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## Comment

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This interesting paper marries the efficiency wage principle to the search and matching setup. Its novelty is an emphasis on fluctuations. Notwithstanding the large literatures on search and matching on the one hand, and efficiency wages on the other, remarkably little work had been done prior to this paper to explore the implications of combining the two ideas. Though related to the Shimer puzzle, the paper does not aim to solve that puzzle quantitatively. It adopts the traditional framework of taking productivity as the driving force of unemployment fluctuations, but the ideas would apply to other drivers.

In the Diamond-Mortensen-Pissarides (DMP) class of unemployment models, the following elements are essential to the ideas in the paper. Employers post  $V$  vacancies. The daily probability that their recruiting efforts will land a new worker is  $q = H/V$ , where  $H$  is the total flow of new hires. The endogenous variable  $\theta$  is an index of labor-market tightness. The job-filling rate is a function  $q(\theta)$ . The benefit to an employer of hiring a new worker—the present value of the difference between the worker’s marginal product and the worker’s wage—is  $J$ , which depends on the future paths of productivity and wages, the duration of the job, and the discount rate. In zero-profit equilibrium, the expected daily benefit of holding a vacancy open equals the daily cost,  $c$ :

$$q(\theta)J(x) = c. \tag{1}$$

This equation determines tightness, which in turn determines the unemployment rate:

$$u = U(\theta). \tag{2}$$

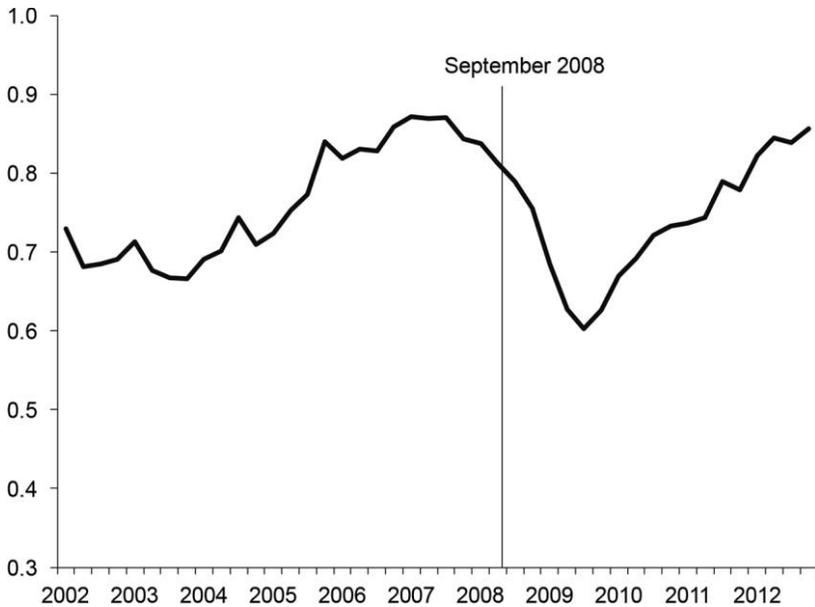


Fig. C1. The job-value index  $c(V/H)$  from JOLTS

The critical object  $J$ , the job value, is directly calculable as

$$J = \frac{c}{q} = c \frac{V}{H}. \quad (3)$$

Figure C1 shows its value in recent years, using data on vacancies and hires from the Job Openings and Labor Turnover of the Bureau of Labor Statistics, together with an estimate that  $c = \$66$  per day from Hall and Milgrom (2008). Huge swings have occurred in the job value, accompanied by large movements in unemployment and the job-filling rate  $q$ .

Shimer (2005) stimulated a decade of research in the search-and-matching paradigm by demonstrating that the assumption of Nash wage bargaining, together with reasonable assumptions about bargaining power and other parameters, implied that wages tracked productivity sufficiently closely to make the job value  $J$  essentially a constant. Most of the ensuing attempts to reinstate the DMP model as a model of substantial fluctuations focused on the productivity-wage gap. Even a small tendency for wages not to fall as much as productivity will generate large declines in  $J$  and corresponding increases in unemployment.

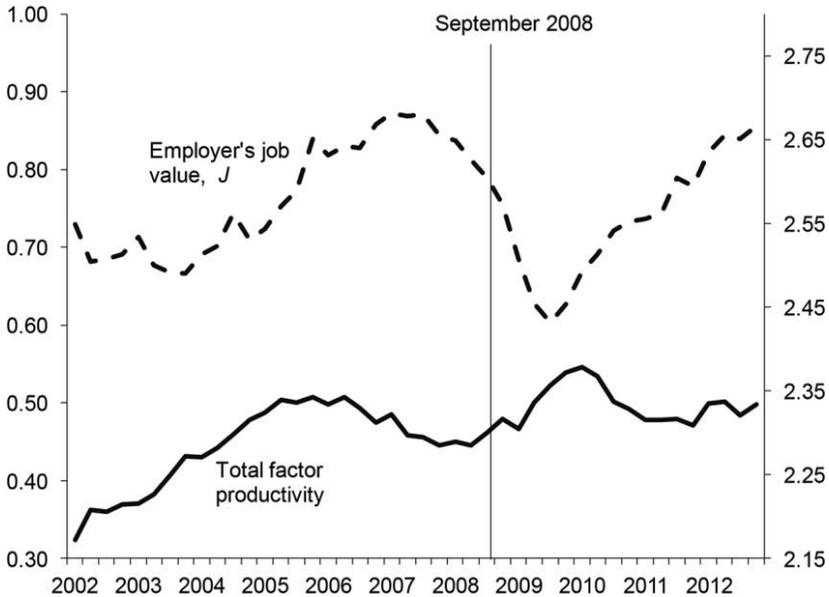


Fig. C2. Correlation with total factor productivity

Recent events cast doubt on productivity as a driving force. Figure C2 shows total factor productivity, a potentially exogenous driving force, along with the job value. The correlation is not impressive.

In a competitive economy, the endogenous variable that would transmit shocks to the labor market is the marginal product of labor. With Cobb-Douglas technology, the marginal product moves in parallel with the output/labor ratio. Figure C3 shows that variable along with the job value. The correlation is even less impressive. Declines in output raise the output/labor ratio because the economy becomes more capital intensive.

Other driving forces have received attention in the labor-macro literature. In Walsh (2003), rising market power in recessions lowers the marginal revenue product of labor and has the same effect as a decline in productivity. Market power rises because sellers have sticky prices but face lower costs, so the markup of price over cost rises. In Gertler, Sala, and Trigari (2008) staggered Nash bargaining results in higher real wages in recessions because price inflation falls while nominal wages have inertia.

Hall (2013) explores the possible role of an increase in discount rates

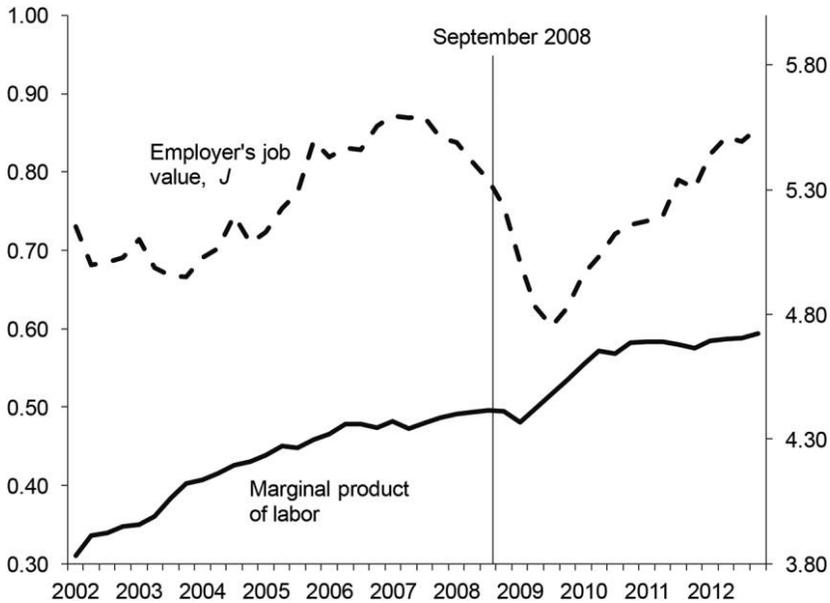


Fig. C3. Correlation with marginal product of labor

as a source of decline in the job value. The paper extracts discounts implicit in the stock market and finds that the rise in 2009 was easily enough to explain the increase in unemployment.

Eliasz and Spiegler enter previously neglected territory by building a model in which a decline in the expected duration of employment is responsible for the decline in the job value. The basic story is the following: negative aggregate productivity shocks have an adverse effect on the expected duration of a job. Thus  $J$  falls not only by any decrease in the productivity-wage gap, but also because the firm earns that gap for a shorter period. In the simplest DMP models, the duration is just the reciprocal of the exogenous separation rate, so this channel is completely shut down. With endogenous separations, a feature of many DMP models, the effect of aggregate productivity on duration is nonpositive—to the extent that lower productivity slackens the labor market, it depresses the probability that an adverse firm-specific shock will drive the worker's marginal product below the worker's search value, and the worker will separate efficiently.

The paper is a sophisticated cousin of the line of thought that Barro (1977) attacked. Barro aimed at sticky-wage theories, picturing employers as laying off workers in recessions because their productivity had

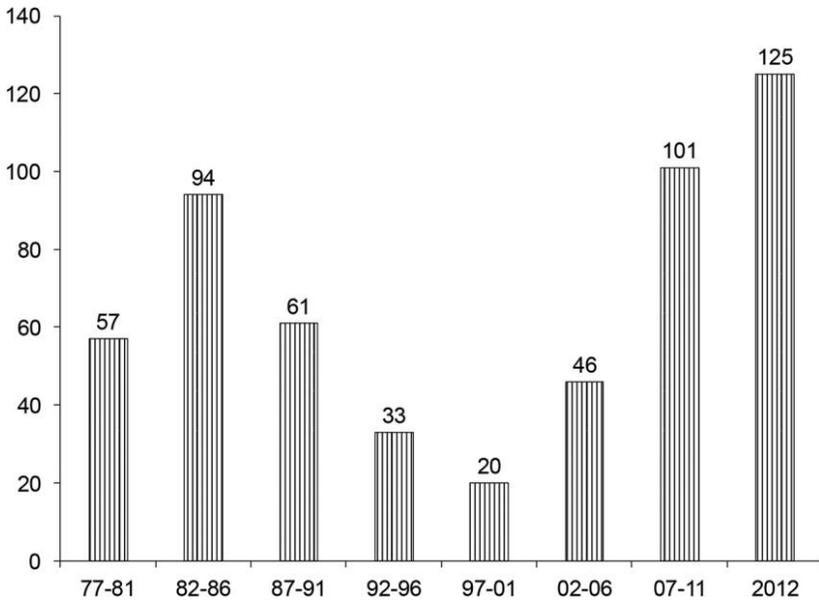


Fig. C4. Annual rate of citations of Barro (1977)

fallen below a contracted wage. The firm and worker passed up an opportunity to avoid this inefficient outcome by rebargaining. Barro's reasoning was influential in the subsequent development of the search-and-matching literature—figure C4 shows that citations of the paper rose dramatically in the upsurge of work that Shimer (2005) triggered.

The ES (Eliaz and Spiegler) paper sidesteps the Barro critique through its assumption of asymmetric information. Employers do not observe workers' effort, so the bargain over effort that Barro assumed, implicitly, cannot occur.

A direct implication of the model is that adverse productivity shocks should cause a burst of separations. In fact, as figure C5 shows, separations are amazingly stable, according to two independent measures, the CPS (Current Population Survey) and JOLTS (Job Openings and Labor Turnover Survey). Separations have been stable during the past three recessions in the United States. The stability of separations seems to point away from all views of the employment relationship that invoke sticky wages that fail to respond even when the bargaining set shifts so that the wage exceeds the employer's reservation wage. In slack markets, however, separations where the worker takes the initiative (quits) fall dramatically while those where the employer takes the initiative

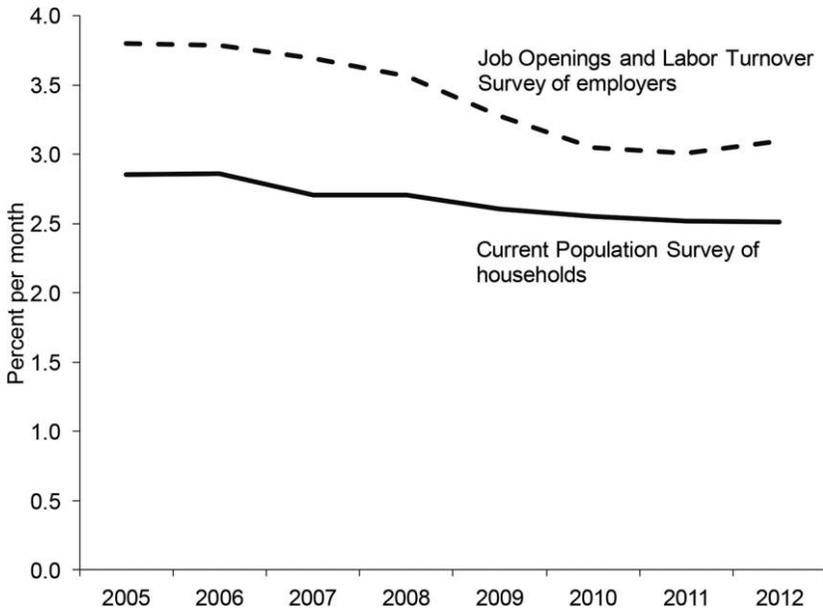


Fig. C5. Separation rates from the Current Population Survey and the Job Openings and Labor Turnover Survey, 2005 through 2012

(layoffs) rise by almost exactly the same amount. Models allowing re-bargaining are unable to deal with this fact.

In the ES model, shirking occurs with positive probability, unlike some other efficiency-wage models. In traditional efficiency-wage models, high unemployment discouraged shirking by raising the cost to a worker fired for shirking. In this quite different efficiency-wage model, shirking breaks out when unemployment rises, because firms do not meet their workers' wage aspirations. Shirking would show up as diminished total factor productivity. The behavior of TFP in recent years does not suggest that there was a burst of shirking when the adverse shock hit in late 2008—see figure C2. The model does not rest on the occurrence of shirking, however—it is consistent with zero incidence.

The authors appear to believe that a desirable feature of a realistic model of aggregate unemployment volatility is fairly high sensitivity of initial wages to productivity shocks. Pissarides (2009) criticized sticky-wage explanations of unemployment volatility on the grounds that empirical work on cyclical sensitivity of initial pay showed essentially complete response of wages to productivity. The authors cite Haefke,

Sonntag, and van Rens (2012) in support of the hypothesis of full response. From 117,243 observations in the CPS on wages of job-changers, Haefke and coauthors estimate the cyclical elasticity of the wage with respect to productivity to be 0.79 with a standard error of 0.40, a disappointingly uncertain finding. That paper observes:

Thus, while our estimates rule out explanations of the unemployment volatility puzzle that rely on a high degree of stickiness in the net present value of wages, they are consistent with a moderate degree of wage stickiness, like the bargaining setup in Hall and Milgrom (2008).

Our paper showed that the moderate degree of stickiness was just the amount required to explain the observed relation between productivity and unemployment.

I conclude that the efficiency wage model deserves further attention and the setup in this paper is a promising start on this neglected topic. I agree that variations in employment duration would be a source of changes in job values that would result in variations in unemployment, but the stability of the separation rate appears to stand in the way of any important role of job duration in the actual US job market. The model's implication that shirking actually occurs in times of high unemployment does not receive support from recent performance of productivity over the cycle.

## Endnote

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