and a bit higher for college graduates, though just the same as in the base case for those with graduate training. Union members are also slightly more likely to have the option of keeping an existing job.

A reasonable summary of these findings is that among workers in general and among those who bargained for their current pay, about 39 percent had the option of staying at their earlier jobs. Note that the fraction of job-seekers with the option is necessarily higher than this 39 percent. Our data omit instances in which employed job-seekers decided that a

	<i>Based on response, knew pay exactly</i>		<i>Based on response, knew pay exactly or had pretty good idea</i>	
	<i>Coefficient (standard error)</i>	<i>Probability of answer suggesting posted wage (percent)</i>	<i>Coefficient (standard error)</i>	<i>Probability of answer suggesting posted wage (percent)</i>
Base case		22		54
African-American	-0.26 (0.45)	18	-0.36 (0.33)	45
Latino/a	-0.42 (0.40)	16	-0.39 (0.27)	44
Woman	0.22 (0.20)	26	0.42 (0.16)	64
Education				
Not HS graduate	-0.18 (0.44)	19	0.06 (0.36)	55
Some college	-0.32 (0.25)	17	-0.36 (0.22)	45
College graduate	-0.82 (0.25)	11	-0.73 (0.23)	36
Professional training	-1.45 (0.36)	6	-1.25 (0.26)	25
Union member	0.90 (0.26)	41	1.04 (0.28)	77
Government job	1.00 (0.28)	43	0.58 (0.24)	68
Non-profit job	0.49 (0.28)	31	0.07 (0.22)	56
Constant	-1.28 (0.22)		0.16 (0.21)	
Number of observations	1317		1317	

Table 3: Probability of Wage Posting under Two Criteria

new job was not as desirable as their existing job and therefore remained at the job despite receiving another offer. Our framework focused on the beginning of the current or most recent job and did not inquire about job offers received in the course of that job.

Table 5 describes the answer to the question, “Did your [current/most recent] employer learn how much you were making in your previous job before making you your job offer?” Knowledge of earlier pay is useful to the employer in cases where the wage is not posted and therefore committed prior to learning about the worker. The left panel reports probabilities for the entire sample. The likelihood of a yes answer is 53 percent in the base case. Respondents with other characteristics varied only a small amount from this value. As expected, employers learned earlier pay less frequently for union members and for government jobs, but the difference is small.

The middle panel of Table 5 considers a group for whom the employer has more to gain from learning earlier earnings, those seeking jobs from employers who bargain. Although employer knowledge of earlier pay is more common in that group, the difference is small.

Knowledge of earlier pay is particularly valuable for a worker who has the option of remaining at the job with that rate of pay. An employer would like to make a wage offer just enough to attract the worker from that job but not over-pay. The right-hand panel of Table 5 shows that there is no meaningful difference between workers who had the option and those who did not.

The finding that many employers made an effort to learn earlier pay rates gives some support to the hypothesis that wage posting is not the dominant mode of wage formation.

## 6 Conclusions

The two leading models of individual wage formation are both important in the labor market of the United States. Between a quarter and a half of workers hold jobs that were filled with posted wages. Jobs held by women and by people with little education are more likely to have been posted-wage positions. College graduates and those with professional training are rather unlikely to hold posted-wage jobs. Posted wage jobs are also common in the government and union sector.

The evidence suggests that most of the remaining workers do not face posted wages but could make a counteroffer that an employer could not resist considering. About a third of workers report explicit bargaining over pay. From bargaining theory, it is reasonable to infer

	<i>All respondents</i>		<i>Respondents who bargained for pay</i>	
	<i>Coefficient (standard error)</i>	<i>Probability of keeping earlier job (percent)</i>	<i>Coefficient (standard error)</i>	<i>Probability of keeping earlier job (percent)</i>
Base case		39		40
African-American	0.27 (0.29)	46	0.38 (0.49)	49
Latino/a	0.08 (0.25)	41	0.17 (0.40)	44
Woman	-0.09 (0.16)	37	-0.19 (0.25)	35
Education				
Not HS graduate	-0.01 (0.35)	39	0.30 (0.75)	47
Some college	0.13 (0.21)	43	0.16 (0.42)	44
College graduate	0.20 (0.22)	44	0.31 (0.41)	48
Professional training	0.01 (0.25)	39	0.11 (0.43)	42
Union member	0.30 (0.22)	47	-0.34 (0.49)	32
Government job	-0.13 (0.22)	36	0.21 (0.39)	45
Non-profit job	-0.02 (0.21)	39	0.47 (0.34)	52
Constant	-0.43 (0.19)		-0.41 (0.40)	
Number of observations	1362		469	

Table 4: Probability that the Previous Job Could Have Been Kept

<i>All respondents</i>		<i>Respondents who bargained for pay</i>		<i>Respondents who could have kept previous job</i>		
	<i>Coefficient (standard error)</i>	<i>Probability that employer learned earlier pay (percent)</i>	<i>Coefficient (standard error)</i>	<i>Probability that employer learned earlier pay (percent)</i>	<i>Coefficient (standard error)</i>	<i>Probability that employer learned earlier pay (percent)</i>
Base case		53		64		54
African-American	-0.48 (0.31)	42	0.08 (0.56)	66	-0.74 (0.40)	34
Latino/a	-0.04 (0.25)	53	-0.44 (0.38)	54	-0.12 (0.37)	51
Woman	0.05 (0.16)	55	-0.17 (0.26)	61	0.20 (0.24)	60
Education				64		54
Not HS graduate	-0.27 (0.36)	47	-0.99 (0.73)	40	-0.20 (0.53)	48
Some college	-0.26 (0.22)	47	-0.42 (0.42)	54	0.02 (0.32)	55
College graduate	-0.17 (0.22)	49	-0.46 (0.41)	53	0.22 (0.33)	61
Professional	0.01 (0.26)	54	-0.08 (0.43)	63	0.25 (0.39)	62
Union member	-0.21 (0.23)	48	0.54 (0.52)	76	-0.14 (0.32)	50
Government job	-0.28 (0.23)	46	0.01 (0.39)	65	-0.47 (0.32)	41
Non-profit job	-0.03 (0.22)	53	-0.18 (0.40)	60	-0.14 (0.33)	50
Constant	0.14 (0.20)		0.60 (0.38)		-0.17 (0.27)	
Number of observations	1197		430		530	

Table 5: Probability that the Employer Learned Previous Pay before Making Job Offer

that a fair number of others could have made a counteroffer, but employers, recognizing that possibility, make a satisfactory initial offer.

Wage-formation theory emphasizes the importance of the option that a job-seeker may have to retain a current job. The option is powerful in forcing a prospective employer to bid high to hire the worker. We find that 39 percent of workers in the base group had this option when they took their current jobs. This estimate is higher than some earlier ones based on data on flows in the labor market. On-the-job search is a central feature of the U.S. labor market.

Finally, we find that about half of workers report that their new employers learned the workers' earlier pay rates before making them job offers. Employer interest in earlier pay is an indication against wage posting. Employers presumably use the information to formulate a satisfactory offer to workers who retain the option on earlier jobs. The information is not sufficiently widespread and employers are unable to commit to ignore counteroffers, else the U.S. labor market would suffer from the Diamond paradox. Instead, many workers appear to earn substantial Ricardian rents.



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