

# FRBSF ECONOMIC LETTER

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## Labor Markets and the Macroeconomy: Conference Summary

*This Economic Letter summarizes the papers presented at a conference on “Labor Markets and the Macroeconomy” held at the Federal Reserve Bank of San Francisco on March 3 and 4, 2006. The papers are listed at the end and are available at <http://www.frbsf.org/economics/conferences/0603/index.html>.*

This year’s conference brought academic researchers and policymakers together to discuss six research papers that focused on labor markets, and how labor market behavior can influence the broader macroeconomy.

Three of the papers addressed aspects of wage bargaining and its consequences for wage and employment volatility over the business cycle. Hall studied a suite of models to understand why employment and unemployment are so volatile. Rotemberg showed that shocks to pricing power can help explain why wages are not strongly correlated with the business cycle, using a model in which large firms bargain simultaneously with many workers. Gertler and Trigari also sought to understand why wages are relatively smooth and employment fluctuations are relatively large over the business cycle, showing that a model with staggered multiperiod wage bargaining can replicate these features of the data.

Shimer developed a model of labor market mobility, one in which some workers may move among labor markets in the event that they become unemployed. With some unemployed workers leaving labor markets that have too few jobs, Shimer showed that the model could capture the strong negative correlation between the unemployment rate and the vacancy rate found in U.S. data.

Aguiar and Hurst looked at five decades of time-use surveys to uncover trends in how people allocate their time. They found that between 1965 and 2003, leisure time for men has increased by 6–8 hours per week while leisure time for women has increased by 4–8 hours per week.

The sixth paper summarized the International Wage Flexibility project, an ambitious undertaking

that includes contributions from over forty researchers, whose goal is to collect and document cross-country micro-level data on wages and earnings in an effort to understand the costs and benefits of inflation for the labor market.

### **The labor market and macro volatility**

An important question in macroeconomics is why employment and unemployment are so volatile. This volatility cannot be explained adequately using standard real business cycle models, models in which labor and product markets are assumed to clear and are perfectly competitive. More generally, in real business cycle models, quantities, such as hours worked, are not that volatile because wages and prices do much of the adjusting needed to clear markets following shocks. However, as shown by Shimer (2005), the standard matching model, in which workers search and then bargain with firms over wages before forming a match, with the firm making a take-it-or-leave-it offer to the worker, also fails to explain why employment and unemployment are so volatile.

Hall studies two mechanisms that may make employment and unemployment more volatile. The first mechanism allows for a form of equilibrium wage stickiness in which the outcome of the wage bargain between a firm and a worker is a combination of the Nash-bargain wage and a constant wage. The second mechanism replaces Nash bargaining with a form of alternating offers. Thus, rather than having one party make a take-it-or-leave-it offer to be accepted or rejected, as occurs with Nash bargaining, an offer by one party can be countered by an alternative offer by the other party, but at the cost of a longer bargaining period. With either of these modifications to the standard search and matching model, Hall showed that employment and unemployment became more volatile. Underlying these increases in the volatilities of employment and unemployment is the fact that both mechanisms serve to make wages “sticky,” that is, less responsive to shocks. The implication of this wage stickiness is that employment and unemployment must do more of the adjusting needed for the labor market to clear.

### **Unemployment fluctuations with staggered wage-setting**

Gertler and Trigari also take up the issue of why employment and unemployment are so volatile in the context of a fully specified macroeconomic model in which workers and firms bargain before making a match. They note that the main problem with the standard matching model, with period-by-period Nash bargaining over wages by workers and firms, is that wages are too volatile and too pro-cyclical, with wage adjustments over the business cycle moderating firms' demand for labor. Their approach to correct this problem with the standard matching model is to introduce staggered Nash wage bargaining, a form of wage rigidity that limits the flexibility of wages and the role of employment and unemployment adjustments in labor market clearing.

With staggered Nash wage bargaining, a proportion of randomly selected firms negotiate a wage contract with its existing workforce with the negotiated wage in force until a renegotiation occurs. Workers hired between negotiation dates receive the wage prevailing for that firm. A consequence of this bargaining arrangement is that the aggregate wage rate becomes less responsive to shocks, such as those to productivity. Building this labor market structure into an otherwise standard business cycle model, the authors show that their model can replicate important features of U.S. macroeconomic data. Specifically, their model is able to capture the volatility in wages, unemployment, vacancies, and labor productivity well, but does less well with respect to the volatility of employment.

### **Wage cyclicality in a search-and-bargaining model**

Rotemberg also takes as motivation the fact that the standard search-and-matching model and models with competitive labor markets generate too much wage volatility and too little employment and unemployment volatility relative to the data but, departing from previous exercises, Rotemberg analyzes a search-and-matching model in which firms are large and have pricing power. In his model, firms are able to post multiple job vacancies cheaply, but they must contend with shocks to their pricing power in addition to productivity shocks.

The fact that large firms can cheaply advertise multiple job vacancies means that workers have less bargaining power, so a positive productivity shock does not translate into a large wage increase. As a consequence, wages become less volatile and less pro-cyclical than in the standard search-and-

matching model. Similarly, a shock that lowers a firm's pricing power will cause that firm to increase its output and employment, and the rise in employment will damp or even lower real wages. Through these mechanisms, and without introducing any wage rigidity, real wages becomes less volatile and less pro-cyclical, while the volatilities of employment and unemployment are magnified.

### **Mismatch**

In models with perfectly competitive labor markets the real wage adjusts so that the demand and supply for labor are in balance. Disturbances, such as technology and oil price shocks, change the wage rate and the number of hours worked, but they do not cause unemployment. Of course, unemployment is an important feature of the economic landscape in actual economies, and so, too, are job vacancies, but why do unemployment and job vacancies co-exist? The paper by Shimer advances an answer to this important question.

In Shimer's model, workers are associated with particular jobs and with particular geographic locations, so a vacancy for a dental technician cannot be filled by an unemployed carpenter and a vacancy in Phoenix cannot be filled by someone unemployed living in Atlanta. In this framework, unemployment and vacancies can coexist due to a mismatch between the skills and geographic location of the unemployment and the skills and geographic location of available jobs. Of course, there is some mobility between labor markets in actual economies, and the model allows for this.

With this apparatus, Shimer shows that the model can replicate important features of labor market outcomes. The model allows unemployment and vacancies to coexist and it is able to replicate closely the Beveridge curve, the strong inverse relationship between the unemployment rate and the vacancy rate found in U.S. macroeconomic data. In addition, the model predicts that an increase in the ratio of the vacancy rate to the unemployment rate should lead to an increase in the job-finding rate, which is also qualitatively consistent with U.S. macroeconomic data.

### **Measuring trends in leisure**

Understanding how and why people allocate their time between work and leisure is important for understanding both labor market outcomes and household well-being. While it is possible to measure the time someone spends working for a firm it is much more difficult to measure leisure time.

The simplest approach is to simply attribute all time not spent working in a formal labor market to leisure. Of course, this approach ignores the fact that people can spend a lot of time working at home on “home production.” Thus, time spent watching TV or playing cards might reasonably be considered leisure time, but time spent mowing the lawn or cleaning the drapes should probably be attributed to home production, not leisure.

To investigate how leisure time has changed over time, Aguiar and Hurst study data from time-use surveys that reveal how much time respondents spend in market work and how they allocate their time outside of market work. Among other results, after adjusting for changing demographics, they find that between 1965 and 2003 leisure has increased by 7.9 hours for men and by 6.0 hours for women. Interestingly, for men this increase in leisure time has come about through a decline in market work, while for women the increased leisure time has come about through a large decline in time allocated to home production and has occurred despite a rise in time spent in market work.

### **The interaction between labor markets and inflation**

The interaction between wage changes and inflation is an important one for macroeconomics and for monetary policy. For example, rigidities in nominal wages make price adjustment, inflation, and, hence, monetary policy, important for employment outcomes. Dickens et al. study the evidence on nominal and real wage rigidity across a wide set of countries.

This study analyzes 31 different data sets, covering 16 countries and 27 million people, on changes over time in individuals' wages or earnings. Applying a common protocol to all 31 data sets and correcting the data for measurement error, the authors find that dispersion in nominal wage changes across individuals is positively correlated with the level of inflation, a feature that is consistent with down-

ward rigidity in nominal wages and with distortions caused by inflation. More generally, to a greater or lesser extent, the authors find evidence for both nominal wage rigidity and real wage rigidity in nearly every country. In particular, nominal wage rigidity was most prevalent in Portugal, followed by the U.S., and least prevalent in Germany, while real wage rigidity was most prevalent in Sweden, followed by Finland, and least prevalent in Greece.

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### **Conference papers**

Aguiar, Mark, and Erik Hurst. 2006. “Measuring Trends in Leisure: The Allocation of Time over Five Decades.” NBER Working Paper #12082.

Dickens, William, Lorenz Goette, Erica Groshen, Steinar Holden, Julian Messina, Mark Schweitzer, Jarkko Turunen, and Melanie Ward. 2005. “The Interaction of Labor Markets and Inflation: Micro Evidence from the International Wage Flexibility Project.” Unpublished manuscript.

Gertler, Mark, and Antonella Trigari. 2006. “Unemployment Fluctuations with Staggered Nash Wage Bargaining.” Unpublished manuscript.

Hall, Robert. 2005. “The Labor Market and Macro Volatility: A Nonstationary General-Equilibrium Analysis.” NBER Working Paper #11684.

Rotemberg, Julio. 2006. “Cyclical Wages in a Search-and-Bargaining Model with Large Firms.” Unpublished manuscript.

Shimer, Robert. 2005. “Mismatch.” NBER Working Paper #11888.

### **Reference**

Shimer, Robert. 2005. “The Cyclical Behavior of Equilibrium Unemployment and Vacancies.” *American Economic Review* 95, pp. 25–49.

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**Index to Recent Issues of *FRBSF Economic Letter***

<b>DATE</b>	<b>NUMBER</b>	<b>TITLE</b>	<b>AUTHOR</b>
12/2	05-34	Recent Policy Issues Regarding Credit Risk Transfer	Lopez
12/9	05-35	Shifting Data: A Challenge for Monetary Policymakers	Fernald/Wang
12/16	05-36	Bank ATMs and ATM Surcharges	Gowrisankaran/Krainer
12/23	05-37	The Diffusion of Personal Computers across the U.S.	Doms
12/30	05-38	Do Oil Futures Prices Help Predict Future Oil Prices?	Wu/McCallum
1/27	06-01	2006: A Year of Transition at the Federal Reserve	Yellen
2/24	06-02	Productivity Growth: Causes and Consequences, Conference Summary	Wilson
3/3	06-03	Postal Savings in Japan and Mortgage Markets in the U.S.	Cargill/Scott
3/10	06-04	External Imbalances and Adjustment in the Pacific Basin	Glick/Spiegel
3/17	06-05	Enhancing Fed Credibility	Yellen
4/07	06-06	What Is the Federal Reserve Banks' Imputed Cost of Equity Capital?	Barnes/Lopez
4/14	06-07	Security Analysts and Regulatory Reform	Marquez
4/21	06-08	Job Matching: Evidence from the Beveridge Curve	Valletta/Hodges
4/28	06-09	Prospects for the Economy	Yellen
5/12	06-10	Bank Diversification, Economic Diversification?	Strahan
5/19	06-11	Central Bank Capital, Financial Strength, and the Bank of Japan	Cargill
6/2	06-12-13	Monetary Policy in a Global Environment	Yellen
6/23	06-14	International Financial Integration and the Current Account Balance	Cavallo
6/30	06-15	Residential Investment over the Real Estate Cycle	Krainer
7/7	06-16	A Monetary Policymaker's Passage to India	Yellen

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