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Job Flows and the Recent Business Cycle: Not All "Recoveries" Are Created Equal

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Abstract:

The last two economic downturns are notable for their slow labor market recoveries. Yet, the behavior of their underlying gross job flows is quite different. The 1990-92 period had a relatively slow decline in job destruction, while the 2001-03 period had a large, persistent decline in job creation that occurs across most industries. The dynamics of the latter period run counter to the conventional wisdom that large movements in job destruction drive business cycles. Evidence spanning the entire postwar period suggests that job creation is at a historic low, and that its recent patterns are part of decades-long decline in the magnitude and volatility of job reallocation.

Keywords: job reallocation, business cycles, employment fluctuations

JEL Codes: E24, E32, J36

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1. Introduction

The two latest downturns appear remarkably similar. Unlike previous downturns, they each have a relatively brief recession followed by steady GDP growth but stagnant employment growth. This paper shows that, despite these apparent similarities, the underlying labor dynamics, particularly during the "jobless" recoveries, are quite different. Previously, others had found that large, episodic movements in gross job destruction and only small changes in gross job creation characterized cyclical fluctuations in the labor market.[1] This implied that job reallocation was countercyclical, and that job destruction rather than job creation was relatively more responsive to the business cycle. Using a new data source on job creation and destruction from the Bureau of Labor Statistics (BLS) and extending it back several years, I find that the dynamics of the 1990-92 downturn are consistent with this pattern, but that the dynamics of the 2001-03 downturn are not. During the latter period, employment losses are driven just as much by a dramatic decline in job creation as they are by a spike in job destruction. The drop in job creation is pervasive across nearly all industries. Previous studies, which find little cyclical movement in job creation, use different data sources, look at earlier periods, and focus on certain sectors of the economy, like manufacturing. Nevertheless, I find that the recent drop in job creation persists even within manufacturing, and the low creation rates during 2001-03 are the lowest on record for this industry during the postwar period. Put simply, from a labor market standpoint, the last economic downturn was unlike any other in the postwar period. Furthermore, the low rates of job creation appear to be part of a

[1] See Davis and Haltiwanger (1990, 1992), and Davis, Haltiwanger, and Schuh (1996).

long-term decline in the magnitude and volatility of job reallocation that began in the early 1960's.

The data I use come from the Business Employment Dynamics (BED) program of the BLS. The BED uses administrative establishment data from state unemployment insurance records to produce quarterly estimates of job creation and destruction for the private sector and major industries. Publicly available estimates begin in late 1992, and illustrate the large drop in job creation discussed in this paper.[2] Yet, without comparable data available for earlier recessions, it is difficult to ascertain whether the BED evidence deviates from previous findings because of a change in the cyclical patterns of job flows or because different data sources and scope are used. State administrative data exist back to 1990 (i.e., the start of the previous recession), but data reporting issues do not allow the BLS to release estimates using these data. To rectify this, I create linkage algorithms for the earlier microdata and estimate job flows back 1990-92 period. The constructed time-series runs spans 1990 through 2005 and allows a comparison of the last two recessions and "jobless" recoveries. To put the evidence for the last two downturns into a cyclical perspective, I also splice the manufacturing data from my extended series with job creation and destruction estimates created by Davis and Haltiwanger (1999) from the Longitudinal Research Database (LRD) of the Census Bureau and the discontinued Labor Turnover Survey (LTS) of the BLS. The final series spans 1947 through 2005, covering the entire postwar period.

Davis and Haltiwanger (1990, 1992) show that, within manufacturing, job destruction is relatively more volatile than job creation over the business cycle, leading to a negative correlation between job reallocation and employment growth. Foote (1998),

[2] The data are available at http://www.bls.gov/bdm/home.htm.

however, argues that this finding may be specific to manufacturing and other contracting industries. Other research finds that job creation exhibits greater variation in the cross-section—Baldwin, Dunne, and Haltiwanger (1998) find this pattern across industries, and Eberts and Montgomery (1995) and Faberman (2005) find this pattern across geographic areas. The evidence in this paper goes a step further and finds that, *even within manufacturing*, the relative volatility of job creation has increased over time. The volatility of both job flows decline over the postwar period, but the volatility of job destruction falls faster. This coincides with a decline in the trend rates of job reallocation for manufacturing. While noting that the latest downturn was different is important in its own right, the fact that its sharp decline in job creation is part of an overall decline in job reallocation and job flow volatility has implications for several ongoing lines of research. First, it alters the conventional wisdom in the job flow literature that episodic movements in job destruction drive cyclical employment fluctuations by illustrating that such movements have become relatively less important in recent years. Second, it adds new evidence for ongoing research on the observed decline in aggregate volatility discussed by Blanchard and Simon (2002) and Stock and Watson (2003). Finally, the fact that the latest downturn is so different has implications for the ongoing debate on the cyclicality of separations and the job-finding rate discussed by Hall (2006) and Shimer (2005).

The next section details the data and defines the relevant job flow concepts. Section 3 presents the evidence on job creation and destruction and its variation (or lack thereof) across industries during the last two recessions. Section 4 discusses the relevance of the latest recession and the decline in job flow volatility in the context of the entire postwar period, as well as their relation to the recent behavior of hires and separations. The final section concludes.

2. Definitions and Data

For this study, I use the BLS definitions of "gross job gains" and "gross job losses" as my definitions of job creation and job destruction, which are collectively referred to as *job flows*. These are also the measures used by Davis and Haltiwanger (1990, 1992) and Davis, Haltiwanger and Schuh (1996). I measure a change in employment between the third months of each quarter. *Job creation* is the sum of all employment gains at (i) continuous establishments expanding their employment, and (ii) "opening" establishments reporting either positive employment for the first time or after reporting zero employment in the previous quarter. *Job destruction* is the sum of all employment losses at (i) continuous establishments contracting their employment, and (ii) "closing" establishments either disappearing or reporting zero employment after reporting positive employment in the previous quarter.[3] The more familiar *net change* in employment is simply the difference between all jobs created and all jobs destroyed. *Job reallocation* is the sum of all jobs created and all jobs destroyed. *Excess reallocation* is job reallocation less the absolute value of the net change; it is a measure of labor market churning in excess of employment growth. Where reported, job flow *rates* are the percentages of employment, where employment is defined as the average of third-month employment for the current and previous quarters.

The BED data are a longitudinal version of the Quarterly Census of Employment and Wages (QCEW), or ES-202, program, which is a virtual census of employment that

[3] Given these definitions, openings and closings include re-openings and temporary closings, as well as births and deaths.

includes all establishments covered under state unemployment insurance (UI) programs.[4] The BED links establishment records over time, primarily using UI identification codes. Pivetz, Searson, and Spletzer (2001) and Spletzer et al. (2004) detail this linkage process. While the public estimates begin in 1992, the available microdata go back to 1990. The QCEW program underwent major changes in the collection of data for multi-unit firms in the early 1990's, making it difficult for the BLS to produce job flow estimates that meet official publication standards for this period. These changes, carried out by state agencies, led to discontinuities in the coding of many UI accounts, and an overstatement of establishment openings and closings (and thus an overstatement of job flows) for these accounts during this time. Luckily, the nature of the administrative change allows me to identify problem records and match them using several identifying assumptions. I describe the assumptions and methodology in detail in the appendix.

My extended data series spans the second quarter of 1990 through the first quarter of 2005, and has job flow estimates for all private-sector 3-digit North American Industry Classification System (NAICS) industries—the industry detail is comparable to the 2-digit level of the older Standard Industrial Classification (SIC) system. The estimates are seasonally adjusted using the X-12 ARIMA process on the individual component series of job creation and destruction statistics (i.e., employment changes at expanding, opening, contracting, and closing establishments). Private sector and industry aggregates are sums of the seasonally adjusted 3-digit estimates. The data range in coverage from 5.0 million establishments representing 89.3 million employees in March 1990 to 6.5 million establishments representing 108.4 million employees in June 2003. On average,

[4] The government, self-employed, and private households are the primary exclusions from the BED.

establishment expansions and contractions at continuous establishments make up about 80 percent of quarterly job creation and destruction, respectively.

To put job flows during the last two recessions into a long-run perspective, I splice the manufacturing data of my extended series with the job flow estimates created by Davis and Haltiwanger (1999). Their estimates are a merged series of job creation and job destruction rates for manufacturing from the Census LRD and BLS LTS.[5] The LRD has estimates of quarterly job flow rates for manufacturing from 1972-1998, while the LTS has estimates of accessions and separations from the early 1930's through 1982. Davis and Haltiwanger merge the two econometrically and get job flow estimates for the LTS by using data during the period where the two series overlap. While their merged series and my BED manufacturing estimates have the same scope and measure the same employment flows, differences in data collection methods lead to subtle differences in the trend rates and volatilities of each series. To create a single, consistent, long time series of job flow estimates, I splice their final merged series to the BED manufacturing estimates. I use a GMM procedure that forces the trend estimates of the earlier period to be consistent with the BED estimates, while preserving key moments of the earlier data.

The GMM splicing estimation proceeds as follows. Let C_t and D_t represent the job creation and job destruction rate estimates, respectively, at time t from the BED, and let POS_t, NEG_t, and NET_t represent the job creation, job destruction, and net growth rate estimates, respectively, from the Davis-Haltiwanger spliced series. Also, let Net_t^C be the net growth rate calculated from the Current Employment Statistics (CES, also known as the payroll survey). The CES net growth rate is a useful part of the estimation strategy

[5] I thank Steve Davis and John Haltiwanger for providing an updated series of these estimates. Davis and Haltiwanger (1999) discuss the two data sources and their merging methodology in detail.

because a) its growth rates match those of the BED by construction (the CES is benchmarked to the BED's employment levels) and b) it has a time series that spans the full 1947-2005 period that I study. Finally, let $\hat{C}_t$ and $\hat{D}_t$ represent the GMM estimates of job creation and destruction, respectively, of the final spliced series. I define the estimates as

(1)
$$\begin{aligned} \hat{C}_t &= \alpha_0 + \alpha_1 POS_t + \alpha_2 Net_t^C + \varepsilon_t^c \\ \hat{D}_t &= \beta_0 + \beta_1 NEG_t + \beta_2 Net_t^C + \varepsilon_t^d \end{aligned}.$$

Thus, I need to estimate six parameters for the model. I match seven moments to minimize the GMM value function. This overidentifies the model, but is necessary given highly nonlinear nature of the value function. The seven moments and their values in the data are listed in Table 1. They span different periods and different data sets and include the means of C_t and D_t, the variance of Net_t^C, the variance of the excess reallocation rate, XR_t (calculated from the Davis-Haltiwanger series), the relative volatility of creation to destruction (defined as the variance of POS_t divided by the variance of NEG_t), the correlation between POS_t and NET_t, and the correlation between NEG_t, NET_t. I choose these moments to make the estimated series consistent with the trend job flow rates from the BED (via the first two moments) while preserving the volatility (both relative and absolute) and covariation of the original job flow estimates. The parameter estimates obtained from GMM estimation represent a unique solution, and the resulting job creation and destruction series are robust to variations on the moments used, whether it be changes in their time periods or in the moments themselves. I discuss the methodology and robustness in more detail in the appendix.

3. Job Flows and the Most Recent Downturn

3.A. Basic Evidence

The 1990-2005 period contains a prolonged expansion sandwiched between two economic downturns. Based on the National Bureau of Economic Research dating, the first downturn begins after a business cycle peak in the third quarter of 1990, reaching its trough in the first quarter of 1991. Figure 1 illustrates net employment growth over the period. Relative to previous recessions, employment losses are mild, but employment gains during the recovery are slow to materialize.[6] The second downturn begins as the economy peaks in the first quarter of 2001. The initial drop in employment is comparable to the previous recession, but losses persist over a longer period, making the total decline are larger relative to previous recessions. These declines include a continuation of losses through the trough at the fourth quarter of 2001 until the second quarter of 2003.

Unlike previous downturns, the labor market is slow to recover after each of the last two recessions, with these periods often referred to as “jobless recoveries”. Based on the net employment changes over these two periods, one might conclude that there are many similarities in the behavior of the labor market over these two periods. The job flows underlying these net changes, however, show that the two periods are quite different. Figure 2 shows the job creation and destruction rates over the same period. Both recessions have relatively high rates of job destruction, with large spikes of job loss at or near each trough. The spike in job destruction in the first quarter of 1991 encompasses 9.5 percent of employment. The spike in job destruction in 2001 is not as great (8.2 percent of employment), but persists over three quarters. Job destruction

[6] Based on calculations from the CES, private employment declines 1.1 percent during the 1990-91 recession, as compared to an average decline of 2.7 percent for the previous postwar recessions.

declines in both recovery periods, but remains relatively high for a longer period in the earlier recovery. After the 1991 trough, the job destruction rate stays above its average rate (7.5 percent) during the subsequent expansion until the third quarter of 1992. Following the 2001 trough, the job destruction rate falls this rate after only two quarters, and continues to fall thereafter. Job creation is markedly different during the two recessions and recoveries. Between 1990 and 1992, the job creation rate deviates little from 8.2 percent of employment—its average during the subsequent expansion. Job creation peaks at the end of 1999, over a year before the onset of the recession. As the business cycle peaks, the job creation rate continues to decline throughout the recession period, and save for a brief increase in early 2002, continues its slide until net employment growth picks up again in mid-2003. Thus, the two “jobless” recoveries are quite different, with the earlier period characterized by a relatively slow return of job destruction rates to expansion-era levels and the later period characterized by a large, persistent drop in job creation. Furthermore, the job flow movements during the latest downturn depart dramatically from the conventional wisdom that employment fluctuations are driven primarily large episodes of job destruction. In this sense, the last recession appears unique.

3.B. Patterns across Industry

While the comparison of job flows during the last the last two recessions is interesting in its own right, it is difficult to draw broader conclusions about the labor market from the findings. The data only span the last 15 years, so one cannot make comparisons to earlier periods without appealing to research with other data sources (such as the LRD). Appealing to such research, however, is not a trivial comparison, since most earlier work focuses on manufacturing. My evidence thus far suggests that the latest recession differs from others with its long persistent drop in job creation, but this finding could be entirely an artifact of using nonmanufacturing data—research by Foote (1998) lends credence to this worry. Thus, it is important to know whether the drop in job creation occurs primarily in manufacturing or nonmanufacturing industries.

Figure 3 presents the most basic evidence to answer this question. The two panels plot manufacturing versus nonmanufacturing job creation and job destruction, respectively. In short, while the magnitudes rates may be different, both manufacturing and nonmanufacturing industries display similar job flow patterns over the sample period. In both cases, there is a spike in job destruction during each recession, a slow decline in job destruction following the 1990-91 recession, and large, persistent drop in job creation between 2001 and 2003. The latter finding is the most notable, illustrating that the recent drop in job creation is *not* predominantly a nonmanufacturing phenomenon.

The next question, then, is whether the drop in job creation occurred among a group of industries (regardless of manufacturing or nonmanufacturing designation) or occurred across a broad range of sectors. To answer this question, I pool job creation rates over this period for the 92 three-digit NAICS industries. I then regress the log of these rates on an industry fixed effect and an interaction of the fixed effect with a dummy variable, T_t, equal to 1 for quarters between 2001:1 and 2003:2 and zero otherwise. I use the log of the job creation rate because wide variations in trend rates across industries make it difficult to compare equal percentage point changes for different industries. Formally, the regression is

(3) $$\ln C_{it} = \alpha_i + \beta_i T_t + \varepsilon_{it} .$$

Given this specification, the β_i coefficients estimate the log point deviation in job creation from its mean for industry *i* during the 2001-03 period. One concern is that movements in an industry's job creation trend may bias β_i upward or downward. To control for such changes, I rerun the regression using the (log) deviation of job creation from its Hodrick-Prescott trend as the dependent variable.[7] Finally, as a comparison, I rerun the regression to estimate the change in job creation during the 1990-92 period by letting T_t equal 1 for the quarters 1990:2-1992:3 rather than for 2001:-2003:2.

I summarize the results by presenting the employment-weighted distribution of the β_i coefficients across industries for each specification. Figure 4 illustrates the distributions in three panels. In each panel, the horizontal axis represents the log point change, so that a reading of -0.10 represents a 10 percent decline in the job creation rate. The top panel presents the kernel density function of the coefficients overlaid upon the histogram of their distribution. While a few industries exhibited above-average job creation during the downturn, most experienced declines between 3 and 35 percent. For the entire private sector, the decline in job creation was 12.5 percent, and in manufacturing, the decline was 22.1 percent. The middle panel compares the kernel density of the 2001-03 downturn to that of the 1990-92 downturn. The distribution of changes in industry job creation is well to the right for the earlier period, with most industries experiencing above-average job creation rates. Job flows, however, have a declining trend over the sample period, so a better comparison lies within the bottom panel, which illustrates the distribution of industry job creation changes relative to their H-P filtered trends. For the 1990-92 period, the distribution is practically degenerate,

[7] To estimate these trends, I use a relatively high smoothing parameter value of $\lambda = 10^5$, given that a lower parameter value may over-predict changes in the trend over such a short time series.

with nearly all industries exhibiting job creation rates close to their trend. For the 2001-03 period, though, it is still the case that most industries exhibit a decline in job creation relative to trend, with the average drop being 3.3 percent below trend.

In summary, the large, persistent decline in job creation during the last downturn occurs across a wide variety of industries in both manufacturing and nonmanufacturing. The declines are pervasive, and persist even after controlling for a declining trend in job flows. This suggests that the decline in job creation during the 2001-03 downturn, which contrasts with earlier findings that recessions are generally driven by large movements in job destruction, is not merely an artifact of examining newer, nonmanufacturing data.

4. The Relevance of the Recent Downturn

4.A. Long Run Declines in Aggregate Volatility

While the drop in job creation during 2001-03 appears unique and pervasive across most industries, the relatively short time series makes it unclear whether or not the decline represents a dramatic shift in the cyclical behavior of job flows. Ideally, one would want comparable private sector job flows that date back over several business cycles. Such data does not exist for the private sector, but is available for manufacturing. With my spliced series of manufacturing data from the BED and Davis-Haltiwanger estimates, I have a time series of comparable job flow estimates for manufacturing that span the entire postwar period and allow me to put the recent job flow dynamics into a historical perspective. Given the strikingly similar patterns observed across industries, particularly the drop in job creation, one can generalize (with a degree of caution) the following manufacturing results to the broader labor market.

The spliced manufacturing estimates are in Figure 5. Several findings stand out in the figure. First, job destruction in the latest recession exhibits a pattern similar to earlier recessions, though the magnitude of its spike is lower than in previous recessions. Second, the drop in job creation in 2001-03 is unique compared to the rest of the postwar period. Job creation rates are at their lowest during this time. In addition, they remain low well after the end of the recession. This is in contrast to recessions prior to 1990, where the beginnings of a recovery were characterized by sharp increases in job creation. The absence of such a spike is likely related to a declining importance of temporary layoffs discussed by Groshen and Potter (2003) and Aaronson, Sullivan and Rissman (2004). A decreased role for temporary layoffs implies there will be less recalls during the recovery period, and hence, a lower likelihood of a sharp rise in job creation. Finally, the overall pace and volatility of job flows decline throughout the entire postwar period.

Figure 6 highlights this latter point. It plots the time series of trend and actual excess reallocation.[8] Excess reallocation is the sum of job creation and destruction less the absolute value of net growth, so it measures the churning of employment *in excess* of what one would need to generate the observed growth rate. Excess reallocation consistently trends downward from the early 1960's forward, from a peak of 12.5 percent in 1961 to a low of 8.0 percent by 2005.

Table 3 quantifies the decline in job flows and job flow volatility over the period. The decline in volatility is particularly interesting—the standard deviations of job creation and job destruction both decline over time, implying that decreasing volatility accompanies the declining job flow rates. More notable, however, is that the volatility of job destruction falls *faster* than that of job creation. As a consequence, the relative

[8] The trend uses a Hodrick-Prescott filter with a smoothing parameter of $\lambda = 1600$.

volatility of job creation increases and the negative correlation between growth and reallocation weakens over time. This suggests that, at least in manufacturing, the relative importance of job creation over the business cycle has increased, and that the image of recessions as large episodes of job destruction amid a period of overall turbulence is less applicable for more recent years.

Thus, while the large, persistent drop in job creation during the 2001-03 downturn is unique among the postwar period, it appears to be part of a broader trend of decreasing labor market volatility and diminished occurrences of large episodes of job destruction. All of this ties into the research on the declining volatility of aggregate growth by Kim and Nelson (1999), McConnell and Perez-Quiros (2000), Blanchard and Simon (2001), and Stock and Watson (2003). These studies find that the volatilities of aggregate measures of output, consumption and employment growth have declined in the United States since the mid 1980's. There is a debate, however, on whether this decrease occurs as a break in the pattern of volatility or as part of a declining trend. This debate is complicated by a finding of an increase in *firm-level* volatility over the same period by Comin and Philippon (2005). In terms of employment growth, my findings only further complicate the debate. Figure 7 shows the net employment growth for my spliced manufacturing series during the postwar period. Consistent with the research on aggregate volatility, there is a noticeable and particularly abrupt drop in the volatility of growth in the mid-1980's. Yet, my evidence on the underlying job flows shows a declining trend in both their magnitude and volatility beginning in the early 1960's. It is unclear why there exists such a disparity in the timing. It is also unclear how one can reconcile the declining trend in job reallocation with the increase in firm-level volatility, though changes in the patterns of entry and exit and the behavior of small versus large firms no doubt play a role.[9] Reconciling the aggregate, firm-level and job flow evidence is beyond the scope of this paper, and remains an interesting avenue for future research.

4.B. Cyclical Movements in Hires and Separations

Closely related to job flows are worker flows, i.e., worker hires and separations. In fact job flows, which measure the net employment change at the establishment level for a given period, are a subset of worker flows, which measure *all* employment changes at an establishment. Consequently, the cyclical behavior of hires and separations are an important part of labor market dynamics. Recent work by Hall (2006) and Shimer (2005) studies the cyclical patterns of separations and the job-finding rate. Using data on gross worker flows, they conclude that since separations appear acyclical, employment fluctuations are primarily driven by movements in the job-finding rate. Given the close relation of the job-finding rate to hires, and the close relation of hires to job creation, one might conclude that my evidence only reinforces these findings. Two important caveats are in order, however, when interpreting my results in the context of worker flows.

First, the last recession appears truly unique. This is important to note for worker flows because arguably the most comprehensive data source on hires and separations (which Hall, Shimer, and others use as part of their studies), the BLS Job Openings and Labor Turnover Survey (JOLTS), begins in December 2000, just prior to the start of the last recession. Thus, while the JOLTS present a thorough picture of worker flows during the last downturn, it is difficult to make inferences from it for earlier periods. Figure 8 plots the quarterly rates of hires and separations calculated from publicly available

[9] Comin and Philippon (2005) perform their analysis using a sample of publicly traded firms from the Compustat database. This sample excludes smaller firms, which tend to account for much of the volatility observed in job flow data.

JOLTS data.[10] Hiring, like job creation, drops considerably during the recession. It remains low until mid-2003, and then, like job creation, increases from late 2003 on. It makes sense that that both job creation and hiring would move together because the measures are closely related. It also suggests that hiring, like job creation, had a dramatic shift in its cyclicality during the last recession. Separations and job destruction, however, have somewhat different patterns. Both increase during the 2001 recession, though separations do not exhibit the large spike seen with job destruction. Both also remain low throughout the "jobless recovery" period. From there on, however, the two series move in opposite directions—job destruction continues its decline, while separations increase considerably.

This decoupling of separations and job destruction brings me to the second caveat: while hires may be analogous to job creation, separations are *not* analogous to job destruction. Why does the latter analogy not hold? For one, the majority of separations (averaging 54 percent in the JOLTS data) are worker *quits*, which are procyclical. Only about a third of separations are layoffs, which, given their propensity for episodic increases during downturns, correspond better with the notion of job destruction. The rise in separations during the 2001 recession is driven by a rise in layoffs, while the rise in separations beginning in 2003 is driven by a rise in quits. This distinction explains the observed acyclicality of separations. Quits tend to be procyclical because of on-the-job search, and consequently often reflect the employer-to-employer transitions studied by Nagypal (2004) and Fallick and Fleischman (2004). Both studies show that these transitions, and their cyclicality, are large part of labor market dynamics, though their

[10] The data are available at https://www.bls.gov/jlt/home.htm.

evidence does not span back further than the mid-1990's.[11] Thus, it is difficult to make inferences about the cyclicality of separations for earlier periods. Given my evidence on job destruction, and the evidence of Groshen and Potter (2003) and Aaronson et al. (2004), it is likely that layoffs have become less volatile over time, and their relative importance for cyclical employment fluctuations has declined. The behavior of quits is less clear. Have quits, and for that matter employer-to-employer transitions, become more cyclical, as seems to be the case with hiring and job creation? If so, the observed acyclicality of separations may be a recent phenomenon, with earlier periods characterized by countercyclical movements in separations. Instead, what if the cyclicality of quits and employer-to-employer transitions has not changed, but their magnitudes and volatility have undergone declining trends? If this were true, then separations are likely acyclical in earlier periods. Understanding the behavior of quits and, more importantly, employer-to-employer transitions will shed light on the relative importance of separations, the job-finding rate, and other labor market variables in accounting for cyclical employment fluctuations. Further research on these dynamics will also aid in linking my evidence on job flows to a broader picture of labor market dynamics.

5. Conclusions

On the surface, employment patterns during the latest economic downturn seem very similar to those of the previous downturn—there are large losses during the recession followed by a stagnant, "jobless" recovery. Yet, the underlying patterns of job creation and destruction show two different stories. Following the 1990-91 recession,

[11] The gross flows data of the Current Population Survey only have estimates of employer-to-employer transitions back to 1994.

employment growth is slow to recover primarily because of a slow return of job destruction to expansion-period rates. Following the 2001 recession, job destruction returns to pre-recession levels relatively quickly, but a large decline in job creation persists well into 2003. This evidence comes from a previously unexploited source of job flow data that, unlike most sources for previous research, includes both manufacturing and nonmanufacturing establishments. The drop in job creation occurs in both sectors, and a more-detailed industry analysis shows that nearly all industries have job creation rates below trend for the 2001-03 period.

Such a large, pervasive drop in job creation during this time is notable because it departs from previous evidence (and the conventional wisdom) that cyclical fluctuations in employment are driven primarily by large, episodic increases in job destruction. With a spliced series of manufacturing job flows dating back to 1947, I show that this was indeed the case in every recession prior to 2001—in this sense, the last recession is truly unique. Furthermore, it appears that the decline in job creation is part of a long-term decline in both the magnitude and volatility of job reallocation where the relative volatility of job creation to job destruction has increased over the period.

The decline in job reallocation is closely related to research on an observed decline in aggregate volatility. This literature finds a drop in the volatility of output, consumption, and employment growth in the mid-1980's. I find that while the volatility of net growth in manufacturing drops abruptly in the mid-1980's, the level and volatility of the underlying job reallocation begins their decline in the early 1960's. This only adds to the puzzle of understanding the decline in aggregate volatility, particularly when one considers the finding of increasing firm-level volatility by Comin and Philippon (2005).

Finally, the decline in job reallocation and the uniqueness of job flows in the latest downturn have implications for the current debate on the role of separations versus the job-finding rate in driving cyclical employment fluctuations. Limited knowledge on the behavior of quits and employer-to-employer transitions in earlier periods makes it difficult to infer what the decline in job reallocation and the uniqueness of the latest recession imply about the cyclicality of separations (and whether this cyclicality has changed over time). Further research, especially studies on the employer-to-employer transitions that lie at the center of the relationship between job flows and worker flows, will aid in the understanding of the long-term behavior of worker flows and provide a better understanding of the labor market overall.

Appendix

A. Linking the 1990-92 BED Data

Implementation of the “Multiple Worksite Report” (MWR) to state administrative records in the early 1990’s caused serious complications to the BED linkage process. The BLS implemented the MWR so that multi-establishment firms could easily report the employment and payroll of their separate establishments. Prior to the MWR, firms in many states reported their multiple establishments as a single record. The MWR changed that, but when it did so, its restructuring of administrative records (which involved breaking out the single records into their individual establishments) was not fully recorded by every state. Consequently, the BLS did not have the necessary information to link what were in reality continuous units. This created large overstatements of opening and closing establishments in the first quarter of 1991, the second quarter of 1992, and the first quarter of 1993.

I correct for these overstatements by using unique characteristics of the MWR implementation process. First, since the MWR implementation occurs at the state level, I only need to focus on the affected states. Second, firm identifying codes do not change during the MWR implementation, only the codes for the individual reporting units change (this is not necessarily true of other administrative changes). Third, since these changes are theoretically only changes in paperwork, there should be no movement of employment across industries or locations, which sometimes occurs in the data during corporate mergers and other account restructurings. Finally, the administrative data have a fine level of geographic and industry detail (county level, and either 4-digit SIC or 6-digit NAICS, respectively). Large employment fluctuations at these levels of detail are relatively rare and thus easily identifiable in the data.

Given these characteristics, I use a three-step process. The first step calculates job flows using the standard BED methodology. From this, I take the subset of establishments identified as openings or closings. The second step uses a grid search for openings and closings with identical firm identifiers by county and detailed industry I assume that these records are the result of the MWR implementation and match them. In the cases where there are multiple openings and multiple closings within the same cell (as opposed to one closing and one or multiple openings), I match probabilistically based on the employment level of each record. The final step recognizes that, in practice, some new records will have different industry codes than their predecessor. It takes the remaining unlinked records with identical firm identifiers and attempts to match within counties only. This last step produces less than 10 percent of the total matches I identify.

My approach is not without risks. First, there exists the possibility of producing false matches of truly opening and closing establishments. I am not too concerned with this possibility since the false match would have to occur among opening and closing establishments within both the same firm and the same county, an occurrence that is extremely rare. Second, there exists the possibility that I miss links that occur either within firm accounts and across counties or across entirely different firm account identifiers. Without predecessor or successor record information, I cannot identify these matches without increasing the chances of a false match among other records, so some small potential for missed links remains.

Table A.1 lists the results of my matching strategy for the three quarters of interest. The matches significantly reduce employment changes at opening and closing establishments, and slightly increase employment changes at continuing establishments, (newly-matched records often have legitimate changes in employment during these quarters). The first quarter of 1991 has the largest reduction in openings and closings, while changes to the first quarter of 1993 are relatively modest.

B. GMM Estimation of Early Manufacturing Job Flows

In order to produce a long time-series of manufacturing job flows, I splice the manufacturing estimates from the BED to a merged series of LRD and LTS data created by Davis and Haltiwanger (1999), using a GMM estimation strategy that matches key moments of the estimated and original data. The estimation minimizes the standard quadratic function, (A.1) $$\min_{\theta}(M^{s}(\theta)-M^{d})W(M^{s}(\theta)-M^{d})'.$$

In this specification, θ represents the matrix of α and β parameters from equation (1), $M^{s}(\theta)$ is the vector of moments for the spliced series to be estimated, and M^{d} is the vector of moments from the actual data listed in Table 1. I use the parameter estimates to produce predicted values for the 1947-90 period. For 1990 forward, I use the original BED manufacturing estimates.

The relatively complex nature of the variances and correlations used lead the minimization function to be highly nonlinear in its parameters. Finding a unique solution is difficult, so I use an overidentified model with seven moments to optimize its six parameters. I list the final parameters in Table A.2. The estimates are unique and match the original moments exactly. I check their robustness, in terms of how well the estimated job flow series preserve the cyclical patterns of the original series, using several variations on the moments I chose. These variations include moments calculated only from the LRD portion of the Davis-Haltiwanger series (i.e., 1972-1998), moments calculated only from the period of BED-LRD overlap (i.e., 1990-98), and an exactly identified model of six moments that excludes the variance of excess reallocation. The exactly identified model fails to produce a unique solution, implying that at least one of the moments chosen provides no power to the estimation procedure. The other checks have unique solutions, but produce job flow estimates that deviate dramatically from the original series. In contrast, the estimates from the specification I use closely match the behavior of the original job flow series. Figure A.1 illustrates this with panels depicting the estimated time series overlapped with the original Davis-Haltiwanger series for job creation and job destruction, respectively.

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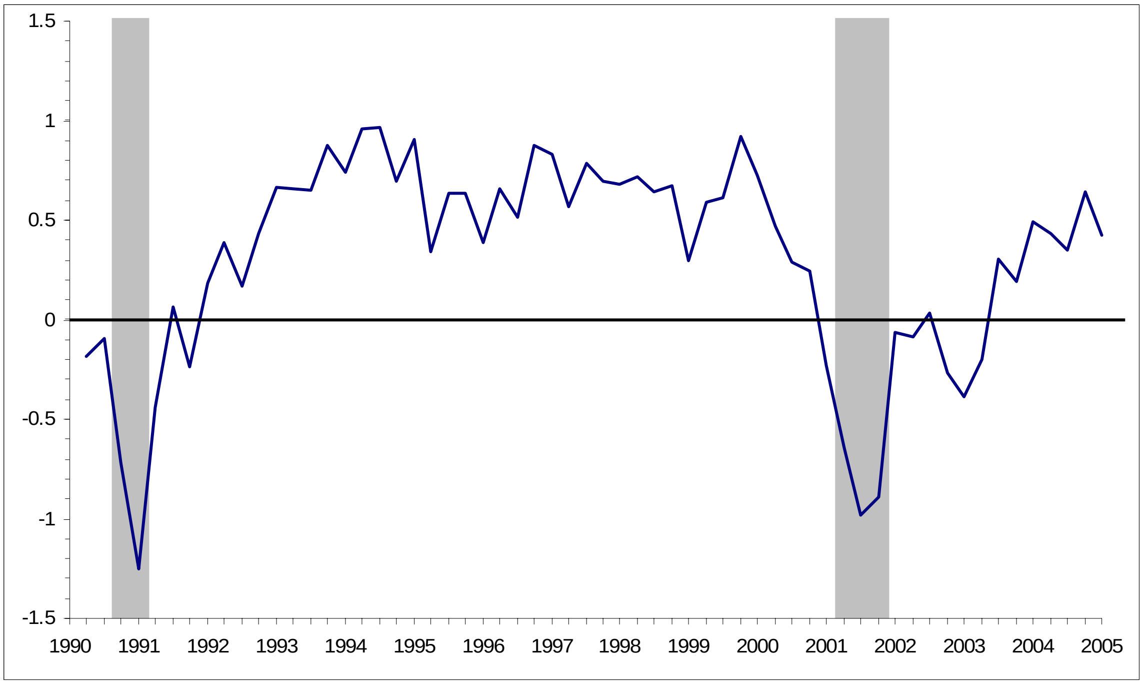
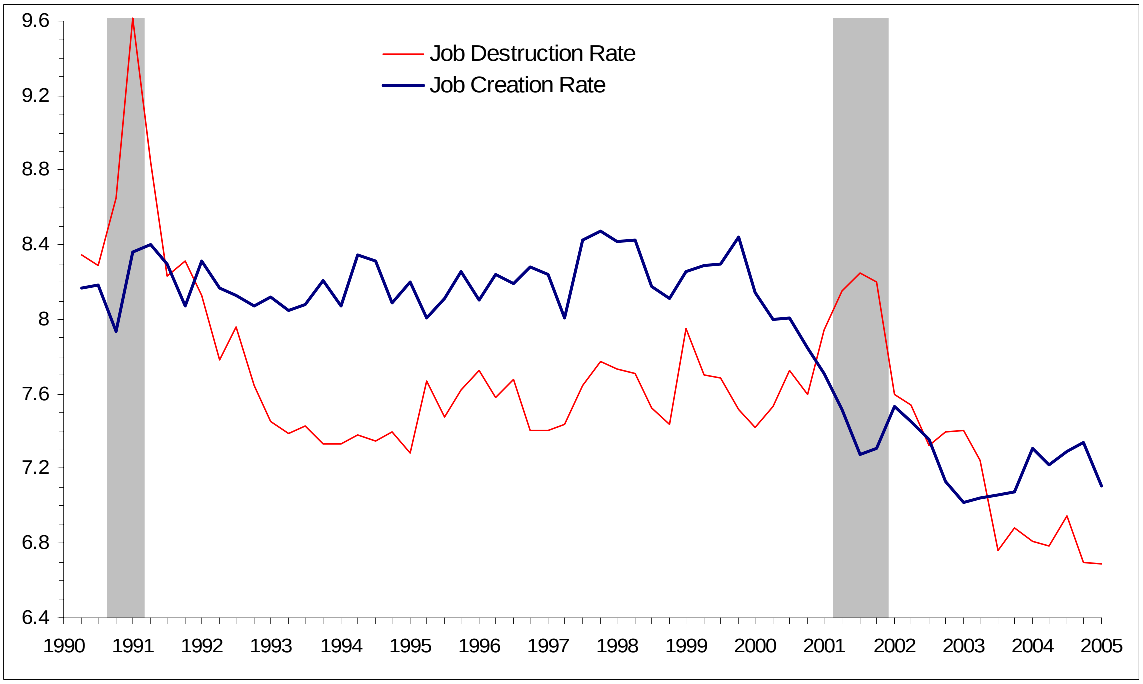
Figure 1. Private Sector Net Employment Growth Rates



Notes: Net growth rates come from author's calculations using the BED. Shaded areas represent NBER-dated recessions.

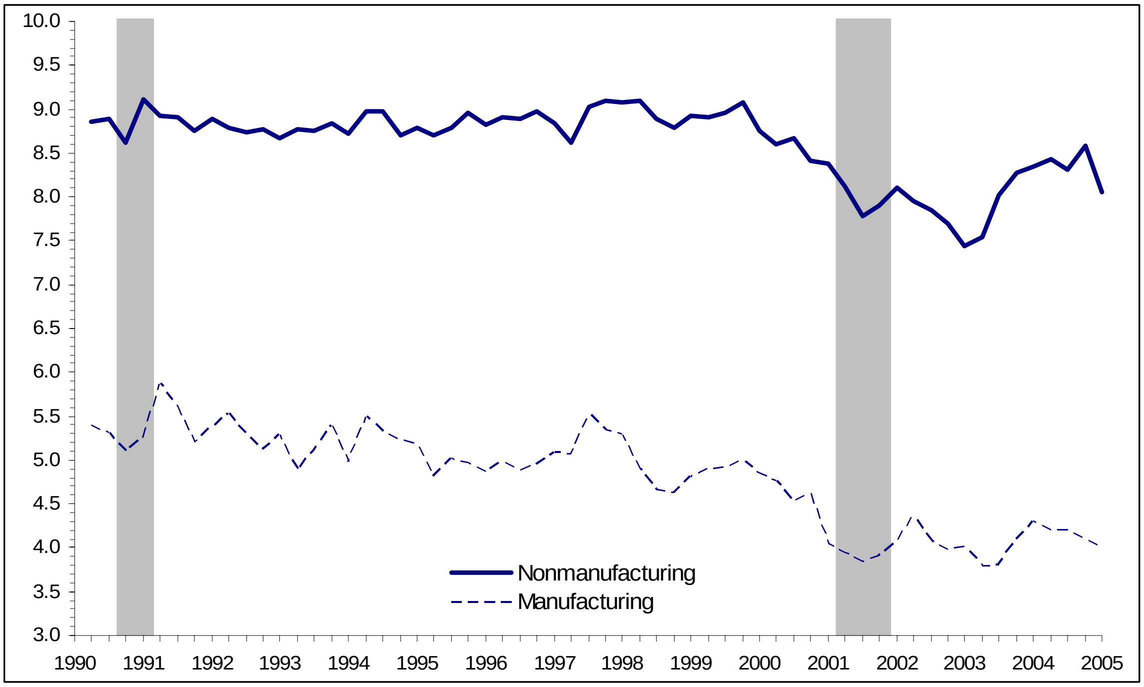
Figure 2. Private Sector Job Creation and Job Destruction Rates



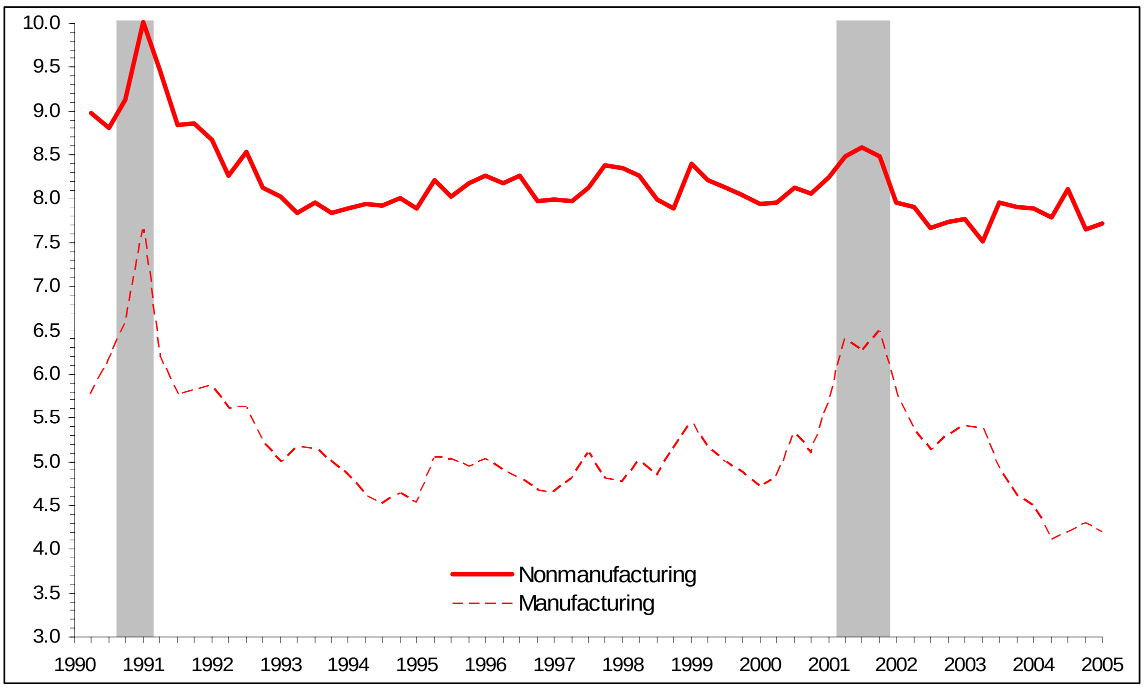
Notes: Job flow rates come from author's calculations using the BED. Shaded areas represent NBER-dated recessions.

Figure 3. Manufacturing vs Nonmanufacturing Job Flows

(*a*) *Job Creation Rates*



(*a*) *Job Destruction Rates*



Notes: Job flow rates come from author's calculations using the BED. Shaded areas represent NBER-dated recessions.

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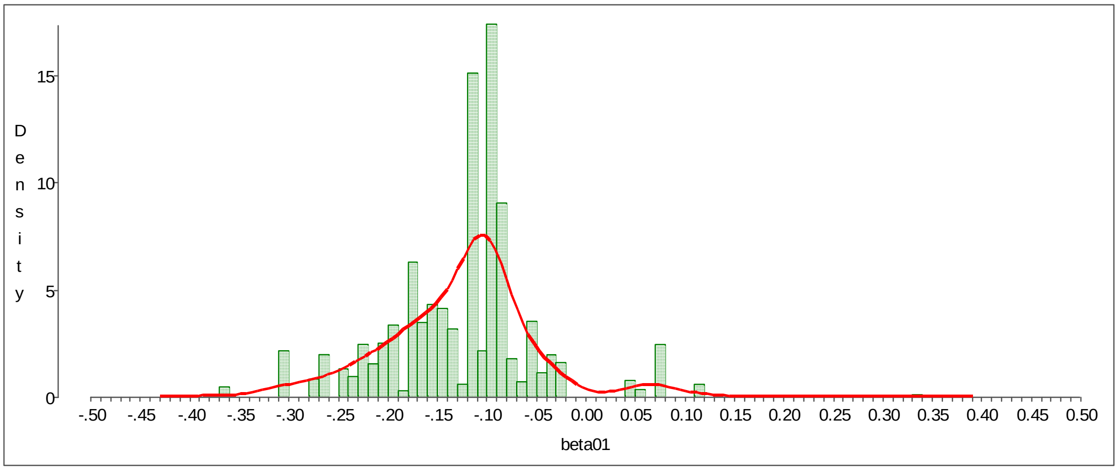
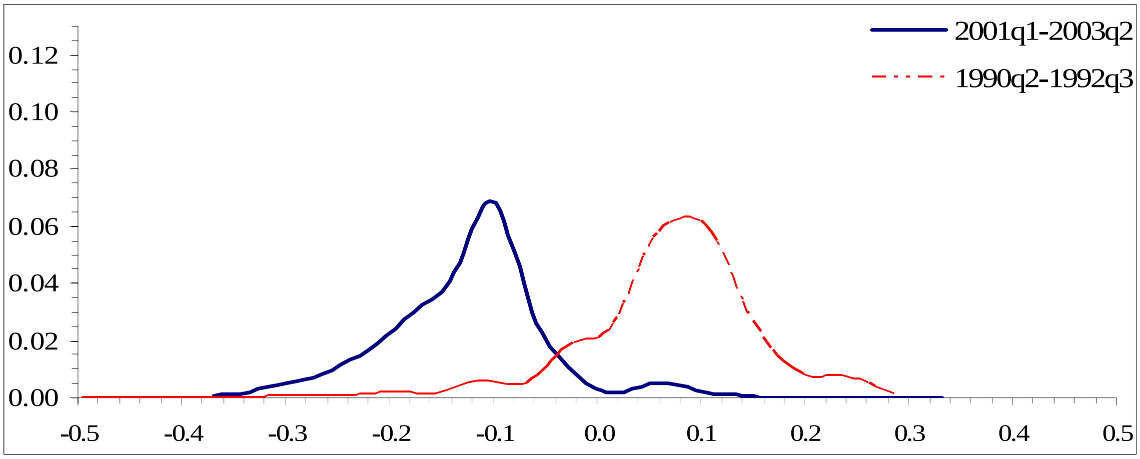
Figure 4. The Distribution of (log Point) Changes in Job Creation by Industry

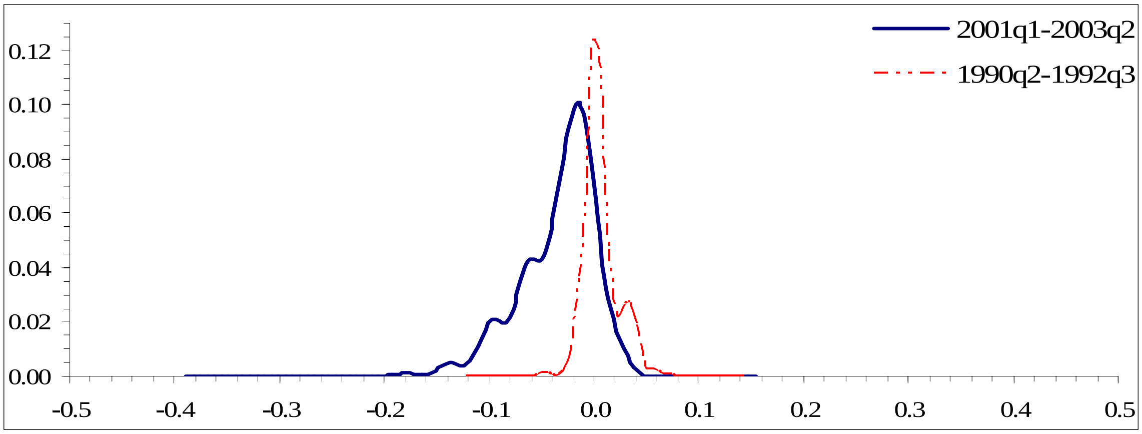
(*a*) *2001q2 – 2003q2 Downturn, Histogram and Kernel Density*



(*b*) *Kernel Densities of Both Downturns, Unconditional Changes*

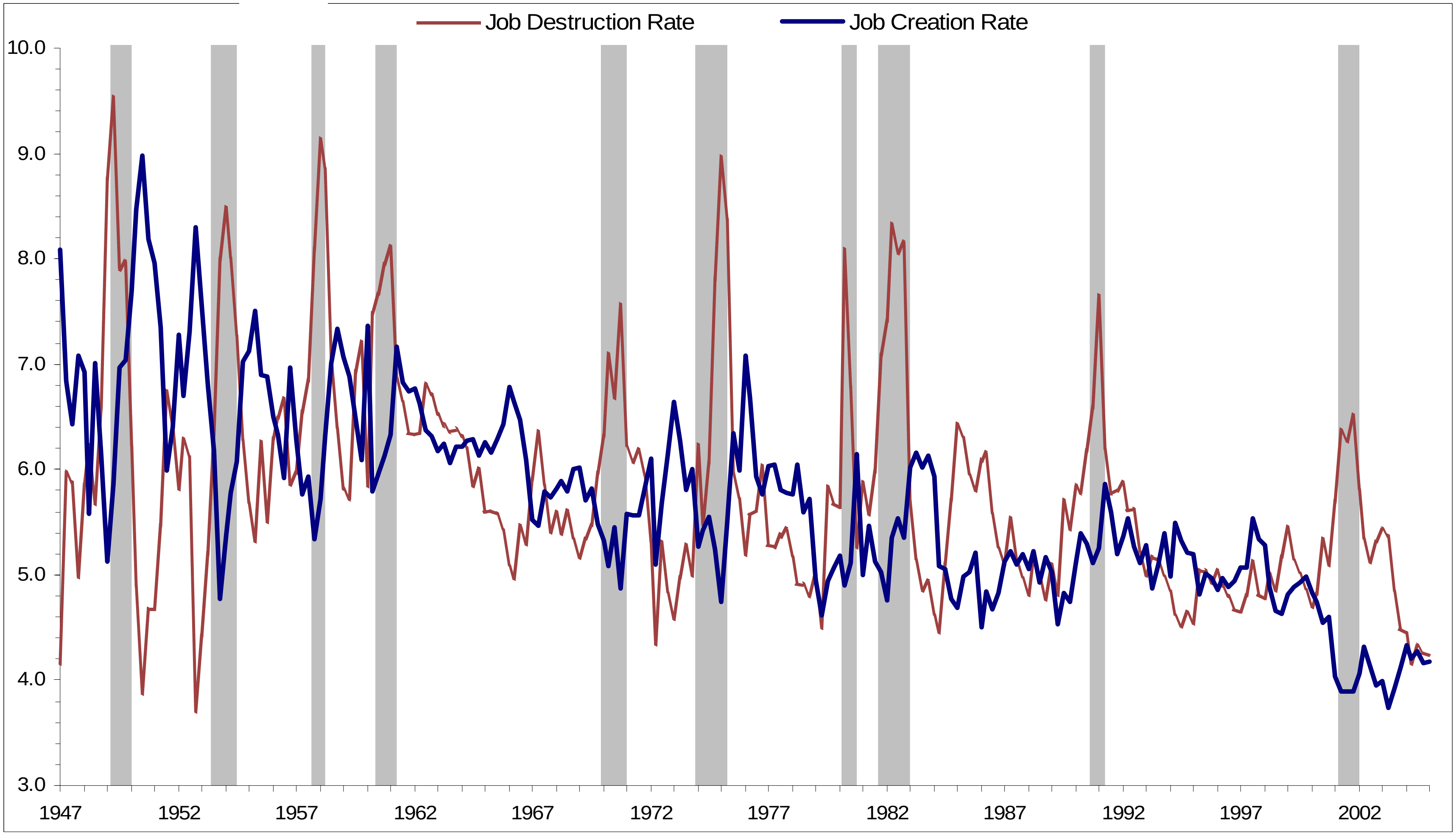


(*c*) *Kernel Densities of Both Downturns, Deviations from H-P Trend*



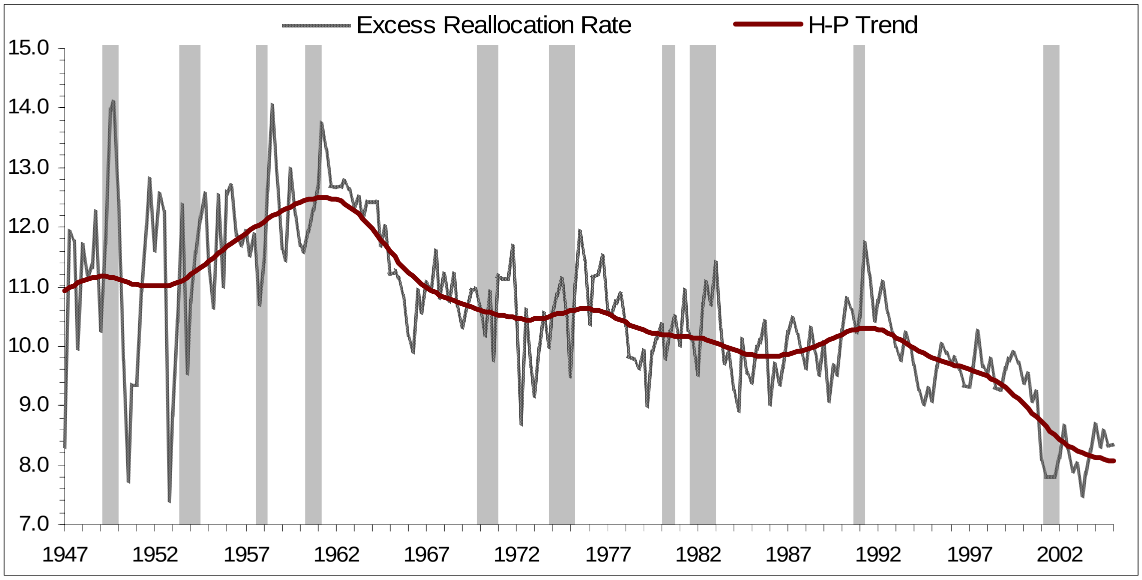
Notes: Figures plot the employment-weighted histogram and kernel densities of the log point changes in the job creation rate across 92 3-digit NAICS industries for the noted periods. Estimates are conditional on industry, and in panel (c) they represent deviations from industry-level Hodrick-Prescott trends that use a smoothing parameter of $\lambda = 10^5$.

Figure 5. Job Creation and Job Destruction in Manufacturing, 1947 - 2005



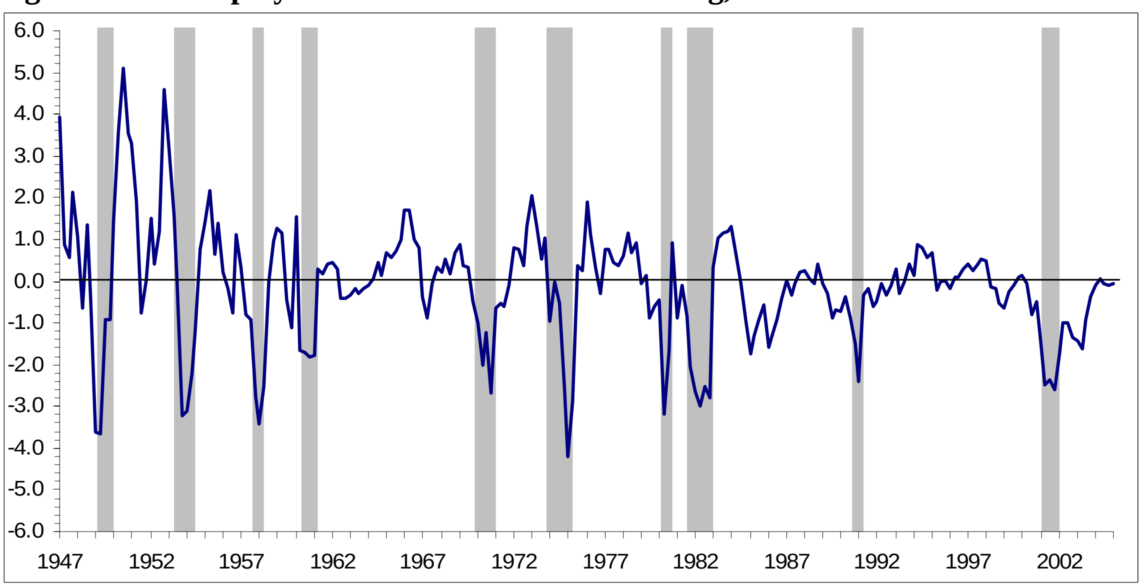
Notes: Estimates come from author's calculations from the BED and a spliced series of LTS and LRD manufacturing job flow data. The series are spliced together using GMM estimation to match key moments of the data. See text and Davis and Haltiwanger (1999) for details. Shaded areas represent NBER-dated recessions.

Figure 6. Excess Reallocation in Manufacturing, Actual and Trend, 1947 – 2005.



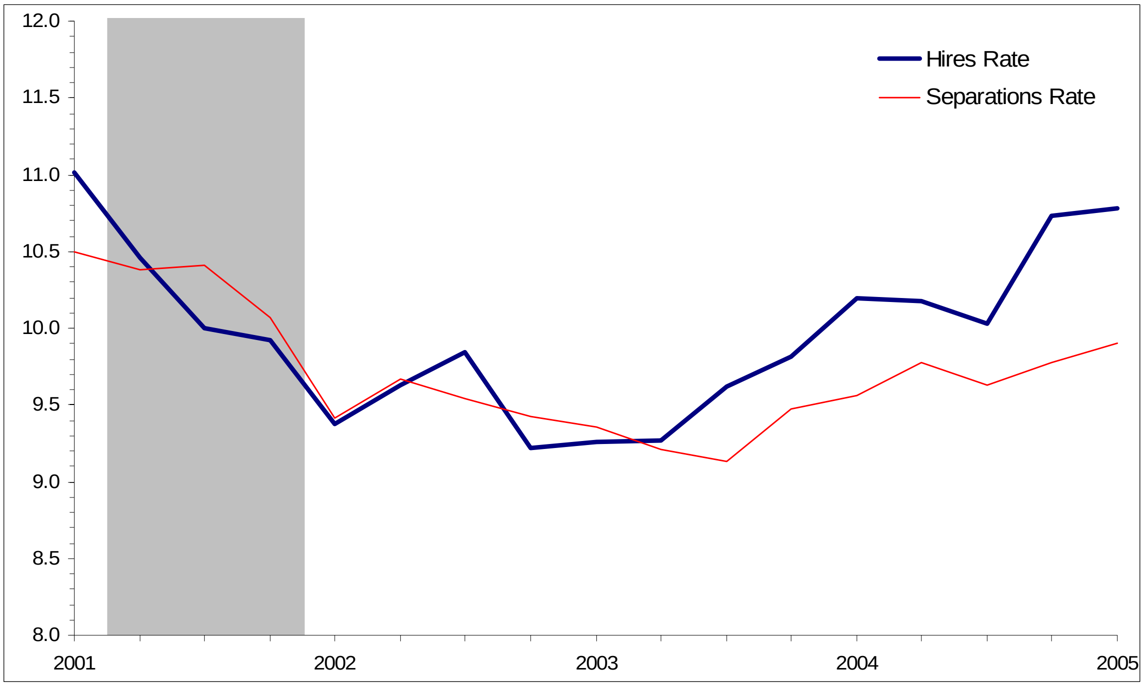
Notes: Excess reallocation estimates come from the spliced manufacturing series described in the text. The trend is Hodrick-Prescott filtered with a smoothing parameter of $\lambda = 1{,}600$. Shaded areas represent NBER-dated recessions.

Figure 7. Net Employment Growth in Manufacturing, 1947 – 2005.



Notes: Net growth rate estimates come from the spliced manufacturing series described in the text. Shaded areas represent NBER-dated recessions.

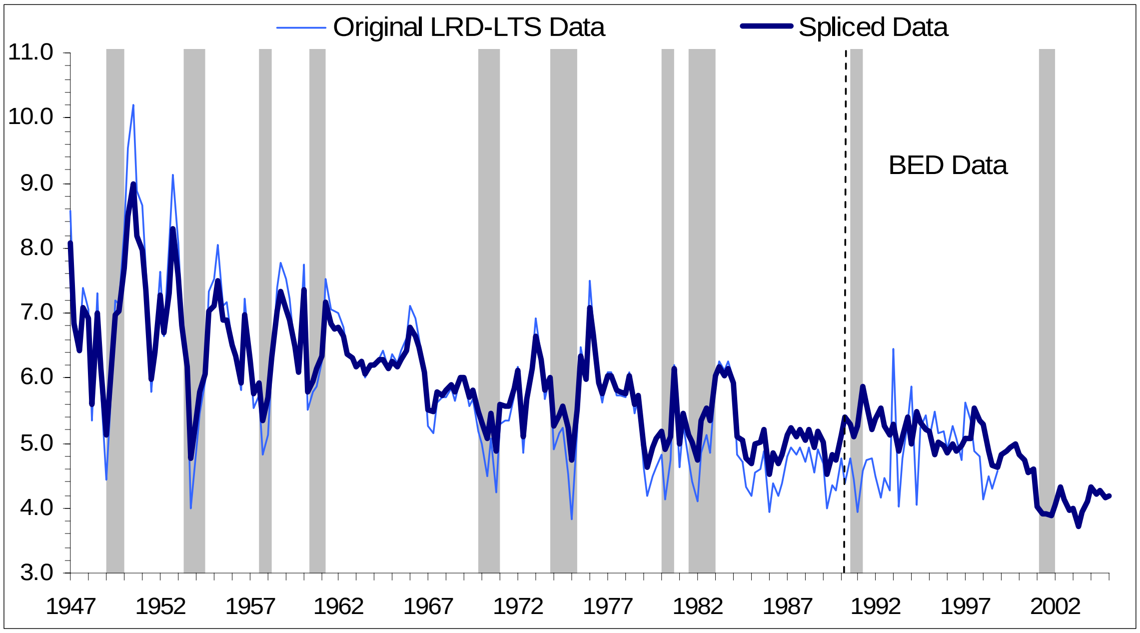
Figure 8. JOLTS Hires and Separations, 2001:1 –2005:1



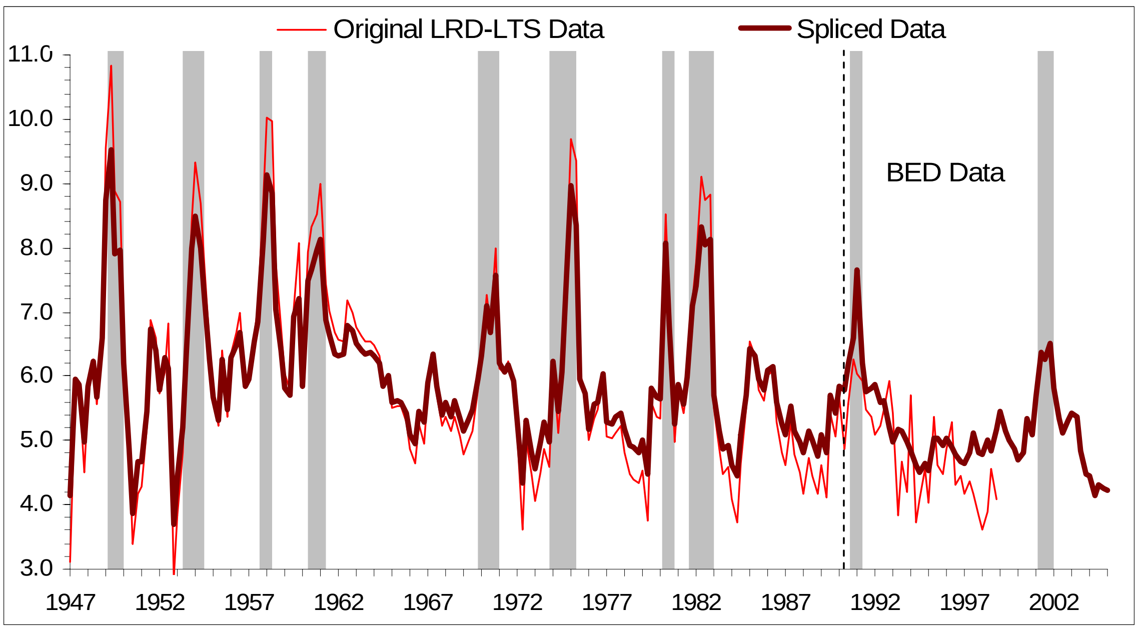
Notes: Estimates are quarterly rates and come from publicly available data from the Job Openings and Labor Turnover Survey (JOLTS). The shaded area represents the NBER-dated recession.

Figure A.1. Original vs. Spliced Manufacturing Job Flow Series

(a) Job Creation



(b) Job Destruction



Notes: Panels compare series of spliced BED-LRD-LTS estimates derived from a GMM model to the original merged LRD-LTS series created by Davis and Haltiwanger (1999). In each panel, the dashed vertical line depicts the break in the estimated series where the actual BED data are used from there forward.

Table 1. Moments Matched in GMM Splicing Estimation

Moment	Data Source	Time Period	Value
Mean C_t	BED	1990:2 – 1998:4	5.165
Mean D_t	BED	1990:2 – 1998:4	5.235
Variance of Net_t^C	CES	1947:1 – 1998:4	1.996
Variance of Excess Reallocation, XR_t	LTS-LRD	1947:1 – 1998:4	2.899
Relative Volatility, $\frac{\text{var}(POS_t)}{\text{var}(NEG_t)}$	LTS-LRD	1947:1 – 1998:4	0.658
Correlation of POS_t, NET_t	LTS-LRD	1947:1 – 1998:4	0.662
Correlation of NEG_t, NET_t	LTS-LRD	1947:1 – 1998:4	-0.794

Notes: Estimates are based on author's calculations from the noted data source.

Table 2. Job Flow Summary Statistics and Correlations

Sector	***Manufacturing***				***Private Employment***
Period	*1947 – 2005*	*1947 – 1972*	*1972 – 1990*	*1990 – 2005*	*1990 – 2005*
Data Source	Spliced Series	Spliced LTS-LRD	Spliced LTS-LRD	BED	BED
Mean					
C_t	5.7	6.4	5.4	4.8	7.9
D_t	5.8	6.3	5.7	5.2	7.6
Standard Deviation					
C_t	0.95	0.79	0.57	0.54	0.45
D_t	1.06	1.09	1.03	0.66	0.52
$\rho(C_t, D_t)$	0.05	-0.53*	-0.25	0.06	0.44*
$\rho(Net_t, Realloc_t)$	-0.12	-0.35*	-0.54*	-0.20	-0.17

Note: Estimates are from seasonally adjusted BED data for the private sector, and the spliced series of BED-LRD-LTS data for manufacturing. See text for details.
* Significant at the 5 percent level.

Table A.1. Results of Early BED Match Identification

	Initial Estimate		Corrected Estimate	
	Thousands of Employees	*Percent of Employment*	*Thousands of Employees*	*Percent of Employment*
First Quarter, 1991				
Changes at Openings	5,321	6.0	2,270	2.5
Changes at Closings	5,462	6.1	2,103	2.4
Changes at Expansions	4,402	4.9	4,685	5.3
Changes at Contractions	7,784	8.7	8,376	9.4
Second Quarter, 1992				
Changes at Openings	3,156	3.6	1,887	2.1
Changes at Closings	2,481	2.8	1,226	1.4
Changes at Expansions	6,642	7.5	6,747	7.6
Changes at Contractions	4,310	4.9	4,401	5.0
First Quarter, 1993				
Changes at Openings	2,111	2.4	1,835	2.1
Changes at Closings	2,171	2.4	1,871	2.1
Changes at Expansions	4,706	5.3	4,752	5.3
Changes at Contractions	6,319	7.1	6,388	7.1

Note: Listed employment changes are prior to seasonal adjustment.

Table A.2. Parameter Values Used in GMM Splicing Estimation

Parameter	Estimate	Parameter	Estimate
α_0	1.424	β_0	2.049
α_1	0.774	β_1	0.664
α_2	-0.072	β_2	-0.097

Note: See text for description of GMM estimation strategy.