GROSS JOB FLOWS AND FIRMS

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Abstract:

This paper extends the work of Dunne, Roberts, and Samuelson [3] and Davis, Haltiwanger, and Schuh [2] on gross job flows among manufacturing plants. Gross job creation, destruction, and reallocation have been shown to be important in understanding the birth, growth, and death of plants, and the relation of plant life cycles to the business cycle. However, little is known about job flows between firms or how job flows among plants occur within firms (corporate restructuring). We use information on company organization from the Longitudinal Research Database (LRD) to investigate the relationship between plant-level and firm-level job flows. We document: (1) the fraction of plant-level gross flows occurring between firms; and (2) gross job flows by the extent of excess job reallocation occurring in firms.

1. Introduction

Recent research has shown that labor markets are characterized by large and pervasive job flows. In an average year, roughly one in 10 manufacturing jobs is destroyed and another one in 10 created. Product and process innovations, changes in relative input prices, the increasing openness of the U.S. economy, changes in the geographic distribution of consumers and potential workers, changes in the communications and transportation infrastructure, and business cycle fluctuations are among the forces driving the churning of jobs.

This reallocative process gives the economy great flexibility and potentially allows economic resources to be used where they will be most productive. Plants and firms that use outmoded techniques, or produce products flagging in popularity, experience employment decreases. The displaced workers can then be reemployed by firms that are expanding. Reallocation comes at a cost, however. Workers displaced by contracting plants may suffer an extended spell of unemployment before finding a new job. And increases in the intensity of job reallocation may be a factor in the origination and amplification of recessions. Job reallocation is clearly an important, but imperfectly understood, process.

Much of what we know about job reallocation in U.S. manufacturing is based on work examining plant-level observations in the Longitudinal Research Database (LRD) produced by the U.S. Bureau of the Census. The LRD links micro data from the Annual Survey of Manufactures (ASM) and the quinquennial Census of Manufactures (CM) over time in a way that has allowed researchers to track the process of job creation and destruction at the plant level.

Surprisingly, the role of reallocation of jobs between plants owned by the same firm has not been studied. Multiplant firms are an important part of the U.S. manufacturing sector, accounting for 18% of manufacturing establishments and 69% of manufacturing employment in 1982. The role of firms in gross job flows is important for several reasons:

- Job flows between plants within firms may entail a lower social cost than job flows between firms if workers at contracting plants transfer to expanding plants within firms. This might be so if the plants are geographically close and require common skills.

- Job flows between plants within firms provide information on the roles of reallocation and creative destruction in the growth of firms. Such flows would reveal whether firms with higher rates of internal job reallocation have higher growth rates.

- Previous research has revealed that increased job destruction among large plants of multi-plant firms is the primary component of higher job destruction during recessions. Job flows between plants within firms provide information about how corporate restructuring in large firms is connected to the business cycle.

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- Gross job flows among plants may occur for financial reasons (credit constraints, cash flow shortages). Financial decisions are made at the firm level, so job flows between plants within firms may help distinguish whether job flows are generated by planned, profit-maximizing reallocation within firms or are responses to financial market imperfections.
- Job flows between plants within firms may shed light on measurement issues in the collection of economic information that may be useful to the Census Bureau as it refines its programs.

This paper reports preliminary evidence from the first stage of our investigation into the role of firms in gross job flows. Section 2 defines job flows and explains the difference between plant-level and firm-level job flows. Section 3 provides motivation and a discussion of conceptual issues. Section 4 describes the data and measurement issues. Section 5 presents statistics on differences between types of plant. Section 6 presents evidence on gross job flows between and within firms.

2. Gross Job Flows

This section briefly summarizes the gross job flow concepts. See Davis, Haltiwanger, and Schuh [2] (henceforth, DHS) for more details.

2.1 Total Between Plants

Job creation and destruction represent positive and negative employment change, respectively, measured at the level of the sampling unit. In this study, the sampling unit is a plant (also known as an establishment), which is owned and controlled by a firm. Firms may own one or more plants.

Let X_{eft} be employment, where subscripts denote plant (e), firm (f), and time (t). Let Δ denote the first-difference operator, $\Delta X_t = X_t - X_{t-1}$. Then plant-level job creation, C, and destruction, D, are

$$C_{eft} = \begin{cases} \Delta X_{eft} & \text{if } \Delta X_{eft} > 0; \\ 0 & \text{otherwise} \end{cases}, \tag{1}$$

$$D_{eft} = \begin{cases} |\Delta X_{eft}| & \text{if } \Delta X_{eft} < 0; \\ 0 & \text{otherwise} \end{cases}, \tag{2}$$

Plant size is the average of current and lagged plant employment,

$$Z_{eft} = 0.5(X_{eft} + X_{ef,t-1}) \,, \tag{3}$$

so the plant-level net employment growth rate is

$$g_{eft} = \frac{\Delta X_{eft}}{Z_{eft}} = \frac{C_{eft} - D_{eft}}{Z_{eft}} \,. \tag{4}$$

This nonstandard growth rate is used because it is symmetric and bounded by $[-2, 2]$, making it feasible to construct finite growth rates for plants that start up ($g = 2$) and shut down ($g = -2$).

Total gross job creation and destruction are the sums of positive and negative employment changes between all manufacturing plants:

$$C_t = \sum_e C_{eft} \tag{5}$$

$$D_t = \sum_e D_{eft} \tag{6}$$

Henceforth we focus on job flow rates denoted by lowercase letters,

$$c_t = \frac{C_t}{Z_t} = \sum_e \left(\frac{Z_{eft}}{Z_t} \right) \max(0, g_{eft}) \tag{7}$$

$$d_t = \frac{D_t}{Z_t} = \sum_e \left(\frac{Z_{eft}}{Z_t} \right) \max(0, -g_{eft}) \,, \tag{8}$$

where $Z_t = \sum_e Z_{eft}$ is total manufacturing employment size. Note that these rates can be calculated either from the summed plant-level employment changes or from the weighted sum of plant-level employment growth rates.

Gross job flows represent the building blocks of net employment growth,

$$n_t = c_t - d_t \,, \tag{9}$$

and gross job reallocation,

$$r_t = c_t + d_t \,. \tag{10}$$

The latter measure is one useful way to summarize employment restructuring among plants. Even if $g_t = 0$, job reallocation may be very high. Another useful measure of restructuring is excess reallocation,

$$x_t = r_t - |n_t| \,. \tag{11}$$

Excess reallocation reflects the amount of employment change at plants that occurred above and beyond the amount required to accommodate net employment change in manufacturing. Put another way, excess reallocation reflects the extent of simultaneous gross job creation and destruction. However, gross job creation and destruction do not always occur fully within a period because reallocation is costly and time consuming. Because there are timing lags between creation and destruction, excess reallocation does not always accurately reflect reallocation occurring across periods and is thus better suited for long-run average flows.

2.2 Between Firms

We also calculate gross job flows between firms. Here the analysis is analogous to the study of gross job flows between detailed industries in Haltiwanger and Schuh [5].

Gross job flows between firms are constructed analogously to flows between plants except that the sampling unit is the firm rather than the plant. Firm-level data are obtained from the appropriately weighted sum of plant-level data,

$$X_{ft} = \sum_{e \in f} \omega_{et} X_{eft} \tag{12}$$

where ω_{et} is the sample weight for plant e.[1]

Firm-level job creation and destruction are:

$$C_{ft} = \begin{cases} \Delta X_{ft} & \text{if } \Delta X_{ft} > 0; \\ 0 & \text{otherwise} \end{cases} \tag{13}$$

$$D_{ft} = \begin{cases} |\Delta X_{ft}| & \text{if } \Delta X_{ft} < 0; \\ 0 & \text{otherwise} \end{cases} . \tag{14}$$

Firm size is the average of current and lagged firm employment

$$Z_{ft} = 0.5(X_{ft} + X_{f,t-1}) \tag{15}$$

and firm-level net employment growth is

$$g_{ft} = \frac{\Delta X_{ft}}{Z_{ft}} = \frac{C_{ft} - D_{ft}}{Z_{ft}} . \tag{16}$$

Firms can start up ($g_{ft} = 2$) and shut down ($g_{ft} = -2$) in the same manner as plants if all plants within the firm start up or shut down (a trivial concept for single-plant firms).

Gross job creation and destruction *between* firms are the sums of all positive and negative employment changes across all firms in the economy (or in a sector, such as industry or region).

$$C_t^b = \sum_f C_{ft} \tag{17}$$

$$D_t^b = \sum_f D_{ft} . \tag{18}$$

Likewise, the rates of gross job creation and destruction between firms are

$$c_t^b = \frac{C_t^b}{Z_t} = \sum_f \left(\frac{Z_{ft}}{Z_t} \right) \max(0, g_{ft}) \tag{19}$$

$$d_t^b = \frac{D_t^b}{Z_t} = \sum_f \left(\frac{Z_{ft}}{Z_t} \right) \max(0, -g_{ft}) . \tag{20}$$

Aggregate (total manufacturing) net employment growth can be calculated using between-plant or between-firm creation and destruction rates:

$$n_t = c_t - d_t = c_t^b - d_t^b; . \tag{21}$$

Gross job reallocation *between* firms is

$$r_t^b = c_t^b + d_t^b , \tag{22}$$

and excess job reallocation *between* firms is

$$x_t^b = r_t^b - |n_t| . \tag{23}$$

Both reallocation measures can be constructed from weighted plant-level or firm-level growth rates as well.

In the empirical work, we provide estimates of the shares of gross job flows between firms in total gross job flows between plants. For example, the job creation share is

$$\sigma_t^c = C_t^b / C_t . \tag{24}$$

These shares indicate the extent to which high rates of total gross job flows are attributable to employment decisions made by firms rather than plants. The remainder, $1 - \sigma_t^c$, provides an upper bound on job creation within firms.

2.3 Within Firms

The shares σ are upper bounds because the DHS methodology does not permit construction of exact measures of job flows *within* firms. The reason, described in Haltiwanger and Schuh [5], is that job destruction is defined as a positive number in equation (2). For example, residual job creation,

$$\tilde{c}_t = c_t - c_t^b \tag{25}$$

is not a valid measure of within-firm creation because the nonlinearity of the absolute value operator precludes identification of the covariance between c_t^b and $\tilde{c}_t$. Only if that covariance were exactly zero — which is unlikely — would the residual measure reflect within-firm creation exactly.

For related reasons, firm-level excess reallocation,

$$x_{ft} = r_{ft} - |n_{ft}| , \tag{26}$$

does not represent reallocation within firms either. Excess reallocation also understates true reallocation when creation and destruction are asynchronous over time, although this does not appear to be a problem in the quinquennial data. Nevertheless, x_{ft} is one sensible way of quantifying the extent to which firms experience churning in employment among their plants. Consequently, we

[1] In this paper, the sample weight always equals one (1.0) because the quinquennial data we use are from censuses of the manufacturing universe. In future work, we plan to construct annual rates of firm-level gross job flows, in which case annual sampling weights will be used to construct firm aggregates. Note, however, that a tricky sampling issue arises. The sample weights do *not* have a firm subscript because plants are sampled only according to their size and SIC industry. See U.S. Bureau of the Census [7].

use x_{ft} to characterize firms as experiencing relatively high or low internal reallocation.

Furthermore, it is of independent interest to examine gross job flows at the firm level. In this regard, the firm is like any characteristic used to classify plants into sectors, such as industry, region, or size. Gross job creation and destruction at the *firm* level are

$$C_{ft} = \sum_{e \in f} C_{eft} \tag{27}$$

$$D_{ft} = \sum_{e \in f} D_{eft} \tag{28}$$

and the job flow rates, c_{ft} and d_{ft}, are defined analogously to the plant-level rates.

3. Motivation and Conceptual Issues

Although there is now a large literature on gross job flows, prior research has not examined gross job flows at plants owned by the same firm. Most gross job flows have been calculated across plants within sectors, such as industry or geography, or within categories defined by *plant* characteristics, such as size, age, wage, or capital intensity. Occasionally, gross job flows between plants have been tabulated by the size of plants' parent firms, as in DHS [2]. But to our knowledge there is no evidence on firm-level gross job flows.[2]

A key factor behind the focus on plant-level job reallocation is the relevance of geography to labor markets. In general, labor markets are localized geographically because of costs associated with commuting, job search, and the like. Plants are geographically specific entities, so the impact of employment changes is likely to be specific to the local labor market. The best gauge of the impact of job reallocation on labor markets is obtained from the plant-level data.

In fact, gross job flows within firms may or may not have a significant impact on labor markets. The impact will depend on several factors: whether the reallocation occurs across local labor markets; where firms offer dislocated workers employment in newly created jobs at the firm; and (when plants are geographically distant) workers' aversion to geographic relocation.

However, it seems reasonable to assume that firm managers, rather than plant managers, are the ultimate decision-makers with regard to plant employment and related operations. Although plant managers may be given some autonomy in hiring and firing decisions, firm managers are more likely to wield the power in major decisions about plant and firm employment and operations.

For example, financing decisions are almost surely made at the firm level, so firm managers who are faced with financial constraints will likely make financial allocation decisions among plants. Similar reasoning applies to the development of product lines, market entry and exit, the optimal responses to variable state and local government taxation and regulation, and other strategic market decisions.

Several aspects of firm-level gross job flows are worth investigating. One issue is the degree to which firms restructure employment along intensive versus extensive margins. The extensive margin – that is, the start-up or shutdown of plants within the firm – may be associated with improvements in the efficiency or market flexibility of the firm. Firms are likely to shut down unproductive plants and to start up plants that introduce newer products or technologies. Firms may also be more inclined to use the extensive margin in adapting to changing product markets by introducing new goods and services or shifting production to growing geographic areas. Some of this kind of restructuring may occur on the intensive margin as well, particularly if plants encompass multiple lines of business, but much of intensive restructuring will have different economic implications.

A second issue is the connection between firm-level gross job flows and economic growth. Flexibility and innovation are important elements to firm growth, especially in the current economic environment. Growth could be in terms of employment, but the more important concept is profitability or firm market value. It is important to know whether firms that restructure more, or more frequently, are also firms that grow more in profitability or value. Furthermore, we want to know the extent to which the high rates of gross job flows among plants are accounted for by job flows between firms as opposed to within firms.

A third issue is the connection between firm-level gross job flows and business cycles. It is now well-known that manufacturing gross job destruction and reallocation increase markedly during recessions, and that these job flows are primarily permanent. But what is not well known is whether cyclical gross job flows among plants occur within firms or between firms. If we can discover how and why these job flows are occurring, we may gain an improved understanding of the causes and consequences of business cycles.

These are just some of the basic issues to be addressed at the beginning of this research program. These issues have implications for many economic subfields such as labor, macroeconomics, growth, and industrial organization.

[2] Gross job flows studies by Leonard [6] and Foote [4] use state-level unemployment insurance data based on employer identification (EI) numbers, which are more aggregate than a plant but are not firms. However, they do not study gross job flows of plants in EI number sampling units.

4. Data and Measurement

We use the Longitudinal Research Database (LRD) from the U.S. Census Bureau to construct gross job flows. This effort extends the work of Dunne, Roberts, and Samuelson [3] (henceforth, DRS), who used the LRD to construct quinquennial gross job flows, and DHS [2], who used the LRD to construct annual and quarterly gross job flows. Both prior studies focused on job flows between plants rather than firms.

The LRD contains historical economic data for 1963 to 1995 from the Census of Manufactures (CM) and Annual Survey of Manufactures (ASM). The CM is conducted quinquennially, occurring in years ending in "2" or "7" (except for 1963) and covers the universe of plants and firms. The ASM is conducted annually in the years between censuses, and covers a probability sample of plants.

The basic sampling unit of the CM and ASM is a plant, but information is included that identifies the firm to which each plant belongs. Plants are defined as a physical geographic location where production occurs and are identified by a permanent plant number (PPN). The PPN does not change over time, even if the parent firm changes, thus enabling construction of a reliable longitudinal panel.

Firms (also called enterprises) are distinguished by an identification number (ID) that indicates common corporate ownership or control. Specifically, U.S. Bureau of the Census [7] states: "The enterprise is the entire economic unit consisting of one or more establishments under common ownership or control. It may vary in composition from a single legal entity (e.g., corporation, partnership, individual proprietorship) with only one establishment to the most aggregate level of business organization, as a complex family of legal entities (and their constituent establishments) under common ownership or control" (p.#12).[3]

Complete firm-level data can be constructed only in certain periods and for certain subsamples of the LRD. In census years, the LRD includes all plants in all firms with at least some manufacturing activity.[4] For very small plants, called administrative records (AR), employment data come from payroll records at the Internal Revenue Service (IRS) or Social Security Administration (SSA).[5] Data for all other plants come from the CM.

Given this universe of plants and firms, it is possible to construct firm-level gross job flows for the universe of manufacturers on a quinquennial basis for 1967 (for only four years), 1972, 1977, 1982, 1987, and 1992. Because the panel of CM data is the easiest to construct and does not pose any difficult sampling issues, we begin our empirical investigation by looking only at the quinquennial gross job flows. In this regard, some of our results will be comparable to DRS [3].

Our measurement methodology for quinquennial gross job flows follows closely that of DHS [2] for annual and quarterly job flows with one notable exception. Thus far, we have not imposed the DHS set of intricate coverage code and other restrictions designed to screen out invalid employment changes, especially in plant start-ups and shutdowns. One reason is that these restrictions do not translate easily to quinquennial data. A second reason is that many of the spurious employment changes at higher frequencies are related to difficulties with the sampling methodology, and these difficulties are much less severe in the quinquennial data. Finally, many of the spurious employment changes were attributable to problems linking plants over time (in both annual and quinquennial data). However, substantial progress has been made in correcting those linkage problems, reducing the need for the restrictions.

In future work, we plan to construct firm-level gross job flows on an annual basis for selected periods and subsamples. ASM panels are constructed from a probability sample of plants selected with sample weights based on plant size and industry. Consequently, this sampling procedure does not guarantee that all plants in a firm will be included. However, prior to 1979 the ASM survey supplemented the probability sample by arbitrarily including all plants within each firm for which at least one plant was chosen for the panel. Thus, firm-level data can be constructed for all firms for which at least one plant was included in the ASM panel over the period 1972 to 1978.

After 1978, construction of firm-level data that include all plants within firms becomes considerably more difficult. One solution is to use data from the Census Bureau's new Longitudinal Establishment and Enterprise Microdata (LEEM) file described in Acs and Armington [1]. Unfortunately, although these data cover virtually the entire economy, at present they are available only for the period 1988 to 1995.

However, two imperfect, but potentially worthwhile, strategies exist for constructing annual and quarterly firm-level data from the LRD beginning in 1979. One strategy is to construct data for firms with only very large plants. The ASM panels include with certainty any plant with 250 or more employees in the preceding census year. Thus, we can construct firm-level data for the sub-

[3] It is also possible to identify companies (also called lines of business) within firms that are entities intermediate to the plant and firm. A company is the set of plants within a firm producing the same product, which is identified by a primary product variable (a 5-digit identification number in the SIC system). We do not exploit the company concept in this paper, but it would be of interest to do so in future work.

[4] The LRD contains data on only the manufacturing of these manufacturing plants and firms. Some firms also have nonmanufacturing activity, which is excluded from the LRD.

[5] The employment size of AR plants varies over time but is typically less than 10 employees.

sample of firms that include only large plants. This subsample will be dominated by very large firms and will not be representative. Nevertheless, it will provide data for a key group of plants and firms — the kind that experience disproportionately large increases in job destruction during recessions.

Another strategy is to construct firm-level data for all plants in the ASM panels despite the fact that some firms will be missing plants. Clearly this would yield unrepresentative and likely biased results. However, it may be possible to develop an estimation/imputation procedure using CM data before, during, and after each ASM panel to correct, at least to some extent, for the missing plants at higher frequencies. Such corrections are feasible and perhaps promising, but they would require considerable work to implement.

5. Evidence on Plant and Firm Types

This section reports descriptive statistics for 1982 on the types of plants and firms in the LRD. These statistics highlight important differences between three types of firms: 1) single-plant firms; 2) multi-plant firms that own only one manufacturing plant; and 3) multi-plant firms that own at least two manufacturing plants.[6]

Table 1 presents employment statistics by firm type. Over three-quarters of plants are owned by single-plant firms, but these firms employ only about one-fourth of manufacturing workers. Firms with multiple manufacturing plants account for less than one-fifth of plants but employ nearly 70 percent of manufacturing workers. Underlying this phenomenon is a large difference in average plant size: single-plant firms average 19 workers per plant, while plants owned by firms with multiple manufacturing plants average more than 10 times as many employees. The plants of multi-plant firms vary considerably in size (standard deviation of 613). Interestingly, the standard deviation of plant employment size within firms (514) is substantially larger than that between firms (222).

Table 2 provides characteristics of multi-plant firms. Manufacturing employment is skewed toward large plants. Most multi-plant firms have two plants but these firms only account for 20 percent of plants and 9 percent of employment. Only 8 percent of multi-plant firms have more than 10 plants but these firms account for 47 percent of plants and 68 percent of employment. More generally, the number of plants in a firm is positively correlated with the average employment size of plants. The mean number of employees per plant in firms owning more than 10 plants is triple that in firms owning two plants.

Differences in average employment size of plants are important. Schuh and Triest [8] documented pronounced differences by plant employment size in the patterns of job creation and destruction over the business cycle. The statistics here suggest that the differences in the job flows by plant size may be linked to the structure of firms. Small plants are prone to destroy jobs through shutdowns and highly concentrated contractions. Relative to small plants, large plants tend to destroy jobs in contractions of more moderate concentration, exhibit greater cyclical asymmetry between job creation and destruction, and have job flows which are somewhat less persistent.

The statistics in Tables 1 and 2 suggest that small plants tend to be owned by single-plant firms and large plants tend to be part of large multi-plant firms. Small single-plant firms may be more vulnerable to credit constraints and fluctuations in local product demand, leading to relatively high frequencies of sharp reductions in employment and plant shutdowns. Large firms are likely to have much better access to a variety of sources of credit and be less vulnerable to regional fluctuations.

Multi-plant firms operate plants in 3 states with 2 plants per state, on average. Obviously, the number of states in which a firm is located depends strongly on the number of plants it operates. Firms with more than 10 plants manufacture in 12 states with 3 plants per state. The fact that firms often operate multiple plants per state lends credence to the view that the impact of job flows on local labor markets might be attenuated because job flows may occur within firms and regions. However, there is also substantial scope for job flows across states (hence across local labor markets) even within firms for large firms with many plants. We explore this issue in Schuh and Triest [9].

Multi-plant firms operate plants in nearly 2 industries (2-digit SIC), on average, and operate 3 plants per industry.[7] Firms with more than 10 plants operated plants in four industries with nine plants per industry. So, although multi-plant firms tend to have some industrial diversity, they generally operate multiple plants within 2-digit industries.

6. Evidence on Gross Job Flows

Table 3 and Figure 1 present the evidence on quinquennial job flows between plants and firms in U.S. manufacturing from 1963 to 1992. Several results stand out from

[6] Multi-plant firms with only one manufacturing plant can arise if the firm owns plants (establishments) outside manufacturing, or if there are errors in the data.

[7] This statistic substantially understates the industrial diversity of plants and firms because plants are assigned to only one industry category even though they may produce products in many different industries. Larger plants tend to be much less specialized than smaller plants, at least at the 4-digit SIC industry level.

Table 1: Manufacturing Plant Employment Size in 1982 by Firm Type

Firm Type	Number of Mfg. Plants	Fraction of Mfg. Plants	Fraction of Mfg. Employment	Plant Employment Mean	Plant Employment Std. Dev.
Single-Plant	1	.79	.27	19	39
Multi-Plant	1	.03	.05	96	203
Multi-Plant	> 1	.18	.69	198	613

SOURCE: Authors' tabulations from the Longitudinal Research Databas (LRD).

Table 2: Characteristics of Multi-plant Manufacturing Firms in 1982

	Number of Plants 2	3-5	6-10	> 10	All Firms
% of firms	52	31	9	8	100
% of plants	20	21	12	47	100
% of employment	9	13	10	68	100
Mean employees per plant	91	120	162	272	121
Mean number of states	1.4	2.1	3.9	11.8	2.7
Mean plants per state	1.6	2.0	2.6	2.9	1.9
Mean number of 2-digit industries	1.3	1.5	2.1	4.1	1.7
Mean plants per 2-digit industry	1.7	2.7	4.5	9.0	2.9

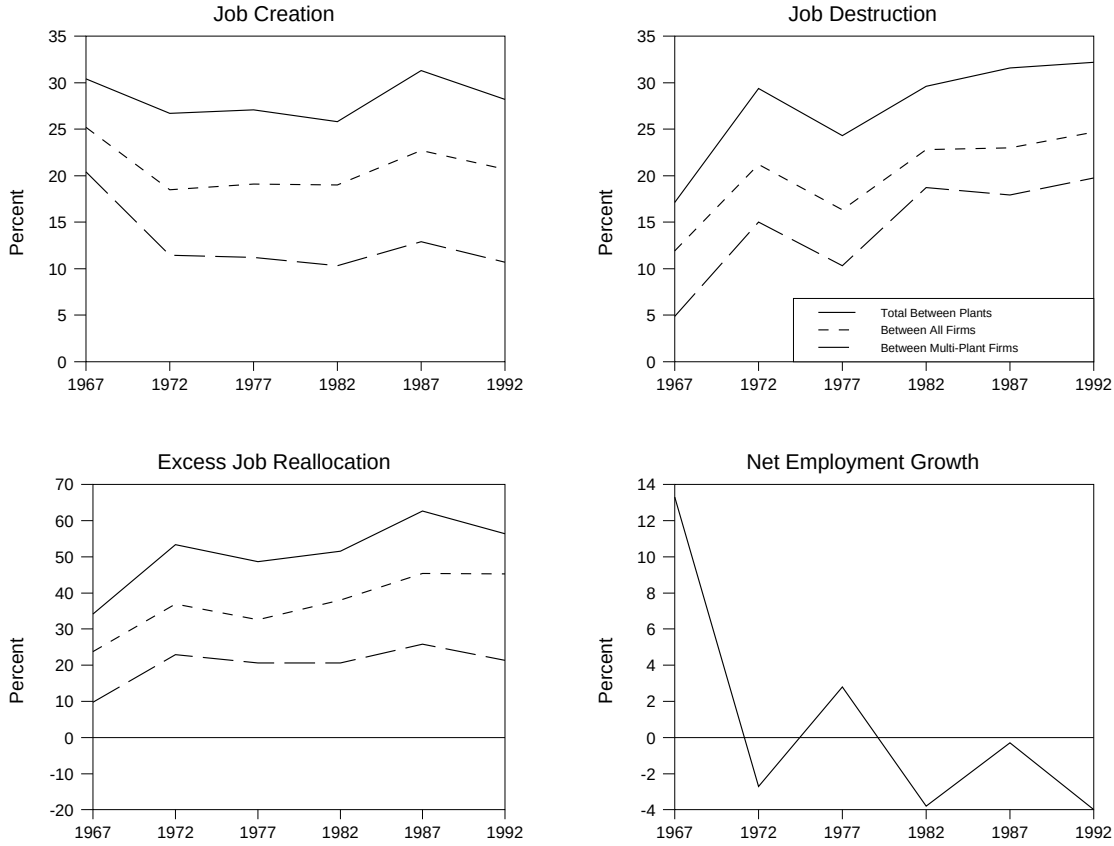
SOURCE: Authors' tabulations from the Longitudinal Research Database (LRD).

Table 3: Average Quinquennial Gross Job Flows in Manufacturing, 1963 to 1992

Firm Type	Total Between Plants (%) n	c	d	r	x	Share Between Firms σ^c	σ^d	σ^r	σ^x
All	.9	28.3	27.4	55.6	51.1	.74	.73	.74	.72
Single-Plant	7.9	43.4	35.5	78.9	70.9	1.00	1.00	1.00	1.00
Multi-Plant (all)	-1.6	22.8	24.4	47.3	40.2	.56	.59	.58	.52

NOTES: Job flows are expressed as a percent of employment size (z). n is net employment growth; c is creation; d is destruction; r is reallocation; and x is excess reallocation. The reason $x < r - |n|$ is because the table reports time-series averages and n changes sign over time. SOURCE: Authors' tabulations from the Longitudinal Research Database (LRD).

Figure 1 - Gross Job Flows Between Plants and Firms, 1967-92



the total gross job flows between plants.

First, manufacturing net employment actually *grew* nearly 1 percent per five years over this period, in contrast to popular conceptions. However, this positive growth is attributable primarily to 13 percent growth in 1967 (from 1963). Furthermore, employment growth differs widely by firm type. Single-plant firms grew at an 8 percent rate while multi-plant firms contracted significantly.

Second, gross job flows are much larger than net job flows. More than one-fourth of all jobs are created or destroyed at plants every five years; thus, more than half of all jobs are reallocated between plants. The vast majority of this reallocation, at 51 percent, is in excess of net employment growth.[8] Gross job flows for single-unit plants are nearly double those for multi-unit plants.

The figure shows that gross job creation and destruction have different trends. Job creation has been flat or declining slightly, but job destruction has been increasing considerably over time. As a result, job reallocation has also been rising and net employment growth declining. Furthermore, gross job flows between all firms and between multi-plant firms move together very closely with total gross job flows between plants over time.

However, the table indicates that high rates of total gross job flows are *not* primarily attributable to gross job flows within firms. Nearly three-fourths of all gross job flows between plants also occurs between firms, so at most one-fourth occurs within firms. This result is important because it indicates that most workers whose jobs are destroyed also lose firm-specific capital, which may significantly reduce future wages. Furthermore, job reallocation between firms is more likely to entail costly and time-consuming geographic movements of workers.

The share of total job flows occurring between firms is quite different by firm type. By definition, *all* job flows at single-unit firms occur between firms. In contrast, less than 60 percent of job flows at multi-unit firms

[8] In the table, $x \neq r - |n|$ because the numbers in the table are time-series averages of the quinquennial rates of excess reallocation. The fact that n changes sign over time means that average x will be less than $r - |n|$.

occur between firms. Thus there is substantial scope for firm-level decision-making to influence plant job flows in multi-unit firms.

Table 4 presents evidence on total gross job flows between plants in multi-plant firms categorized by the extent of excess reallocation in the firm.[9] The categories are defined by unweighted quintiles of the time-series cross-section distribution of excess reallocation rates in all manufacturing firms. The first category, "None," represents firms with $x_{ft} = 0$ in all periods, which occurs when all plants in a firm expand or all contract (including firm start-ups and shutdowns). The gross job flows rates are averages of aggregate rates for all manufacturing in each category except for excess reallocation, which is the average of x_{ft} across all firms in each category.

Average firm-level excess reallocation varies dramatically, from 3 percent to 59 percent. Interestingly, however, the patterns of net and gross job flows differ across excess reallocation categories. Firms with very low or very high excess reallocation have the fastest net employment growth, probably because because they are primarily smaller firms (as evidenced by the small employment shares). Most larger firms appear to have average to moderately high excess reallocation and shrinking employment. These results suggest that it will be important to control for size when investigating this issue further.

In contrast, gross job flow rates generally rise monotonically as firm-level excess reallocation rates rise. This result may seem obvious, but it does not necessarily have to occur. High rates of gross job flows can occur in a firm with low rates of excess reallocation if the firm is growing or shrinking rapidly and plants within the firm tend to move their employment in the same direction.

7. Concluding Comments

This paper contains the first results from a new research program on the role of firms in gross job flows. Single-plant and multi-plant firms differ in important ways. In particular, plants owned by multi-plant firms tend to be much larger than those owned by single-plant firms, suggesting that differences in the behavior of plants by employment size might actually be largely driven by differences between the types of firms which own large and small plants.

Preliminary results indicate that gross job flows between firms account for three-fourths of total job flows. Thus, high rates of total gross job flows between plants are not primarily accounted for by firms moving jobs across their plants (much less across plants in the same local labor market). However, up to three-fifths of job flows in plants owned by multi-plant firms may occur between plants within those firms.

This result suggests that job restructuring in manufacturing firms plays a significant role in total gross job reallocation. The data show considerable heterogeneity among firms in their average excess reallocation behavior. Furthermore, gross job flows behavior differs substantially in firms that exhibit high and low excess reallocation rates.

Our initial results suggest a number of extensions to this research, which we plan to pursue. Analysis of how the firm-level job flows vary with firm characteristics, such as the number of plants a firm operates, average size of plants the firm operates, and age of the firm, is an obvious extension. We will also be investigating the determinants of why firms decide to simultaneously expand some plants while decreasing employment at others. Plant age, product mix, local labor market conditions, recent productivity growth, and energy efficiency are among the factors that might affect the firm's allocation decisions. This analysis will provide insights into the role of firm-level gross job flows in the growth of firms.

As discussed above, we are interested in the extent to which gross job flows between plants within firms may be associated with smaller impacts on local labor markets than gross job flows between firms. To study this, we will be analyzing the degree to which gross job flows in firms occur between plants in relatively close geographic proximity.

Our analysis of how plant size varies with firm type and the number of plants a firm owns has made us optimistic regarding the possibility of analyzing the role of firms in gross job flows on an annual, rather than quinquennial, basis. Because large multi-plant firms tend to own large plants, it is likely that the ASM panels contain a very high percentage of the plants owned by the firms engaged in the bulk of reallocation across plants within firms. Analysis of such reallocation using annual data will allow us to gain a better understanding of how these gross job flows relate to the business cycle. In particular, do firms engage in more restructuring during recessions, perhaps because it is a time when the opportunity cost of doing so is relatively low?

[9] This table excludes multi-plant firms with only one manufacturing plant because these firms cannot exhibit job reallocation between plants by definition.

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Table 4: Average Gross Job Flows by Firm, by Excess Reallocation Category, 1963 to 1992

Firm Excess Reallocation	Total Between Plants (%)					Employment Share (%)
	n	c	d	r	x	
None	38.7	50.1	12.3	63.2	0	3.3
Very Low	6.9	19.4	12.6	32.0	3.1	7.4
Moderately Low	1.6	18.9	17.3	36.2	9.4	14.2
Average	-1.6	18.1	19.7	37.8	17.5	34.4
Moderately High	-1.1	23.7	24.7	48.4	28.9	33.5
Very High	2.6	36.8	34.2	71.1	59.0	6.9

NOTES: Job flows are expressed as a percent of employment size (z). n is net employment growth; c is creation; d is destruction; r is reallocation; and x is excess reallocation. Data are for multi-plant firms with at least two manufacturing plants only. Categories are from the quintiles of the time-series cross-section distribution of x_{ft}; None is $x_{ft} = 0$. All flow rates are time-series averages of aggregate rates except for x, which is the time-series average of firm-level rates. SOURCE: Authors' tabulations from the Longitudinal Research Database (LRD).

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