

Getting to the tipping point?: Using employment data to forecast the odds of a recession

HUMAN CAPITAL CURRENTS

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- Panelists in the October 1 issue of *Blue Chip Financial Forecasts* put the odds of the U.S. economy entering a recession by the end of 2012 at 34.6 percent.
- Two recession probability models, regularly updated on the Atlanta Fed Center for Quantitative Research website, put the odds that the U.S. economy already entered a recession earlier this year at 14.4 percent and 23.6 percent, respectively.
- Growth in payroll employment and household employment—two of the indicators the NBER closely examines when dating business cycle peaks—are not in recessionary territory. Moreover, some simple probit models using only employment growth are not signaling an elevated risk of a recession by the end of 2012.
- However, when changes in the S&P 500 are added to the probits, the odds of entering a recession become somewhat higher. When the change in the unemployment rate is added, the results are mixed.

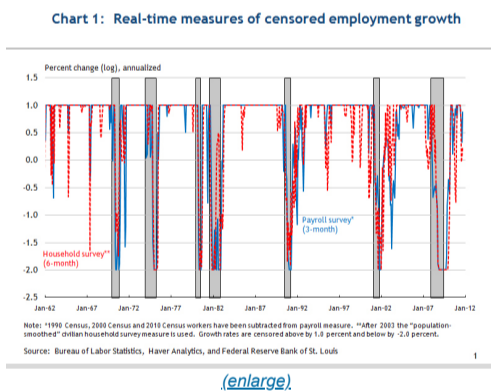
The October 1 issue of *Blue Chip Financial Forecasts* asked its panel for the odds of a recession in the United States by the end of 2012. The average response was 34.6 percent. However, the responses were quite dispersed with the average of the top 10 responses equaling 48.5 percent and the average of the bottom 10 responses totaling 19.5 percent.

At the time of this survey, the data that the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) uses to determine recession/expansion dates was available through August 2010 at the latest. In 17 percent of the nonrecession months from January 1983 to August 2009, a transition to a recession occurred within 16 months. Since January 1948, the same transition occurred 27 percent of the time. So a 16-month recession odds forecast, conditioned only on the information that the economy is not in a recession, might put the odds between 17 and 27 percent.

Examining employment and other data to forecast recession

Is it safe to assume the economy was not in a recession this August? The Center for Quantitative Economic Research of the Federal Reserve Bank of Atlanta posts the output of two recession [probability models](#). One gross domestic product (GDP) based model from economist James Hamilton puts the first-quarter 2011 recession probability at 14.4 percent. The other, from economist Marcelle Chauvet, uses five of the monthly series the NBER uses to determine recessions. It shows a 23.6 percent recession probability for July 2011. Two of the series in Chauvet's model are employment measures: (1) total nonfarm payroll employment from the Bureau of Labor Statistics (BLS) *establishment survey* and (2) total civilian employment ages 16-plus from the *household survey*. According to the FAQs on the NBER's website, employment was especially important in the dating of the business cycle peak in both the 2001 and 2007–2009 recessions.¹ The household survey employment measure was not cited as one of the indicators used to date the March 2001 peak.² It was "considered by the committee" for determining the December 2007 peak, but the payroll measure was still viewed as "the most reliable comprehensive measure of employment."

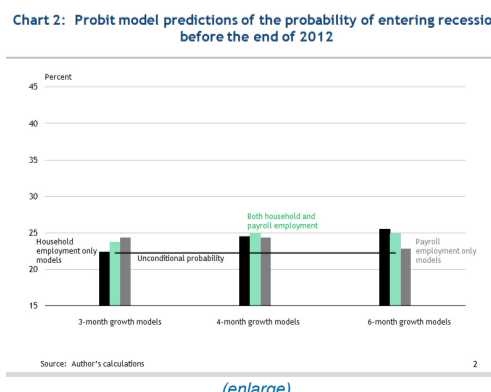
The NBER refers to the original civilian employment series on its website. In my opinion, however, the BLS population-smoothed series (available [here](#)) that smooths out level shifts in employment from population control adjustments is preferable. Chart 1 plots the three-month annualized (log) percent change in payroll employment and the six-month annualized percent change in the smoothed household survey measure.



The data are all real time (i.e., they are not revised data) except for the fact that the current vintage estimates of the 1990 Census, 2000 Census, and 2010 Census workers are subtracted from the payroll series. Additionally, the (real-time) population-smoothed version of the household series is used since its introduction in 2003; prior to that the conventional (real-time) household employment measure is used. Growth rates above 1 percent or below -2 percent are truncated to focus the eye on the middle portion of the graph. In a recent [working paper](#), Federal Reserve economist Jeremy Nalewaik argued that U.S. recessions have often been preceded by a slow "stall speed" growth phase. There was some evidence of slow employment growth in one or both of the employment measures prior to the last four recessions. However, there have also been some false positives such as 1995 and, of course, the so-called jobless recoveries following the 1990–1991 and 2001 recessions, which ultimately did not turn into double-dip recessions. The most striking feature of the graph is the ability of the series to identify a current recession. In every recession since 1969, both employment growth rates have fallen below -1.5 percent (annualized). Conversely, no expansion months at least 12 months past the last business cycle trough had both growth rates below -1.5 percent. The most recent employment growth rates from both surveys, while somewhat soft, have still been well above this recession threshold.

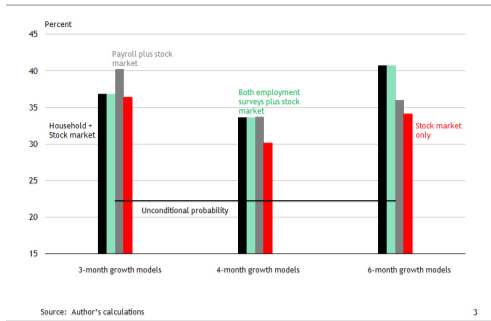
Using probit models as further predictive tools

Returning to the question of the likelihood of a U.S. recession occurring before the end of 2012, I ran a number of probit models to discover what the recent employment numbers see through the lenses of these simple statistical models. The following setup is used: using only observations where each of the prior five months were not recession months, estimate a probit model of the probability that either the current or subsequent 15 months is a recession month conditional on the most recent three-month, four-month, or six-month employment growth rates from either the *household survey* and/or the *payroll survey* using data from January 1961 to August 2009. Real-time data from Haver Analytics and the Federal Reserve Bank of St. Louis [ALFRED](#) database are used to estimate the probits. Then, assuming the economy was not in a recession this August, forecast the probability of entering a recession before the end of 2012 using the latest three-month, four-month, or six-month employment growth rates. These probabilities, as seen in chart 2, are in the 22–25 percent range and are only trivially higher than the historical unconditional probability of transitioning to a recession month over the same time frame.



By itself, recent employment growth certainly does not appear to be signaling an imminent recession. The Economic Cycle Research Institute is not so sanguine, however; it recently made a call that the U.S. economy is "[tipping into a new recession](#)." I augmented the probit models with real Standard & Poor's (S&P) 500 growth, since the S&P 500 has fallen 9 percent over the three months ending October 19. [Estrella and Mishkin](#) (1995 and 1998) found that stock prices historically have some predictive power for recessions. The real S&P 500 is also one of the indicators used to construct The Conference Board Leading Economic Index. Chart 3 displays the recession predictions from the stock market augmented models.

Chart 3: Probit model predictions of the probability of entering recession before the end of 2012



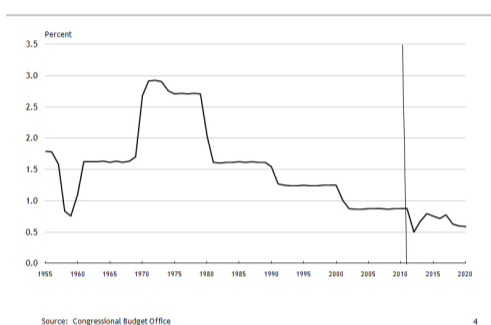
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In these models, the weekly averages of the S&P 500 are interpolated to get a weekly average for the 21st of each month (around the time the *Blue Chip* survey is conducted) and these averages are deflated by the previous month's consumer price index. These probabilities, generally in the 30–40 percent range, are indeed higher than the employment-only probit model predictions. Chart 3 also shows that adding one or both of the employment measures to a stock market only probit model does increase the recession probability modestly.

Considering the unemployment rate in models

Former New Jersey congressman Jim Saxton and economist Tim Kane (2008) [found](#) that "among popular monthly labor measures, the unemployment rate is the most useful as an indicator of recession, whereas two top measures of employment growth—payroll jobs and civilian employment—have little value." One possible issue with using employment growth as a recession indicator is that trend labor force growth fluctuates over time. Chart 4 displays the Congressional Budget Office's estimate of annual potential labor force growth.

Chart 4: Potential Labor Force Growth

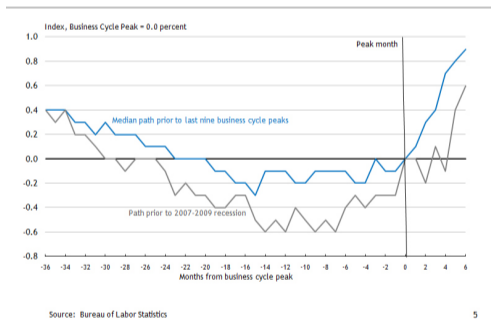


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In the 1960s, 1970s, and 1980s potential labor force growth was above 1.5 percent. Since 2002, it has been below 1 percent. Annual labor force growth of 0.75 percent implies that job gains slightly below 100,000 per month are all that are needed to keep the unemployment rate constant. If labor force growth was 2 percent or higher, a gain of more than 200,000 jobs would be needed. The unemployment rate will not be influenced by changes in the trend rate of population growth or the aging of the population nearly as much as the aggregate measures of employment are.

To give a sense of the behavior of the unemployment rate leading up to a recession, I use economist Edward Leamer's approach ([2001](#)). For each of the 36 months prior to a business cycle peak, I first normalize by subtracting the unemployment rate at the time of the business cycle peak from the unemployment rates prior to the peak. For example, the unemployment rate was 4.4 percent on December 2006 and 5 percent on December 2007, so December 2006 gets assigned a normalized unemployment rate of -0.6 percent. I did this for each of the last nine business cycle peaks; the median of the normalized paths is shown in chart 5 as is the path prior to the December 2007 peak.

Chart 5: Median unemployment rate path in months leading up to business cycle peak in last nine expansions

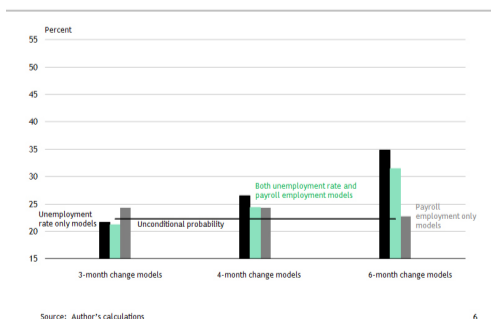


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In general, the unemployment rate is declining up until 15 months before a business cycle peak. Thereafter, it is flat or increases modestly until the peak and then increases more rapidly after it. Recently, the unemployment rate was as low as 8.8 percent in March 2011 before increasing back up to its current 9.1 percent.

I substituted the t -month change in the unemployment rate for t -month household survey employment growth in the original probit specifications and reran them. Again, real-time data are used and the unemployment rate is calculated as the ratio of the unemployed to the labor force (to eliminate rounding effects). The results are shown in chart 6. For the six-month change model, the unemployment rate model is giving a higher recession signal (35 percent) than the payroll employment change model (23 percent), while for the three-month and four-month change models, the unemployment rate only and payroll growth only models are signaling roughly the same recession odds.

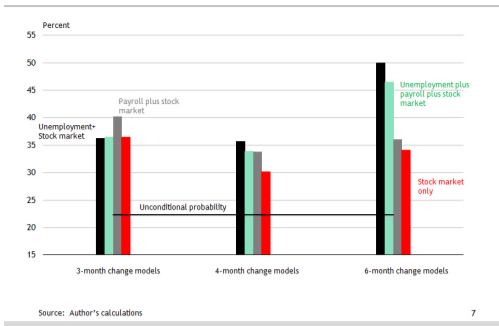
Chart 6: Probit model predictions of the probability of entering recession before the end of 2012



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The six-month unemployment rate change model probability signal is still well below the 50 percent threshold commonly used to "call" recessions; in order to exceed this threshold the six-month change would have to be 0.7 percentage point or larger. When the (real) growth rate in the S&P 500 is added to these models, the recession probabilities again increase substantially (see chart 7).

Chart 7: Probit model predictions of the probability of entering recession before the end of 2012



[\(enlarge\)](#)

Conclusion

In closing, probits using the most recent employment indicators are not signaling that a recession is imminent. If one adds stock market growth to these models, things get a little dicier. Finally, the range of the probabilities spanned by all the different probits I estimated is fairly similar to the range between the "top 10" and "bottom 10" *Blue Chip* panel estimates of "recession odds" that I cited at the beginning of the article.

By Patrick Higgins, Atlanta Fed economist

1 Q: How does the committee weight employment in determining the dates of peaks and troughs? A: In the 2007–2009 recession, the central indicators—real GDP and real gross domestic income (GDI)—gave mixed signals about the peak date and a clear signal about the trough date. The peak date at the end of 2007 coincided with the peak in employment. We designated June 2009 as the trough, six months before the trough in employment, which is consistent with earlier trough dates in the NBER business-cycle chronology. In the 2001 recession, we found a clear signal in employment and a mixed one in the various measures of output. Consequently, we picked the peak month based on the clear signal in employment, as well as our consideration of output and other measures. In that cycle, as well, the dating of the trough relied primarily on output measures.

2 From the November 26, 2001, announcement of the March 2001 peak: Q: You emphasize the payroll survey as a source for data on economy-wide employment. What about the household survey, which showed a decline in employment in August? A: Although the household survey is a large, well-designed probability sample of the U.S. population, its estimates of total employment appear to be noisier than those from the payroll survey. The downward jump in August, which differs from the payroll data, may be such a random movement. Data in the coming months will help resolve the discrepancy between the two sources of data on employment.

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