Though this paper presents itself as a technical treatise on correcting some serious biases in JOLTS, it actually has important lessons for labor mobility and aggregate labor-market fluctuations. I’ve learned a lot over the years from the Davis-Haltiwanger team and appreciate the relentless pressure that they, especially Steve, have applied to me to correct my ways.

In this literature, there is something called the “hiring-driven view” or otherwise the Hall-Shimer fallacy. (Slide 1). Research on JOLTS has voided this view, which never had any factual support and is not an intrinsic part of the Hall-Shimer position on aggregate fluctuations. (Slide 2).

The team’s work with JOLTS demonstrates a simple proposition: firms raise employment by increasing hiring and cut employment by increasing layoffs or other separations. (Slide 3). The micro relation between employment growth and hires has a beautiful kink right at zero. (Slide 4). The layoff rate has a similar kink (Slide 5). Interestingly, the quit rate also has a kink (Slide 6). Workers figure out that it is time to quit when firms downsize, or their employers take actions that make them decide to quit.

I have a particular interest in aggregate fluctuations. Slide 7 gives my view of the evidence, now that I’m fully indoctrinated by the DH team. This view is validated by this paper and the body of DH research. (Slide 8)

Slide 9 shows the layoff rate in the corrected JOLTS. It shows no particular bulge during the large decline in employment in the recession that began in early 2001. There is a small spike
associated with 9/11.

My worst error, which I now confess, has been to downplay the significance of the DH measures of job destruction and job creation. Earlier I had said unfortunate things like “job destruction” is just the negative part of employment growth and we don’t know if it occurs because of layoffs or reduced hiring, so we can’t relate it to worker flows.” The work on micro-JOLTs data makes it clear that JD and JC are useful measures.

One of the many benefits of the DH research program has been the Business Employment Dynamics program at the BLS. Now that I have realized that JD is a reasonable proxy for separations and JC for hires, I can study them for aggregate movements, as in Slides 10 and 11. The JD rate has a little bump upward during the recession of 2001, shaded, and JC a similar bump downward, but the view of general cyclical stability is confirmed.

Today’s paper is a big step toward reconciling worker flow rates and employer flow rates. Slide 12 shows the separation rate in the CPS since the 1994 improvements. It confirms the rise in separations in 2001, though the bump is not nearly as pronounced. The adjusted JOLTS separation rate in this paper, the BED JD rate, and the CPS rate are now within a reasonable range of each other.

As the paper makes clear, the measurement of separations is tricky, because they are concentrated among certain categories of firms and certain occupations. The median duration of a job in the US is one day. Lots of separations occur in areas involving day work and highly transitory jobs, despite the low share of employment of those areas. Slide 13 shows the wide range of quarterly separation rates from different sources with different conceptual bases (this is from my 1995 Brookings paper, “Lost Jobs”, so the CPS number does not include job-to-job separations).

Let me now turn to the theory of separations. One attractive hypothesis—to a follower of Ronald Coase—is that separations occur if and only if they are bilaterally efficient. Let $J_t$ be the joint value achieved from the employment relationship by employer and worker and let $U_t$ be their value if they separate. I use $U$ for unemployment on the supposition that the employer’s breakup value is zero, a standard assumption in the matching literature. Slide 14 shows the Bellman equation for the employer-worker pair.

$\alpha_t$ is an aggregate influence on the worker’s productivity and $\epsilon_t$ is the large idiosyncratic component. $r$ is the discount rate.

Slide 15 shows the separation rate $s$ as the probability that the max will occur with breakup. $F$ is the cdf of the idiosyncratic component. Slide 16 takes the derivative with respect to some aggregate influence $x$, which could be aggregate productivity $a$ or something else, such as an
influence on wages, that affects $U$. The equations identifies two factors that could make the effect of $x$ on separations fairly small, as we find in the data. One is that the density $f$ could be small. This would imply that fairly few workers are close to the margin of separation. A low value of $f$ would naturally occur if the dispersion of the idiosyncratic component is high. The DH team has demonstrated exactly that proposition in their work on micro data.

The other factor is that the aggregate influence on the unemployment value $U$ and on the continuation value may be about the same. For example, if $x$ is productivity, an increase in $x$ will raise $a$ and $J$ and on that account discourage separation. But it will also tighten the labor market, lower unemployment, and increase $U$ because the next job is found faster. Or, if wages respond to productivity, $U$ will rise on that account. The effect of aggregate shocks on separations is ambiguous and should be small.

Notice that this view makes no assumption about how employment changes are implemented—it is a true theory of separations. The Hall-Shimer view is completely consistent with the micro facts about labor-market dynamics.

If I have time:

Slide 17 gets at some of the heterogeneity stressed by the authors, using published BED data. Turnover is much higher among small units, when measured as a proportion of employment. Interestingly, the aggregate effects are bigger in the large units.

Slide 18 is another demonstration of heterogeneity. It shows turnover rates by age. Older workers, typically embedded in long-term jobs with substantial match-specific capital, have remarkably low turnover rates.
The hiring-driven view:
Firms adjust employment mainly by varying their hiring rates
The hiring-driven view:
Firms adjust employment mainly by varying their hiring rates
The inescapable truth: Firms raise employment by increasing their hiring rates and cut employment by increasing their layoffs.
Figure 4. Cross-Sectional Relationships of Worker Flows and Job Openings to Establishment Growth Rates, JOLTS Data, Zoomed in to Growth Between -25 and 25 Percent

(a) Hires Rate

(b) Job Openings Rate

(c) Quits Rate

(d) Layoffs Rate
Figure 4. Cross-Sectional Relationships of Worker Flows and Job Openings to Establishment Growth Rates, JOLTS Data, Zoomed in to Growth Between -25 and 25 Percent

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Still, aggregate fluctuations have little effect on the separation rate and large effects on the job-finding rate
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Figure 6. Adjusted and Published Estimates of JOLTS Worker Flows and Job Openings

(a) Hires Rate

(b) Job Openings Rate

(c) Quits Rate

(d) Layoffs Rate
BED job-destruction rate
BED job-creation rate
measure flows; measurement is only possible because, in most months, one can match data for people reported in that month to data reported in the previous month. Flows are inferred from differences in status reported in consecutive months. As a result, random errors in measuring status raise the levels of the flows. This problem has impeded research on labor-market dynamics based on the CPS. Longitudinal data overcome the problem—I discuss one important longitudinal survey below.

Starting in 1994, the CPS has provided a direct measure of separations—it added a question for a person who has been at work in successive months whether it is for the same or a different employer. Separations are the number of people who were at work in one month and unemployed the next month plus the number at work in one month and not in the labor force the next month plus those at work in both months but with different employers. Figure 2.4 shows the flows as twelve-month centered moving averages of seasonally unadjusted data.

The first feature to note about the CPS measure of separations is that the average rate of about 7 percent per month is much higher than the

![Figure 2.4](image)

**Figure 2.4**
Separation Rate Measured in the CPS, 1994–2004
Table 1. Alternative Measures of Job Loss, Quarterly Rates

<table>
<thead>
<tr>
<th>Measures</th>
<th>Rate of job loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent separations, UI system data</td>
<td>17.23</td>
</tr>
<tr>
<td>CPS tenure survey, 1981b</td>
<td>10.04</td>
</tr>
<tr>
<td>All separations, CPS</td>
<td>8.29</td>
</tr>
<tr>
<td>Gross employment reductions</td>
<td>5.66</td>
</tr>
<tr>
<td>Permanent layoffs, PSID, 1985g</td>
<td>1.81</td>
</tr>
<tr>
<td>Displaced Workers Survey, all workers, 1991–93</td>
<td>0.61</td>
</tr>
<tr>
<td>Displaced Workers Survey, workers on the job for at least 3 years, 1991–93</td>
<td>130.59</td>
</tr>
</tbody>
</table>

Sources:
- b. Bureau of Labor Statistics (1983, table 1, p. 1). Fraction of workers on the job for six months or less, stated at quarterly rate (unadjusted rate is 18.2 percent per six months).
- c. Blanchard and Diamond (1990, figure 1). Average monthly flows out of employment, 1968–86, divided by civilian labor force for 1977 (Economic Report of the President, 1995, table B-33), stated at quarterly rate (unadjusted rate is 2.7 percent per month).
- d. Davis, Haltiwanger, and Schuh (1995, table 2.1) using the Longitudinal Research Database (LRD). Quarterly flow of "job destruction" in manufacturing, with adjustment for compounding (unadjusted rate is 5.5 percent per quarter).
- e. Topel (1990, figure 1). Annual frequency of job loss from employer going out of business, layoff or firing, and completion of job reported in PSID, stated at quarterly rate (unadjusted rate is 7.0 percent per year).
- g. Bureau of Labor Statistics (1994, table 1). Number of workers with tenure of at least three years displaced between January 1991 and December 1993, divided by the civilian labor force for 1992 (Economic Report of the President, 1995, table B-33), divided by the fraction of the labor force with tenure of at least three years (51.5 percent) (Bureau of Labor Statistics, 1983, table 1, p. 1), stated at quarterly rate (unadjusted rate is 6.8 percent per three years).

Incidence and Consequences of Job Loss

Many different measures of the incidence of job loss are available, spanning a wide range of rates of loss. Table 1 presents a selection of the measures, arranged with the highest rates first. Almost all of the differences in the rates result from conceptual differences, not from measurement error. All of the measures are standardized at quarterly rates with adjustments for compounding (if the original rate is \( s \), measured over \( T \) quarters, the standardized measure is \( -1/T \log (1-s) \)). The standardized measure is interpreted as the instantaneous flow rate of separation, stated at a quarterly rate.

The administrative records of state unemployment insurance systems provide one of the most comprehensive measures of job loss.\(^\text{12}\)

12. Anderson and Meyer (1994). All separations are measured, so the rate is instantaneous and no adjustment is needed for compounding.
Theory of separations

\[ J_t = \max \left( a_t + \epsilon_t + \frac{1}{1 + r} J_{t+1}, U_t \right) \]
Theory of separations

\[ J_t = \max \left( a_t + \epsilon_t + \frac{1}{1 + r} J_{t+1}, U_t \right) \]

\[ s = F \left( U_t - a_t - \frac{1}{1 + r} J_{t+1} \right) \]
Theory of separations

\[ J_t = \max \left( a_t + \epsilon_t + \frac{1}{1 + r} J_{t+1}, U_t \right) \]

\[ s = F \left( U_t - a_t - \frac{1}{1 + r} J_{t+1} \right) \]

\[ \frac{ds}{dx} = f \left( U_t - a_t - \frac{1}{1 + r} J_{t+1} \right) \left( \frac{dU_t}{dx} - \frac{da_t}{dx} - \frac{1}{1 + r} \frac{dJ_{t+1}}{dx} \right) \]
BED expansion rates by employment


- 1 to 4
- 5 to 9
- 10 to 19
- 20 to 49
- 50 to 99
- 100 to 250
- 250 to 499
- 500 to 999
- 1000+
The fraction of workers rises until they are in their late thirties, as more and more find good job matches. The fraction then remains remarkably constant at about 40 percent until retirement age. However, these aggregate results conceal very important differences between men and women, a topic I will take up shortly.

Another way to express the movement of workers into stable jobs is by the number of jobs held by the average worker. The flow of new jobs is recorded directly in the tenure data in the form of the number of workers who have tenure of six months or less, though this measure understates the total flow of new jobs because some workers will have started two or more jobs in the six months before the survey. The annual number of new jobs started by the average person in an age group is roughly twice the fraction of the age group that is found in the zero to six-month tenure category. The average number of jobs held over a two-year span is twice the annual rate, and the average over a five-year span is five times the annual rate. These simple computations yield the results shown in Table 3 for the number of jobs held by the average worker (again, brief jobs are undercounted somewhat). Job shopping is most intense in the early twenties—by age 24, the average worker has held four jobs out of the ten he or she will hold in an entire career. The next fifteen years, from age 25 through 39, will contribute another four jobs. Then, during the ages when near-lifetime work is characteristic, less than three more jobs will be held on the average.

### Table 3—New Jobs

<table>
<thead>
<tr>
<th>Age Group</th>
<th>New Jobs per Year</th>
<th>New Jobs over the Age Interval</th>
<th>Cumulative Number of Jobs Held to this Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>16–17</td>
<td>.394</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>18–19</td>
<td>.534</td>
<td>1.1</td>
<td>1.9</td>
</tr>
<tr>
<td>20–24</td>
<td>.425</td>
<td>2.1</td>
<td>4.0</td>
</tr>
<tr>
<td>25–29</td>
<td>.309</td>
<td>1.5</td>
<td>5.5</td>
</tr>
<tr>
<td>30–34</td>
<td>.240</td>
<td>1.2</td>
<td>6.7</td>
</tr>
<tr>
<td>35–39</td>
<td>.192</td>
<td>1.0</td>
<td>7.7</td>
</tr>
<tr>
<td>40–44</td>
<td>.167</td>
<td>0.8</td>
<td>8.5</td>
</tr>
<tr>
<td>45–49</td>
<td>.126</td>
<td>0.6</td>
<td>9.1</td>
</tr>
<tr>
<td>50–54</td>
<td>.096</td>
<td>0.5</td>
<td>9.6</td>
</tr>
<tr>
<td>55–59</td>
<td>.076</td>
<td>0.4</td>
<td>10.0</td>
</tr>
<tr>
<td>60–64</td>
<td>.054</td>
<td>0.3</td>
<td>10.3</td>
</tr>
<tr>
<td>65–69</td>
<td>.032</td>
<td>0.2</td>
<td>10.4</td>
</tr>
<tr>
<td>70+</td>
<td>.010</td>
<td>0.1</td>
<td>10.5</td>
</tr>
</tbody>
</table>

### V. Long-Term Jobs among Blacks and Women

Many accounts of the disadvantages facing blacks and women in the labor market emphasize their lack of success in finding and holding permanent jobs. The techniques of this paper reach a surprising conclusion in testing this view—it is upheld strongly for women, but not at all for blacks. Lifetime employment is almost as common among blacks as among whites, and long-term employment is actually more common.3 (See Table 4.)

### Table 4—Comparison of Blacks and Whites

<table>
<thead>
<tr>
<th></th>
<th>Percent with Eventual Tenure of 5+ Years</th>
<th>20+ Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Blacks</td>
<td>63.4</td>
<td>26.4</td>
</tr>
<tr>
<td>All Whites</td>
<td>57.3</td>
<td>28.7</td>
</tr>
</tbody>
</table>

The lower-paying jobs where blacks are concentrated are not systematically briefer than are the better jobs typically held by whites. Discrimination against blacks does

---

3The same conclusion is reached by Steven Director and Samuel Doctors using personnel data from three firms, and by Akerlof and Main.