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Explaining cyclical movements in employment: Creative-destruction or changes in utilization?☆

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ABSTRACT

An important step in understanding why employment fluctuates cyclically is determining the relative importance of cyclical movements in permanent and temporary plant-level employment changes. If movements in permanent employment changes are important, then recessions are times when the destruction of job-specific capital picks up and/or investment in new job capital slows. If movements in temporary employment changes are important, then employment fluctuations are related to the temporary movement of workers across activities (e.g. from work to home production or search and back again) as the relative costs/benefits of these activities change. I estimate that in the manufacturing sector temporary employment changes account for nearly 60% of the change in employment growth over the cycle. However, if permanent employment changes create and destroy more capital than temporary employment changes, then their economic consequences would be relatively greater. The correlation between gross permanent employment changes and capital intensity across industries supports the hypothesis that permanent employment changes do create and destroy more capital than temporary employment changes.

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1. Introduction

Understanding why employment varies cyclically is important for understanding both the origins of business cycles and the welfare implications of fluctuations in the pace of economic activity. An important step in understanding why employment fluctuates cyclically is determining the relative importance of cyclical movements in permanent and temporary plant-level employment changes. If movements in permanent employment are important, then recessions are times when the destruction of job-specific capital (physical, human and organizational) picks up and/or investment in new job capital slows. Understanding how incentives to destroy or create this capital change over the cycle is then key to understanding the timing, duration and magnitude of cyclical fluctuations.[1] If movements in temporary employment changes are important, then employment fluctuations are related to the temporary movement of workers across activities (e.g. from work to home production or search and back again) as the relative costs/benefits of these activities change. In this case, understanding why and how the relative attractiveness of these alternative activities changes becomes key to understanding the change in employment growth over the cycle.[2]

Both permanent and temporary employment changes can be efficient or inefficient, but the type of inefficiency and any policy needed to address it likely differ across these two kinds of employment changes. For example, Caballero and Hammour (1996) show that whether cyclical swings in the permanent creation and destruction of jobs in response to changes in demand is inefficiently too large or too small depends importantly on the size of the sunk costs of permanent job creation. Such costs are less important when considering the inefficiency of the response of temporary employment changes to fluctuations in demand. Much more relevant are policies and/or institutions that drive a wedge between the utility of leisure or home production and the marginal product of work times the utility of consumption. For example, Feldstein (1976) shows that UI benefits can lead to inefficiently low levels of market work by providing too strong

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[1] Papers that discuss cyclical fluctuations in permanent plant-level employment changes include Caballero and Hammour (1994, 1996), Mortensen and Pissarides (1994) and Davis and Haltiwanger (1990).

[2] Papers that discuss cyclical fluctuations in temporary plant-level employment changes include: those describing the intertemporal substitution of labor when wage insurance is provided by employers, e.g. Bailey (1974) and Azariadis (1975); those discussing the unresponsiveness of wages to changes in cyclical demand, e.g. Hall and Lazear (1984), Akerlof and Yellen (1990) and McDonald and Solow (1981); and those describing temporary movements of workers across sectors, including home production, e.g. Barlevy (2001) andBenhabib, Rogerson and Wright (1991).

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an incentive to change from work to other activities in response to temporary changes in the marginal revenue product of market work.

Estimation of permanent and temporary plant-level employment changes requires a data set with sufficiently long time series of plant-level employment. I use the Census Bureau's Longitudinal Record Data set (LRD), which satisfies this requirement for a large number of manufacturing plants. To isolate permanent changes in employment at continuing plants, I apply a low-pass filter to time series of plant-level employment. To estimate permanent plant shutdowns and startups, I use the methodology of Davis et al. (1996), henceforth DHS. Combining permanent shutdowns and startups with permanent and temporary employment changes at continuous plants yields aggregate rates of permanent and temporary employment changes.

I estimate that permanent employment changes account for about half of annual plant-level employment changes in the manufacturing sector, with temporary employment changes accounting for the remaining half. Permanent employment changes account for slightly less than half of the change in employment growth over the cycle. Thus, both types of employment changes contribute importantly to cyclical movements in employment, though the contribution of temporary employment changes is greater.

However, to the extent that the economic consequences of the two types of employment changes differ, their relative importance may be greater or smaller than simple tabulations of their cyclical variation suggest. In particular, it seems likely that permanent employment changes entail the creation and destruction of more specific capital (physical, organizational and human), than temporary employment changes. A simple model of permanent and temporary employment changes suggests a test of this hypothesis. The model predicts that permanent and temporary employment changes should be smaller in industries with higher sunk costs of job creation, or greater amounts of specific capital per job. The intuition for why sunk costs reduce permanent employment changes is straight forward. When sunk costs are high, plants will be more hesitant to respond to changes in demand by permanent job creation. In addition, because sunk costs raise the option value of maintaining job capital after a plant has suffered an adverse relative productivity/demand shock, permanent job destruction will also be less responsive to shocks. Put another way, the amount of permanent job flows should be inversely proportional to its costs. Cross-industry regressions using capital intensity as a proxy for the level of sunk costs confirm the model's prediction.

Putting these results together, though temporary plant-level employment changes account for more of the cyclical fluctuation in employment than permanent plant-level employment changes, permanent employment changes are more costly and have potentially greater economic consequences. As a result, it is likely equally important to understand the role of both creative-destruction and changing utilization in cyclical fluctuations.

Many papers have investigated the behavior of plant-level employment changes, but few have tried to identify temporary and permanent employment changes, and none that I am aware of have sought to distinguish the economic consequences of these two types of employment changes or to quantify their relative importance to cyclical changes in aggregate employment. DHS, among others, estimate plant shutdowns and startups. In addition, they construct measures of persistent job changes at continuing plants. However, they consider only forward persistence (whether an employment change in period t will be reversed in periods $t+1$, $t+2$, etc), not backward persistence (whether an employment change in period t reverses employment changes in periods $t-1$, $t-2$, etc.). Moreover, their choice of method does not make clear what level of persistence should be associated with plant-level employment changes not directly related to business cycle fluctuations in utilization. Finally, they only report their most persistent measure of employment changes (2 years) for a limited number of years making analysis of changes in permanent flows over the business cycle problematic. In my measures of permanent employment changes, I use a method similar to that of DHS to identify shutdowns and startups but add an additional filter to retain only permanent shutdowns and startups. For continuous plants, the low-pass filter I use isolates employment changes that are long-lasting from both a forward and backward perspective. In addition, I choose weights for the low pass filter that identify permanent employment flows as having a frequency lower than that associated with business cycles. Finally, I measure the contributions to cyclical employment movements of permanent and temporary employment changes and test whether permanent employment changes are likely to be more costly than temporary employment changes.

The following section describes in more detail the data and method I use to distinguish permanent and temporary employment changes. Section 3 reports measures of the magnitudes and cyclical movements of both temporary and permanent changes in employment. Section 4 uses a simple model to show that permanent employment changes should be more closely associated with changes in capacity and less closely associated with changes in utilization than temporary employment changes and tests the model's prediction that higher sunk costs of job creation should reduce the frequency of permanent and temporary employment changes. Section 5 concludes.

2. Measuring permanent and temporary employment changes

To estimate permanent employment changes I combine estimates of long-lasting increases and decreases in employment at continuing plants with permanent plant startups and shutdowns. To estimate the former, I use a low-pass filter developed by Baxter and King (1999). The filter removes fluctuations in employment that are temporary in duration, while preserving those changes that are long lasting. To estimate the latter, I modify slightly the methodology of DHS.

As shown by Baxter and King (1999) a low-pass filter can be implemented by taking a centered symmetric weighted moving average of a time series, where weights are determined by restrictions in the frequency domain. The ideal filter is an infinite order moving average. Of course, construction of such a filter is not possible, and researchers must pay for increases in the accuracy of the filter with decreases in sample size. Baxter and King examine this trade-off and recommend using a centered window of 7 years when researchers are concerned about separating business cycle-related fluctuations from longer-lasting movements. Implementation of the filter also requires specification of a cutoff period/frequency to separate low from high frequency movements in the series. Baxter and King recommend a cut-off of 8 years to filter out movements related to business cycles, and I follow their recommendation. I apply the resulting low-pass filter to annual data on total employment (production workers plus nonproduction workers) which is available at an annual frequency from the LRD.

The LRD derives from the quinquennial Census of Manufacturers (CM) and the Annual Survey of Manufacturers (ASM). The CM gathers data on all plants in the manufacturing sector, approximately 350,000, while the ASM gathers data from a representative sample of 50,000 to 80,000 plants. Large plants (generally those with employment greater than 250) are selected with certainty to be in the ASM, while small plants are selected randomly. Because the LRD assigns plants a unique identification number that does not change over time, I can create plant-level time series of employment. For plants with sufficiently long time series centered on period t, I apply a low pass filter to estimate the permanent and temporary (the difference between actual and permanent) levels of employment for the plant at time t. Summing across those plants produces measures of aggregate permanent and temporary employment at time t, and differencing the data for all plants with permanent and temporary employment levels in t and $t-1$ yields aggregate permanent and temporary job flows from $t-1$ to t.