



UC SANTA BARBARA
Laboratory of Aggregate Economics and Finance

Volume XV
No. 3
Winter 2022

FROM THE LAB

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conference held February 25–26, 2022

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Director's Message

Finn Kydland



The purpose of this conference was to focus on the role labor markets play in determining broader macroeconomic outcomes. Bringing together a diverse group of researchers who study both new labor data sets and new theories of the labor market, the conference main goal was to broaden our understanding of how labor market outcomes are affected by and contribute both to short-run business cycles and to long-run economic trends. Participants considered both aggregate labor market outcomes and how macroeconomic forces disproportionately impact individual workers and firms across the wage, income, skill, and productivity distributions. Discussions arising from this conference will help inform policymakers seeking both aggregate labor market stability and more equitable labor market outcomes for a diverse set of both workers and employers.

The academic organizers were Assistant Professor of Economics David Wiczer at Stony Brook University, Assistant Professor of Economics Ben Griffy at SUNY Albany, and Nick Pretnar, Postdoctoral Scholar at the University of California, Santa Barbara.



Labor Markets and Macroeconomic Outcomes

February 25–26, 2022

Serdar Birinci – Federal Reserve Bank of St. Louis
Sydnee Caldwell – UC Berkeley
Jason Faberman – Federal Reserve Bank of Chicago
Rod Garratt – UC Santa Barbara
Andy Glover – Federal Reserve Bank of Kansas City
Victoria Gregory – Federal Reserve Bank of St. Louis
Ben Griffy – SUNY Albany
Malin Hu – Vanderbilt University
Marianna Kudlyak – Federal Reserve Bank of San Francisco
Finn Kydland – UC Santa Barbara
Rocio Madera – Southern Methodist University

Paolo Martellini – University of Wisconsin-Madison
Guido Menzio – New York University & NBER
Yusuf Mercan – University of Melbourne
Simon Mongey – University of Chicago
Nicolas Petrosky-Nadeau – Federal Reserve Bank of San Francisco
Nick Pretnar – UC Santa Barbara
Stan Rabinovich – University of North Carolina at Chapel Hill
Brenda Samaniego de la Parra – UC Santa Cruz
Keiran Walsh – UC Santa Barbara
David Wiczer – Stony Brook University

Photo above: Santa Barbara Harbor. Credit: Tony Mastres. UC Santa Barbara

Stubborn Beliefs in Search Equilibrium

Guido Menzio



Although rational workers should adjust their expectations when economic conditions change, empirical evidence shows that workers

have stubborn beliefs. This departure from rational expectations affects the search equilibrium in the economy.

Menzio began by introducing a model environment in which identical firms were matched with unemployed workers who had stubborn beliefs about the firms' productivity, and the two parties bargained over the wage. A participant asked why the probability of match dissolution should differ by whether the worker or firm made the first offer, as it does in Menzio's model; Menzio responded that he set the probabilities to be equal when he performed calculations, but allowed flexibility in the theoretical model.

Some participants suggested adding complexity to the model. One audience member asked why the model did not incorporate search effort, pointing out that workers' irrational optimism should affect the effort they would exert in the job-finding process. Another suggested

that workers' beliefs were sticky rather than fully stubborn, meaning that they would adjust their beliefs, but only in response to extreme evidence. Menzio's model does not allow workers to adjust their beliefs at all.

Multiple participants were interested in heterogeneity across workers, noting that while workers might be stubborn on average, they would not have identical beliefs about firms' productivity levels. Other participants were interested in adding endogenous separation, as all separations in the current version of the model were exogenous. Menzio agreed that these suggestions could lead to interesting extensions of his model, but emphasized that he was still in the process of solving the simple version.

When Menzio showed how to find an equilibrium in his model environment, one participant was interested in whether the outcome would depend on whether the worker or the firm made the first wage offer. Menzio explained that the outcome would not depend on who made the first offer in this setting. Participants pressed Menzio on why workers never updated their beliefs, even after experiencing a bargaining process in which the firm's behavior was inconsistent with the worker's beliefs. Menzio argued that workers would believe that a

single firm made a mistake rather than change beliefs about all firms.

Menzio showed the bargaining process and the resulting equilibrium under rational expectations and two types of stubborn beliefs: one where the worker observed firm productivity and another where firm productivity is assumed equal to the long-run average. Menzio argued that with stubborn beliefs, the worker's wage when employed would not depend on the firm's productivity. A participant argued that the firm's productivity should change the wage each period. Menzio clarified that in his model, bargaining with the worker happened only at the time of hiring. After hiring the wage would be constant.

Menzio compared his three equilibria, showing that the elasticity of labor market tightness was lowest in the rational expectations equilibrium and highest when workers had stubborn beliefs and did not observe firm productivity. He then calculated the social planner's optimal subsidy on employment in each equilibrium to show that the efficiency of equilibrium decreased as the elasticity of labor market tightness increased. He concluded with an extension in which only a fraction of workers held stubborn beliefs, while others were rational.

Wage Posting and Wage Bargaining: Evidence from Linked Survey-Administrative Data

Sydnee Caldwell, Ingrid Haegele and Joerg Heining



Firms can set wages either by bargaining with each worker they hire or by posting, which occurs when the firm makes a single, non-

negotiable wage offer. Whether the firm posts or bargains affects the overall level of employment and how this level responds to shocks. Economists have struggled to identify which option firms use.

Caldwell conducted a survey of German firms to elicit the prevalence of posting and bargaining and used evidence from the survey to study the consequences to wage rigidity. A participant asked whether results from the German survey were relevant to the American labor market. Caldwell responded that some of the results could be extrapolated to the American setting, and that she hoped to expand the project in the future to include American firms.

Many firms ask workers about their salary expectations, which Caldwell considered an initial wage offer by the worker. Participants pushed back against this claim, arguing that the way the question is phrased to job applicants does not lead them to believe they are making a wage offer.

Participants also questioned whether

Caldwell's work was distinct from Hall and Krueger (2010). Caldwell provided two distinctions: the frequency with which firms requested salary expectations in her setting and her ability to classify firms as being willing to bargain, even if a worker chooses not to negotiate. An audience member was curious about the cyclical nature of bargaining, and Caldwell explained that this was a topic she had not yet explored but plans to in another version of the survey.

The survey of German firms was directed at human resource, or HR, professionals, who know their firm's hiring policies. One participant raised a concern about endogenous selection, as larger firms are more likely to have an HR department. Caldwell clarified that when a firm lacked an HR professional, the survey was directed at the person in charge of hiring, thus ensuring small firms remained in the sample. Another participant brought up a recent paper that showed a lack of leftover wage dispersion after controlling for job titles. Caldwell argued that those results were specific to jobs covered by collective bargaining agreements and that, in her setting, she found evidence of wage dispersion resulting from the decision to post or to bargain.

Bargaining policies were elicited for four groups of workers: recent labor market entrants, experienced

non-managers, managers, and high-demand workers in bottleneck occupations. Multiple audience members criticized the idea of a bottleneck occupation, arguing that positions should never be hard to fill when wages are set correctly. Caldwell responded that bottlenecks could arise in a period of transition to new labor market conditions and pointed out that most workers were in the other three categories. Participants asked if Caldwell could observe bargaining between HR and the department hiring a worker, which could affect a posted offer. She explained that she could only observe bargaining between the firm and the worker, not bargaining within the firm.

Caldwell showed evidence of four preliminary results: many posting firms don't publicly advertise their wages; workers often make the first offer; posting firms differ from bargaining firms; and bargaining is more common at high levels within a firm. Participants had several suggestions for future analysis, including weighting firms by size, providing evidence on whether the tendency to bargain depends on firm size, and studying the effects of search time for a worker on a firm's decision to bargain or post.

The Quality-Adjusted Cyclical Price of Labor

Marianna Kudlyak, Mark Bills, and Paulo Lins



Models of employment must account for cyclical changes in the price of labor, but the average wage is not informative about this cyclical

because it does not control for temporal variation in the quality of the worker, the firm, or the worker-firm match. Kudlyak proposes using the expected long-run wage as a measure of the quality of the worker, the firm, and the worker-firm match. Quality could then be separated from cyclical changes in the price of labor.

An audience participant suggested using the wages of new hires to measure quality. Kudlyak responded that an employment relationship should be understood as long-term, with a firm viewing the wage in each period as an installment payment for the asset of the worker's labor. Because the wage of a new hire is only one of those installments, the expected long-term wage is more informative.

The main finding was that the new-hire wage tended to be highly procyclical, increasing by 2.5% in response to a one percentage point decline in the unemployment rate. The audience raised several concerns about this result's reliance on Kudlyak's

measure of quality. A participant asked how Kudlyak accounted for cyclical changes in the quality of individuals at the time of hiring. Another participant wanted to know how the model accounted for on-the-job learning, which would cause match quality to improve over time. Another questioned whether a measure of how much workers produce was necessary in addition to the wage to determine worker quality. And yet another asked whether the long-run wage in the model was distorted by inflation. Kudlyak pointed out that she only used real wages, stripping away inflation. She argued that her method of separating cyclical changes from quality accounted for on-the-job learning and was a sufficient measure of worker quality that did not require additional data on the worker's productivity.

Kudlyak next showed that the user cost of labor has been even more procyclical than the new-hire wage, increasing 4% when the unemployment rate declined by a percentage point. An audience member asked about worker heterogeneity, which could cause the decline in the unemployment rate to be highly dispersed around the 4% average. Kudlyak explained that while she controlled for some features, such as worker education, and classified matches at certain points

in the recession cycle as systematically good or bad, she did not consider worker heterogeneity. However, her method could be applied to workers in different groups to explore heterogeneous effects.

An assumption in Kudlyak's model was that match quality growth did not depend on whether a worker was hired in a recession. Participants were unconvinced that this assumption would hold, arguing that matches in a recession were likely to be lower-quality and therefore have faster quality growth. Kudlyak responded with evidence that hours grew more slowly when workers were hired in a recession, suggesting that matches made in recessions were not of lower quality than other matches. When a participant pointed out that longer hours could be a sign of low productivity instead of growth in match quality, Kudlyak explained that hours growth was the best available evidence that could be used to test this assumption. Participants also questioned whether Kudlyak's results were cohort-specific. She argued that she avoided this issue by using two waves of the National Longitudinal Survey of Youth, each of which includes several birth cohorts.

How Much is a Formal Job Worth? Evidence from Mexico

Brenda Samaniego de la Parra and Bhavyaa Sharma



Mexican employers are legally required to register their workers and to file payroll taxes. However, limited enforcement has left over half the

employed population unregistered and without the government benefits that accompany formal work. This paper estimates the value workers place on formality to determine whether informality results from frictions or from worker preferences. Participants suggested that Mexican workers may prefer informal work because they would rather avoid income taxes than receive government benefits. Samaniego de la Parra's findings showed that workers actually tended to prefer formality, but that firms were able to keep workers in informal jobs due to their higher bargaining power.

The estimated value of being a formal worker included the monetary value of government benefits, long-term labor market advantages, and other utility gains from formal work. A participant asked whether the daycare centers that formal workers could use had enough spots for all workers' children. Others were curious about heterogeneous effects of access to government benefits for different groups of workers. Samaniego de la Parra said that the research did not

explore variation across occupation, age group or belonging to areas with different daycare capacities, but said that including these would be interesting extensions.

The researchers used data from the National Employment and Occupation Survey from 2005 to 2016 and took advantage of inspections that raised the probability of an informal worker becoming formal to estimate the value workers placed on formality. Samaniego de la Parra presented separate wage distributions for high- and low-education workers, where a high-education worker had completed elementary school or more. Participants were surprised that conditional on the job, education did not affect the wage distribution. Samaniego de la Parra pointed out that high- and low-education workers may differ by only a year of education, and participants then questioned whether high and low education were meaningful categories in this setting.

Estimation began with a reduced-form approach to determine the effect of a shock that raised the probability of formalization. Because the shock came through an inspection, an audience member asked whether firms can pay off the inspector, removing the incentive to formalize workers in response to an inspection threat. Samaniego de la Parra argued that whether the firm can pay off the inspector or not, the cost of having an informal worker is higher when the

inspection probability increases, and therefore the likelihood that the firm will formalize workers is higher as well.

Next, a joint labor supply model with informality was estimated. An audience member suggested that the model include firms' risk aversion, which would determine whether firms responded to the shock by formalizing their informal workers. Samaniego de la Parra agreed that the model did not currently account for variation in risk aversion across firms. She showed that she had so far been unable to match the model to the data, partly because the current model was fit for all households, without separation by education. Participants suggested the use of a different weighting matrix, with weights that were proportional to the variance of the moments.

Samaniego de la Parra agreed that she should use a different weighting matrix to increase efficiency. Participants also suggested that future versions of the paper include stronger links between the reduced-form estimates and the model. Preliminary conclusions from the paper were that the value of formality varies by household education and composition, and that informally employed low-education households would be willing to forego 24.3% of their average wages to transition to a formal job.

A Theory of Business Transfers

Paolo Martellini, Anmol Bhandari and Ellen McGrattan



The allocation of capital in the private sector has implications for growth, market concentration and the impact of taxes. When

firms buy other firms, there are forms that must be filled out that reveal how the firm perceives its own capital allocation, particularly in a category like intangibles. Paolo Martellini's research, with co-authors, studies firm dynamics and the allocation of capital in the private business sector and reveals a picture of when and why firms choose to acquire.

Buyers and sellers both fill out forms and have different incentives for categorizations of capital. A participant commented this was indicative of relative bargaining strength and elaborated that this interaction can be thought of as a bargaining process between price of the sale and the categorization decisions.

A participant asked if there were any tax incentives for undervaluing certain categories. Martellini responded that there were, but that there were also incentives to overvalue in order to depreciate quickly. A buyer wants to call everything depreciable property, to lower their tax bill, while a seller wants to call everything goodwill, or intangibles, because then they would pay less in capital gains taxes. A participant mentioned that an existing, alternative model accomplished similar goals, and Martellini pointed out why such a model was inappropriate for his analysis.

The authors' model includes production, capital markets, a process for the way in which buyers and sellers come together, and managerial-owner decision making. An important part of the model is that firms can only trade indivisible units in pairwise meetings. Martellini employs recursive equilibrium with matching, and establishes a structure in which no firms have an incentive to deviate from the one with which they are matched, which is referred to as

pairwise stability.

Firms grow by either acquiring other firms or by investing internally. More productive firms gain a larger share of an industry and attract capital from firms with lower marginal product of capital. The authors calibrated his model using tax data.

A participant asked about the basis for the managerial productivity variable in the the model, and Martellini responded that it was coming from nontransferable ability, meaning that this value would be lost as the firm changed hands. This is actually an important part of his model: the idea that, when acquired, a business unit loses some amount of value in the expertise of its previous owner-manager.

An audience member asked if the competitive equilibrium has public firms, private firms, and transitions from public to private. Dr. Martellini responded that the model did not have public firms. There are only owners selling to owners.

What Drives Trends in Employment to Population Ratios?

Nicolas Petrosky-Nadeau and Huiyu Li



In recent years, labor markets have changed alongside several notable employment trends. Among them are declining male

participation in labor markets; rising, then stable; participation among females, declines in the wage gap between males and females; and a declining share for labor in the national income. The authors, represented by Nicolas Petrosky-Nadeau, are interested in some of these long-run trends in employment-to-population ratios, with a focus on the United States since 1976, prime-age workers, and the effect of nonmarket work.

By modeling these labor markets, the research aims to evaluate the role of competing explanations for these trends, as joint trends in statistics like unemployment and participation rates put boundaries on the roles of these various explanations. The authors used a search model with endogenous participation and employment. Groups compete within a labor market and possible

spillover effects, and participation is determined by a hiring threshold or individual entry and exit decisions.

Petrosky-Nadeau mentioned that these models and its assumptions were standard. A participant asked if the random value of nonmarket work drove entry and exit decisions. Petrosky-Nadeau responded this was true in steady state. Another participant asked what other forces drove the outcomes, and Petrosky-Nadeau responded that changes in the relative bargaining power of different groups with respect to firms on the setting of wages were a key driver.

Their research focused in on nonmarket activity, and how often new values of nonmarket activity are drawn from the distribution, as well as the role of fixed costs of production within a skill group over time. An audience member asked how much of the level difference was attributable to women having children. Petrosky-Nadeau said that children were not explicitly in the model, but were reflected in the frequency and distribution of nonmarket activity. A participant asked about the life cycle decisions of the individuals, and Petrosky-Nadeau responded that one shortcoming of the model was the

absence of such dynamics.

The model includes risk-neutral, infinitely-lived individuals and firms with continuous time. There are two genders with various education levels. An audience member asked if the nonmarket utility would be correlated with the market utility, and Petrosky-Nadeau responded that they were independent. A participant asked where the spillovers were coming from, and Petrosky-Nadeau responded that they came from all types searching in the same labor market and facing the same arrival rate of job offers.

An audience member asked about the model's goals. Petrosky-Nadeau replied that the goal was to match features of the model to the data, and then track how the distributions of these features change over time. A commenter said that if there was no distinction between ability and education for production, then it was unclear why we should worry about education at all. Petrosky Nadeau responded that some of the patterns within demographic groups differed within education categories.

A Congestion Theory of Unemployment Fluctuations

Yusuf Mercan, Benjamin Schoefer and Petr Sedláček



Many existing frameworks for understanding employment dynamics, especially during recessions, do not capture what we see in

empirical data. In particular, hiring of workers tends to be much less in reality than what we would expect from some of these models. Yusuf Mercan presents research, with his co-authors, that tries to explain why poor job creation during recessions can explain some of these dynamics and what drives this weakness in new hiring.

In general, a greater number of unemployed workers should make it less costly for firms to pursue new hiring. But the authors propose a congestion theory of unemployment fluctuation that is driven by the idea that not all workers are the same. An audience member asked if the model assumed unemployed individuals are inherently less productive. Dr. Mercan responded that the unemployed are not necessarily less productive, but that workers are heterogeneous and therefore need to be modeled this way. New hires are imperfect substitutes for existing workers.

The story that Mercan's research

tells is that during recessions firms do indeed hire more workers, as we see in the data, but that this isn't nearly enough hiring to absorb the increase in available workers. Why don't firms hire more? As the absorption of these recently unemployed workers increase, the marginal productivity of labor among new hires declines, making it less attractive to hire yet more people. This is the essence of the congestion effect, and it can help explain other observed features of post-recessionary labor markets as well, such as persistently low wages for those who were hired. A commenter pointed out that the effect of job loss is akin to a scarring effect.

Mercan detailed the empirical evidence and described the paper's VAR, or vector autoregressive, model. Combining these, he and his co-authors model the tightness of the labor market in a manner that improves on previous research. Several participants were interested in how sensitive the VAR model was to the specification. An audience member expressed some confusion about how unemployment would change a worker, to which Mercan replied that the model assumes that these workers lose their on-the-job skills. He acknowledged that this could be too strong an assumption and performed

some of the analysis with a loosened version of this assumption.

An audience member asked how, specifically, the authors modeled this heterogeneity of workers, given the data. Mercan responded that the model focuses on the duration of the unemployment spell. A participant expressed concern about worker recalls in this framework. Mercan acknowledged that 30 to 40 percent of unemployed individuals would qualify as recalls and that he can model this fact with a slight recalibration.

Participants suggested modeling alternatives that could generate some of this congestion, including via decreasing returns in the matching function or via an economy-wide convex hiring cost, each of which Mercan acknowledged. One audience member raised an empirical question as to whether there was strong evidence that productivity of new hires was higher when an economy was in an expansion state, compared to when it was in recession.

Mercan's research suggests that policies like penalties for firing and worker furloughs would help to preserve the firm-employee link. This in turn could lessen some of the severe effects of recession on labor markets.

Default Risk Heterogeneity and Borrower Selection in the Mortgage Market

Malin Hu



Hu documents that statutory debt-payment-to-income limits in U.S. mortgage markets do not bind sufficiently safe borrowers.

The author then

argues that a debt-to-income (DTI) ratio is an insufficient measure of ability to repay and suggests an alternative approach to increase welfare.

The research has three parts: (1) documentation of DTI not binding all borrowers, (2) a structural model, and (3) a calibration and counterfactual exercise. So first, Hu documented that the regulatory DTI ratio of 45% that was implemented after the 2008 financial crisis has non-binding effects. The sample includes Freddie Mac single-home 30-year fixed rate mortgages from 1999 to 2016.

Participants asked for clarification on the focus on DTI rather than actual income. The DTI has been used as a cutoff in regulations, and actual income was not available in the dataset. A participant also raised

concerns about comparing the 2005-2008 distribution of mortgages to the 2009-2016 mortgages, given the differences in the housing market in these periods. Even during this irregular time, Hu explained, the shape of the distribution of DTI remained constant beginning in 1999.

A participant asked about the importance of FICO credit scores in the description of the data. Regardless of the predictive power of the credit score on foreclosure, the metric is treated as very important. If thinking about types of borrowers constrained, there isn't a clear difference between those above and below the limit. Rather, it is likely that there are relatively safe borrowers with optimal constraints.

The standard framework used by Hu was an incomplete-markets life-cycle model with two notable changes. The first is a tractable screening technology that captures in reduced form the ways discretion is employed by financial institutions. The second is discrete types of mortgage contracts allowing the model to flexibly capture costs lenders incur if they exhibit

mortgages that have certain forms.

A participant asked what led to defaults. In the model, defaulting can be an optimal choice for households if they experience a bad loan, a negative income shock, or depreciation shock. A participant asked for clarification of utility over consumption. Hu responded that the utility comes from standard nondurable consumption and housing. Another participant expressed concern over the state contingencies, suggesting DTIs may be a sub-optimal approach. Hu responded that if the DTIs are taken as given, we can imagine there is a negative externality related to defaults, justifying the existence of the policy in the model.

The presentation ended with a description of the calibration and counterfactual analysis. A participant noticed that one potential solution to the problem is to limit the size of houses individuals are allowed to buy. Hu acknowledged smaller houses as a result of the model, and joked about adding a not-in-my-backyard, or NIMBY, element.

Should I Stay or Should My Earnings Grow?

Andrew Glover and José Mustre-del-Río



Moving for better opportunities could be great for income. But little research has been done to quantify just how great. Andrew Glover

showed that, in the Survey of Income and Program Participation, young college graduates gained almost 40% in their earnings after moving across state lines. But these gains came later, according to Glover, generally three years or more after the move.

Several audience members questioned how this gain was calculated. Glover explained that essentially earnings were detrended. Then, gains in earnings could be interpreted as gains above expected wages for someone who had not moved.

If there are large gains from moving, why do some people move while others do not? Glover and his co-author built a life-cycle model of savings and borrowing, with earnings growth coming from interstate mobility. This model was meant to decompose the financial and nonfinancial costs of mobility

to explore how different policies could affect those who decided to move and those who decided to stay, allowing for personal reasons, family reasons, and climate preferences.

A participant contrasted this model with literature that ignored moving costs and focused instead on movement drivers like loss or gain of employment. Glover asserted that the importance of upfront costs of moving and the availability of credit would be too important to ignore. Because Glover focused on interstate moves, substantial costs associated with selling one's home, physically moving personal items, and adjustment costs associated with a new location would be paid upfront, even if with credit.

One audience member asked about the utility function that was used and how the shape affected the findings. Glover explained that at high levels of consumption, the utility function led to small changes in consumption. To make the model more representative, utility was scaled by the average marginal utility of each age group.

Glover described several examples of movers at different levels of income in the calibrated model. Those who moved at a young age

originally drew from the left tail of the income distribution in their home state, which is another way of saying they drew a low wage. When given the chance to move, these early movers were willing to take on debt to move to a higher income. Those who moved at an old age or never moved had drawn a more favorable income in their home state, which made an early move less beneficial.

Several audience members had questions about the distribution of earnings of movers and of nonmovers. One audience member asked if it was feasible that draws from the income distribution would be correlated for each individual. That is, high- and low-income individuals who move would draw from separate income distributions after their move. Glover considered adding this correlation into his model. Next, he went through several policy experiments and decomposed how financial and non-financial factors could matter for mobility. Glover found that while financial costs did affect individuals who chose to move, the nonfinancial utility costs were far greater driving forces

Dynamic Oligopsony, Wage Inequality, and Unemployment

Simon Mongey, David Berger, Kyle Herkenhoff and Andreas Kostøl



Search frictions, worker bargaining power, tastes, amenities, and strategic decision-making by firms are each among the many

reasons that wages may be different than a worker's marginal product of labor. Simon Mongey combined all of these different channels to quantify and compare their relative importance and size. An audience member suggested that information asymmetry could be added in as a potential source of wage discrepancy. In his talk, Mongey provided a theoretical background for each source of variation and provided empirical evidence, using data from Norway on worker flows, wages, and market structure to calibrate his model.

To perform comparative statics, Mongey modeled a closed economy, which previous papers on this topic generally had not done. In this model, firms could post several job positions, allowing firm concentration within the market to affect the size of the labor market. This decision by firms would affect the quantity and the allocation of labor across firms. One participant

encouraged Mongey to include literature on product markets, since we often assume that there are finite sellers in product markets, similar to Mongey's model of labor.

In this model, workers would search for jobs by applying to available job postings from a finite set of available firms. They would meet with firms randomly, and matches could form. Employed workers would also search, applying to all firms other than the one in which they are employed. Several participants had questions about the matching function that Mongey used and the implications of the matching function occurring at the firm level. This would mean that labor market tightness was firm-specific.

A participant contrasted this model to prior work and pointed out that, in prior work, wages were not redrawn after each job match and were instead decided through an individual-specific history of wages. Another participant suggested that, rather than a model where workers applied to jobs at random, it would be better to reframe the model such that variation in firms came from differences in recruitment effort by firms. While the result would be the same, several audience members felt that the framework would be easier to understand.

Next, Mongey defined a stationary recursive competitive equilibrium in his model. In equilibrium, each firm's number of posted vacancies was a best response to all other firms' posted vacancies, and all parameters were consistent. Interestingly, job vacancies could be either complements or substitutes for one another. In essence, at different levels of employment, a vacancy at one firm could either encourage or discourage another firm to post vacancies.

Mongey also shared his empirical findings and compared his reduced-form results with the results of his model. The data used came from Norway and covered employment and unemployment transitions, as well as job-to-job transfers and wages between 2006-2016. This data allowed Mongey to compute true market concentrations and make within-market comparisons. In both the model and empirical results, Mongey found that higher firm concentration led to lower wages. One participant suggested that Mongey show how concentration affected job tenure, especially if employees made fewer job-to-job transfers.

Job Applications and Labor Market Flows

Serdar Birinci, Kurt See and Shu Lin Wee



The Internet has allowed workers to submit more job applications, but Serdar Birinci pointed out that we did not see a change in the job-finding rate.

He found that a key benefit of the increase in job applications was higher quality matches, resulting in longer durations at a job.

Several participants had questions about Birinci's research approach, particularly the way he combined the Employment Opportunity Pilot Project (EOPP) and the Survey of Consumer Expectations (SCE). One participant was worried about the effect of differences in survey questions about the number of job applications.

One participant suggested including data on employees' expectations about their job and wages rather than only the outcomes of their searches.

In Birinci's framework, firms must choose whether to invest in obtaining information about prospective employees. This information can lead firms to obtain better matches, but must be weighed against the cost of obtaining it. Importantly, as the pool of applicants increases, investing in information can be more beneficial, since a larger pool of applicants is more likely to contain a high-value match.

A participant asked Birinci to contrast his work with prior studies. Birinci explained that he focused on a more modern period when technological innovations in job applications would have had a larger effect. Birinci said that, unlike past research, in his model changes in job finding rates would not rely on growth in reservation rates over time.

Another participant asked whether this model would be able to say anything about apparent cyclicalities in the job-finding rate over time. Birinci responded that his model focused more on the long-run trend, rather

than year-to-year cyclicalities.

Birinci discussed the calibration of his model, using EOPP and SCE data from two periods, 1976-1985 and 2010-2019. His calibrations showed that a rise in applications led to a more-than-40% decline in job inflow rates and very small changes in job outflow rates. The number of short-duration jobs fell as workers obtained better matches.

Several participants discussed how the model would change if firms had to choose to screen before viewing the total number of applicants. Since the decision to obtain information depended on the random number of applications received, firms would act identically. Another participant pointed out that job-seekers that were aware of their high match quality might apply to fewer jobs, knowing that they were likely to receive one. This would potentially introduce endogeneity into the model.

Has the Willingness to Work Fallen During the Covid Pandemic?

Jason Faberman, Andreas I. Mueller and Ayşegül Şahin



Given the large impact of COVID-19 on the U.S. labor force, Jason Faberman and his co-authors explore the topic of willingness of

individuals to work.

From the start, a participant asked Faberman about distinctions between working from home and working at the office, noting that the demand for these types of work might differ. Another participant noted that while working from home, hours were often hard to quantify, since work hours and personal hours tended to mix at home.

To measure labor market underutilization, Faberman used a measure called the Aggregate Hours Gap (AHG), which is the difference between actual hours worked and desired hours worked. The COVID-19 pandemic led to a sharp increase in the AHG that disappeared by the end of 2021. However, there has been a persistent decline in desired work hours, particularly among those who are not participating in the labor force. Importantly, the reduction in

desired hours is twice as large as the reduction in the labor participation rate, making measures that focus on the participation rate poor measures of willingness to work.

The data that Faberman used came from two sources, the Survey of Consumer Expenditures (SCE) and the Current Population Survey (CPS). Similar respondents were compared between the two data sets. Several questions were added to the SCE during the pandemic in order to capture desire to work. One participant was worried that survey respondents might misinterpret a question about desired work hours if they misunderstood the wage they would receive for any additional hours worked. Another participant pointed out that some survey respondents might claim that they would like to work fewer hours but retain the same annual income. This type of change in desired hours, such as a move to a four-day work week, may not be fully captured by the questionnaire.

Faberman discussed how utilization of labor was captured using the gap in desired hours and actual work hours and dividing it by the labor supply. Several participants expressed

confusion about why Faberman did not allow for a negative gap and, instead, set any survey respondent with a negative gap to zero. One participant remarked that this would pool together someone who wished to work less and someone who was working their desired amount. Another audience member suggested that Faberman also look at how current wages and desired wages differ, an additional source of variation.

Using the AHG, Faberman showed several figures of labor utilization and unemployment, and how they had evolved over time. In these figures the AHG trended closely with the unemployment rate until 2009, during the Great Recession, after which the AHG normalized slowly. In more recent years, the AHG normalized quickly in 2021, falling faster than the unemployment rate over the same period. One participant asked about pandemic workers who had been furloughed. Faberman explained that despite this group being employed, they would still appear as underutilized, since they were not producing work hours.

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Special thanks for their accurate and concise summaries of the presentations go to the following UCSB Economics PhD students:

Toshio Farrazares

Daniel Klinenberg

Sarah Papich

Copy editor **Ravi Vora**

Design and production: **Monica Pessino, Ocean o' Graphics, MSI**

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