Federal Reserve Bank of Minneapolis
Research on Employment and Unemployment
Kei-Mu Yi
January 2011

EXECUTIVE SUMMARY

Introduction

This summary highlights existing and ongoing Minneapolis Fed research pertinent to the question of monetary policy and employment. The summary also includes a call for new data/surveys to better understand unemployment, as well as a call for new theories to better understand monetary policy. Relevant memos are attached.

Geographic Mobility and the Great Recession

Many policy, research, and media reports have expressed concern that unemployment remains high because the once-footloose American worker has suddenly become a homebody, unable or unwilling to move across the country for a job. Two recent Minneapolis Fed research papers argue that the concern is unnecessary.[1] First, the research shows that, contrary to popular belief, interstate migration did not fall relative to trend during the Great Recession. The apparent drop in migration in Census Bureau statistics is a statistical artifact due to a change in imputation procedures for missing data. Second, the research also shows that — despite concerns that the decline in the housing market is reducing mobility — homeowners with negative equity are *more* rather than *less* likely to move. A much-cited journal article obtained contrary results because it systematically dropped some negative-equity homeowners' moves from the data.[2] In sum, our research shows that neither "house lock" nor other factors appear to be significantly reducing Americans' geographic mobility. **The current high unemployment rate may have many causes, but geographic immobility is unlikely to be one of them.**

A Duration-Weighted Measure of Unemployment

The unemployment rate is often used as an indicator of the amount of "slack" in the economy. However, in the current recession the increase in the fraction of unemployed workers who are long-term unemployed has been unprecedented. Moreover, the long-term unemployed historically have very low job-finding rates, suggesting that they are not easily absorbed into vacant positions. In the attached memo, we explore a duration-weighted measure of the unemployment rate which adjusts for changes in the duration composition of the unemployment pool to provide an alternative measure of slack. **Our measure rises by 2 percentage points less than the official BLS measure.** In addition, we find that using this measure eliminates much of the flattening and hooking of the Beveridge curve. This exercise points to the need to carefully study the opportunities facing the longer-term unemployed.

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[1] Greg Kaplan and Sam Schulhofer-Wohl, 2010, "Interstate Migration Has Fallen Less Than You Think: Consequences of Hot Deck Imputation in the Current Population Survey," Federal Reserve Bank of Minneapolis Working Paper 681, and Sam Schulhofer-Wohl, 2010, "Negative Equity Does Not Reduce Homeowners' Mobility," Federal Reserve Bank of Minneapolis Working Paper 682.
[2] Fernando Ferreira, Joseph Gyourko, and Joseph Tracy, 2010, "Housing Busts and Household Mobility," *Journal of Urban Economics* 68(1), 34–45.

Improving Data on Unemployment, Employment, and Hiring

There has been much debate about the extent to which unemployment is high because (a) extended unemployment insurance (UI) benefits create a disincentive to search for work, (b) unemployed workers do not have the skills that employers need, or (c) matching efficiency — the rate at which searching workers and vacant jobs find each other — has fallen. Unfortunately, the data are insufficient to reach definitive conclusions on these issues; reasonable economists can and do disagree significantly on whether UI disincentives, mismatch, and changes in matching efficiency are important. Estimates of the effect of extended UI on the unemployment rate, for example, range from essentially nothing to in the vicinity of 2 percentage points.[3] **The attached memo briefly summarizes the limitations of the available data and proposes ways to collect data that would provide more definitive answers.**

Improving Models of Employment and Monetary Policy

The canonical frameworks used to study employment and monetary policy have tended to be "representative agent" frameworks.[4] There is a single stand-in household that is representative of the entire economy. This formulation is implicitly grounded in the assumption that financial markets are complete (so that there are no credit constraints or insurance limitations facing individuals and firms). This assumption abstracts from many important aspects of the macroeconomy at all times, and even more so during the 2007–10 period. The attached memo briefly describes three pieces of existing or ongoing research that use incomplete markets frameworks to explain the sharp decline in employment during the Great Recession. At this stage, the analysis is nonmonetary. However, we believe that it should be possible to extend the analysis to include monetary elements. We are optimistic that the resulting models would be more reliable tools for policy than the more traditional "representative agent" frameworks.

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[3] See, e.g., Rob Valletta and Katherine Kuang, 2010, "Extended Unemployment and UI Benefits," Federal Reserve Bank of San Francisco *Economic Letter* 2010-12, and Shigeru Fujita, 2010, "Effects of the UI Benefit Extensions: Evidence from the Monthly CPS," Federal Reserve Bank of Philadelphia Working Paper 10-35.

[4] There are exceptions, of course. See, for example, Vasco Cúrdia and Michael Woodford, "The Central-Bank Balance Sheet as an Instrument of Monetary Policy", forthcoming, *Journal of Monetary Economics*, or Gauti Eggertsson and Paul Krugman, "Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo Approach", Unpublished manuscript.

Geographic Mobility and the Great Recession[*]
Sam Schulhofer-Wohl
Federal Reserve Bank of Minneapolis
December 23, 2010

Many policy, research and media reports have expressed concern that unemployment remains high because the once-footloose American worker has suddenly become a homebody, unable or unwilling to move across the country for a job.[1] This memo argues, based on two Minneapolis Fed research papers, that the concern is unnecessary. First, the research shows that, contrary to popular belief, interstate migration did not fall relative to trend during the Great Recession.[2] The apparent drop in migration in Census Bureau statistics is a statistical artifact due to a change in imputation procedures for missing data. Second, the research also shows that — despite concerns that the decline in the housing market is reducing mobility — homeowners with negative equity are *more* rather than *less* likely to move.[3] A much-cited journal article obtained contrary results[4] because it systematically dropped some negative-equity homeowners' moves from the data. In sum, our research shows that neither "house lock" nor other factors appear to be significantly reducing Americans' geographic mobility. The current high unemployment rate may have many causes, but geographic immobility is unlikely to be one of them.

Trends in interstate migration

The Census Bureau reports Americans' rate of moving between states, between counties in the same state, and within counties. Of these measures, interstate migration is likely the best gauge of labor mobility, because labor markets typically span multiple counties and large fractions of a state. Figure 1(a) shows the interstate migration rate as reported by the Census Bureau for the past decade. This is the graph that sparked so much concern about a sharp drop-off in migration: The migration rate apparently plummeted in 2006 from a relatively high plateau earlier in the decade.

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[*] The views expressed herein are those of the author and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.

[1] See, e.g., "Slump Creates Lack of Mobility for Americans," *New York Times*, April 23, 2009, p. A1; "Few in U.S. move for new jobs, fueling fear the economy might get stuck, too," *Washington Post,* July 30, 2010, p. A1; Nicoletta Batini et al., 2010, "United States: Selected Issues Paper," International Monetary Fund Country Report No. 10/248; William H. Frey, 2009, "The Great American Migration Slowdown: Regional and Metropolitan Dimensions," Brookings Institution report.

[2] Greg Kaplan and Sam Schulhofer-Wohl, 2010, "Interstate Migration Has Fallen Less Than You Think: Consequences of Hot Deck Imputation in the Current Population Survey," Federal Reserve Bank of Minneapolis Working Paper 681.

[3] Sam Schulhofer-Wohl, 2010, "Negative Equity Does Not Reduce Homeowners' Mobility," Federal Reserve Bank of Minneapolis Working Paper 682.

[4] Fernando Ferreira, Joseph Gyourko, and Joseph Tracy, 2010, "Housing Busts and Household Mobility," *Journal of Urban Economics* 68(1), 34–45.
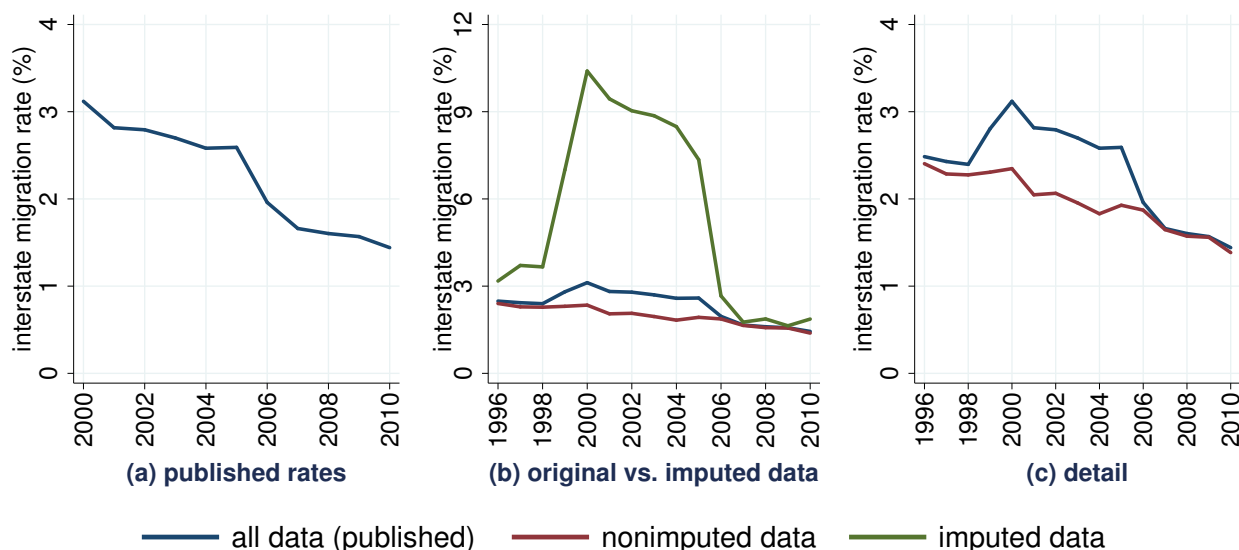
Figure 1: Rates of migration between states. Rate is weighted percentage of respondents at least one year old who lived in a different state one year ago. Source: Kaplan and Schulhofer-Wohl (2010), calculation from March CPS.

But the figure is misleading. The data come from the March Current Population Survey (CPS). About 10 percent of CPS participants do not answer migration questions, and the Census Bureau has to impute answers for them. In 2006, the Census Bureau made an undocumented change in the way it calculates the imputations. Kaplan and Schulhofer-Wohl (2010) show that this change in methods — *not* any actual change in migration patterns — turns out to be responsible for much of the recent decline in reported migration rates. In essence, the pre-2006 method spuriously imputed many interstate moves that should have been local moves. Kaplan and Schulhofer-Wohl (2010) find that the change in procedures explains 90 percent of the reported decrease in interstate migration between 2005 and 2006, and 42 percent of the decrease between 2000 (the recent high-water mark) and 2010.

Figure 1(b) illustrates the problem. The figure shows the interstate migration rate for all CPS respondents, and for those with original and imputed data separately. From 1996 to 1998 and from 2006 to 2010, the rate for respondents with imputed data is only slightly higher than the rate for respondents with original data, and the rate for all respondents is likewise very close to the rate for respondents with original data. But from 1999 to 2005, the interstate migration rate for respondents with imputed data is *three to five times* the rate for respondents with nonimputed data.

Kaplan and Schulhofer-Wohl (2010) find that the interstate migration rate in nonimputed data is a reliable guide to trends in the overall interstate migration rate. Figure 1(c) illustrates this point by reproducing figure 1(b) without the imputed-data migration rate, to show only the contrast between overall and nonimputed rates. Since 2006, the interstate migration rate including imputed data has been virtually identical to the rate using only nonimputed data.

Figure 1(c) shows that, once we remove the effect of changes in the imputation procedure, the interstate migration rate has hewed closely to a smooth downward trend for the past 15 years. With imputations included, the rate peaked at 3.12 percent in the 2000 survey, fell to 2.59 percent by the 2005 survey, plummeted to 1.96 percent in the 2006 survey, and is now down to 1.44 percent. Without imputations, the rate was 2.35 percent in the 2000 survey, 1.93 percent in the 2005 survey, 1.87 percent in the 2006 survey, and 1.38 percent in the 2010 survey. Thus, the change in imputation procedures explains nine-tenths of the 0.63 percentage point drop from 2005 to 2006 and four-tenths of the 1.68 percentage point drop from 2000 to 2010.

As figure 1(c) shows, interstate migration has been trending downward for many years. But, relative to that trend, there was no additional decrease in interstate migration during the December 2007-June 2009 recession. To see this, it is important to know the timing of the CPS data. The survey is taken in February through April each year and asks people whether they moved in the previous 12 months. Thus, the data points corresponding to migration during the recession are the data points for the 2008, 2009 and 2010 surveys. Figure 1(c) shows that, in the nonimputed data that Kaplan and Schulhofer-Wohl (2010) view as most accurate, migration fell faster than trend in the 2007 survey year, *before* the recession.

It is possible that migration rates should currently be higher than trend because unemployed workers should be moving to states with more jobs — and thus that a migration rate near the long-run trend reflects geographic immobility. But this argument requires evidence that some aspect of the current economy is preventing workers from moving. The leading suspect is "house lock" due to negative equity resulting from the drop in home prices. I now turn to evidence on this factor.
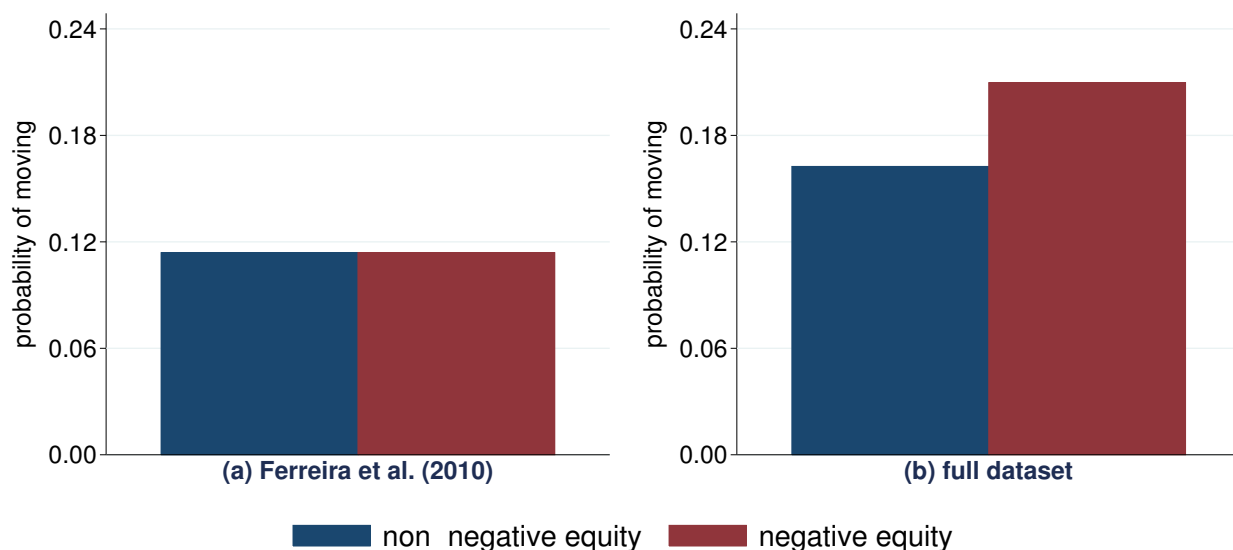
Negative equity and mobility

About 10 percent of all housing units are currently occupied by owners who have negative equity.[5] Ferreira et al. (2010) report that homeowners with negative equity are one-third less likely to move than homeowners with nonnegative equity,[6] a finding that some have interpreted as suggesting that the weak housing market might keep unemployment high by preventing workers from moving to better job markets. However, Schulhofer-Wohl (2010) suggests that the Ferreira et al. result is inaccurate: Ferreira et al. found fewer moves among

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[5] Zillow and CoreLogic both estimated that about 23 percent of homes with mortgages had negative equity in the third quarter. About two-thirds of housing units are owner occupied, and two-thirds of owner-occupied units have mortgages. Zillow's estimate is for single-family homes, and CoreLogic's is for all residential properties. The calculation that 10 percent of housing units have owner occupants with negative equity assumes that negative equity is equally common for owner-occupied and non-owner-occupied properties.

[6] A few older papers have found results similar to those of Ferreira et al. (2010) in geographically or demographically selected samples, but the Ferreira et al. result has attracted substantial attention because it provides results for a nationally representative sample of homeowners over a long time period.

Figure 2: Raw probability of moving in a two-year period for negative-equity and non-negative-equity homeowners. (a) Ferreira et al. sample, which excludes owner-to-renter and owner-to vacant transitions. (b) Full sample, counting owner-to-renter and owner-to-vacant transitions as moves. Source: Schulhofer-Wohl (2010), calculation from Ferreira et al. AHS data.

negative-equity homeowners because they systematically dropped some negative-equity homeowners' moves from the data.

Ferreira et al. analyze data from the American Housing Survey (AHS), which is a panel survey of homes. AHS surveyors go to the same homes every two years and record who lives there. Consider a house that is owner occupied in 2005. Four outcomes are possible in 2007: (1) the house is occupied by the same owners as in 2005; (2) it is occupied by different owners; (3) it is occupied by different people, who are renters; or (4) it is vacant.[7] Uncontroversially, Ferreira et al. consider (1) as indicating that the 2005 occupants did not move and (2) as indicating that they did move. But Ferreira et al. drop (3) and (4) from the data, even though the 2005 occupants moved in these cases, too. Because people with negative equity are more likely when they move to leave a house vacant (perhaps due to foreclosure) or rent it out (perhaps because they prefer to hold the property in hopes it will appreciate), Ferreira et al.'s approach systematically drops negative-equity moves and concludes that negative-equity homeowners move less than they actually do.

Figure 2 illustrates how dropping owner-to-renter and owner-to-vacant transitions affects the data.[8] In the raw data, negative-equity and non-negative–equity homeowners are about

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[7] AHS surveyors talk with neighbors and other knowledgeable people to verify that vacant homes are truly vacant and not merely cases of occupants failing to answer the door.
[8] This memo discusses Schulhofer-Wohl's (2010) "alternative 1" coding, which includes counts as moves all cases where an owner-occupant is followed by a renter or a vacancy. Schulhofer-Wohl (2010) shows that the differences between his results and those of Ferreira et al. (2010) are

	Marginal effect on probability of moving	
Variable	(a) Ferreira et al.	(b) Full sample
Negative equity	-0.002	0.029
	(0.008)	(0.009)
Observations	61,803	65,493

Table 1: Probit estimates of the effect of negative equity on mobility, controlling for economic and demographic characteristics. (a) Ferreira et al. sample, which excludes owner-to-renter and owner-to vacant transitions. (b) Full sample, counting owner-to-renter and owner-to-vacant transitions as moves. Source: Schulhofer-Wohl (2010), calculation from Ferreira et al. AHS data. Heteroskedasticity-robust standard errors clustered by household in parentheses.

equally likely to move when we follow Ferreira et al.'s definition and exclude owner-to-renter and owner-to-vacant transitions, but negative-equity households are much more likely to move once we include the owner-to-renter and owner-to-vacant transitions.

The probability of moving in the raw data does not reveal the causal effect of negative equity on mobility because other factors might affect the propensity to move and might be correlated with negative equity. Ferreira et al. account for other variables that might affect mobility by estimating probit models that include a rich set of demographic and economic controls. Table 1 shows the results of estimating these models in Ferreira et al.'s restricted sample and in the full dataset that includes owner-to-renter and owner-to-vacant transitions. In Ferreira et al.'s sample, negative equity slightly reduces the probability of moving, all else equal;[9] in the full sample, negative equity significantly raises the probability of moving, all else equal. In sum, what the data show is that negative-equity homeowners are less likely to move and be followed by another owner-occupant, but more likely to move and be followed by a renter or a vacancy — and *more* likely to move overall.

An important caveat to any research using the Ferreira et al. data is that these data measure homeowners' equity in years ranging from 1985 to 2005. People who have negative equity in 2010 may differ in a variety of ways from those who had negative equity five or more years ago, and negative equity may have different impacts on different kinds of people. (For example, the broad swath of homeowners who now have negative equity may differ in their propensity to default on debts from the small subset of homeowners who had negative equity in 2005.) Negative equity may also have different impacts in strong and weak economies, or in economies with different prevailing interest rates. Conclusive work on the impact of negative equity in the current environment will therefore have to wait until more recent data are available.

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robust to accounting for imputed data and cases where owners may have sold their homes and become renters without moving.

[9] Ferreira et al. obtain a more negative, statistically significant effect of negative equity on mobility by estimating an instrumental variables model, but Schulhofer-Wohl (2010) argues that their instrument is invalid because negative equity is a binary variable.

Federal Reserve Bank of Minneapolis
A Duration-Weighted Measure of the Unemployment Rate
Terry Fitzgerald and Jonathan Heathcote
January 8, 2011

The unemployment rate is often used as an indicator of the amount of "slack" in the economy. However, in the current recession the increase in the fraction of unemployed workers who are long-term unemployed has been unprecedented. Moreover, the long-term unemployed historically have very low job-finding rates, suggesting that they are not easily absorbed into vacant positions. In this document, we explore a duration-weighted measure of the unemployment rate which adjusts for changes in the duration composition of the unemployment pool to provide an alternative measure of slack.

Weighted Unemployment   Specifically, we construct a weighted sum of the monthly unemployment series for four duration groups (<5 weeks, 5–14 weeks, 15–26 weeks, and 27+ weeks). The weight for a given duration group is the group's average unemployment-to-employment (UE) hazard rate over the 1999 to 2007 period.[1] The spirit of this weighting scheme is that average UE hazard rates are a proxy for the readiness of unemployed workers to fill vacant positions. The weighted series is scaled so that the unemployment rate in January 1999 is 4.3 percent, the same as the official BLS figure.

Figure 1 below shows our weighted unemployment series (in blue) alongside the official BLS series (in black). The main finding is that our weighted unemployment rate rises by 2 percentage points less than the official BLS measure during the Great Recession. This measure stands in sharp contrast to all previous recessions in the postwar period, during which the two measures track each other closely. The implication is that slack has risen by less during the Great Recession than the BLS series would suggest, and by less than it increased during the recession of the early 1980s.

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[1] Monthly hazard rates by duration are available only since 1999. We choose to end our series in 2007 to ensure that our average hazard rates are broadly reflective of normal times.
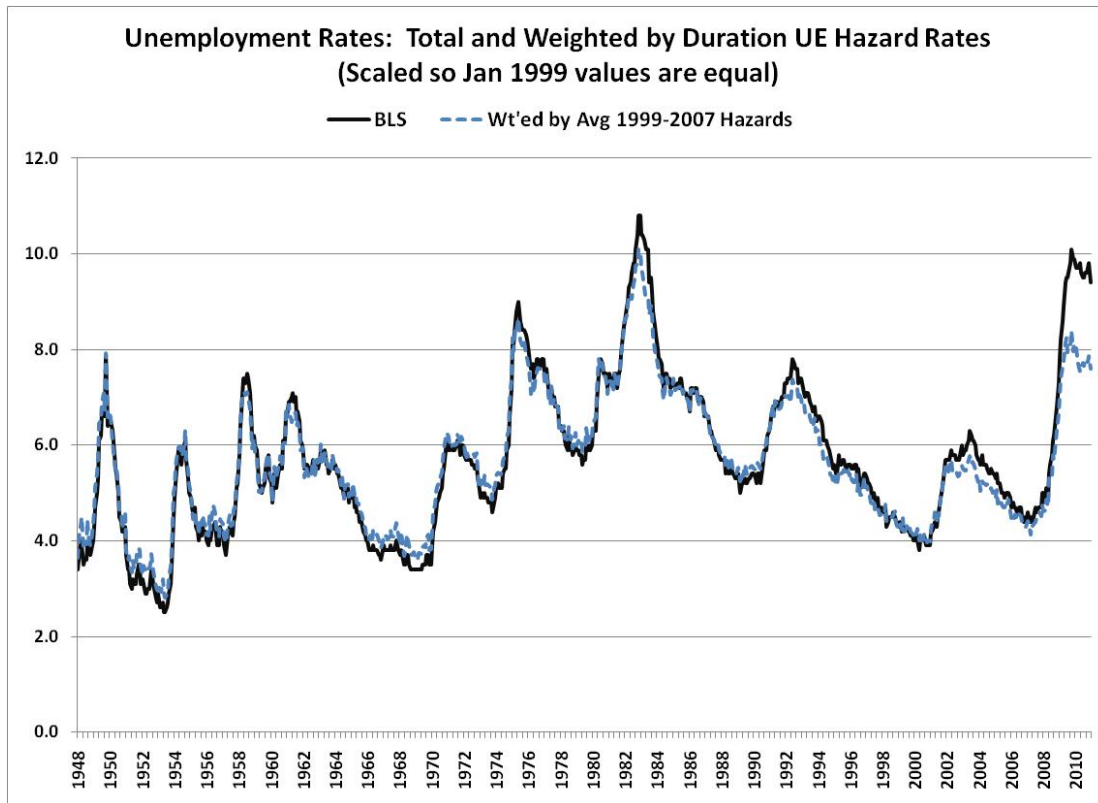
Background We now describe in more detail the motivation for our analysis, and trace the features of UE hazard rates and duration composition that underlie the series plotted above.

First, UE hazard rates, defined as the percentage of unemployed workers who find a job in a given month, decline notably with unemployment duration (see Figure 2). The average UE flow rates from 1999 to 2007 for durations <5, 5–14, 15–26, and 27+ weeks are, respectively, 36.6, 25.8, 21.0, and 16.3 percent. While UE hazard rates declined in the Great Recession, no dramatic changes occurred in *relative* hazard rates by duration.

Figure 2

Monthly UE Hazard Rates, by duration of unemployment
(rolling 12-month average, NSA data)
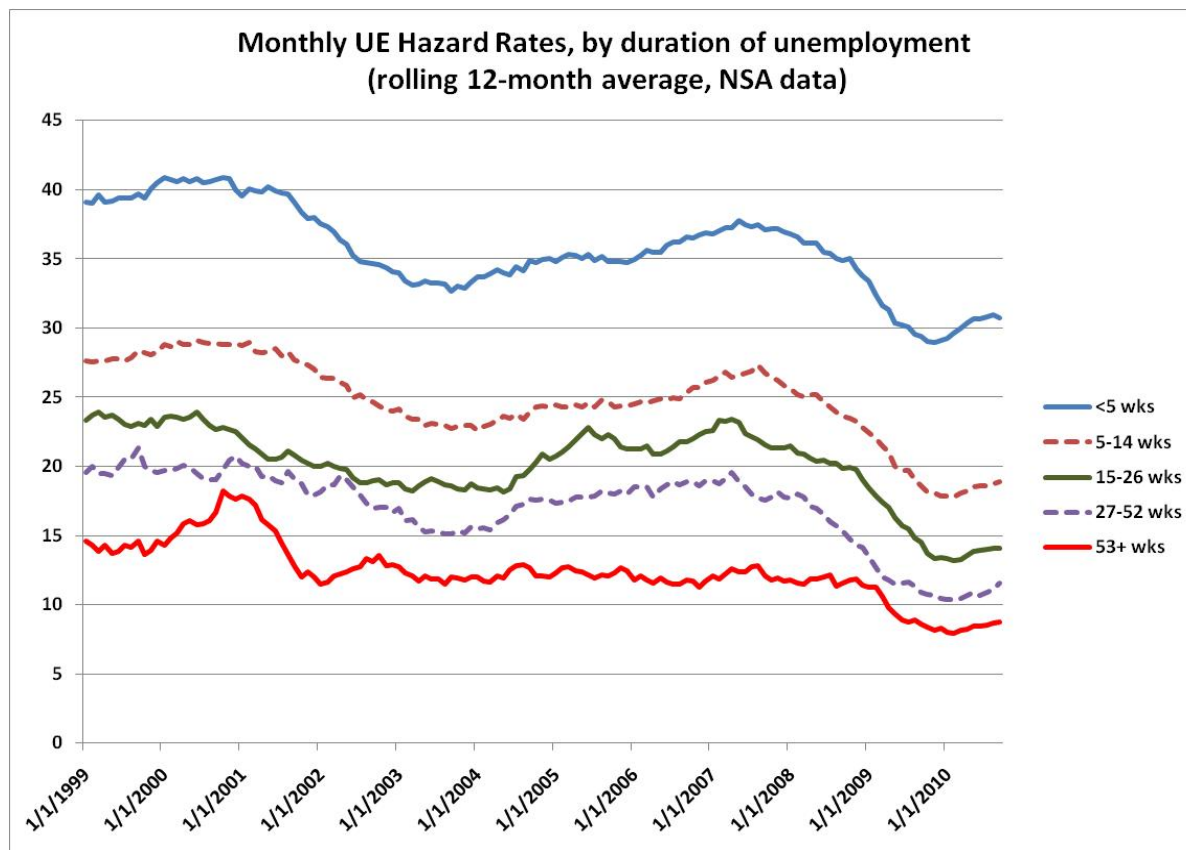
Second, the share of long-term unemployment in total unemployment increased dramatically in the Great Recession, while the share of short-term unemployment fell (Figure 3). The surge in the fraction of the unemployed who have been unemployed for at least 27 weeks was unprecedented in postwar data, as was the fall in the fraction of the unemployed who have been unemployed for 5 weeks or less.

Taken together, Figures 2 and 3 suggest that we should expect a relatively low current UE hazard rate. Figure 4 illustrates this. The blue line shows the predicted UE hazard rate assuming constant UE rates by age group (the age-group specific averages over the 1999–2007 period) but adjusting for changes over time in the duration composition of the unemployment pool. This line indicates that even if duration-specific UE exit rates were to return to normal (1999–2007) levels, we should expect only around 23 percent of unemployed workers to find a job in any given month, compared with over 27 percent prior to the start of the recession. This decline in the predicted job-finding rate is the counterpart to the relatively modest increase in the weighted unemployment rate documented in Figure 1. Of course, the actual UE hazard rate (the red line) has fallen more dramatically because actual hazard rates for each duration group fell far below their respective 1999–2007 averages during the recession (recall Figure 2).
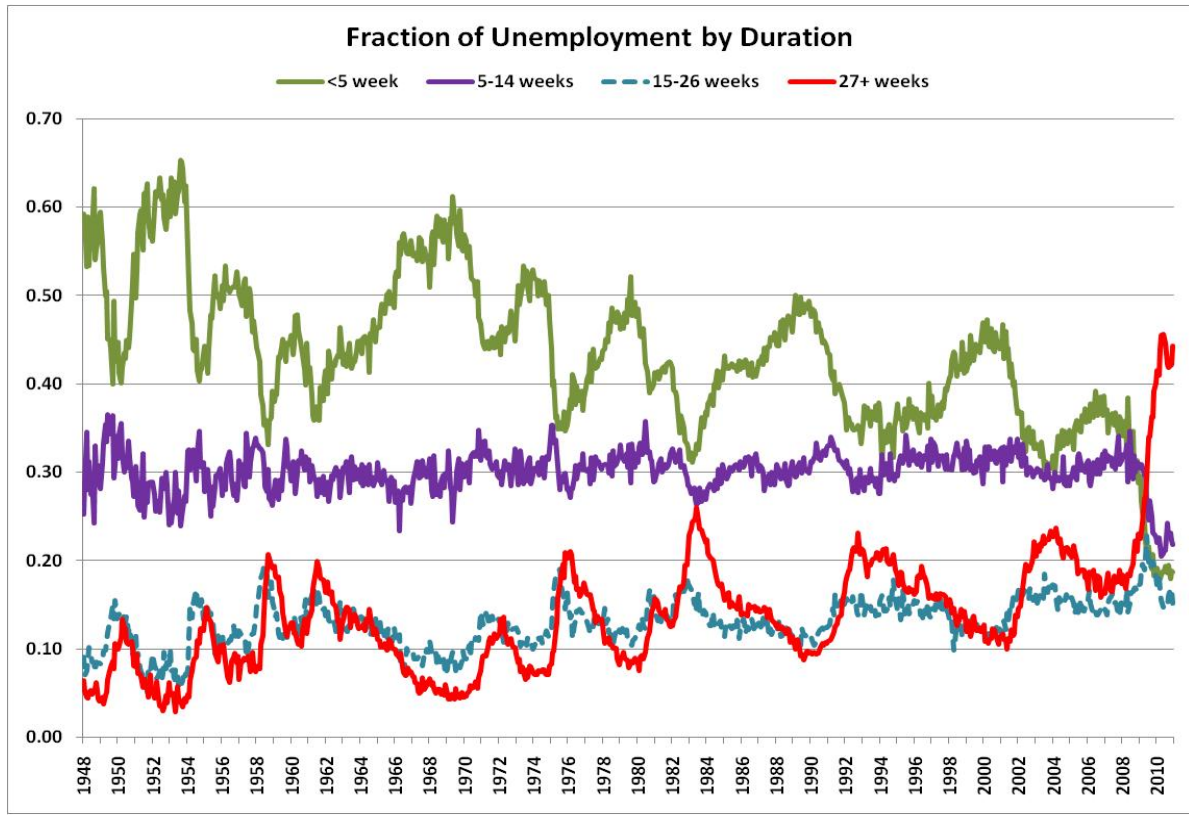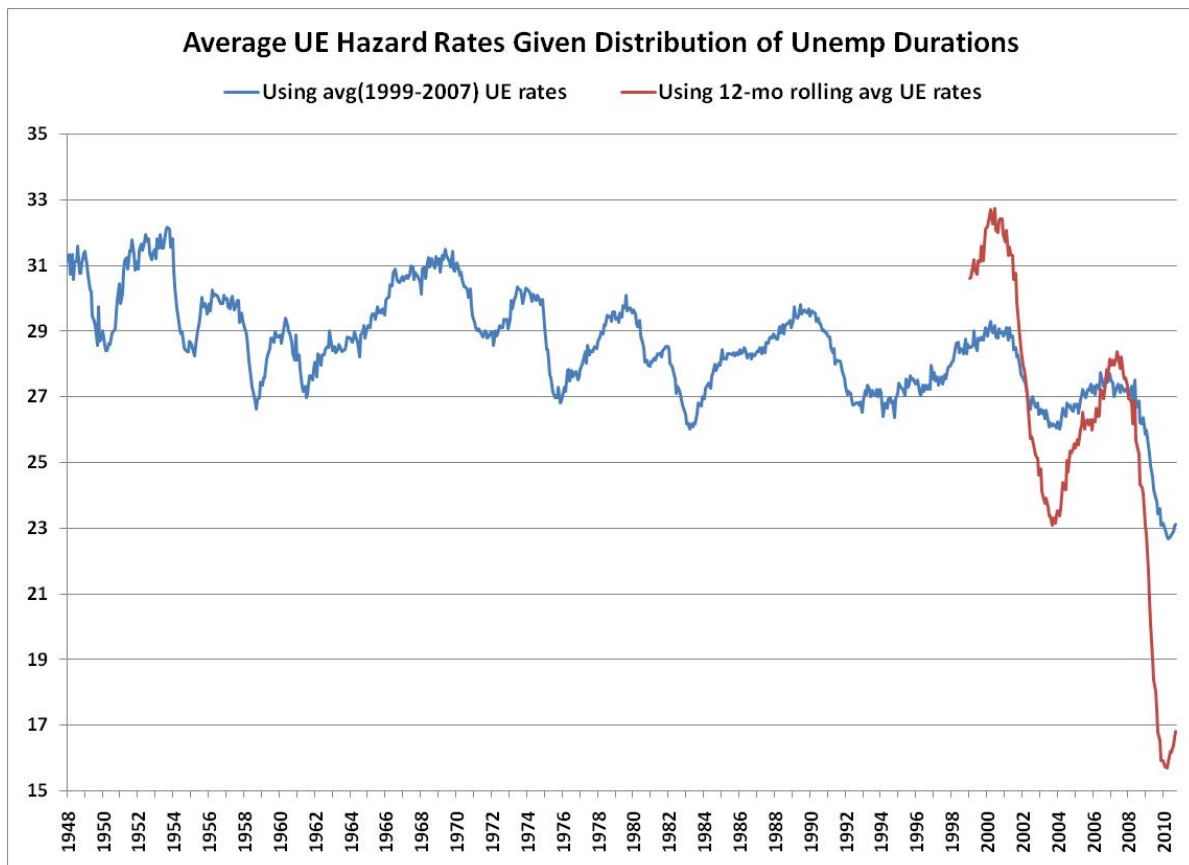
Figure 3

Fraction of Unemployment by Duration

— <5 week — 5-14 weeks — — 15-26 weeks — 27+ weeks

Figure 4

Average UE Hazard Rates Given Distribution of Unemp Durations

— Using avg(1999-2007) UE rates — Using 12-mo rolling avg UE rates

Beveridge Curves   Finally, we plot Beveridge curves associated with the two alternative definitions of unemployment (Figures 5 and 6). The flattening during the recession, followed by the upward hook in the curve in recent months, is much less pronounced using the weighted unemployment definition. Thus, one interpretation of the widely discussed shift in the Beveridge curve is that the traditional measure of the unemployment rate has become an imperfect and exaggerated measure of the effective supply of unemployed workers.
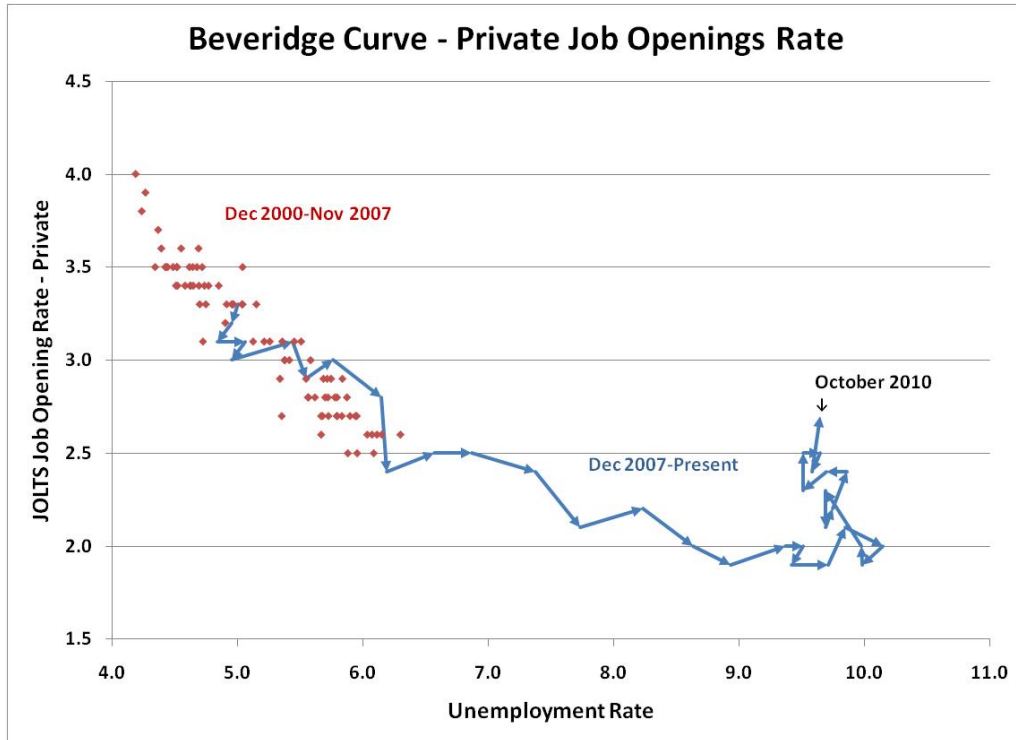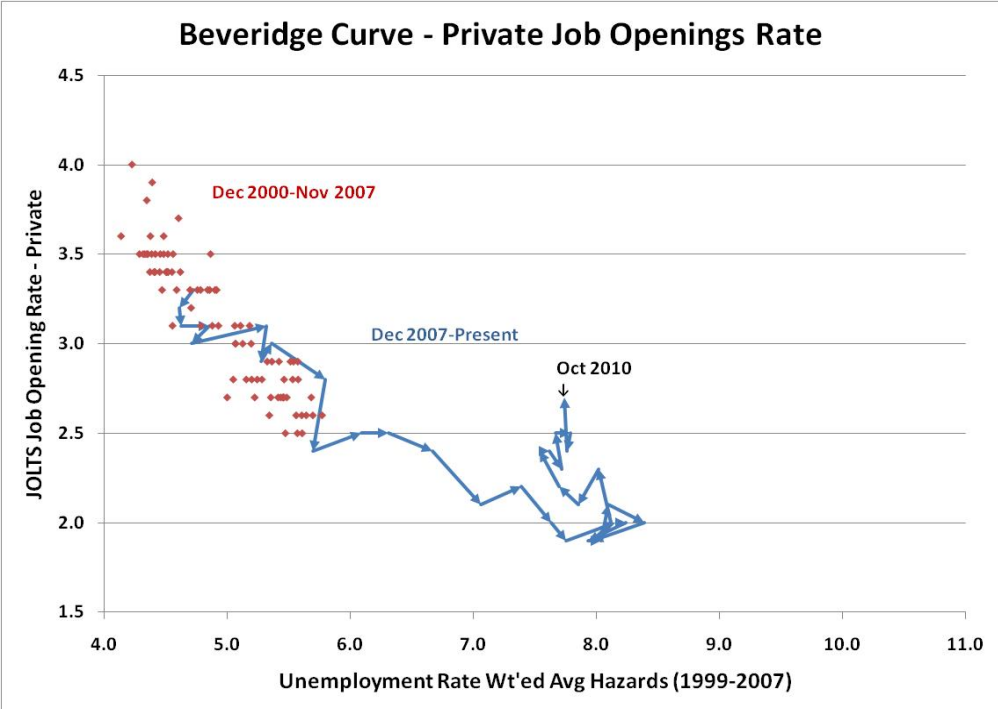
Figure 5

Beveridge Curve - Private Job Openings Rate

Figure 6

Beveridge Curve - Private Job Openings Rate

Improving Data on Unemployment, Employment, and Hiring[*]
Sam Schulhofer-Wohl
Federal Reserve Bank of Minneapolis
January 11, 2011

There has been much debate about the extent to which unemployment is high because (a) extended unemployment insurance (UI) benefits create a disincentive to search for work, (b) unemployed workers do not have the skills employers need, or (c) matching efficiency — the rate at which workers and jobs find each other — has fallen. Unfortunately, the data are insufficient to reach definitive conclusions; reasonable economists can and do disagree about whether UI disincentives, mismatch, and changes in matching efficiency are important. Estimates of the effect of extended UI on the unemployment rate, for example, range from essentially nil to nearly 2 percentage points.[1] This memo briefly summarizes the limitations of the available data and proposes ways to collect data that would provide more definitive answers.

1. Disincentive effect of UI

The key challenge in estimating the disincentive effect of UI is that one must compare workers who are eligible for UI with workers who are ineligible, but these two groups may differ in other ways that also affect unemployment duration. Researchers have used a variety of methods to control for differences between workers or exploit "as-if-random" variation in UI eligibility arising from natural experiments.[2] Disagreements center on whether differences between eligible and ineligible workers have been adequately controlled for and on whether results from other countries and time periods are relevant to the United States in 2011.

A randomized trial could resolve these disagreements and measure whether extended UI is currently raising unemployment.[3] The experiment would enroll many UI recipients. Half, chosen at random, would continue to receive regular UI benefits. The rest would receive a lump sum but no further benefits. If ongoing benefits reduce search incentives, lump-sum recipients would find work sooner; because participants were assigned to the two arms at random, any differences in unemployment duration would be due to incentive effects, not to heterogeneity.[4]

2. Skill mismatch

Although anecdotes of skill shortages are easy to find, there is little real-time, high-frequency, nationally representative data on employers' skill demand. There are three main

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[*] The views expressed herein are those of the author and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.

[1] See, e.g., Rob Valletta and Katherine Kuang, 2010, "Extended Unemployment and UI Benefits," Federal Reserve Bank of San Francisco *Economic Letter* 2010-12, and Shigeru Fujita, 2010, "Effects of the UI Benefit Extensions: Evidence from the Monthly CPS," Federal Reserve Bank of Philadelphia Working Paper 10-35.

[2] For a review, see David Card, Raj Chetty, and Andrea Weber, 2007, "The Spike at Benefit Exhaustion: Leaving the Unemployment System or Starting a New Job?" National Bureau of Economic Research Working Paper 12893.

[3] The idea is inspired by Marco Del Negro, Fabrizio Perri, and Fabiano Schivardi, 2010, "Tax Buyouts," *Journal of Monetary Economics* 57, 576–595.

[4] An important challenge is that the lump sum could produce liquidity effects, which the experiment must separate from incentive effects. One approach would be to randomly vary the size of the lump sum; the difference in search behavior between those receiving larger and smaller lump sums measures the liquidity effect.

national-level data sources. First, the Job Openings and Labor Turnover Survey (JOLTS) records the industry of vacant jobs but not the skills each job requires, but since jobs in different industries may use the same skills and jobs in one industry may use various skills, JOLTS does not truly measure changes in skill demand. Second, the Conference Board online help wanted dataset provides more detail on skill requirements, but it records only positions advertised online; it is not a representative sample of all vacancies. Third, the Current Population Survey (CPS) measures skills — as proxied by workers' education, job titles, and wages — but only for jobs that are actually filled. The CPS does not tell us anything about jobs that are not filled.[5]

The Minnesota Job Vacancy Survey (MN JVS) could, if it were expanded nationally, provide better information. MN JVS is a semiannual state-run survey that collects information not only on the number of vacancies at firms (as in JOLTS) but also on the education and experience required and on the terms of employment. Some states have run similar one-off surveys but, to my knowledge, Minnesota is the only state with an ongoing survey. If MN JVS were expanded nationally, it would provide valuable real-time information on the evolution of skill demand as well as on other issues beyond the scope of this memo, such as wage stickiness.

3. Matching efficiency

The apparent outward shift of the Beveridge curve has led some economists to suspect a decrease in the efficiency with which workers and jobs find each other. There are many reasons why an outward shift may not reflect a decrease in matching efficiency; here, I focus on the data used to construct the curve. The unemployment rate used in drawing the curve should count all workers who are searching — including those who are engaged in on-the-job search, not just the unemployed — and should weight workers according to the effort with which they search.[6] But the main high-frequency data source on unemployment, the monthly CPS, does not measure on-the-job search or search intensity.[7] Thus, the CPS cannot tell us whether the recession has left a backlog of on-the-job searchers who will take many vacancies before the unemployed find jobs, nor whether the unemployed are searching less vigorously than in the past.

Krueger and Mueller's recent study of UI benefit recipients in New Jersey shows how economists can measure search intensity in real time by collecting time use data.[8] It would be valuable to conduct similar surveys nationally on an ongoing basis. A nationally representative time series would help policymakers understand whether shifts in the Beveridge curve are due to changes in matching efficiency or, rather, to changes in the relationship between the measured unemployment rate and the amount of job search that is actually taking place.

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[5] For example, the observation that employment has not fallen for professional jobs does not imply that unemployed people would find work if they earned professional degrees; firms may already have all the professionals they need.
[6] Similarly, the vacancy rate should weight vacancies according to the intensity with which firms are trying to fill them; this issue is beyond the scope of this memo.
[7] Other datasets measure on-the-job search but are released infrequently and with long lags.
[8] Alan B. Krueger and Andreas Mueller, 2010, "Job Search and Job Finding in a Period of Mass Unemployment: Evidence from High-Frequency Longitudinal Data," paper presented at Federal Reserve Bank of Atlanta conference on "Employment and the Business Cycle," Nov. 11.

Federal Reserve Bank of Minneapolis
Improving Models of Employment and Monetary Policy
Kei-Mu Yi
January 14, 2010

The following is a brief summary of three existing or ongoing research projects at the Minneapolis Fed that rely on incomplete markets frameworks to study the large decline in employment and output during the Great Recession. We believe that extending these frameworks to include monetary elements should be possible. We are optimistic that the resulting models would be more reliable tools for policy than the more traditional "representative agent" frameworks.

A. Two key features of the Great Recession were a substantial decrease in output and employment without any deterioration in productivity, and a large increase in firm volatility. In a recent Minneapolis Fed research paper, the authors develop a model to link these variables, and in this model, fluctuations in firms' volatility impact the aggregate economy.[1] In so doing, their paper contributes to a recent research literature that emphasizes the importance of uncertainty in driving business cycles. In the model, there are a large set of firms that hire workers, produce output, borrow, and can default. This activity occurs in a dynamic setting. Creditors are aware that firms can default and therefore price the loans accordingly. The key mechanism is that in the presence of imperfect financial markets, an increase in firm-level uncertainty leads firms to contract the size of their projects and employ fewer workers to avoid default. The increase in uncertainty also has an amplification effect on firms' output through tighter credit. Firm-level credit is more restricted because of the rise in default risk that comes with higher firm-level uncertainty. The main findings are that the increase in uncertainty can explain a substantial portion of the decline in output and labor, and that it can do so without any fall in worker productivity.

B. Over the past 120 years in the United States, periods of low asset prices are associated with high macroeconomic volatility, and periods of high asset prices are associated with low macroeconomic volatility. Minneapolis Fed researchers develop a model that relates asset prices to macroeconomic activity and volatility.[2] It is an equilibrium micro-founded model, but it also delivers Keynesian-type outcomes. Volatility arises because households alternate between being optimistic and pessimistic about future unemployment prospects. These expectations become self-fulfilling because they affect demand, which then affects employment, leading to periods of high and low output. In addition, households can accumulate assets to try to buffer against these animal spirits. The greater the level/value of these assets, the less sensitive household demand is to household unemployment prospects; hence, the lower the volatility in the economy. The work is ongoing, but it suggests policy implications for unemployment benefit programs and for asset purchase programs.

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[1] Cristina Arellano, Yan Bai, and Patrick Kehoe, 2010, "Financial Markets and Fluctuations in Uncertainty," unpublished manuscript.

[2] See Fabrizio Perri and Jonathan Heathcote, "Wealth and Volatility," unpublished manuscript (in process).

      C. Many observers attribute the Great Recession to a large decline in aggregate demand. The standard equilibrium business cycle framework implies that temporary demand shocks (i.e., a temporary decrease in consumption demand) lead to countercyclical real wages, which is counterfactual. In an attempt to redress this problem, Minneapolis Fed researchers develop a framework in which demand for goods has an intrinsic productive role: consumers "search" for goods. Increased demand leads to increased search, which leads to increased goods "found" and consumed.[3] However, firms must choose their "full capacity" — including labor — in advance, based on expected demand. A key implication is that demand shocks, in and of themselves, can lead to fluctuations in measures of aggregate productivity. By focusing on demand shocks, the framework has Keynesian features — thereby also providing a rationale for Keynesian fiscal policies — even though the framework features rational decision makers and flexible prices. This ongoing research also has implications for how output gaps are measured.

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[3] See Yan Bai, José-Víctor Ríos-Rull, and Kjetil Storesletten, "Demand Shocks that Look Like Productivity Shocks," unpublished manuscript (in process).