

# Who Set Your Wage?

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## **I. A Brief History: 1932–1970**

- In the final chapter of her book, Robinson (1933) laid out a model of a firm with a combination of price-setting and wage-setting power, and showed that the result was a “double wedge” between marginal productivity and wages, reflecting the markup of prices over marginal costs and the markdown of wages relative to value marginal products.
- Why didn’t this idea catch on?
- I think there are several explanations. The first is that her framework describes “perfect” monopoly and “perfect” monopsony.
- She offers very little guidance on intermediate levels of market imperfection in either market, and says nothing about the interactions between competing firms in such intermediate cases—a criticism raised in the early review by Kaldor (1934) and freely acknowledged by Robinson herself (Robinson 1953).

- A second and related reason is that the simple geometric apparatus developed by Robinson (and also used by Chamberlain in his book published in the same year) was not very useful for further analytical exercises.
- Stigler (1949) made this point forcefully with respect to Chamberlain's theory of monopolistic competition, arguing "... it has not been useful in the concrete analysis of economic problems, in the sense that it does not contain more accurate or more comprehensive implications than neoclassical theory."
- The importance of a tractable framework is underscored by the current status of Chamberlain's idea.

- A third explanation is that in simple monopsony models, firms are ready and willing to hire any qualified worker who is willing to accept their offered wage.
- Indeed, a monopsonistic firm is always starved for labor.
- Proposing such a model in the depths of the Great Depression was not ideal timing for Robinson.
- In contrast, in today's economy the idea of labor-starved firms is more attractive.
- Fourth, the question of how wages and prices are set got caught up in the grand ideological debate over alternative economic systems that occupied many minds during the twentieth century.
- Robinson rather dogmatically insisted that any divergence between marginal products and wages represented a failure of market capitalism.

## **II. New Theoretical Frameworks**

- Early analysts (including Robinson and Reynolds) recognized two alternative explanations for a less-than-perfectly elastic supply of labor to a given firm: information frictions and idiosyncratic preferences for different jobs.
- New models of optimal search and of the demand for differentiated products that were developed in the 1970s provided the foundations to formalize these explanations.

## *A. Search Models*



- Research in the late 1960s (including McCall 1970 and Mortensen 1970) led to an elegant theory of optimal search by unemployed workers faced with an exogenous distribution of potential wage offers.
- Almost immediately, Diamond (1971) and Rothschild (1973) noted difficulties with endogenizing the wage offer distribution in this setting.
- To sidestep this problem, much of the subsequent literature has followed the lead of Diamond (1982); Mortensen (1982); and Pissarides (1985) and switched to a model of search over job match quality (see Pissarides 2010).
- Since wages have no allocative role in such models, they are not particularly helpful for analyzing wage-setting power.
- The canonical status of these models may have also led to an overemphasis on the importance of match effects in wage determination and labor market dynamics.

## *B. Differentiated Demand Models*

- Chamberlain (1933) considered a model in which firms produce a differentiated set of products and set prices ignoring strategic interactions with other producers.
- This model translates directly to the supply side, though to the best of my knowledge Bhaskar and To (1999) were the first to try to formalize the idea of monopsonistic competition.
- Chamberlain's simple graphical analysis was reproduced in many undergraduate textbooks, but (as noted above) had a limited impact on subsequent research until Spence (1976) and Dixit and Stiglitz (1977) wrote down CES-style models of representative agent preferences that rationalized his framework.
- Models based on these preferences (and generalizations with a nested CES structure) have proven amenable to a multitude of applications in different fields.
- Recently, Berger, Herkenhoff, and Mongey (2021) have adapted the approach to the study of wage setting.

- An alternative approach to modeling demand for differentiated products is the multinomial logit (MNL) model proposed by McFadden (1974, 1978).
- The MNL and its generalizations specify individual-level preferences that lead to convenient expressions for the share of consumers that purchase each product (Berry 1994), and are widely used in industrial organization (IO) and labor economics. Card et al. (2018) proposed the use of MNL style preferences to model the dispersion in tastes for different workplaces.
- If employers ignore strategic interactions in wage setting, their setup leads to very simple expressions for the supply of labor to individual firms which can be used to rationalize the firm effects in a model like that of Abowd, Kramarz, and Margolis (1999).

- While the “representative agent CES” approach and the “individual level MNL” approach might appear to be very different ways of modeling consumer demand (or labor supply), Anderson, de Palma, and Thisse (1978) and Verboven (1996) showed that at the market level they are isomorphic (subject to functional form choices about the terms in the CES function and the indirect utility function in the MNL).
- This isomorphism is extremely convenient and in principal allows analysts to proceed with either approach, and build on advances that have been made in the two literatures.

**III. Empirical Evidence in the First Three  
Decades of Modern Labor Economics:  
1965–1995**

- “Modern” labor economics began in the mid- 1960s with the release of individual microdata from the 1960 census (e.g., Cain 1966; Hanoch 1967; Bowen and Finegan 1969), the Survey of Consumer Finances (e.g., Stafford 1968) and the Survey of Economic Opportunity (e.g., Ashenfelter 1972).
- As noted by Stafford (1986), these new datasets, along with cross-sectional microdata from the Current Population Surveys and longitudinal data from the Panel Study of Income Dynamics and the National Longitudinal Surveys, propelled research in the field for the next few decades and shaped our current understanding of the labor market.

- Considerations of employer wage setting played little role in this stream of research.
- One reason for this was the influence of economists at the University of Chicago, who were at the forefront of the new “analytical” labor economics (Rees 1976), and strongly advocated for neoclassical modeling.
- Even more importantly, the newly available micro datasets had almost no information on employers.
- Thus, it was extremely convenient to frame the analysis in the setting described by Hicks (1932), where individual employers are irrelevant.



- A second exception was the literature on quits, turnover, and the returns to seniority. Pencavel (1972) and Parsons (1972) presented multi- period models of employer wage setting with a trade-off between wages and quit rates— foreshadowing the dynamic monopsony literature discussed below.
- While the wage-setting equations in these papers are clearly interpretable in a monopsony framework, neither author acknowledged any connection with Robinson, or noted that in a perfectly competitive labor market the quit rate should rise to 100 percent if the wage is set below the “market” rate.

- A problem faced by both papers was the confusion surrounding Becker's (1962) analysis of firm-specific human capital, which addressed what we now call the problem of "relationship-specific investments."
- Many labor economists interpreted Becker as saying that firms choose wages to reduce quits (e.g., Parsons 1972 and Hashimoto 1981) assuming that quits are a smooth function of wages.
- This is equivalent to monopsonistic wage setting.<sup>8</sup>

- In addressing the closely related problem of optimal turnover in a model with a fixed (but unknown) match component, Jovanovich (1979) showed that an equilibrium contract pays the worker the expected value of her match-specific productivity, and allows her to quit when the option value of the current job falls below the option value of a fresh job.
- Jovanovich's model has features of the canonical Diamond-Mortensen-Pissarides search model, but incorporates job-to-job mobility, leading to something like a "worker-specific job ladder" as jobs that are revealed to be worse matches (and therefore have lower pay) are terminated.
- Topel and Ward (1992) interpreted the patterns of wages and turnover for young male workers as evidence of this process, but they did not have rich enough data to tell whether wages include a match-specific component (as in Jovanovich 1979) or whether later-career jobs pay higher wages to all workers (as in the BM model).

## **IV. What Happened in the 1990s?**

- Four new types of evidence have accumulated in the past 25 years that suggest employer wage-setting power is nonnegligible: evidence on quit and recruiting responses to wages, evidence on the relationship between wages and firm productivity, evidence on the concentration of employment in small numbers of employers, and evidence of conspiracies and other forms of firm behavior targeted at suppressing firm-to-firm mobility and wage growth.

## *A. Quit, Recruiting, and Application Elasticities*

- Though many economists acknowledge that quit and recruitment rates vary with wages, the connection between these responses and the elasticity of supply that is relevant for a monopsonistic wage setter does not seem to have been fully appreciated until the seminal paper by BM (which circulated for many years prior to its publication).
- Card and Krueger (1995) noted that in any steady state, the elasticity of labor supply is just the sum of the absolute values of the elasticities of recruiting and quitting.
- Manning (2003) showed that in a simple job ladder model the two are equal: thus, an analyst can estimate one or the other and double it to yield an estimate of the overall supply elasticity.
- Manning's insight provides a tractable method of estimating labor supply elasticities that has been implemented in many different settings.

- Perhaps the most compelling evidence based on this approach comes from the experiment on public sector hiring conducted by Dal Bo, Finan, and Rossi (2013).
- These authors randomly varied the salaries announced at different job sites to potential job applicants for a position in the office of the Regional Development Program in Mexico.
- Taking account of the combined impact of higher wages on application rates and on the probability of accepting a job, they calculate that the elasticity of recruiting with respect to wages is around 2.1 (though rather imprecisely estimated).
- Using Manning's shortcut, the implied (steady state) elasticity of labor supply is around 4.2.11 In a simple monopsonistic model such an elasticity implies that wages are marked down relative to marginal revenue products by about 20 percent.



*B. The Relationship between Wages and Firm  
Productivity*

- In a competitive labor market, more and less productive firms pay the same wages for workers, even if the more productive firms are larger.
- In imperfectly competitive labor markets, however, more productive firms will generally have to pay more to maintain a larger workforce.
- Card et al. (2018) developed a simple partial equilibrium model where workers have MNL preferences over different firms and firms set wages without accounting for strategic interaction effects (i.e., a model of monopsonistic competition).
- They then calibrated the model to (roughly) match the observed degree of pass-through from value added per worker to wages. In the existing literature researchers typically find that wages are about 0.5 to 1.5 percent higher at firms with 10 percent higher productivity.
- In the parameterization of preferences adopted by Card et al., this degree of pass-through is consistent with firm-specific supply elasticities of about four.

- A related method of estimating the degree of wage-setting power is to look at establishment-level responses of employment and wages to an exogenous shock (similar to the pioneering study by Sullivan 1989).
- Berger, Herkenhoff, and Mongey (2021) uses evidence on firm-specific reactions to state tax changes to infer the degree of oligopsony power in a setting with strategic interactions among wage setters (based on Atkeson and Burstein 2008).
- They estimate that the average markdown of wages relative to marginal revenue products is around 25 percent (equivalent to the markdown in a simple monopsonistically competitive model with firm-specific elasticities of around 3.5).
- Kroft et al. (2020) extend the setup in Lamadon, Mogstad, and Setzler (2022) using information on successful bids in government procurement auctions as firm-specific demand shocks that affect employment and wages at larger construction firms.
- They estimate labor supply elasticities in the range of four to five.

*C. The Number of Competitors for Labor Services*

- In thinking about price-setting or wage-setting power many economists turn instinctively to the question of how many potential sellers or buyers are present in a market, or to the degree of market concentration measured by the Herfindahl-Hirschman index (HHI).
- As noted by Berry, Gaynor, and Scott Morton (2019); Syverson (2019); and Eeckhout (2021), simple measures of the number of competitors or their concentration do not necessarily provide a clear index of market power.
- Nevertheless, a common perception (among judges for example) is that the number of potential employers for any given worker is large, and that the market power of employers is therefore negligible.

- One of the most surprising findings in the recent literature is that for many workers in many local markets the number of potential employers is relatively small, particularly when the “market” is defined by actively searching firms.
- Azar et al. (2020), for example, use data on the near universe of US vacancy listings to calculate HHIs for labor markets at the narrowly defined occupation-by-commuting zone (CZ) level.
- They estimate that an average labor market has an HHI of around 4300—equivalent to 2.3 equal sized recruiting firms.
- This is low enough to possibly raise concerns about the effect of mergers and acquisitions on labor outcomes (see Naidu and Posner 2021).

- A growing number of papers study the relationship between average wages for a specific subgroup of workers in a given local market and the HHI of potential employers in that market.
- These studies differ in how they define the set of potential employers (based on industry or occupation), how they count employment (based on the stock of employment, the number of job openings, or some transition-probability-adjusted stock of employment), and whether they use a purely observational approach, or implement a research design that isolates some exogenous component of the local HHI.
- Despite these differences, most recent studies seem to show a negative effect of higher concentration on wages, with elasticities between the HHI and wages on the order of  $-0.05$  to  $-0.15$ .

- Recent studies by Arnold (2020) and Prager and Schmidt (2021) use event study designs to look at the effects of merger and acquisition activity on local HHIs and wages.
- In my opinion, these designs provide the best available evidence that employer consolidations that raise the HHI have significant negative effects on wages, at least for workers who are highly attached to the affected industry.



*D. Conspiracies and Other Arrangements to Suppress Competition*

- Adam Smith (2003, p.94-95) wrote that employers “are always and everywhere in a sort of tacit, but constant and uniform combination, not to raise the wages of labor above their actual rate.”
- He also noted, however, that “(w)e seldom, indeed, hear of this combination, because it is the usual, and one may say, the natural state of things, which nobody ever hears of.”
- While discoveries of employer collusion are still relatively rare, in the past two decades there have been a number of lawsuits and public disclosures that provide the details of some agreements to suppress competition.
- These provide a useful perspective on the mechanisms generating market power for employers.

- The best-known lawsuit concerned “no poaching” and “no solicitation” agreements affecting software and animation engineers in Silicon Valley (see Ashenfelter et al. forthcoming for more details).
- The agreement originated in the mid-1980s when Lucasfilm sold its computer animation division to Steve Jobs, who then renamed the company “Pixar.”
- To avoid bidding wars over employees, Lucasfilm and Pixar agreed (i) not to “cold call” each other’s employees; (ii) to notify the other company should they receive an application for employment; (iii) and that all offers to employees at the other company would be “final,” with no further bidding.
- Ultimately this agreement was extended to other high- tech firms (e.g., Google, Microsoft, and Oracle) and lasted over 20 years, until 2008.

- The size of the settlement to affected engineers (\$585 million in two suits), and other wage adjustments made after the agreement was made public (e.g., a 10 percent across-the-board increase offered by Google to all its employees in November 2010) suggest that the suppression of between-firm competition was successful—a validation of the idea that at least some labor markets are vulnerable to wage fixing.
- Another interesting lawsuit concerned a “no hire” agreement between the medical schools at Duke University and University of North Carolina (Seaman v. Duke).
- This case, which resulted in a settlement of around \$10,000 for each member of the medical faculties at the two schools, reveals how localized competition appears to matter, even for workers who arguably face a national market.

- While one might be tempted to think that “no hire” and “no poaching” agreements affect only highly skilled workers, Ashenfelter and Krueger (2021) found that no poaching clauses were widespread in US franchise agreements.
- These agreements typically prohibit a franchisee from hiring another franchisee’s employees for some prespecified period of time after an employee’s departure.
- For example, a standard franchise agreement for McDonald’s as of 2016 had a clause stating: “Franchisee shall not employ or seek to employ any person who is at the time employed by McDonald’s, any of its subsidiaries ... or otherwise induce, directly or indirectly, such person to leave such employment” (quoted in Ashenfelter and Krueger 2021).
- The prohibition extended to employees for six months after leaving another McDonald’s job.

## **V. An Agenda for the Future**

- It is presumptuous for anyone to try to influence the direction of research in a large and fractious field like labor economics.
- Nevertheless, I have two suggestions for where I see the most exciting possibilities for progress: more and better models; and a sustained effort to move the entire topic of wage setting into the hands of (labor) economists.

## *A. Models*



- There are two main approaches to modeling the factors that generate upward-sloping supply curves: search frictions (which Manning 2021 calls the “new monopsony”) and idiosyncratic preferences for jobs (which Manning calls the “new classical monopsony”).
- Both approaches have some strengths and some weaknesses.
- The search approach directly addresses turnover, which is a key feature of labor markets and appears to be the main mechanism for between- firm competition.
- Models with on-the-job search also create a job ladder, which is a very useful construct for understanding the costs of job displacement and the effects of recessions (e.g., Altonji, Smith, and Vidangos 2013; Moscarini and Postel- Vinay 2018).

- Models based on idiosyncratic preferences, on the other hand, ignore imperfect information but assume that most people simply don't want another job, even if it pays more.
- On the positive side, these models build directly on established frameworks from IO and trade: the accumulated experience in those fields will be very helpful, particularly in addressing strategic interactions between wage setters (as in Berger, Herkenhoff, and Mongey 2021).
- On the negative side, there is no job ladder or any particular cost of losing the current job: everyone is employed at their best option, given the wage and nonwage amenities offered by different employers.
- Employers are starving for workers, but are nonetheless setting wages below marginal revenue products to capture some of the surplus from inframarginal workers.
- Such a framework seems unlikely to yield helpful insights about recessions or depressed local labor markets.

- Manning (2021) suggests that one way to combine some of the strengths from both approaches is to assume that workers have idiosyncratic preferences over current job openings, and that—as in directed search models—one of the attributes of an opening is the size of the application pool.
- This seems like a promising direction.
- Another idea is to assume more complicated task-based production functions for firms that lead to minimum skill standards—so many jobs are “off limits” for most workers, even within a given observed skill group (e.g., Haanwinckel 2020; Huckfeldt 2022).
- This might be a way to incorporate the cyclical upgrading process discussed by Reder (1955) and Okun (1973).

*B. Who Should Study Wage Setting?*

- Once we accept that firms set wages, the analysis of wage setting becomes a part of labor economics, just like the analysis of price setting is a part of IO.
- Right now, much of the practical discussion of wage setting is done by noneconomists.
- Human resources departments at large corporations are often staffed by people with primary training in social psychology or sociology.
- Most business schools have almost no courses on wage setting, and few if any that feature standard economic ideas.
- By insisting that “markets set wages,” labor economists ceded the field, and had very little to say about questions like the design of online labor markets, or the effects of no-solicitation or no-poaching agreements—other than that they should not matter.
- We also distanced ourselves from other economists—particularly those in IO—who were busy developing useful models of market power and strategic decision making.

- One of the most exciting developments in the field today is the evidence of labor economists taking questions about wage setting seriously.
- This effort began with Manning's (2003) landmark book: I hope that the growing body of work since then finds its way into the classroom and into the textbooks soon.
- I also expect this work to lead to some rethinking on policies such as minimum wages, the regulation of trade unions, and anti-trust (see Langella and Manning 2021, and Naidu and Posner 2021).
- Perhaps we may even see a reevaluation of the widespread belief that excessive wages are the root cause of many economic problems.
- After all, if your employer set your wage, it's hard to believe that it's too high.