Discussion

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The main ambition of Scott Schuh and Robert Triest's paper is to develop new evidence that helps us understand the relationship between reallocation activity and aggregate business cycle fluctuations. In my remarks on their paper, I first outline why that objective is a worthy one. I then offer a few suggestions intended to help the paper achieve that ambition.

Why Study Factor Reallocation Activity to Understand Business Cycles?

Market economies experience high rates of job creation and job destruction in almost every time period and sector.[1] Each year, many businesses expand and many others contract. New businesses constantly enter, while others abruptly exit or gradually disappear. Amid the turbulence of business growth and decline, jobs, workers, and capital are continually reallocated among competing activities, organizations, and locations.

Research in this general area has mushroomed in the past 20 years. The economics profession is now armed with some well-documented empirical regularities regarding the reallocation process and many intriguing facts. The past decade has also seen major strides in the theoretical analysis of how reallocation activity relates to business cycle fluctuations and longer-term growth. Davis and Haltiwanger (1998b),

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[1] For a compilation of the evidence that underlies this claim, see Davis and Haltiwanger (1998b). My comments borrow liberally from that paper.

Mortensen and Pissarides (1998), and Hall (1998) review empirical and theoretical research in this area.

Much of the reallocation process, and much of our interest in it, center on the labor market. The creation and destruction of jobs require workers to switch employers and to shuffle between employment and joblessness. Along the way, some workers suffer long unemployment spells or sharp declines in earnings; some retire early or temporarily leave the labor force to work at home or upgrade skills; some switch occupation or industry; some change residence to secure a new job, migrating short or long distances, often with considerable disruption to the lives and jobs of family members.

The workers who participate in this process differ greatly in the bundle of skills, capabilities, and career goals that they bring to the labor market; likewise, jobs differ greatly in the skill requirements, effort, and diligence that they demand from workers. The diversity of workers and jobs, and their large flows, underscore the truly breathtaking scale and complexity of the search, assignment, and reallocation processes carried out by the labor market and supporting institutions. The matching process and the prospect of match termination also influence the nature of ongoing employment relationships and the patterns of investment by both workers and firms.

On the macroeconomic level, the extent to which the reallocation and matching process operates smoothly determines, in large measure, the difference between successful and unsuccessful economic performance. The persistently high unemployment rates in France, Spain, and several other Western European countries over the past two decades point to the enormous costs of a partial breakdown in the reallocation and matching process.[2] The recent and ongoing transition to market-oriented economies in Eastern Europe and the former Soviet Union brought tremendous shifts in the industrial structure of employment and in the ownership and operation of business enterprises. Large differences in output movements, unemployment rates, private-sector expansion, and other performance indicators in formerly statist economies suggest that the efficiency of the restructuring and reallocation process varies greatly.[3] A different line of research focused on the U.S. economy shows that job reallocation from less to more productive plants plays a major role in longer-term productivity gains.[4]

How does this evidence and research on reallocation activity fit into

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[2] Recent work on this topic includes Caballero and Hammour (1998), Cabrales and Hopenhayn (1997), Ljungqvist and Sargent (1998), Machin and Manning (1998), Millard and Mortensen (1997), and Nickell and Layard (1998).

[3] See Blanchard (1997) and Davis and Haltiwanger (1998b, section 8).

[4] Davis and Haltiwanger (1998b, section 7) and Foster, Haltiwanger, and Krizan (1998) review work in this area.

contemporary thinking about business cycles? I suspect that most policymakers and researchers acknowledge an occasional role for reallocation activity in business cycle fluctuations. It seems fair to say, however, that in their thinking about business cycles, most policymakers and researchers assign a secondary and modest role to the shocks that trigger fluctuations in reallocation activity and to the frictions involved in the reallocation process.

In any case, most formal models of business cycle phenemona certainly downplay the role of factor reallocation. Prevailing theories of the business cycle stress the role of aggregate shocks that induce broadly similar outcomes among households and among workers. See, for example, the fine collection of essays in Cooley (1995). These theories abstract from mobility costs and other frictions associated with the reallocation of jobs, workers, and capital. For the most part, they also abstract from heterogeneity on the household and firm sides of the economy. Because they abstract from reallocation frictions and heterogeneity, these theories of the business cycle are silent about the behavior of job, worker, and capital flows. For the same reason, they deliver rather stunted interpretations of unemployment fluctuations, capacity utilization, and related phenomena.

This state of affairs in thinking about business cycles shows some signs of change. Recent research on labor market flows, in particular, has greatly stimulated attention on the role of reallocation frictions and heterogeneity in aggregate economic fluctuations. Several facts about labor market flows contribute to this stimulus. I mention only a few. First, cyclical increases in unemployment predominantly reflect an increase in the number of workers who experience permanent job separations (for example, Table 5 in Davis and Haltiwanger 1998a). Second, postwar U.S. recessions are characterized by an increase in the number of workers who flow through the unemployment pool (Chapter 6 in Davis, Haltiwanger, and Schuh 1996). Third, recessions often coincide with sharp spikes in job destruction activity for major sectors of the economy (Davis and Haltiwanger 1998b, section 3.7). This burst of job destruction largely reflects permanent employment declines at the affected establishments (Davis and Haltiwanger 1998b, section 3.3). Fourth, job loss often leads to repeated spells of unemployment before the displaced worker settles into a new stable employment relationship. As a consequence, cyclical increases in job destruction lead to persistent increases in the aggregate unemployment rate (Hall 1995). These facts, and many others, point to an intimate relationship between aggregate fluctuations and the intensity of reallocation activity, as reflected in labor market flows.

When we follow the lead of these facts and build models that incorporate reallocation frictions and heterogeneity among production units, two central implications become evident: (i) aggregate shocks influence the intensity of reallocation activity, and (ii) shocks to the

structure of factor demand can drive fluctuations in the economic aggregates that occupy the attention of business cycle researchers. The precise nature and strength of these influences depend on the details of the economic environment. Which details matter most, and why, are important questions on the business cycle research agenda.

Models with reallocation frictions also help to address some well-recognized shortcomings in prevailing theories of the business cycle. Standard equilibrium business cycle models generate little amplification of shocks for standard specifications of technology and preferences (Campbell 1994, Table 3). Standard models also fail to explain the persistence properties of aggregate fluctuations (Cogley and Nasson 1995; Rotemberg and Woodford 1996). As emphasized by Hall (1998), the introduction of labor market frictions improves the performance of standard models along both of these dimensions. Thus, further development of models that incorporate frictions in the reallocation of labor (and capital) promises to advance our understanding of business cycle behavior, even if we adopt a narrow definition of the subject that encompasses only the persistence and co-movement properties of aggregate output, employment, productivity, consumption, investment, and interest rates.

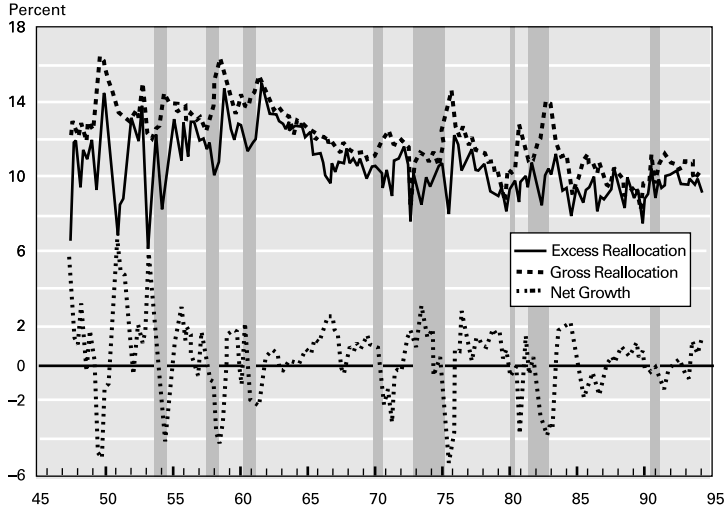
Which brings us back to the main ambition of the paper by Schuh and Triest: Careful descriptions of time variation in reallocation activity are essential guideposts for the development and evaluation of business cycle theories that explore the implications of reallocation frictions. Descriptive studies also lay the groundwork for structural analyses that interpret the data through the lens of an explicit theoretical model.

Describing Cyclical Variation in Reallocation Activity

Choosing an Index of Reallocation Intensity

Schuh and Triest treat the job reallocation rate—that is, the sum of creation and destruction rates—as equivalent to the intensity of reallocation activity. This position seems natural enough, especially given the terminology, and is harmless in many contexts. In a time-series context, however, the job reallocation rate is a questionable index of reallocation intensity. Job reallocation rises with simultaneous creation and destruction, but it also rises with the absolute value of the net employment change. For example, an economy with a 5 percent creation rate and no destruction has a 5 percent reallocation rate, whereas an economy with no creation and no destruction has a 0 percent reallocation rate. The first economy does not obviously involve more reallocation activity than the second. Another way to make the same point is to observe that the following two statements are equivalent: (i) the job reallocation rate and the net employment growth rate are negatively correlated over time; and

Figure 1
Quarterly U.S. Manufacturing Job Flows, 1st Quarter 1947 to 4th Quarter 1993



Source: Author's calculations.

(ii) the variance of the destruction rate exceeds the variance of the creation rate. It is not obvious that we want to treat statement (ii) as synonymous with the claim that reallocation intensity fluctuates countercyclically.

A closely related measure circumvents these difficulties: *Excess* job reallocation equals job reallocation minus the absolute value of the net employment change. Excess reallocation represents that part of job reallocation over and above the amount required to accommodate the net employment change. It is, in fact, an index of simultaneous creation and destruction. In the example above, the excess job reallocation rate is zero for both economies.

Does the distinction between job reallocation and excess reallocation matter much for the investigation by Schuh and Triest? A cursory investigation suggests an affirmative answer. Consider the quarterly job flow rates plotted in Figure 1 for the U.S. manufacturing sector from 1947 to 1993. The time-series behavior of the excess reallocation rate and the job reallocation rate differ substantially. In particular, the recessionary spikes in the job reallocation rate during the 1970s and 1980s are absent from the excess reallocation rate. Regressing the job reallocation rate on the net employment growth rate (and an intercept term) yields a slope

coefficient of −0.17 with a standard error of 0.06. By this metric, countercyclic variation in reallocation intensity seems confirmed, although the regression coefficient is not especially large. However, a regression of the excess reallocation rate on the net growth rate yields a statistically insignificant coefficient of −0.08 (standard error of 0.06). I do not conclude from this regression that reallocation intensity is acyclical, because my simple bivariate specification ignores important matters of timing,[5] but it is fair to conclude that the choice between indexes matters. My previous remarks explain why excess reallocation is a better index of reallocation intensity.

Plant-Level Job Growth Regressions

The paper by Schuh and Triest is (over)stuffed with multi-way tabulations, multi-way frequency distributions, and time-series plots of frequency distribution components. In many instances, these statistical objects fail to convey a clear message and are difficult to digest. Frequency distributions and cross-tabulations are extremely useful tools for summarizing patterns in the data, but they lose much of their appeal when they do not elicit important patterns in a clear, easily digested form.

Plant-level job growth regressions offer an alternative descriptive tool that easily accommodates three (or many more) dimensions of data variation at the same time. Let me elaborate a bit on a regression approach to describing cyclical variation in reallocation activity.

Suppose we group plant-level observations into cells defined by employer characteristics like size and age and by time characteristics like calendar year or a business cycle indicator. Within each cell, we can calculate the job reallocation rate or the excess reallocation rate. We can then regress cell-level reallocation rates on cell characteristics to characterize the patterns of variation in the data.[6] We could, for example, characterize how the relationship between employer size and reallocation varies over the business cycle. In the same way, we can regress cell-level net job growth rates on cell characteristics to characterize the variation in net job growth behavior.

Once we adopt a cell-based regression approach, we will be tempted to define the cells ever more narrowly in order to more fully characterize conditional patterns of covariation in the data. Pursuing this idea to its limit, the cell-based approach leads to regressions of the plant-level absolute growth rate and net growth rate on plant-level characteristics.

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[5] In fact, the excess reallocation rate is significantly negatively related to the sum of the current and four lagged net growth rates.

[6] See Dunne, Roberts, and Samuelson (1989) for a cell-based regression approach to plant-level entry and exit behavior.

The appropriate growth rate measure for this purpose equals the change in employment between period $t - 1$ and t, divided by the simple average of employment in $t - 1$ and t. This growth rate measure is symmetric about zero, lies in the closed interval $[-2, 2]$ and facilitates an integrated treatment of births and deaths.[7] It is identical to the log difference up to a second-order Taylor series expansion.

Figure 2, drawn from Davis and Haltiwanger (1998b), illustrates the approach. Using pooled data in the LRD for 1978, 1983, and 1988, we regressed plant-level growth rate observations on a battery of employer characteristics. In particular, the regression specification contains year effects, 4-digit industry effects, ownership-type effects, state effects, a quartic in the log of plant size interacted with detailed plant age categories, a quartic in plant-level energy intensity, a quartic in wages per worker, percentiles of the plant-level distribution of capital per worker (that is, 100 dummy variables), and a measure of plant-level product specialization.[8] Based on the regressions, and for selected employer characteristics, the figure plots (i) the predicted variation in the net employment growth rate and (ii) the difference between the predicted absolute growth rate and the absolute value of the predicted net growth rate. This difference yields the predicted excess reallocation rate as a function of employer characteristics. Each curve in the figure traces out the fitted relationship from the 5th to the 95th percentile of the variable on the horizontal axis.[9] In tracing out the curves, we evaluate all other variables at sample medians.

Several strong patterns emerge clearly from this figure. In particular, conditional on an extensive set of controls for other employer characteristics:

1. Net job growth declines as energy intensity increases.
2. Excess reallocation rises with energy intensity but only over the lower half of the energy intensity distribution.
3. Net growth declines with plant-level wages.
4. Excess reallocation declines with plant-level wages.
5. Net growth declines as capital intensity increases.
6. Excess reallocation rises with capital intensity.

Effects 1 to 6 are large, but in many cases they would be difficult to discern in simple cross-tabulations. For example, the figure shows a strong

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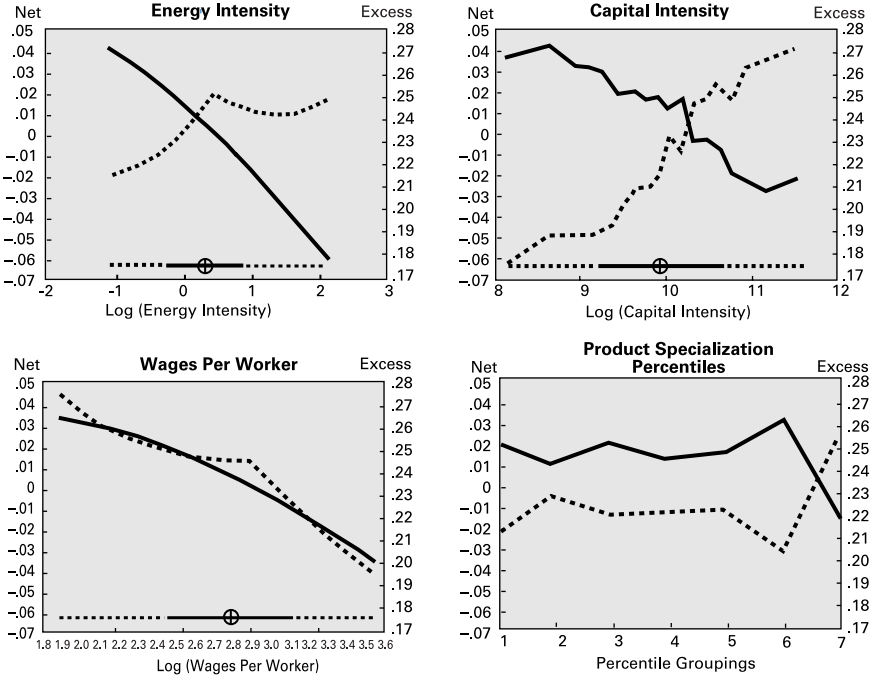
[7] The job reallocation rate can be written as the size-weighted frequency distribution of the plant-level absolute growth rates (Davis and Haltiwanger 1998b, section 2.3). Hence, we should weight the regression observations by plant size, because larger plants account for a larger amount of job reallocation at any given growth rate.

[8] See section 4.2 in Davis and Haltiwanger (1998b) for precise variable definitions.

[9] The product specialization variable is grouped into seven ordered categories. Category 7 corresponds to complete specialization in a single 5-digit product classification. For the other variables, the line atop the horizontal axes depicts selected percentiles of its distribution in the sample.

Figure 2
Growth Rate and Excess Reallocation, by Employer Characteristics



1. The solid line is the predicted variation in the net employment growth rate.
2. The dashed line is the difference between the predicted absolute growth rate and the absolute value of the predicted net growth rate (the predicted excess reallocation rate).
3. The horizontal lines above the horizontal axes depict the 5th, 25th, 50th (circle), 75th, and 95th percentiles.

Source: Davis and Haltiwanger (1998b).

positive relationship between capital intensity and excess job reallocation conditional on other employer characteristics (notably, size and wage level), but a simple cross-tabulation in Table 3.6 of Davis, Haltiwanger, and Schuh (1996) shows the opposite pattern.

The regression approach is easily adapted to the goals of the paper by Schuh and Triest. They seek to characterize cyclical variation in reallocation activity. I encourage them to pursue this goal by addressing the following sort of question: How do the curves in the attached figure (and analogous curves for other employer characteristics) shift over the business cycle? Schuh and Triest have at their disposal all the data required to answer this question. The regression method outlined above

is simple and flexible, and it delivers transparent messages. It is also easily adapted to other issues taken up by Schuh and Triest, such as the relationship between a plant's current growth rate behavior and its past growth rate intensity. I hope that Schuh and Triest pursue this line of investigation. I would view the results with great interest, and I suspect others would as well.

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