

What Flows in the Labor Market Reveal about the Employment Relationship *

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Abstract

I focus on two aspects of the employment relationship. One is the formation and continuation of worker-employer matches. The principle of bilateral private efficiency holds that a match will be formed if it adds to the joint value of the two parties and that the match will continue until the time when splitting up would raise joint value. The second aspect is the effort that employers put into recruiting new workers. Employers make these efforts because of the profit that they gain from employment. Wages have a role in both aspects. The bilateral worker-employer relation defines a bargaining set—any wage in the bargaining set results in the formation and retention of an efficient match. The choice of wage within the bargaining set is indeterminate. But the choice still matters for recruiting effort. If the wage is toward the upper end of the bargaining set, employers will anticipate little profit and will recruit correspondingly less aggressively. I discern two concepts of wage stickiness in this framework. One is that wages might be sticky in a way that interferes with the continuation of efficient matches. I show that the data for the modern U.S. economy reject that type of stickiness. The second is that the wage's position in the bargaining set moves persistently. Periods when it moves up in the set are recessions, when the job-finding rate falls sharply and unemployment rises. I show that U.S. data support this view against the alternative that the wage is at the middle of the set each period.

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1 Introduction

A standard view of recessions is that an adverse shock results in widespread layoffs of workers from established employment relationships. Workers lose their jobs because wages are sticky and employers no longer find the relationships profitable after the shock, in this view. High unemployment lasts until the bulge of unemployed workers can find new jobs.

I propose that the evidence supports quite a different view. An adverse shock has little effect on established employment relationships, especially in the modern market where collective bargaining affects few workers outside government. Jobs end when it is in the mutual interest of worker and employer to part company. A shock raises unemployment by lowering the profitability of hiring new workers. Unemployment rises not because of a bulge of layoffs but because workers entering job search—from previous jobs, from school, and from home activities—experiences unusual difficulty in finding jobs.

As a preliminary matter, I observe that it is well known that job-finding rates are far too high to match the persistence of unemployment following a recession (Cole and Rogerson 1999, Hall 1995). The exit rate from unemployment is about 60 percent per month. If a recession started with a bulge of job loss and lasted as long as it took for those workers to find new jobs or leave the labor force, unemployment would return to normal at 60 percent per month. Instead, the reversion rate is about one percent per month. The market reaches its stochastic equilibrium so quickly, in fact, that the movements of unemployment can be understood in a model that neglects turnover dynamics and considers only the stochastic steady states of the model.

The key fact supporting the central thesis of this paper is that, in the modern economy, there is no bulge of job loss at the onset of a recession, or, for that matter, at any time in the business cycle. A new survey that measures separation rates from the employer side demonstrates this fact conclusively. Separation rates declined during the recession that began at the beginning of 2001. Although data from earlier recessions are not available on the same footing, flows of workers into unemployment are also remarkably stable, especially in the past two recessions.

The movements of unemployment arise almost entirely from changes in the job-finding rate. The data do not speak as loudly on this point. The flow of workers

into jobs is shown definitively to decline slightly during a recession in the new employer turnover survey. With a declining flow and higher unemployment, there is a presumption that job-finding rates are lower in slack markets. But two factors complicate the measurement of those rates. First, some workers who lose or leave jobs move to new jobs without becoming unemployed at all. The likelihood of job-to-job transitions without unemployment is higher in strong labor markets with low unemployment, though the data on these transitions are weak. Second, people may search actively while they are still holding jobs or while they are in school or out of the labor force for other reasons. Despite these obstacles, it seems clear that recessions are times of large declines in job-finding rates.

Research has been active in developing models of the labor market that come to grips with these facts about the cyclical behavior of flows. One important contribution is the Diamond-Mortensen-Pissarides (DMP) matching model (Diamond 1982, Mortensen 1982, Pissarides 1985). In that model, decisions about the formation and continuation of jobs are privately efficient—they maximize the combined value of the worker and the employer. This line of thinking rejects the earlier view that workers are laid off in bad times because their rigid wages have become unrealistic. Separations only occur when the worker gains more from leaving the job than the employer loses. These efficient matching models predict that the separation rate declines in recessions. The value of the option to search for a new job declines when jobs become hard to find and thus the efficient outcome is the continuation of jobs that might have ended in normal times.

As Shimer has pointed out, the DMP model cannot explain the magnitude of the rise in unemployment during a recession (Shimer 2003b). The reason is that the model takes the wage to be instantly flexible. An adverse shock to profitability results in an immediately lower wage. Employers continue to recruit workers with almost the same enthusiasm, because a lower wage almost completely absorbs the profit shock. Job searchers find it almost as easy to find new jobs, so the unemployment rate rises only just above its normal level.

As I have proposed in a companion paper (Hall 2003), wage stickiness can have an important role in an efficient matching model. The search friction creates a range of wages, the bargaining set, from the reservation wage of the worker at the low end to the entire product of the worker at the upper end. As long as the wage is in this bargaining set, the match will be formed and continued efficiently. But the

wage does matter for the recruiting effort of employers. If the wage is toward the lower end of the bargaining set, employers will gain more from the relationship and will put a higher level of resources into trying to form employment relationships. Shimer discusses this mechanism at a more general level (Shimer 2003a); it does not require the specific ideas put forth in my other paper.

In the efficient matching-sticky-wage view, a recession is a time when the flow of job separations declines somewhat—because the flow is determined efficiently—but when the wage is unusually high in the bargaining set. A recession could be triggered by a spontaneous rise in the wage or by an adverse technology or cost shock that lowered profitability. Firms shift toward less aggressive recruiting and the job-finding rate rises accordingly. Unemployment rises, because the small decline in the flow of separations is more than offset by lower job-finding rates among the unemployed and by lower likelihoods of job-job transitions without unemployment.

2 The Irrelevance of Turnover Dynamics

Let u be the unemployment rate, f be the exit rate (the fraction of unemployed workers in one month who are not unemployed in the next month), and s the entry rate (the number of newly unemployed as a fraction of employment). With the labor force normalized at 1, the law of motion for the unemployment rate is

$$u_t = (1 - f_{t-1}) u_{t-1} + s_{t-1} (1 - u_{t-1}) \quad (1)$$

To measure the exit and entry rates, I use data on unemployment by duration. The Bureau of Labor Statistics reports the number of unemployed searchers who began unemployment in the four weeks preceding the survey and also the number who began 5 to 14 weeks before the survey. If the exit rate is a constant over duration (probably a reasonable approximation for relatively short durations) and the weekly inflow to unemployment is a constant (a very good approximation, as I will show), the ratio of unemployment in the two duration categories is

$$\frac{1 + \dots + (1 - f)^4}{(1 - f)^5 + \dots + (1 - f)^{14}} \quad (2)$$

I solve for the exit rate by equating this expression to the observed ratio of unemployment in the two categories. The entry rate is the unemployment rate in the 0 to 4 week category divided by $1 + \dots + (1 - f)^4$. I will discuss the resulting time series for the exit and entry rates shortly.

If the exit and entry rates are constant, then equation 1 describes a two-state Markov process with stationary unemployment,

$$u = \frac{s}{s + f}. \quad (3)$$

If unemployment dynamics were an important part of the story of the movements of unemployment, then the stationary level of unemployment would lead the movements of actual unemployment. For example, during a period of higher flows into unemployment from job losses at the beginning of a recession, unemployment builds up to its new higher level, then recedes to its normal level after the inflow returns to normal. But the lead is tiny, because the exit rate is about 60 percent per month. Figure 1 demonstrates the irrelevance of turnover dynamics. It compares the actual movements of unemployment to the movements of the stationary level, evaluated at the current estimates of the entry and exit rates.

The fact that unemployment movements have almost nothing to do with turnover dynamics was noted earlier (Hall 1995, Cole and Rogerson 1999). For my purposes in this paper, I achieve a considerable simplification by considering only the stochastic stationary state and ignoring turnover dynamics. Almost nothing is lost from this simplification.

3 Model

Here I develop a model of the type that embodies the mechanisms that concern the paper. Another paper gives an exposition that does more justice to some of the subtleties of the subject (Hall 2004). The model here describes the stationary equilibrium of the labor market. The model is stationary in two senses. First, the environment is stationary—the driving forces are not changing over time. Present values of future flows are formed on the assumption that the flows will always have their current values. Second, in line with the evidence in the previous section, the model considers only the stochastic equilibrium of the matching process and not

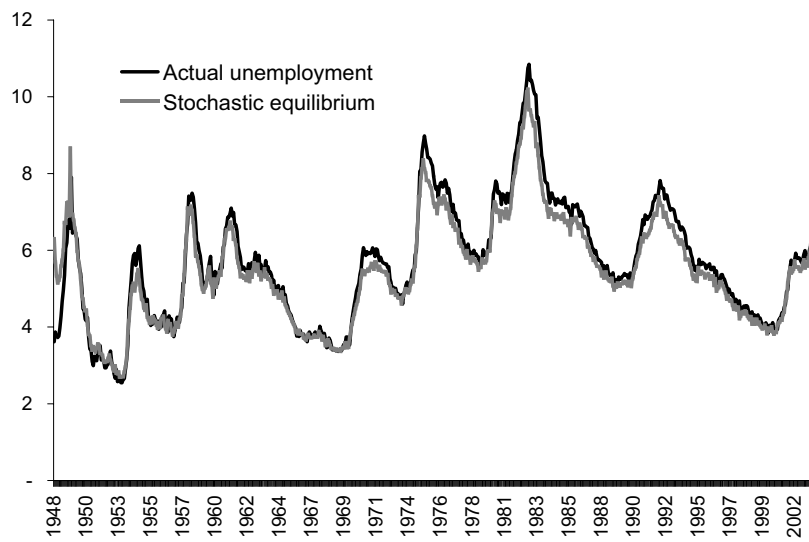


Figure 1. Unemployment dynamics

its dynamics.

I assume that a worker with tenure on a job of t periods contributes profit

$$ze^{-\delta t}. \quad (4)$$

Here z incorporates the product price, productivity, and the cost of non-labor inputs; it is the driving force of fluctuations. I assume that the rate of decline of profit, δ , is positive. In a simple model with homogeneous workers, the profit generated by a worker must eventually decline enough to explain turnover—if profit remained constant with tenure or rose, jobs would last forever.

Workers may change jobs without becoming unemployed. I assume that an employed worker faces a hazard f_E of encountering another employer. Because the worker's contribution will be higher for the new employer, trilateral efficiency calls for the worker to move to the new employer.

3.1 Values associated with employment and unemployment

The value that a worker associates with a job, apart from the wages the job pays, is the present value of the likelihood of moving directly to a new job and receiving E plus the present value of moving to unemployment, with resulting value U , after the job ends L periods from its inception. The lowest wage value that a searcher will accept is the one that makes the total value of employment equal the value of remaining unemployed:

$$\underline{W} = \left[1 - e^{-(r+f_E)L}\right] U - \frac{f_E}{r + f_E} \left[1 - e^{-(r+f_E)L}\right] E \quad (5)$$

The value a worker associates with a new job paying wages with a present value of W is

$$E = U + W - \underline{W}. \quad (6)$$

An employer achieves a present value \overline{W} from the relationship with a newly hired worker:

$$\overline{W} = \frac{z}{r + \delta + f_E} \left[1 - e^{-(r+\delta+f_E)L}\right] \quad (7)$$

Thus the net value to the employer after paying wages with a present value of W is

$$J = \overline{W} - W. \quad (8)$$

The bargaining set for the wage value W , once a worker and employer have met, is $[\underline{W}, \overline{W}]$. Any wage value in the bargaining set will result in efficient formation of job matches.

An unemployed worker achieves a present value U from the flow value of leisure and unemployment compensation, λ , and from the prospect of finding a job with a value E . The hazard of finding a job while unemployed is f_S . Thus

$$U = \frac{f_S E + \lambda}{r + f_S} \quad (9)$$

The point where the pair should separate if the worker has still not come in contact with a new employer is when the flow value of being unemployed is equal to the flow of profit generated from this job:

$$rU = ze^{-\delta L} \quad (10)$$

I consider an alternative, privately inefficient rule for ending jobs: There is a predetermined flow wage w and the job ends when a worker's current contribution to profit falls to the level of the wage:

$$w = ze^{-\delta L} \quad (11)$$

This rule embodies the governance principle often assumed for the employment relationship: Employers make unilateral choices about continuing employment, considering only their own profit, with the wage taken as given.

Employers control the resources that govern the rates of job finding for employed workers and for the unemployed. A related paper discusses this important asymmetry in detail (Hall 2004). The incentive to deploy the resources is the employer's net value from a match, J . I posit two functions, ϕ_S and ϕ_E , mapping this incentive to the matching hazards in the model:

$$f_E = \phi_E(J) \quad (12)$$

$$f_S = \phi_S(J) \quad (13)$$

These functions describe the outcome in terms of matching hazards for workers when employers engage in recruiting activities up to the point where the marginal benefit, indexed by J , equals the marginal cost of the activities (controlled by variables that are implicit in the functions). These activities could include posting vacancies (Mortensen 1982, Pissarides 1985), or evaluating candidates (Hall 2004). Vacancies are not an explicit element of the model, but the setup is exactly compatible with the standard Mortensen-Pissarides setup with vacancies and a matching function that depends on unemployment and vacancies. When J is higher, firms post more vacancies, get in touch with more workers, unemployed and employed, advertise for more workers, and so on. All of these make it easier for the unemployed to find new jobs and more likely that an employed worker will move to a new and more productive job.

Notice that the functions ϕ_S and ϕ_E describe more than employers' unilateral responses to the incentive to find new workers. Search involves externalities. The functions describe the job-finding hazards facing workers when employers make decisions about recruiting effort reflecting the external effects from the efforts of other employers.

In the sticky-wage version of the model, I take the per-period flow wage, w , to be a state variable. I do not deal here with the law of motion of the wage, but my other papers give a couple of examples of adjustment processes that describe persistent but not total wage rigidity (Hall 2003, Hall 2004). The present value of the wage paid on a job is

$$W = \frac{w}{r + f_E} \left[1 - e^{-(r+f_E)L} \right] \quad (14)$$

I require that this present value be in the bargaining set, $[\underline{W}, \overline{W}]$.

In the other, flexible-wage version, I adopt the symmetric Nash wage bargain of DMP. For unemployed workers, the resulting equation for the present value of the wage is:

$$W = \frac{1}{2} (\underline{W} + \overline{W}) \quad (15)$$

The wage is set so that its present value, W , is the average of the worker's reservation value, \underline{W} , and the employer's reservation value, \overline{W} . Although it is possible

to implement this present value in terms of a contingent flow wage, the flow wage plays no role in the model.

Wage determination for on-the-job search is a more complicated issue, because it involves three parties, the earlier employer, the new employer, and the worker. A number of other papers deal with the trilateral issue explicitly (Burdett and Mortensen 1998, Postel-Vinay and Robin 2002, Shimer 2003c, Hall 2004). To keep this exposition simple, I will make the assumption that the conventions of the labor market require that a worker who has come in contact with a prospective new employer while still working for an earlier employer quit her existing job before negotiating wages with the new employer. The outcome of the resulting bilateral bargain is in the bargaining set for the trilateral bargain, so the assumption is no more than an equilibrium selection rule. The assumption implies that a job found by on-the-job search has the same present value of wages, W , as one found during a spell of unemployment.

I consider three variants of the model: (1) sticky wages and efficient separations, where the flow wage w is held fixed, the present value of wages is governed by equation 14, and separations are governed by equation 10; (2) flexible wages, where the present value of wages is governed by equation 15; and (3) sticky wages and inefficient separations, where separations are governed by equation 11.

3.2 Calibration

I calibrate the flexible-wage model, because I believe that the sticky wage converges slowly to something like the Nash wage bargain—wages are sticky but not permanently rigid.

In the calibration, I take the profitability z to be 1, so all values are measured in units of the monthly profit obtained from the work of one newly-hired worker. I take the monthly interest rate to be $r = 0.05/12$. I take the rate of decline of a worker's profitability to be $\delta = 0.008$, a value that gives a reasonable value of λ (so in effect I am calibrating to λ). For the overall separation rate, s , I use the value from the turnover survey for 2000, 3.5 percent. I obtain the on-the-job search hazard f_E by subtracting an estimate of the employment-unemployment hazard from the total separation rate. The estimate comes from Blanchard and Diamond's study of turnover data in the Current Population Survey (Blanchard

and Diamond 1990). They find a monthly hazard of 2.9 percent for transitions out of employment, either to unemployment or out of the labor force. Thus I use $f_E = .006$.

To measure the job-finding rate for searchers, f_S , I follow Blanchard and Diamond's suggestion to combine people who are unemployed and those who are not in the labor force but want a job. The job-finding hazards are 25 percent per month for the unemployed and 34 percent for those who want jobs. The combined hazard is $f_S = 0.29$. Notice that combining the two groups implies an unemployment rate, 9.1 percent, that is rather higher than the standard unemployment rate.

Based on these values, I calculate the job-duration limit, L , from the principle that the separation rate is the reciprocal of the average duration of a job:

$$\frac{1}{s} = \frac{1 - e^{-f_E L}}{f_E}, \quad (16)$$

which implies

$$L = -\frac{\log\left(1 - \frac{f_E}{s}\right)}{f_E}. \quad (17)$$

The resulting value is $L = 31.3$ months.

Next I calculate the unemployment value U directly from equation 10 and the employer reservation value \bar{W} directly from equation 7. I solve equations 5, 6, and 15 for \bar{W} , E , and W . I calculate the leisure-unemployment compensation value λ from equation 9. The resulting value is 0.3 or 30 percent of a newly-hired worker's profitability. I calculate the employer's job value J from 8. It is 1.64 months of the profit earned from a newly hired worker.

I assume that the job-finding hazard functions are linear and proportional, with slopes ϕ_S and ϕ_E and calculate the slopes as the ratios of the values of f_S and f_E to the calibrated value of the incentive, J .

3.3 Comparative statics

Figure 2 illustrates the determination of the stationary equilibrium in terms of the supply and demand for recruiting effort, measured on the horizontal axis as the job-finding rate for searchers, f_S . The figure describes the sticky-wage, efficient

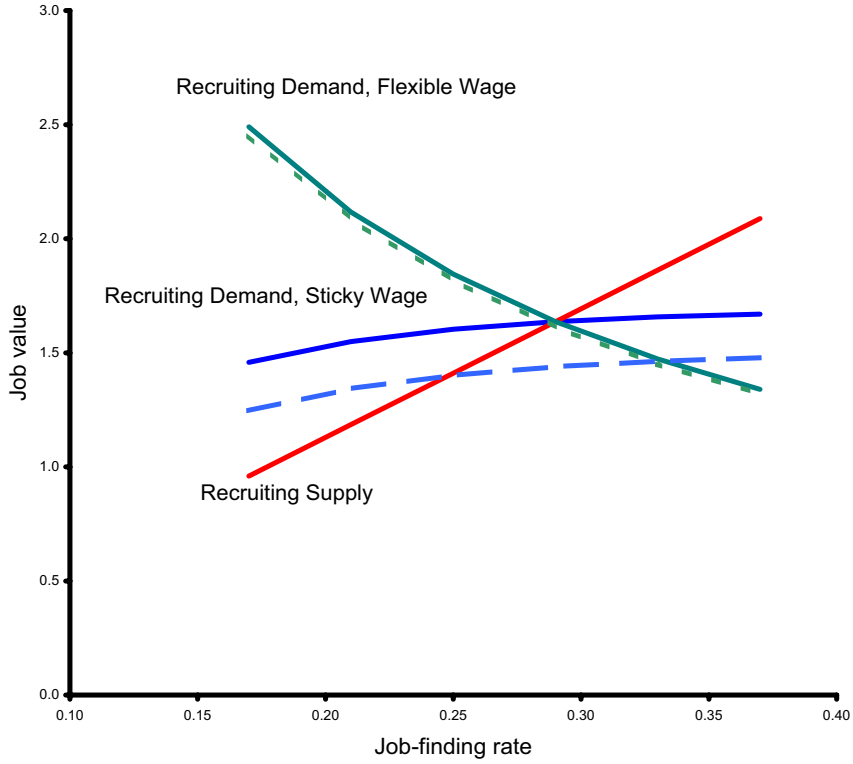


Figure 2. Supply and Demand

separations model and the flexible-wage model. The sticky-wage, inefficient separations model (not shown) is similar to the efficient separations model in this diagram. The vertical axis is the value, J , that the employer derives from the relationship at the time it is formed.

The supply curve is equation 13:

$$f_S = \phi_S(J) \quad (18)$$

A higher job-value J causes employers to increase their recruiting efforts. They move to a new point where the marginal private value of effort equals the marginal private return. The supply curve is a straight line from the origin under my assumption about the functional form for ϕ_E . In the background, the job-finding rate f_E for employed workers changes along the supply curve as well.

The demand curve encapsulates the rest of the model. In the sticky-wage case,

it slopes upward because a tighter labor market with a higher job-finding rate is more efficient. The job-job transition rate, f_E , is higher in the tighter market and the tenure level, L , where workers automatically depart, is lower. On both accounts workers stay on their jobs for shorter periods and thus have higher average productivity. With a sticky wage, employers pick up the benefit of the higher productivity.

On the other hand, in the flexible-wage case, the demand curve slopes downward. Employers do not gain directly from the higher efficiency of a tight labor market, because the wage absorbs virtually all of the gain. A tighter market with less matching friction results in a lower level of match capital. The employer receives half the value of the match capital, so the incentive to recruit is smaller in a tighter market.

Figure 2 also shows shifts in the demand curves caused by a one-percent reduction in profitability z . The resulting downward shift is substantial for the sticky-wage demand curve. Employers bear the full brunt of the decline when the wage is fixed, so the incentive to recruit falls substantially. A small decline in profitability—from a drop in productivity, a drop in the product price, or a rise in other costs—results in a large decline in the job-finding rate and rise in unemployment. By contrast, with a flexible wage, the shift in the demand curve is tiny. The decline in profitability causes a corresponding decline in the wage and little effect on the incentive to hire. Job-finding and unemployment rates are hardly different.

Table 1 describes the responses of the three versions of the model to a one-percent decline in profitability, z . The table shows the derivatives of the equilibrium with respect to the profitability variable, z , evaluated at the calibrated point. For all variables except the unemployment rate, the derivatives are normalized as elasticities.

The negative shock has a large negative effect on the two job-finding rates, f_E and f_S , in the sticky-wage models, for the reasons just explained. It also has a smaller but non-trivial negative effect on job-finding rates in the flexible-wage model. The effects of the shock on the job duration limit, L , are small in the efficient separations models—slightly negative with sticky wages and slightly positive with flexible wages—but strongly negative in the inefficient-separation model. With a fixed wage but diminished profitability, workers lose their jobs. This effect is the essence of the traditional view of employment fluctuations.

The total separation rate, s , is the sum of the employment-unemployment haz-

<i>Variable</i>	<i>Concept Measured as</i>	<i>Model</i>			
		<i>Sticky wage, efficient separations</i>	<i>Flexible wage, efficient separations</i>	<i>Sticky wage, inefficient separations</i>	
f_E	Separation and job-finding rate for employed workers	Elasticity	-13.9	-0.8	-11.4
f_S	Job-finding rate while unemployed	Elasticity	-13.9	-0.8	-11.4
L	Job duration	Elasticity	-0.3	0.1	-4.0
s	Total separation rate	Elasticity	-1.0	-0.2	2.6
u	Extended unemployment rate	Derivative	1.3	0.1	1.4
J	Value of job match to employer	Elasticity	-13.9	-0.8	-11.4
U	Worker's value when unemployed	Elasticity	-0.9	-1.0	-1.0
E	Worker's value at start of employment	Elasticity	-0.8	-1.0	-0.9

Table 1. Responses of the Three Models to a One-Percent Decline in Profitability

ard,

$$s_u = f_E \frac{e^{-f_E L}}{1 - e^{-f_E L}}, \quad (19)$$

and the job-job hazard, f_E (note that if the job-job hazard is zero, $s = 1/L$). The table shows important differences in the response of the total separation rate to the adverse shock. In the sticky-wage, efficient-separation model, the job-job hazard, f_E , falls but the job-duration limit L rises, so separations into unemployment fall. The net effect is a decline in separations in proportion to the decline in profitability. In the flexible-wage model, the job-job hazard rate also falls, but not nearly as much. Job duration rises slightly, so on both accounts the total separation rate falls, but only a little. In the inefficient-separations model, the job-job hazard falls almost as much as in the sticky-wage, efficient separations model of the first column, but the large decline in job duration swamps that effect and causes total separations to decline by 2.6 times the decline in profitability. Thus rising separations in recessions is the signature of the inefficient separations model that distinguishes it from the efficient separations cases.

Both sticky-wage models generate substantial increases in unemployment, as the next line in the table shows. As Shimer has stressed, flexible-wage models in the DMP tradition cannot explain the magnitude of unemployment variations (Shimer 2003b). This principle carries over to the model developed here—the addition of on-the-job search does not erode Shimer’s conclusion.

The last three lines in the table show the responses of the values achieved by employers and workers. The net value of the match to the employer, J , is highly sensitive to the adverse shock in the sticky-wage models. This key feature of the model explains the decline in job-finding rates that occurs during a recession. The elasticity of 0.8 in the flexible-wage model is not nearly high enough to generate realistic recessions from shocks of likely magnitude—it takes an elasticity above 10.

On the other hand, all models generate elasticities of about one for the response of the worker’s values, U and E , to changes in profitability. Labor is the sole factor of production in the model and is supplied inelastically, so these values capitalize almost all of the profit available from production. This property does not mean that unemployed workers face unchanging incentives to find jobs. That incentive is con-

trolled by $E - U$, which moves in mirror image to J . If wage stickiness results in a diminished share of the surplus to employers, it also results in an increased share of the surplus to newly hired workers. The essence of the sticky-wage explanation of fluctuations in the labor market is the asymmetric response to incentives—workers cannot make up for the diminished incentives facing recruiting employers, even though the workers face increased incentives.

Early in the paper I suggested that one can understand the changes that occur in a recession in the labor market without considering unemployment dynamics. One aspect of dynamics does bear mentioning, however. In the inefficient-separations model, the decline in job duration that occurs when profitability falls means that the workers with tenure between the old and new values of L lose their jobs when the shock hits. The data reveal this phenomenon as a spike in layoffs. No such spike would occur with efficient separations. So one of the ways to gauge the importance of inefficient separations is to examine the behavior of layoffs at the beginnings of recessions.

4 Evidence

4.1 Separations and layoffs

Beginning in December 2000, the Bureau of Labor Statistics has collected data on separations and hires for a large sample of employers. Fortuitously, the early months of the new survey caught the labor market just before the peak of employment, so the period of the survey to date describes the differences between a strong market and a weak market. The extended unemployment rate rose from 6.9 percent in December 2000 to 9.1 percent in August 2003.

To date, the BLS has not developed seasonal adjustment factors for the new survey. I have calculated rough seasonal adjustments with monthly dummies. Figure 3 shows the turnover rates recorded in the survey. Most remarkable is the decline of the separation rate. Layoffs remained almost exactly constant from the peak of the market in December 2000 through late 2003, a period of continuing declines in employment and rising unemployment. The recession did not begin with a burst of job loss. Quits did decline, in accord with standard beliefs about what happens in the labor market during recessions, so total separations fell modestly.

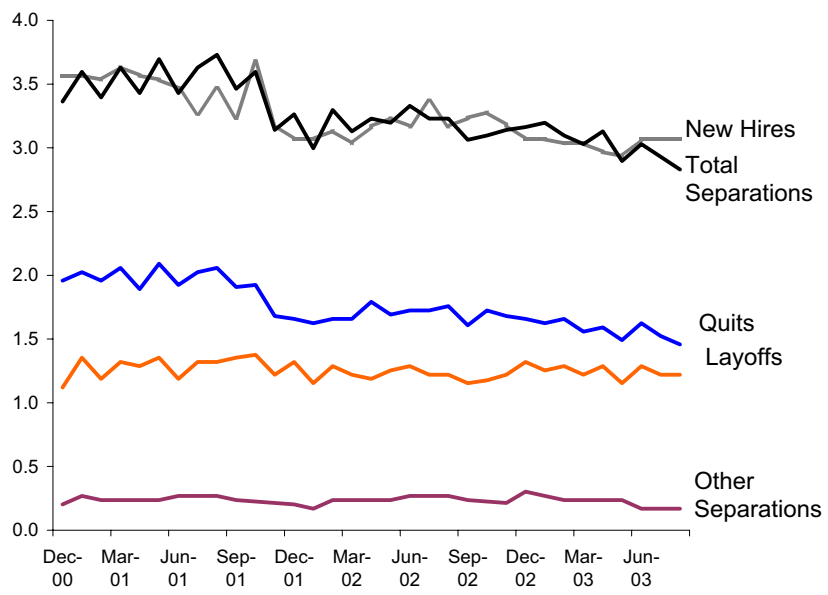


Figure 3. Separation Rate and Components

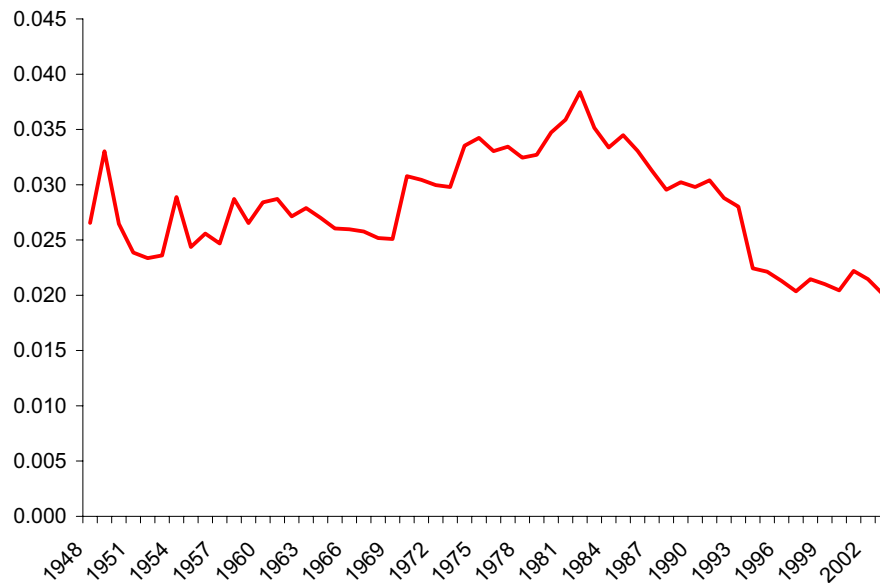


Figure 4. Flows into Unemployment

Figure 3 suggests that the sticky-wage, inefficient-separations model does not describe the modern U.S. labor market at all. Despite a large increase in unemployment, separations fell. There was no burst of layoffs at any time.

The turnover survey gives an unambiguous picture of the behavior of separations in a recession, in the economy of 2000 and later. Its only defect is lack of history. Figure 4 shows a less satisfactory measure of separations over a long period. It reports the results of the calculation described in Section 2 of separations in the sense of entry to unemployment. The flow has large low-frequency movements, rising to a peak in 1982 and then falling to its historical low in the last year reported, 2003. There is no sign of important increases in inflows to unemployment in the two most recent recessions, in 1990-91 and 2001. Earlier recessions, especially 1948-49 and 1981-82, did show bursts of entry to unemployment.

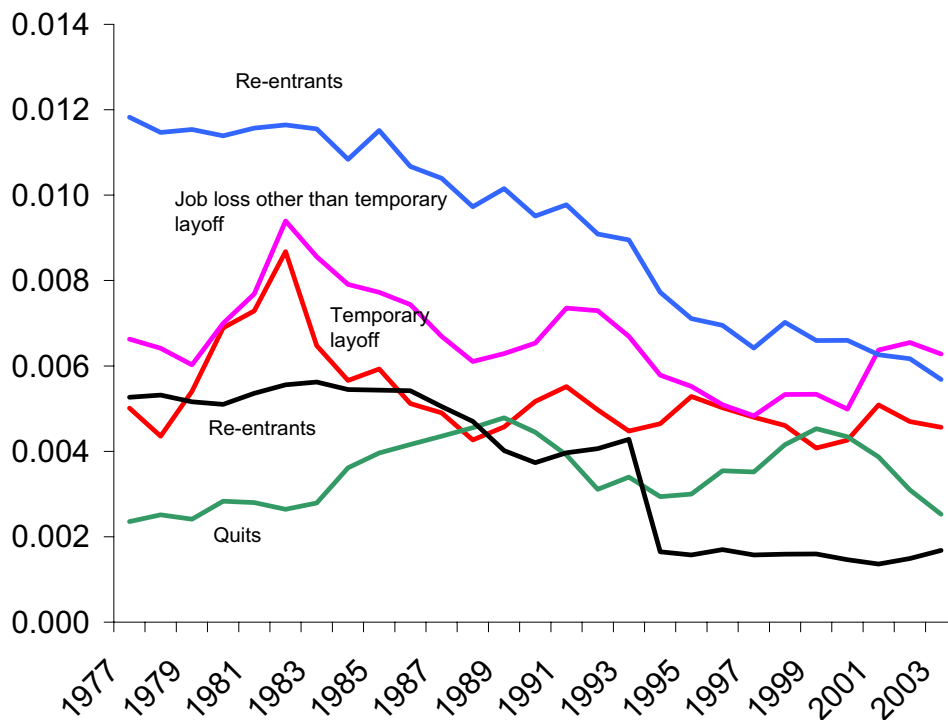


Figure 5. Components of Flows into Unemployment

Figure 5 confirms the suspicion that the lack of a burst of job loss in recessions is a recent development. For years starting in 1977, it breaks down new unemployment by source. Job loss from both temporary layoff and other sources—permanent loss of jobs and the ending of temporary jobs—rose dramatically in the 1981-82 recession and rose a small amount in 1990-91 and 2001.

The behavior of inflows to unemployment does not contradict the turnover survey for 2001 and later. Some workers who lose jobs do not become unemployed but move to new jobs directly. The job-job transition rate is a close cousin of the job-finding rate for searchers. As I will show in a moment, that rate falls precipitately in a recession. The modest increase in inflows of job losers to unemployment in 2001 is probably entirely the result of a higher likelihood of unemployment among job losers and not higher separations from jobs.

In summary, the evidence on separations suggests that inefficient separations are not an important in the modern U.S. economy. In particular, the decline in

total separations that occurred in the recession that began in early 2001 accords closely with the efficient-separations model and gives no support to the inefficient-separations model. But earlier contractions did see bursts of job loss of the type predicted only by the inefficient-separations model. This change is consistent with the dramatic decline in factory-floor employment and in non-government unionization.

4.2 Job-Finding Rates

Data on job-finding rates are lacking. The turnover survey does not distinguish between new hires from unemployment and new hires directly from earlier jobs. This distinction would not be practical in an employer-based survey. The Current Population Survey does not generally track job changes.

The data I discussed in the calibration section suggest that most new hires are from the unemployed (in the extended sense of this paper). Of the total outflow of workers from jobs of 3.5 percent per month, 2.9 percentage points are flows into unemployment, (Blanchard and Diamond 1990). In stochastic equilibrium, the same ratio must govern the inflows—a ratio of 2.9/3.5 of hires are from the unemployed. Consequently, the ratio of hires to unemployment is indicative of job-finding rates. Figure 6 shows the ratio for the period covered by the turnover survey.

The job-finding rate declined from 45 percent per month to 30 percent over the period. There can be no question that the labor market softened substantially as the recession developed. It seems altogether likely that both the job-finding rate for searchers, f_S , and the rate for the employed, f_E , fell during the period. Further, the magnitude of the decline appears inconsistent with the elasticity of the job-finding rate with respect to the profitability driving force given in Table ?? for the flexible-wage model. The elasticity is 0.8, so the driving variable, z , would need to have fallen by 42 percent to account for the slackening of the labor market.

A decline of 42 percent in profitability is easy to imagine in a particular industry—say computers in the case of the 2001 recession. But the slackening of the labor market was economy-wide. The forces that can depress economy-wide profitability are circumscribed. One is productivity. It is easy to rule out the possibility that the recession was caused by a 43-percent decline in productivity. The other is

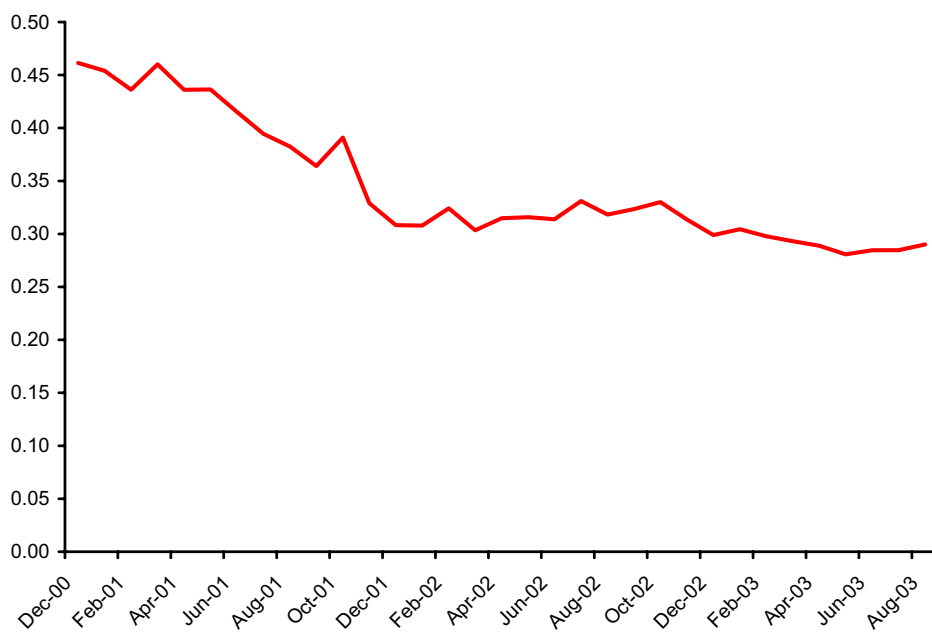


Figure 6. Job-Finding Rate Measured as the Ratio of New Hires to Extended Unemployment

an adverse shift in the terms of trade. The shift was adverse in the recession, but nowhere near large enough to depress z by 43 percent. Finally, an increase in the wage above its Nash-bargain level has essentially the same effect as a decline in z . So a third possibility is a large spontaneous increase in the wage.

The decline in z needed to explain the decline in the job-finding rate in the sticky-wage, efficient-separations model is a more reasonable 3 percent. A recession of the observed magnitude could be caused by some combination of productivity declines, shifts in the terms of trade, and overshooting of wages, that summed to 3 percent.

I conclude that the flexible-wage model cannot account for the substantial decline in the job-finding rate observed in the 2001 recession. It is a topic for further research to determine if the sticky-wage model is consistent with the events of the recession, but sticky wages seem the most promising avenue among those considered here.

5 Concluding Remarks

The data on flows in the U.S. labor market are informative about the employment relationship and about changes in the relationship over time. I have considered two key features of the relationship. One is the efficiency of the mechanism used to determine when matches are made and when they are continued or terminated. I showed that the behavior of the separation rate during recessions distinguishes efficient from inefficient separations—among the models I consider, a jump in separations during a recession is an unambiguous indicator of inefficiency. The data show that such jumps occurred in earlier recessions, but not those of the past 20 years, including the one that started in 2001. I conclude that modern employment relationships are generally terminated in the joint interest of the worker and the employer. I infer, without any direct evidence, that the same principle applies to the formation of matches as well.

The second key feature is the movement of the wage within the zone consistent with efficiency. The conclusion that separations only occur efficiently rules out wages that are too high to merit retention from the employer's point of view, or too low to merit the worker staying on the job, but allows the wage to take on any value in the bargaining set bounded by those two values. In a labor market with

frictions, there is a substantial gap between the lowest and highest efficient wage. From the perspective of the worker and employer, the wage is indeterminate in the bargaining set. An equilibrium selection rule governs the actual choice.

Although the choice of wage in the bilateral employment relationship is indeterminate, the choice has allocational consequences, because employers make economic choices about recruiting effort based on their expectations about the resolution of the indeterminacy. If they expect the wage to be at the low end of the set, they will recruit more actively and the labor market will be stronger, in the sense of higher job-finding rates for job seekers.

This line of thought results in a role for wage stickiness quite different from the traditional one resulting in inefficient separations. Its distinctive effect is on job-finding rates, not separation rates. When wage stickiness is a factor in a recession, it is not because workers lose their jobs on account of sticky wages, but because those who lose their jobs at normal rates experience abnormally low job-finding rates.

The data give strong support to the second type of wage stickiness. The recession of 2001 saw a huge decline in the job-finding rate. Among the models I consider, only those with sticky wages can explain the decline—it is far too large to be the result of flexible wages modeled as a Nash bargain.

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