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by Yoonsoo Lee

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Relocation Patterns in U.S. Manufacturing

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This paper summarizes relocation patterns in the U.S. manufacturing industry over the period 1972-1992, using plant- and firm-level data from the U.S. Census of Manufactures. This study contributes to the existing literature on firm dynamics by distinguishing entry due to relocation from entry by *new* firms, and exit due to relocation from *permanent* exit. In contrast to previous studies which report that entering plants experience relatively lower productivity, I find that some entering plants—specifically, those that are not new but merely relocated—have higher productivity. I also find a pattern of relocation that suggests that plants tend to be relocated to areas that are becoming new centers for the industry; namely, plants are moved out of areas in which the industry is heavily concentrated to areas where it is not, but these areas also have higher employment growth rates than other areas.

Keywords: Entry, exit, relocation
JEL Codes: D2, L2, R3

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1 Introduction

Firms regularly reorganize in order to optimally respond to changing economic conditions. In the short run, a firm expands and contracts its activities and the number of workers it employs. Some radical changes in the environment, however, may lead a firm to shut down the plant and start over in a new space. While this process of relocation can cause dramatic shifts in activity and employment at the regional level, as well as at the firm level, very little is known about actual patterns of relocation in the U.S. economy. I address this omission by providing summary measures of the patterns of location changes in U.S. manufacturing industries over the period from 1972 to 1992.

Geroski (1995), Sutton (1997), and Caves (1998) provide summaries of theoretical and empirical research on industry dynamics in the field of industrial organization. Much of this existing research, however, has focused on the entry, growth, and exit of new firms while ignoring the possibility of an incumbent plant changing its location. While Holmes and Stevens (2004) document the way in which spatial distribution of manufacturing activity in the U.S. has changed over time, research to date provides only a very limited understanding of the role of individual firms in the geographic shift of manufacturing activity.

So far, research on relocation has focused mainly on the urban economic aspects of the decision to relocate, using relatively small samples from manufacturing or from small geographic regions (Burns, 1977; Erickson and Wasylenko, 1980; Schmenner, 1980, 1982). Compared to previous research, the present study provides broader evidence on the patterns of plant relocations and their consequences for the performance of manufacturing firms. This study employs confidential data from the U.S. Bureau of the Census, which covers the universe of manufacturing establishments present in the country. Using individual plant and firm level data collected in the last five Censuses of Manufactures from the Longitudinal Research Database (LRD), I identify and measure relocations in US manufacturing between 1972 and 1992. In this paper, I focus on the decision of a multi-unit firm to relocate one of its plants, the case in which an existing firm shifts its production processes from one location to

another, by opening a new plant that produces the same product, *i.e*. in the same four-digit industry. I identify relocated plants and compare them with *de novo* entrants, incumbent plants, and exiting plants in the given industry.

Section 2 presents an overview of the data set and constructs measures of entry, exit, and relocation. The contribution of this study to the existing literature on industrial organization is that it distinguishes entry due to relocation from entry by new firms, and exit due to relocation from permanent exit, assessing the relative importance of entry, relocation, and exit in the industry, in terms of both numbers and size.

Section 3 summarizes empirical findings on plant entry, exit, and relocation. I report the average rates of entry, relocation, and exit, their market shares, along with the relative sizes of entrants, relocated plants, and exiting plants across four-digit industries for each five-year period between census years. Over a typical five-year period, I find more than nine percent of closed multi-unit plants are relocated. For every 100 new entrants starting operation over a five-year period, more than 10 plants turn out to be relocated from other counties. The substantial variation in relocation rates, as well as in entry and exit rates, suggests that industry-specific factors play an important role in determining relocation patterns.

Section 4 presents an examination of the characteristics of relocating firms and relocated plants, in comparison to non-relocating firms and plants, as a means of assessing the patterns of relocation. I use a simple probit model to examine how these plant and location specific factors affect a firm's decisions concerning plant relocation. In general, I find that relocated plants are larger and more productive, as well as more capital and skill intensive, than either *de novo* entrants or permanently closed plants. In contrast to the predictions from previous research on the productivity of entrants and exiting plants, this study discovers that the average labor productivity of relocated plants is higher than that of non-relocated plants. This suggests that the researcher may need to treat relocated plants differently than *de novo* entrants or permanently exiting plants when analyzing the effects of entry and exit on productivity or employment growth. Examining productivity changes between new and old plants belonging

to the same firm reveals new evidence supporting the vintage capital model (Cooley, T., Greenwood, J. and Yorukoglu, 1997; Campbell, 1998). In general, researchers have found relatively lower productivity among exiting plants, which is consistent with the prediction of the model. However the findings of previous studies, contending that new plants do not enter with higher productivity seems to contradict the model (Bartelsman and Doms, 2000). A caveat of these studies is that they did not clearly distinguish the new plants of existing firms (e.g., destination plants in this study) from the new plants of new firms. Considering the impact of selection and learning on the productivity growth of new plants (Jovanovic, 1982), it might not be easy to identify the effect of new technology from the observed productivity of new plants. By comparing the productivity levels of new plants to those of old plants within a firm, this study is in a position to rule out the firm-specific, selection effects on the plant-level productivity. The productivity of new, relocated plants is not only higher than that of old plants in the firm, but also higher than that of other non-relocated plants in the industry. This finding suggests that the latest vintage of technology may be embodied in a new plant, driving the productivity growth of the economy.

Other plant, firm, and location characteristics— including age, employment, output share, growth rate, agglomeration, wage, business tax rate, and unionization— are examined here in more detail, in order to illuminate how these characteristics determine which plants the firm chooses to relocate. The majority of previous research has focused on factors affecting the location choices of new businesses or expansions; relatively little is known about the geographic factors that influence plant turnover and relocations decisions. While plants have been less likely to relocate if they were in a state with a higher unionization rate, they have tended to choose a state with a lower unionization rate when they relocate. However, I do not find statistically significant effects for energy prices, the tax rate, or the capital and skill endowments in the county. I find that a plant is more likely to relocate if it is located in a county with a higher concentration in the same industry. The finding of a relatively lower

concentration ratio but higher growth rates in the concentration ratio for the new location suggests that plants are relocated from an old to a new 'center' for the industry.

2 Measuring plant relocation with Census of Manufactures data

In this section, I define relocation and discuss possible issues that may occur in identifying relocation. Following Dunne, Roberts, and Samuelson (1988), I construct summary measures of entry, relocation, and exit, as well as their sizes relative to those of other firms in the 4-digit SIC industry. Previous research focusing on entry and exit has ignored the possibility that plants can be reopened (relocated) after shutting down. In this study, I distinguish between the entry due to relocation and the entry of *de novo* plants— new plants, which are not merely relocated incumbent plants—, as well as between the exit due to relocation and *permanent* exit— the shutting down of a plant without relocating its production processes to any new plant.

2.1 Data

The plant-level data used in this study are taken from the Census of Manufactures (CM) maintained by the Center for Economic Studies (CES) at the U.S. Bureau of the Census.[1] The CM contains data on the output of individual manufacturing establishments, along with detailed information on the factors of production and costs, such as the levels of capital, labor, energy, and materials used as input. An important feature of the CM is its plant classification and identification information, which includes firm affiliation, location, product, industry, and various status codes identifying birth, death, and ownership changes. These identifying codes— permanent plant number (ppn) or firm ID— are used in developing the longitudinal linkages of individual plants or firms.

[1] The Longitudinal Research Database (LRD) is constructed from the Census of Manufactures (CM) and the Annual Survey of Manufactures (ASM).

In this study, I use five Censuses of Manufactures (1972, 1977, 1982, 1987 and 1992) on 300,000-400,000 plants to develop measures of relocation for each establishment. Since the CM covers the universe of manufacturing plants in the U.S., the measurement of entry and exit is likely to be more reliable when full CM files are used. Because the CM is only taken at five-year intervals, however, it is not possible to observe plants that enter and also exit or relocate between census years.[2]

2.2 Identifying Relocation

I define *relocation* as a firm's geographic shift of production processes. In order to distinguish *relocation* from *expansion*, consider the example of a firm with a plant in New Jersey, which opens a new plant in Pennsylvania producing the same product (four-digit industry classification) as that produced in the previously existing plant in New Jersey. This process can occur either when a firm expands into a new geographic market by opening a branch plant or when changes in the economic environment results in the movement of an establishment to a new location. In the first case, the firm will keep the production in the original location; however, in the second case, defined here as relocation, it will probably shut down or contract the original plant. Since most studies in the literature deal with the second case, I focus mainly on the complete relocation of a production process from one location to another.

I have labeled previously existing plants in the original location— one that was operated by the same firm before the firm shifted production processes— as an *origin* plant and a new plant after relocation as a *destination* plant. I have labeled previously existing plants in the original location— that was operated by the same firm before the firm shifted production process— as an *origin* plant and a new plant after relocation as a *destination* plant. Relocation can thus be defined as an action by an existing firm that meets both conditions, A and B:

[2] Entry, exit, and relocation rates across adjoining census years may underestimate the actual number of entries, exits, and relocations. Including the ASM does not fully solve this problem because the data are only collected for a subsample of the establishments represented in the CM during non-census years. For a more complete description of the LRD, see McGuckin and Pascoe (1988), along with Davis, Haltiwanger, and Schuh (1996).

A. A firm opens a new plant in a new and distant location—neither in the original county nor adjacent to it—and produces the same product (4-digit industry) as an origin plant produced.[3]

For a new plant to be considered a relocated plant, it should be located in a "new location" away from the "original location" of the plant. In this paper, a new plant is considered relocated only when it is moved out of the *neighborhood* of the plant, which is defined as the county that the original plant is in, as well as all neighboring counties.[4] Moving production processes within the neighborhood of the plant is not counted as relocation since it is not likely to affect workers in the origin plant or the local labor market. In order to focus on relocations that would affect the workers in the plant, I have excluded these short distance movers from this paper.

B. The origin plant of the same firm is replaced by the new plant and shuts down.

If the origin plant of a firm keeps producing the same product, the production processes in a new location will be considered a simple expansion to a new geographic market. A timing issue concerning relocation may arise if plants are in the middle of the relocation process near a census year. In a state of transition, prior to the complete shift of production, a firm may manufacture its product at both the origin plant and the destination plant. This occurrence is particularly problematic since the Census of Manufactures is only taken at five-year intervals;

[3] When a firm relocates an existing plant, that firm may build a new plant or buy an existing plant from other firms. To identify relocation by plant ownership changes, one needs to distinguish between plant that changed ownership and plants that simply changed firm ID. The feasibility of Identifying plant ownership changes using the information in the CM, however, turned out to be very limited. In this paper, I examine relocations by new plant openings only. See Nguyen (1998) for more detail on identifying plant ownership changes.

[4] Following Holmes (1999), throughout this paper, I define the neighborhood of a plant as counties that are located within 50 miles of the county that the plant is located in as well as the county that the plant is in. The distance between counties is calculated based on the longitude and latitude of the county center. Given that most workers in the U.S. commute less than 45 minutes, relocating a plant more than 50 miles away will affect most workers involved.

therefore, relocation is accordingly identified over the five-year period between pairs of census years. For example, if a firm opened a new plant in 1976 and kept the original plant operating until it completely shifted the production process, finally shutting down the original plant in 1978, the data would indicate a plant birth in the 1977 Census and a plant death in the 1982 Census. In such a case, I measure relocation based on the census year when a new destination plant opens. To distinguish relocation as distinct from a simple expansion, I classify a shift of production processes as relocation only when a previously existing plant reduced total employment in the original location by more than 50% in the next census year.[5]

Some limitations on the definition

The measures of relocation adopted in this paper have some limitations. Specifically, relocation may be underestimated in certain instances. First, if a reincorporating firm—one that shuts down all of its plants in a given location and resumes operations in newly built plants in a new state—files for a new Employer Identification Number (EIN) and its plants are assigned a new firm ID, it would not be identified in the CM as a relocation, leading to a possible undercounting. The possibility of this scenario occurring is one of the problems with the CM, and consequently the identification of the births and deaths of firms may not always be accurate.[6] Second, because the CM covers only plants in the U.S., and cannot account for plants that relocate outside the U.S., it may underestimate relocation rates and overestimate exit rates. Third, there may not always be a one-to-one match between the origin plants and the destination plants. When there are more than two destination plants associated with one origin plant, I take the one closest to the origin plant to be the destination plant. I proceed on

[5] The probability that a plant will shut down in the next census, given that it reduced total employment more than 50%, is well over .5. Other criteria will also be used to see if the results are robust. The criteria would not affect the relocation rates measured in Section 2 and 3, in which I only consider relocations after shutting down origin plants to avoid relocation measures depending on the criteria.

[6] This error becomes particularly problematic for single unit plants. Without a firm ID assigned to them, it is almost impossible to keep track of single unit establishments when they change geographic locations because plant permanent number (*ppn*: unique identifying code assigned to a physical location of the individual establishment) may or may not change as they change their county or state locations.

the assumption that a firm is most likely to move its operation to the closest among its new plants, there being a certain inertia binding it to its original location and labor force and predisposing it against moving further than is strictly necessary. This may cause relocation to be underestimated, as illustrated by the following example.

Let's assume that there exists a firm that has two plants producing in SIC 2011, one in Rochester, NY and the other in Pittsburgh, PA. The firm proceeds to shut down both of these plants and opens three new ones that produce the same product in Rochester, NY, Cleveland, OH, and San Francisco, CA. Since the destination plant is that closest to the original, as discussed above, the new plant in Rochester would be the destination plant from the origin plant in that city, and the new plant in Cleveland the destination plant from the origin plant in Pittsburgh. However, since the former is a case of movement within the same county, it would not actually be considered a relocation, while the latter would. Unless I am further able to investigate other information (possibly a 5- or 7-digit product code) to verify that that the origin plant in Rochester, NY was actually relocated to Cleveland, OH or San Francisco, CA, it would not be counted as an instance of relocation. Measurement error may occur in this case, particularly if the firm actually moved its operation from Rochester to San Francisco.

2.3 Measuring entry, relocation, and exit

Throughout this paper, entry, relocation, and exit are measured as plant opening or closing—entry into or exit from a local labor market or an industry. Entry is defined as the opening of an establishment that was not operating in a location in the previous censuses ($t \leq t-5$), but is operating in the current census. Exit is defined as the closing of an establishment that was operating in a location in the previous census ($t-5$), but is not operating in the current (t) and later censuses ($t \geq t+5$).[7] To examine which industries have experienced frequent relocations

[7] Note that this measure is different from entry and exit measures in industry, where definition of entry and exit includes entry and exit of an existing (continuing) establishment by changing the mix of products they produce between two census years as well. Since I am interested in firm's location choice and the impact of plant turnover

relative to others, I construct summary measures of entry, exit, and relocation.[8] First, I define a set of variables to assess overall measures of plants (and firms) that enter, relocate, or exit in each industry in the following Definition Table:

Definition Table.

Variable	Definition
Entry Rates (opening plants)	
$Entry\ Rate_i(t)$	$\frac{\text{the number of opening plants in industry i}}{\text{the total number of plants in industry i in census year t}}$
$Relocation\ Rate\ New\ Locale_i(t)$	$\frac{\text{the number of relocated (destination) plants in new locale}}{\text{the total number of plants in industry i in census year t}}$
$Ratio\ of\ Relocation\ to\ Entry_i(t)$	$\frac{\text{the number of relocated (destination) plants in new locale}}{\text{the number of opening plants in industry i}}$
Exit Rates (closing plants)	
$Exit\ Rate_i(t-5)$	$\frac{\text{the number of closing plants in industry i}}{\text{the total number of plants in industry i in census year t - 5}}$
$Relocation\ Rate\ Old\ Locale_i(t-5)$	$\frac{\text{the number of relocated (origin) plants in old locale}}{\text{the total number of plants in industry i in census year t - 5}}$
$Ratio\ of\ Relocation\ to\ Exit_i(t-5)$	$\frac{\text{the number of relocated (origin) plants in old locale}}{\text{the number of closing plants in industry i}}$

Note that there are four different rates measuring relocation. *Relocation Rate New Locale$_i$(t)* and *Relocation Rate Old Locale$_i$(t – 5)*) respectively measure how many plants opened or closed due to relocations among the total number of plants. The other two relocation rates (*Ratio of Relocation to Entry$_i$(t – 5)* or *Ratio of Relocation to Exit$_i$(t)*) measure the fraction of original (or relocated) plants among opening (or closing) plants. Since the number of closing plants (origin plants) and opening plants (destination plants) may differ for a firm, *Relocation Rate New Locale$_i$* and *Relocation Rate Old*

on the location involved, I exclude the entry and exit of continuing plants and focus on the entry and exit caused by plant openings and closings.

[8] While these measures are defined for an industry in this paper, the same measures can be defined for a state. Please see Lee (2005) for measures at the state level.

$Locale_i$ are not always equal.

Market shares

To examine the relative importance of entry, relocation, and exit in industry output, market shares of plants that enter, relocate (into new locale or from old locale), or exit are calculated between each pair of census years:

$$Entry\ Market\ Share_i(t) = \frac{\text{total output of entering plants in industry } i \text{ in census year } t}{\text{total output of all plants in industry } i \text{ in census year } t}$$

$$Relocation\ New\ Locale\ Market\ Share_i(t) = \frac{\text{total output of relocated (destination) plants in industry } i \text{ in census year } t}{\text{total output of all plants in industry } i \text{ in census year } t}$$

Market shares of exiting plants (*Exit Market Share*$_i$(*t-5*) and *Relocation Old Locale Market Share*$_i$(*t-5*)) are calculated in a manner corresponding to the calculation of market shares for entrants. These measures summarize the contribution of plants in each category—entry, relocation, and exit—to industry output.

Relative Size

To assess the relative importance of origin and destination plants in the labor market, I measure the relative size of origin and destination plants compared to existing plants in the industry. For entering plants and destination plants, I examine the average size of entrants and destination plants in new locales relative to existing plants in that locale (*Entrant Relative Size* and *Relocation New Locale Relative Size*), as well as the average size of destination plants (in new locales) relative to other non-relocated entrants (*Relocation New Locale Relative Size compared to Entrants*). For example, the average size of entrants in a new locale relative to existing plants is defined as,

$$Entrant\ Relative\ Size_i(t) = \frac{Average\ Size\ of\ \ Entrants_i(t)}{Average\ Size\ of\ \ Incumbents_i(t)},$$

where *Average Size of Entrants* is calculated by dividing the number of employees in entering plants by the number of entering plants and *Average Size of Incumbents* is calculated by dividing the number of employees in continuing plants by the number of continuing plants in the industry. [9]

For exiting plants and destination plants, I examine the average size of exiting plants and origin plants relative to that of continuing plants (*Exiting plant Relative Size* and *Relocation Old Locale Relative Size*), and the average size of origin plants relative to other non-relocated closing plants (*Relocation Old Locale Relative Size compared to Exiting plants*). Relative size measures for exiting plants are constructed in a manner corresponding to the construction of relative size measures for entering plants as described above. These measures allow us to compare the average size of i) entrants and existing plants, ii) relocated plants and existing plants, iii) relocated plants and other non-relocated entrants, iv) exiting plants and continuing plants, v) origin plants and continuing plants, and vi) origin plants and other non-relocated exiting plants.

3 Entry, Relocation, and Exit Statistics across Industries

I describe relocation patterns compared to entry and exit patterns using the measures defined in the previous section. Entry, relocation, and exit are measured across four-digit industries to provide information on patterns of relocation by industry.[10] Since the Census of Manufactures is only taken at five-year intervals, estimates of entry, relocation, and exit rates are obtained for each five-year period. Nationwide, 17,648 plants out of 71,734 multi-unit plants in

[9] Relative size measures of destination plants are defined as,

$$Relocation\ \ New\ Locale\ \ Relative\ \ Size = \frac{Average\ \ Size\ of\ \ Relocated\ \ (Destinati\ \ on)\ \ Plants}{Average\ \ Size\ of\ \ Continuing\ \ \ Plants}$$

$$Relocation\ \ New\ Locale\ \ Relative\ \ Size\ compared\ \ to\ Entrants$$

$$= \frac{Average\ \ Size\ of\ \ Relocated\ \ (Destinati\ on)\ Plants}{Average\ \ Size\ of\ \ (de\ novo\ )\ Entrants}.$$

[10] In this section, unless I specify otherwise, I only count relocations after completely shutting down origin plants in old locales, to avoid the variation of relocation measures as the criteria of contraction rate (50%) in origin plants changes.

operation in the sample year 1977 shut down before 1982. During the same time period, 12 percent of these closed plants were relocated to non-neighboring counties, located more than 50 miles away from the county where the closed plants were originally located.[11] Among 14,442 multi-unit plants that started operation during the same time period, 1,841 plant openings (12% of multi-unit plant openings) were actually relocations from other non-neighboring counties. Over the sample period of 1972-1992, I find that about the same number of plants were relocated during each five-year period.

Table 1 reports average levels of entry, relocation, and exit variables across four-digit industries in the manufacturing sector between each pair of census years. Since it is not possible to identify relocations of single unit plants in the data, I mainly focus on relocations among multi-unit plants. I present the variables separately for two different groups of plants—single unit plants and multi-unit plants. The first group consists of all establishments present in the Census of Manufactures in the year of interest. The second group excludes all single unit plants and plants with administrative records.[12]

Similar patterns have been observed for entry and exit variables as documented in the previous studies on entry and exit (e.g., Dunne, Roberts, and Samuelson, 1988). The top half of Table 1 presents variables for entrants, which include destination plants in new locales. About 20% of multi-unit plants (32% of all plants) operating in each industry in each census year are new plants that were not operating in the previous census year. I find that destination plants— newly opened plants to which firms have shifted production processes from other closed plants— account for 2 percent of all multi-unit manufacturing plants present in each census year. These destination plants, on average, explain 9.6% of plant openings in each industry in each census year. The average ratio of relocation to entry varies from .094 to .105

[11] If I include plants relocated counties within 50 miles, almost 20% of closed plants are relocated.
[12] I exclude administrative records as well in the second group to avoid measurement errors resulting from errors in matching small plants. Most data for these small plants are imputed from other government sources, rather than surveyed directly, and many researchers using the LRD prefer separately reporting results excluding these small plants. Throughout this paper, I exclude plants with administrative records when I report results from the sample of multi-unit plants.

across census years. These destination plants are relatively small plants and are responsible for less than 2% of industry's output. These plants on average employ about half of the workers incumbent plants employ. Compared to other non-relocated new plants, however, destination plants have more than 10% bigger work forces.

The exit rates are similar to the entry rates. The bottom half of the table presents variables for exiting plants, including both permanent shutdowns and origin plants (relocated plants in old locales of which production processes are relocated to new plants in other locations after shutting down). On average across four five-year periods, 26% of multi-unit plants (32% of all plants) shut down in each industry. I find 6 to 10 percent of these closed plants are relocated to other non-neighboring counties across census years. Origin plants in old locales, just like destination plants in new locales, are also small plants. They are responsible for almost the same fraction of industry output as destination plants in new locales. Origin plants on average employ about half of the workers a continuing plant would employ.

One of the robust patterns found in previous empirical studies of entry and exit is substantial inter-industry variation in both entry and exit rates (Dunne, Roberts, and Samuelson, 1988; Evans and Siegfried, 1992). As a source for the examination of the diversities in entry, relocation, and exit patterns across industries, Table 2 provides average statistics of entry, relocation, and exit variables over the four time-period observations for all of the four-digit industries within each of the two-digit SIC sectors. Since I focus on relocations of multi-unit plants, I present results from the sample of multi-unit plants only.

The top half of the table presents variables for entrants, which are new plants and destination plants. The first and second column in the first panel reports average entry rates and relocation rates in new locales across industries within a two-digit sector. According to the third column, more than 10 percent of multi-unit plant openings are actually from relocation processes of existing firms in half of the twenty two-digit sectors. The average relocation rates among opening plants across industries within a two-digit sector vary from a low of .051 in primary metal to a high of .150 in tobacco. The variation across four-digit

industries within a sector is noteworthy. Most of the sectors have four-digit industries with zero relocation rates, while almost all sectors also have industries with high relocation-rates where more than a quarter of new plants are relocated plants of incumbent firms.

The market shares of entrants and destination plants (the fourth and fifth columns) suggest that these opening plants have a small impact on industry output. In general, they tend to have smaller work forces compared to incumbents even though, in some industries, destination plants provide more jobs than incumbents within the industry.

The second panel at the bottom of Table 2 presents variables for exiting plants, which are permanently closed plants or origin plants. Earlier studies on firm entry and exit have documented similarities between average entry and exit measures across two-digit sectors. Similar patterns are observed for entry and exit due to relocations in Table 2 as well. The simple correlation of relocation rates in new locale (second column of the top panel) and relocation rates in old locale (second column of the bottom panel) in the 20 sectors is .89. The simple correlation of average market shares of destination plants and origin plants (relocated plants in old locale) is .92 while the simple correlation of average of relative size of destination plants and origin plants is only .09.

The third column provides information on how many plant closings are actually relocations. Percentages of closed plants that are relocated to other non-neighboring counties by the same firms vary from a low of 2.8% in textiles to a high of 13.7% in petroleum. The variation across four-digit industries within a sector is substantial in exit variables as well. Virtually all sectors have four-digit industries where no plants are relocated after they are closed, while most of the 20 sectors have four-digit industries where more than 20% of closed plants are relocated.

Finally, it is worthwhile to note that the sectors with high entry or exit rates are not always sectors that have high ratios of relocation to entry or exit. For example, the average entry rates in the instruments industry are the second highest, next to furniture, but only 8.7% of the new plants are destination plants (the sixth lowest rate). While the average exit rates in

the apparel, leather, and miscellaneous industries have the three highest among those of the 20 sectors, the average ratios of relocation to exit for these sectors are among the lowest. There seem to be two possible explanations for the substantial differences in relocation rates across industries. First, for the firms in the industries with zero or very low relocation rates, it is possible that there have been no changes in geographic market conditions within the U.S. (neither in demands for final goods nor in factor supplies), dramatic enough to trigger the relocation of a plant.[13] An alternative explanation, which seems more plausible, is that there exists substantial variation in sunk costs of relocation across industries, which also differs from the sunk costs of entry. Regardless of the sunk costs a firm pays entering the industry, which may or may not be tied to a geographic location, substantial differences in the sunk costs of relocation— sunk investments in human and physical capital which are tied to a geographic location and can be lost as a plant is relocated— may drive the disparity of relocation rates across industries. Further study is needed to isolate the industry specific characteristics that give rise to these differences in relocation activity across industries.

4 Patterns of relocations—relocation decisions of firms

In this section, I investigate four aspects of plants' relocation decisions in order to assess patterns of relocation. First, I study manufacturing firms as decision makers in plant relocations. I examine the characteristics of those manufacturing firms that relocate plants, comparing them to other manufacturing firms. Second, in order to examine what types of plants are relocated, I describe *origin plant*s before relocation, comparing them to plants that remain at their initial location. Third, I examine changes in the characteristics of relocated plants, such as employment, costs, and policies after relocation. Lastly, using a probit regression, I investigate the factors affecting plant relocation decisions such as the age, size,

[13] I am not excluding the possibility that firms in these industries may have relocated plants to or from other countries.

factor intensity, tax, unionization, and agglomeration of the location. I describe plant and firm level variables of interest, as well as variables describing the characteristics of the origin and destination locations in the appendix.

4.1 Characteristics of relocating firms

I find that firms relocating plants across geographic areas tend to be very large conglomerates operating in a number of four-digit industries. On average, relocating firms operate in about 6 four-digit industries while non-relocating firms operate in 1.6 four-digit industries. Relocating firms hire about 15 times more workers and produce about 19 times more in total value of shipments than non-relocating firms.

Given the huge differences in the number of industries represented as well as differences in size between relocating and non-relocating firms, it may be more desirable to describe the characteristics of relocating firms at a finer level, say in terms of the "line-of-business" within an industry. For example, a large conglomerate firm operating in more than 10 four-digit industries may relocate only a couple of plants in one four-digit industry. Even within the same firm, the business segment that relocates a plant may be quite different from others that do not relocate a plant under their control. I describe the size and growth of relocating firms compared to non-relocating firms at the *company* level, *i.e*. the four-digit industry line-of-business level (or segment of a firm operating in a single four-digit industry).[14] Table 3 presents the means for variables relating to several of the firms' characteristics, as constructed from the CM. These statistics are reported separately for relocating and for non-relocating

[14] A large conglomerate firm operating in 10 four-digit industries may consist of more than two different organizations of separated business lines, each with a different scope and scale of managerial controls. The Census Bureau defines a company as "a group of individual establishment under common ownership all producing the same basic output." Sometimes referred to as a "line-of-business," it can be considered as "all establishments of the same firm producing the same product." My definition of a company – a line-of-business that consists of all establishments of the same firm producing in the same four-digit industry – is thus broader than that of the Census Bureau. However, since I consider plants that produce in the same four-digit industry as virtually the same plants, my definition of company should work for the purpose of this section. Throughout this paper, I call a company that relocates one of its plants a "relocating firm" and one that maintains all its plants in the same location over time a "non-relocating firm."

firms, along with the *t* statistics for the null hypothesis, *i.e.* that the means are equal in the two groups.[15]

As can be seen from Table 3, relocating firms employ more workers and produce more output, specifically about 5 times more workers and about 6 times more in total value of shipments than non-relocating firms. On average, relocating firms have 5.5 more plants than non-relocating firms. The average size of the plants is also bigger for plants operated by relocating firms. Plants of relocating firms hire about 30% more workers and produce about 65% more value than plants owned by non-relocating firms. While relocating firms are more productive than non-relocating firms, these differences are not statistically significant.

Compared to non-relocating firms, relocating firms show slower growth rates in most of the firm level variables— the four labor productivity measures, along with six size variables, namely i) employment, ii) output, iii) number of plants, iv) number of states a firm operates in, v) average plant employment, and vi) average plant output.[16, 17] However, since larger firms are known to have lower growth rates and lower labor productivity, it may be necessary to compare growth rates and labor productivity measures within the same size class before reaching a conclusion about the productivity and growth rates of relocating firms. When I classify firms into 8 size groups based on their total employment, and compare growth rates between relocating firms and non-relocating firms within each size group, I find that relocating firms still show lower growth rates in firm level size variables—employment, output, number

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[15] Most of the results are the same when compared at a more aggregated level of organization – firm or enterprise level that includes all manufacturing plants owned by a single party – than the company level, except for the fact that labor productivity measures for relocating firms are lower than they are for non-relocating firms. Compared within the same size class, however, relocating firms are more productive than non-relocating firms, and growth rates in measures of productivity are also higher for relocating firms.

[16] Growth rate of variable X is defined as $\frac{X_t - X_{t-5}}{(X_t + X_{t-5})/2}$. This measure is an alternative to the traditional way of taking the difference of the natural logarithms of the year *t* and *t-5* levels. This measure of growth ranges from -2.0 (when employment goes from positive in year *t-5* to zero in *t*) to +2.0 (when employment is zero in *t-5* and positive in *t*). This measure allows the sample to contain observations on "births" and "deaths" and to describe expansion and contraction symmetrically (Davis, Haltiwanger, and Schuh 1996).

[17] The four productivity measures are output per worker, value added per worker, output per worker relative to the four-digit industry average, and value added per worker relative to the four-digit industry average. See the appendix for details.

of plants, number of states, and average plant size measured in employment and output.[18] However, firm level labor productivity measures and growth rates in labor productivity measures are higher for relocating firms within the same size class, and the differences are statistically significant at 1% for 5 of the 8 size groups.

An interesting fact regarding the growth rates of relocating firms is revealed when growth rates of expanding firms are compared with those of contracting firms. Based on the firms' growth rates in total employment, I classify firms into two groups: expanding firms (positive employment growth rates) and contracting firms (negative employment growth rates). In both groups, the growth rates in size variables of relocating firms— employment, output, number of plants and states, and average plant size— are lower than those of non-relocating firms within the same group. This confirms the conclusion from previous comparisons within size groups that relocating firms tends to be growing slowly in terms of their size. Regarding productivity growth, however, relocating firms seem as a group to show relatively moderate growth in productivity, growing faster than contracting firms but slower than expanding firms. Compared to non-relocating firms within the group of growing firms, relocating firms' growth rates for the six productivity measures are lower than those for non-relocating firms. When compared to non-relocating firms among contracting firms, however, relocating firms show higher productivity growth rates.

Table 3 also reports the five-year leads of growth rates for relocating firms and non-relocating firms, in order to provide information regarding the performances of relocating firms *subsequent to* relocation. Both relocating firms and non-relocating firms show negative growth in firm size measures, but relocating firms show less contraction than non-relocating

[18] All manufacturing companies are classified into eight firm size classes according to total employees in the four-digit industry line-of-business:

	1	2	3	4	5	6	7	8
Total employees	0 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 to 999	1000 or more

firms.[19] Firm level productivity increases for relocating firms after relocation, while non-relocating firms experience negative productivity growth. This finding suggests that reorganizations of firms via relocations may have the effect of enhancing the firm's organizational efficiency.

To summarize, relocating firms are more efficient firms, which grow slowly both in their scales (employment and output) and in organizational scopes (number of plants and number of states they operate in). These results are robust when growth rates and leads of growth rates are measured over a 10-year period.

4.2. Characteristics of origin plants before relocation

In the previous section, I explained the characteristics of relocating firms using firm level data constructed from the CM. In this section, using the plant level data, I describe the characteristics of origin plants—plants in their old locales prior to relocation—to determine what types of plants are relocated. As in the previous section, I present in Table 4 the means for a number of variables describing plant specific characteristics, along with *t* statistics for the null hypothesis, i.e. that the means are equal for the two groups—*origin* plants and *non-origin* plants (defined as all plants other than origin plants in the sample).

Origin plants, on average, hire 150 workers and produce value totaling 20 million dollars. On average, a county loses about 100 jobs that pay $9.25 per hour (in 1987 constant dollars) every time a plant shuts down to be relocated to another part of the country. Compared to other non-relocated plants, origin plants have smaller work forces and output. Origin plants equip individual workers with more capital. When non-production worker wage share is used as a measure of skill-intensity (Dunne, Haltiwanger, and Troske, 1997), origin plants have higher skill intensities than non-origin plants. Further more their labor

[19] Firms that exit in the next census year drive the lead of growth rates toward negative values. One needs caution to interpret the results regarding the growth rates and the leads of growth rates, because they may be driven by entry and exit of firms rather than firm specific characteristics. Because the growth rates of entering firms are 2 and the leads of growth rates of exiting firms are -2 by construction (see Appendix), entry biases growth rates positively (toward 2) and exit biases leads of growth rates negatively (toward –2).

productivity is higher than that of non-origin plants. Considering that both theoretical and empirical studies find that exiting plants have lower productivity than incumbents, the fact that origin plants have higher labor productivity is noteworthy. Differences in behavior of origin plants as compared to other closed plants imply that one may need to treat these groups differently than one would permanently shutting down plants when analyzing the effects of entry and exit.

A caveat concerning direct comparison of the means of origin plants and non-origin plants is that origin plants have some typical characteristics of closed or contracting plants, as origin plants, by definition are closed plants or contracting plants that reduced total employment by at least 50%. In previous work using the LRD, Dunne, Roberts, and Samuelson (1988), Dunne and Roberts (1990), and Bernard and Jensen (2002) find that young and small firms are more likely to exit. To control for the characteristics of closing or contracting plants, I also compare origin plants to a subset of non-origin plants that have closed or contracted by more than 50%. When I compare origin plants to non-origin plants that shut down or contract by more than 50% but are not relocated, I find that origin plants hire 40% more workers and produce almost 80% more in value than non-origin plants. Origin plants are more productive, pay a higher hourly wage, and are less specialized. They show higher growth rates in employment and output than non-origin plants during the same period.

4.3 Characteristics of destination plants and changes after relocation

Section 4.2 provides information about characteristics of origin plants *before* relocation. In this section, I examine the characteristics of destination plants in new locales *after* relocation, and compare them to their origin plants in old locales before relocation.

Characteristics of destination plants (relocated plants in new locales)

The results in Section 3 concerning the average of entry and relocation variables imply that the average size of destination plants is smaller than the average size of incumbent plants, but

larger than the average size of other non-relocated entrants. In order to examine the characteristics of destination plants in more detail, I present in Table 5 the mean characteristics of destination plants and non-destination plants, including all plants in the sample, with the exception of destination plants. I find that destination plants are smaller in total employment, total output, and market share within the plant's four-digit industry in comparison to non-destination plants. On average, destination plants are less than half the average size of non-destination plants. However, these size differences are mainly due to the fact that destination plants are by definition newly opened plants. Compared to new plants that are not relocated, destination plants are larger in all of these three size measures. Destination plants in new locales, like origin plants in old locales, are more capital and skill intensive.

What is surprising is that the average labor productivity of destination plants is higher than that of non-destination plants, more than 80% of which are continuing plants. This finding contrasts with those reported in studies by Bartelsman and Dhrymes (1992) and Olley and Pakes (1996), who find that new entrants tend to have lower productivity. Combined with the previous finding that origin plants (i.e., relocated plants in old locales) are more productive than other continuing plants, the finding of this research suggests that something other than plant level characteristics, e.g., managerial control or organizational capital of the parent firm—plays an important role in the performance of the plant.

Changes after relocation

One straightforward way to discover the factors driving plant relocation is to directly compare changes that occur in destination plants in their new locales with equivalent characteristics of their origin plants in their old locales. Since relocations usually occur with the expansion or consolidation (contraction) of firms, the number of origin plants and destination plants is not always the same. For almost 70% of all firms that relocated at least one plant, the number of destination plants in new locales is not equal to the number of origin plants. This makes it difficult to directly connect destination plants in new locales with their originals in the old

locales on a plant by plant basis.[20] Since such one-to-one comparisons of destination plants with their corresponding origin plants are not practical, I attempt instead to calculate the mean characteristic variables for destination plants and origin plants for each firm in the same four-digit industry (i.e., the four-digit industry line-of-business) and then compare the means within a firm.

Table 6 reports the means of plant and location characteristic variables across firms, i.e., the four-digit industry lines-of-business. The downsizing of a plant seems to be a phenomenon accompanying relocations. Destination plants are smaller than origin plants either in terms of total employment, total output, or market share. Moreover, plants are more specialized in their primary product after relocation. However, compared to radical decreases in the number of workers, the decreases in output or market shares are rather mild. The relatively smaller output decrease can be explained by increases in labor productivity, accompanied by increases in capital and skill intensity.

A comparison of labor productivity between new and old plants in a given firm reveals new evidence, supporting the vintage capital model. While this model has been used frequently in recent theoretical work (e.g., Cooley, T., Greenwood, J. and Yorukoglu, 1997; Campbell, 1998), evidence from plant level data was not quite consistent with the prediction of this model (Bartelsman and Doms, 2000). The finding of a higher productivity among relocated plants sharply contrasts with the previous findings of relatively lower productivity among entering plants. The higher labor productivity with increased capital stocks observed in relocated plants support the idea that the latest vintage of technology embodied in a new plant may drive the productivity growth of the economy.

Another change of interest is found in the wages paid to employees. Although firms increase labor productivity as much as 9% subsequent to relocation, they pay workers at

[20] By a “firm”, I mean a “company”, or a line-of-business of a firm in the four-digit industry. See Footnote 14 in Section 4.1.

destination plants an average of 4% less than the firms did at origin plants prior to relocation.[21] The increased shares of non-production workers on the firms' total payrolls after relocation suggest that they become more skill intensive. However, results pertaining to increased skill and capital intensities for destination plants must be interpreted with caution. As documented in Bernard and Jensen (2002), U.S. manufacturing industries have substantially increased capital and skill intensities during the 1970s and 1980s. Therefore, increases in capital and skill intensities after relocation may well be a general phenomenon common to all manufacturing plants in the U.S., rather than a specific phenomenon observable only among relocated plants.

Destination plants are located in places with more favorable business conditions. I find that tax rates and union participation rates are significantly lower after relocation.[22] Firms have relocated plants to less concentrated locations; I find employment densities in the neighborhood decrease more than 50% after relocation. However, growth rates of neighborhood employment densities are higher for these new locations, suggesting that firms have moved their relocated plants to growing locations, in terms of agglomeration. This finding suggests that relocating plants may move into locations that are becoming the new centers of the industry.[23]

4.4 Factors affecting relocation— Decision to relocate after plant closing

In order to examine how plant and location specific factors impact on a firm's decision to relocate, I run a probit regression of relocation, given that a plant is shut down. Table 7 presents the estimation results from the probit regressions using data pooled across years for

[21] The reduction in the wages may be, at least in part, due to changes in the workforce. If a firm employs younger workers with less tenure than it did at the previous location, it may pay a lower wage per worker. Information of such worker characteristics is not available in the CM.

[22] Overall union membership rates have declined during the sample period. On average union membership in a state declined by about 2.3% over a 5 year sample period. The decrease of 5.18 percentage observed for relocated plant is bigger than that of the overall trend.

[23] Dumais, Ellison, and Glaeser (2002) document how new plant births, plant expansions, contractions and closures contributes to agglomeration in the U.S. manufacturing.

all plants in the sample. All the regressions include controls for the plant's two-digit SIC industry and year.[24]

If a closed plant had higher labor productivity, it is more likely to be relocated. While a plant with more employees is more likely to be relocated, the probability of relocation is lower if a plant has a higher market share. Regarding the effect of skill intensities, I examine the coefficient of the wage shares of non-production workers and the average hourly wages. The first measure is the ratio of wages paid to non-production workers to total payroll, as in Dunne, Haltiwanger, and Troske (1997). As an alternative measure of skill, I use the average hourly wages paid to production and non-production workers, assuming that a producer will pay higher wages for skilled workers. The effect of skill intensities on the plant relocation is not clear from the regressions. While plants with a higher share of non-production worker wages are more likely to be relocated, the effects of average hourly wage run in the opposite direction. However, interpretation of the coefficient of wage requires a caution since it also reflects the effect of the price of labor that a plant would pay.

A closed plant is more likely to be relocated if it belongs to a larger firm, operating in a number of states, suggesting that relocation would be less costly for such a larger firm. To examine the relationship to other production facilities of the firm, I include two kinds of indicator variables measuring the proximity of nearby plants similar to Dunne, Klimek, and Roberts (2002). The first variable is a dummy variable that indicates whether a plant has another production facility that belongs to the same firm within 100 miles of the plant. The second dummy variable indicates whether a firm has a plant between 100-250 miles away, but not within 100 miles. A plant is less likely to be relocated if there is another production facility that belongs to the same firm within 100 miles of the plant original location. This finding suggests that vertical or horizontal integration with other nearby facilities may play an important role in location decision of a firm.

[24] I present results for probit regressions of exit in the appendix.

The effects of location specific factors on the decision to relocate are reported in the last two columns of Table 7. To examine the effect of agglomeration on the probability of plant relocation, I include two measures of neighborhood employment density in the probit model—within the same four-digit industry or the entire manufacturing industry. The employment density within the same four-digit industry measures the localization or specialization of the industry, which reflects externalities associated with being located close to other producers in the same industry. On the other hand, the employment density of the entire manufacturing industry reflects the extent to which urbanization economies occur when producers from different industries concentrate in the same location (Holmes, 1999; Henderson, 2001; Holmes and Stevens, 2003). While the neighborhood employment density in the same four-digit SIC industry is positively correlated with the probability of relocation, employment density at higher levels of aggregation (i.e., two-digit SIC, or manufacturing as a whole) does not show a significant correlation with the probability of relocation.

Except for the neighborhood employment density within the same four-digit industry and the union participation rate in the state, other location characteristics are not significantly correlated with the probability of relocation. A closed plant is less likely to be relocated in a state with a higher union participation rate, implying a possible role of unions in hindering the relocation of jobs.[25] However, the effects of wages, energy prices, the tax rate, or the capital and skill endowments are not statistically significant.

5. Conclusion

I have analyzed the CM to document the patterns of plant entry, exit, and relocation in U.S. manufacturing industries. By examining the full population of manufacturing establishments present in the national market over the period of 1972-1992, this research provides new evidence on the role of plant relocations in the process of employment growth across states. I

[25] This is not inconsistent with the finding on Table 6. While plants are less likely to relocate if they are in a state with a higher unionization rate, they chose a state with a lower unionization rate when they relocated.

find that plant relocations on average account for 10 percent of the plant turnovers in a given four-digit industry. While relocation rates do not vary much across states over time, they vary substantially across four-digit industries, with no multi-unit plants relocated in a number of industries. Combined with the previous finding of inter-industry differences in entry and exit rates, which is confirmed in this article, these facts suggest the existence of underlying cross-industry differences in demand conditions, technology, or sunken costs that may differ between *de novo* entrants and relocating entrants. Future research identifying the characteristics of industry that drive the disparities in plant turnover and relocation is needed to broaden the knowledge of the behaviors of plants and firms.

One prominent issue regarding firm-level gross job flow is the effect of reorganization on economic growth. Preliminary results indicate that, subsequent to relocation, relocating firms, show higher growth rates in terms of employment and labor productivity than do non-relocating firms. Another important question, which Schuh and Triest (1999) ask, is "whether firms that restructure more … are also firms that grow more in profitability or value" (p. 4). Linking the current data to firm level data, such as S&P COMPUSTAT data, future research may supply an answer to this question.

Another issue regarding firm growth is motivated by observations of the size and productivity of relocated plants. Compared to *de novo* entrants or permanently exiting plants, these plants are found to be larger and more productive. This finding implies that there are some firm specific characteristics such as managerial ability and organizational capital that influence the performance of individual plants. A natural question is then whether, and if so, how much the organization capital of a firm can be transferred from one plant to the next. Further investigation of the performance of relocated plants and firms will shed light on these issues.

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Table 1: Entry, Exit, and Relocation Variables in Manufacturing

(Averages of over 387 Four-digit SIC industries)

	All years pooled	1972-1977	1977-1982	1982-1987	1987-1992
Entry Rate					
All plants	0.319	0.343	0.304	0.298	0.332
Multi-unit plants	0.203	0.241	0.177	0.194	0.202
Relocation Rate New Locale					
All plants	0.007	0.008	0.006	0.007	0.007
Multi-unit plants	0.018	0.021	0.017	0.017	0.019
Ratio of Relocation to Entry					
Multi-unit plants	0.096	0.087	0.105	0.094	0.097
Entry Market Share					
All plants	0.122	0.126	0.105	0.120	0.137
Multi-unit plants	0.099	0.108	0.080	0.098	0.110
Relocation New Locale Market Share					
All plants	0.015	0.016	0.014	0.013	0.016
Multi-unit plants	0.019	0.021	0.018	0.018	0.021
Entrant Relative Size					
Multi-unit plants	0.423	0.357	0.388	0.447	0.499
Relocation New Locale Relative Size					
Multi-unit plants	0.569	0.528	0.572	0.559	0.617
Exit Rate					
All plants	0.318	0.291	0.328	0.328	0.326
Multi-unit plants	0.262	0.228	0.239	0.300	0.280
Relocation Rate Old Locale					
All plants	0.007	0.008	0.007	0.006	0.007
Multi-unit plants	0.019	0.022	0.018	0.017	0.019
Ratio of Relocation to Exit					
Multi-unit plants	0.077	0.098	0.077	0.060	0.072
Exit Market Share					
All plants	0.140	0.115	0.114	0.171	0.160
Multi-unit plants	0.129	0.101	0.098	0.167	0.149
Relocation Old Locale Market Share					
All plants	0.014	0.015	0.011	0.014	0.015
Multi-unit plants	0.018	0.020	0.015	0.019	0.020
Exiting plant Relative Size					
Multi-unit plants	0.436	0.390	0.373	0.491	0.489
Relocation Old Locale Relative Size					
Multi-unit plants	0.574	0.502	0.489	0.695	0.613

Table 2: Entry, Relocation, and Exit Variables across Industries

A. Entry
(Means across Years and Four-Digit SIC Industries within Each Two-Digit Sector)

		Entry Rates			Market Shares		Relative Size	
sic		Entry Rate	Relocation Rate New Locale	Relocation /Entry	Entrants	Relocated Plants	Entrants	Relocated Plants
20	Food	0.155	0.018	0.127	0.080	0.018	0.466	0.658
21	Tobacco	0.109	0.016	0.150	0.066	0.058	0.578	1.741
22	Textiles	0.174	0.008	0.051	0.088	0.019	0.430	0.669
23	Apparel	0.211	0.012	0.068	0.128	0.018	0.530	0.727
24	Lumber	0.253	0.032	0.133	0.167	0.037	0.587	0.675
25	Furniture	0.238	0.019	0.084	0.120	0.020	0.394	0.521
26	Paper	0.144	0.017	0.135	0.068	0.015	0.461	0.466
27	Printing	0.283	0.029	0.108	0.129	0.020	0.356	0.543
28	Chemicals	0.201	0.032	0.141	0.080	0.021	0.347	0.458
29	Petroleum	0.209	0.028	0.125	0.114	0.023	0.534	0.402
30	Rubber and Plastics	0.205	0.015	0.070	0.098	0.019	0.402	0.526
31	Leather	0.173	0.013	0.076	0.107	0.025	0.549	0.720
32	Stone, Clay, Glass	0.186	0.018	0.102	0.100	0.020	0.479	0.504
33	Primary Metal	0.162	0.009	0.051	0.074	0.012	0.383	0.443
34	Fabricated Metal	0.196	0.017	0.089	0.092	0.016	0.384	0.549
35	Ind. Machinery	0.228	0.017	0.074	0.102	0.017	0.387	0.517
36	Electrical Equipment	0.221	0.020	0.108	0.087	0.018	0.322	0.565
37	Transportation	0.234	0.021	0.104	0.104	0.023	0.354	0.617
38	Instruments	0.278	0.026	0.087	0.117	0.018	0.337	0.442
39	Miscellaneous	0.227	0.017	0.088	0.114	0.021	0.501	0.666

Table 2: Entry, Relocation, and Exit Variables across Industries (continued)

B. Exit
(Means across Years and Four-Digit SIC Industries within Each Two-Digit Sector)

		Exit Rates			Market Shares		Relative Size	
sic		Exit Rate	Relocation Rate Old Locale	Relocation/ Exit	Exiting Plants	Relocated Plants	Exiting Plants	Relocated Plants
20	Food	0.233	0.022	0.088	0.109	0.022	0.445	0.572
21	Tobacco	0.253	0.022	0.067	0.139	0.059	0.424	0.670
22	Textiles	0.256	0.007	0.028	0.129	0.014	0.481	0.624
23	Apparel	0.334	0.013	0.045	0.211	0.021	0.504	0.690
24	Lumber	0.313	0.029	0.099	0.191	0.029	0.568	0.592
25	Furniture	0.283	0.020	0.073	0.129	0.017	0.402	0.557
26	Paper	0.188	0.019	0.117	0.089	0.014	0.456	0.492
27	Printing	0.312	0.022	0.079	0.142	0.015	0.411	0.453
28	Chemicals	0.221	0.026	0.112	0.080	0.014	0.379	0.392
29	Petroleum	0.219	0.028	0.137	0.096	0.017	0.515	0.782
30	Rubber and Plastics	0.227	0.017	0.083	0.126	0.019	0.545	0.735
31	Leather	0.328	0.011	0.036	0.215	0.017	0.562	0.647
32	Stone, Clay, Glass	0.233	0.017	0.084	0.116	0.022	0.454	0.597
33	Primary Metal	0.208	0.011	0.057	0.107	0.013	0.466	0.438
34	Fabricated Metal	0.240	0.017	0.073	0.114	0.014	0.414	0.562
35	Ind. Machinery	0.265	0.018	0.074	0.130	0.020	0.413	0.637
36	Electrical Equipment	0.261	0.021	0.091	0.110	0.019	0.352	0.507
37	Transportation	0.271	0.026	0.095	0.110	0.018	0.394	0.438
38	Instruments	0.312	0.028	0.086	0.122	0.018	0.302	1.014
39	Miscellaneous	0.330	0.018	0.059	0.168	0.019	0.428	0.567

Table 3: Means of Firm-level Variables of Relocating Firms and Non-relocating Firms

	Relocating Firms (obs =4,528)		**Non-relocating Firms** (obs=155,000)		**Differences**
Variable	**Mean**	**Std Err**	**Mean**	**Std Err**	**t value**
Firm Size measures					
Total employment (TE)	1470.10	86.76	307.68	3.37	13.39
Total value of Shipments (TVS)	234,345	24,974	38,804	752.58	7.83
Number of plants	7.13	0.15	1.61	0.00	36.36
Market share (mktsh)	0.03	0.00	0.01	0.00	24.27
Average plant employment (avg_te)	211.33	8.29	162.44	1.11	5.84
Average plant output (avg_tvs)	29,676	1,558.60	17,899	175.89	7.51
Labor Productivity					
LP (TVS/TE)	204.68	35.56	171.42	4.95	0.93
LPV (VA/TE)	89.56	12.54	76.29	2.44	1.04
RLP (LP relative to 4-digit average)	2.16	0.14	2.11	0.06	0.35
RLPV (LPV relative to 4-digit average)	2.13	0.14	2.07	0.06	0.41
Growth Rates (before relocation)					
Employment (Gr_te)	0.08	0.02	0.99	0.00	-58.12
Output (Gr_tvs)	0.23	0.02	1.03	0.00	-50.93
Number of plants (Gr_plt)	0.20	0.01	1.02	0.00	-62.74
Market Share (Gr_mktsh)	0.15	0.02	1.00	0.00	-54.27
Average plant employment (Gr_avg_te)	0.01	0.01	0.99	0.00	-67.02
Average plant output (Gr_avg_tvs)	0.17	0.01	1.02	0.00	-58.08
LP (Gr_lp)	0.99	0.02	1.08	0.00	-5.4
LPV (Gr_lpv)	0.97	0.02	1.07	0.00	-5.19
RLP (Gr_rlp)	0.78	0.02	0.91	0.00	-7.09
RLPV (Gr_rlpv)	0.79	0.02	0.91	0.01	-6.29
5 year lead of Growth Rates (after relocation)					
Employment (Lead of Gr_te)	-0.41	0.01	-1.11	0.00	47.57
Output (Lead of Gr_tvs)	-0.39	0.02	-1.05	0.00	40.59
Number of plants (Lead of Gr_plt)	-0.33	0.01	-1.07	0.00	59.53
Market Share (Lead of Gr_mktsh)	-0.41	0.02	-1.09	0.00	42.32
Average plant employment (Lead of Gr_avg_te)	-0.31	0.01	-1.11	0.00	60.38
Average plant output (Lead of Gr_avg_tvs)	-0.31	0.02	-1.05	0.00	48.18
LP (Lead of Gr_lp)	0.23	0.02	-0.76	0.00	55.21
LPV (Lead of Gr_lpv)	0.21	0.02	-0.77	0.01	53.19
RLP (Lead of Gr_rlp)	0.01	0.02	-0.89	0.00	51.38
RLPV (Lead of Gr_rlpv)	0.00	0.02	-0.89	0.00	50.2

* A firm is defined as four-digit industry line-of-business (a combination of firm ID and industry).

Table 4: Origin Plants and Non-Origin (Staying) Plants

	Origin plants (Closed or Contracting Plants) obs = 9,879		Non-Origin plants *All Non-Origin Plants* obs = 263,000		Difference	Non-Origin plants *Closed or Contracting Plants only* obs = 78,209		Difference
Variable	Mean	StdErr	Mean	StdErr	t-value	Mean	StdErr	t-value
Total Employment	149.42	4.81	191.81	1.16	-8.56	106.43	1.20	8.67
Total Value of Shipment	19,748.00	1,039.80	25,862.00	222.02	-5.75	11,060.00	174.44	8.24
Market Share	0.00	0.00	0.01	0.00	-26.2	0.00	0.00	1.76
Log Labor Productivity	3.31	0.01	3.21	0.00	10.13	3.06	0.00	24.96
RLP (LP relative to 4-digit average)	1.28	0.03	1.23	0.00	1.66	1.15	0.01	4.5
RLPV (LPV relative to 4-digit average)	1.19	0.02	1.20	0.00	-0.37	1.10	0.01	3.88
Average Hourly Wage	9.25	0.05	9.23	0.01	0.32	8.83	0.02	8.13
Capital Intensity	47.44	2.01	39.02	0.41	4.1	31.38	1.10	7.01
building asset/te	9.34	0.59	8.98	0.11	0.59	7.82	0.33	2.25
machinery asset/te	38.10	1.74	30.03	0.32	4.57	23.57	0.80	7.6
Nonproduction Worker Wage Share	0.31	0.00	0.28	0.00	13.13	0.28	0.00	11.64
Energy Intensity	0.37	0.00	0.35	0.00	8.79	0.36	0.00	6.52
Specialization (PPSR)	0.03	0.00	0.03	0.01	-0.63	0.03	0.00	-0.52
Employment Growth Rate	90.74	0.17	89.06	0.04	9.64	91.86	0.06	-6.21
Output Growth Rate	0.11	0.05	0.19	0.01	-1.53	-0.06	0.02	2.86
Output growth rate	-1.92	0.43	-1.67	0.67	-0.32	-3.43	1.14	1.24

Table 5: Destination Plants and Non-Destination Plants

	Destination Plants (New Entrants) obs = 8,938		Non–Destination Plants *All Non-Destination Plants* (New Entrants and Continuing Plants) Obs = 270,000			Non–Destination Plants *New Entrants only* obs = 51,077		
Variable	Mean	StdErr	Mean	StdErr	t-value	Mean	StdErr	t-value
Total Employment	85.35	3.49	184.42	1.10	-27.08	60.83	0.71	6.89
Total Value of Shipment	13,182	658.84	27,941	247.78	-20.97	7,678	143.69	8.16
Market Share	0.00	0.00	0.01	0.00	-42.25	0.00	0.00	6.24
Log Labor Productivity	3.39	0.01	3.27	0.00	10.46	3.13	0.00	22.10
RLP (LP relative to 4-digit average)	1.54	0.06	1.25	0.00	5.05	1.25	0.01	5.08
RLPV (LPV relative to 4-digit average)	1.44	0.05	1.22	0.00	4.59	1.22	0.01	4.41
Average Hourly Wage	8.89	0.06	9.48	0.01	-10.38	8.84	0.04	0.72
Capital Intensity	97.00	4.76	51.22	0.55	9.54	45.14	1.66	10.28
building asset/te	16.69	1.23	11.19	0.38	4.27	10.77	0.49	4.47
machinery asset/te	80.31	4.15	40.03	0.33	9.68	34.37	1.20	10.64
Nonproduction Worker Wage Share	0.39	0.00	0.37	0.00	8.36	0.37	0.00	5.99
Energy Intensity	0.04	0.01	0.04	0.01	0.13	0.03	0.00	1.03
Specialization (PPSR)	92.41	0.17	89.50	0.04	16.57	93.37	0.07	-5.23
Employment Growth Rate	1.00	0.00	-0.12	0.01	134.89	1.00	0.00	0.00
Output Growth Rate	1.00	0.00	-1.76	0.53	0.00	1.00	0.00	0.00

Table 6: Changes after Relocations: Difference between Destination Plants and Origin Plants

A. Plant Characteristics

	Destination Plants obs = 4,971		Orgin Plants obs = 5,025		Difference within a firm obs = 4,344		
Variable	Mean	StdErr	Mean	StdErr	Mean	StdErr	t
Total Employment	104.90	5.51	164.10	6.53	-61.92	8.46	-7.32
Total Value of Shipment	16,241	1,047.40	19,810	1,272.00	-3,820	1,522.36	-2.51
Market Share	0.00	0.00	0.00	0.00	0.00	0.00	-5.76
Log Labor Productivity	3.33	0.01	3.24	0.01	0.09	0.01	6.40
RLP (LP relative to 4-digit average)	1.52	0.09	1.25	0.02	0.29	0.11	2.72
RLPV (LPV relative to 4-digit average)	1.41	0.07	1.20	0.03	0.22	0.09	2.41
Average Hourly Wage	8.84	0.06	9.21	0.06	-0.41	0.08	-5.25
Capital Intensity	66.94	3.44	33.69	1.29	35.13	3.91	8.99
building asset/te	16.29	1.24	8.15	0.39	8.68	1.48	5.85
machinery asset/te	50.66	2.54	25.55	0.97	26.45	2.78	9.51
Nonproduction Worker Wage Share	0.38	0.00	0.37	0.00	0.01	0.00	2.05
Energy Intensity	0.03	0.00	0.03	0.00	0.01	0.00	2.26
Specialization (PPSR)	92.38	0.22	90.81	0.22	1.41	0.30	4.73

Table 6: Changes after Relocations: Difference between Destination Plants and Origin Plants (continued)

B. Location Characteristics

	Destination Plants		Orgin Plants		Difference within a firm		
Variable	Mean	StdErr	Mean	StdErr	Mean	StdErr	t
Union Participation	17.73	0.11	22.77	0.12	-5.18	0.14	-37.10
Tax Effort Rate	95.02	0.23	99.29	0.27	-4.34	0.36	-12.20
Effective Tax Rate	0.01	0.00	0.01	0.00	0.00	0.00	-3.20
Capital Intensity (Neigh_Cap_Lab)	72.83	0.85	49.55	0.56	23.32	0.83	28.27
Skill Intensity (Neigh_Nonp_Wagesh)	0.38	0.00	0.38	0.00	0.00	0.00	2.04
Neighborhood Employment Density							
4digit (neigh_te4dn)	0.15	0.01	0.24	0.01	-0.09	0.01	-10.46
2digit (neigh_te2dn)	1.09	0.03	1.92	0.04	-0.88	0.05	-18.69
Manufacturing (neigh_tedn)	13.67	0.27	24.23	0.40	-11.30	0.49	-23.07
Growth of Neighborhood Employment Density							
neigh_te4dn growth	2.00	0.38	0.48	0.08	1.91	0.64	3.01
neigh_te2dn growth	0.22	0.02	0.10	0.01	0.09	0.02	3.58
neigh_tedn growth	0.04	0.00	0.02	0.00	0.00	0.01	0.39

Notes: All observations are pooled over years.
The difference is between mean of variables for destination plants and mean of variables for origin pants.

Table 7: Probit of Relocation Given Shutdown

	[1]	[2]	[3]	[4]
constant	-2.055*	-1.829*	-1.646*	-1.715*
	(0.066)	(0.076)	(0.089)	(0.091)
6 – 10 years old	-0.134*	-0.121*	-0.126*	-0.125*
	(0.029)	(0.032)	(0.032)	(0.032)
11 – 15 years old	-0.160*	-0.091***	-0.095**	-0.095**
	(0.042)	(0.048)	(0.048)	(0.048)
Plants in 1972 CM	-0.029	-0.082*	-0.075*	-0.077*
	(0.018)	(0.021)	(0.021)	(0.021)
Size (log Total employment)	0.095*	0.049*	0.048*	0.051*
	(0.006)	(0.006)	(0.006)	(0.006)
Market share	-6.509*	-9.915*	-9.178*	-9.871*
	(1.271)	(1.458)	(1.452)	(1.459)
log labor productivity	0.186*	0.104*	0.103*	0.104*
	(0.011)	(0.012)	(0.012)	(0.012)
Specialization (PPSR)	0.000	0.001***	0.001	0.001
	(0.000)	(0.001)	(0.001)	(0.001)
Capital intensity	0.000*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Non-production worker wage share	0.022	0.066***	0.065***	0.077**
	(0.034)	(0.038)	(0.038)	(0.038)
Energy intensity	0.006	-0.001	-0.001	-0.001
	(0.008)	(0.014)	(0.013)	(0.014)
Average Hourly Wage	-0.008*	-0.007*	-0.005*	-0.005*
	(0.002)	(0.002)	(0.002)	(0.002)
Nearby Plant 1 (within 100 miles)		-0.216*	-0.214*	-0.203*
		(0.022)	(0.022)	(0.022)
Nearby Plant 2 (between 100 and 250 miles)		0.026	0.030	0.032
		(0.024)	(0.024)	(0.024)
Number of State the parent firm operates in		0.044*	0.044	0.043
		(0.001)	(0.001)	(0.001)
Firm Size (Total Employment)		0.000*	0.000*	0.000*
		(0.000)	(0.000)	(0.000)
County average wage (same 2-digit SIC)			-0.004	-0.002
			(0.005)	(0.005)
County Electricity price			-0.256	-0.189
			(0.306)	(0.257)
Union participation			-0.005*	-0.004*
			(0.001)	(0.001)
Business Tax Rate			-1.663	-1.375
			(1.479)	(1.475)
Neighborhood Capital Intensity			0.000	0.000
			(0.000)	(0.000)
Neighborhood Skill Intensity			-0.118	-0.053
			(0.107)	(0.113)
Neighborhood Employment Density (4-digit)			0.075*	
			(0.015)	
Neighborhood Employment Density				0.000
				(0.000)

Note: All regressions include industry and year dummy. Std errors in parentheses.
* Statistically significant at the 1% level. ** 5%. *** 10%.

Appendix

A. Variables of plant, firm, and location characteristics

A.1. Plant specific variables:

- Age: Plant age is not available in the LRD. I create dummy variables for the following age categories for probit models in section 4; 1-5 years, 6-10 years, 11-15 years, and 16-20 years.
- Labor Productivity:
  - log labor productivity

$$\log(lp) = \log(tvs) - \log(tph)$$

$$tph = \frac{ph}{ww}(sw + ww + cw_{it})$$

where *tph* is total plant hours (production worker and non-production worker hours), *sw* is salaries or total payrolls, *ww* is worker wages, *ph* is production worker hours, and *cw* is costs of contract workers. The CM contains data on production worker hours, but not on non-production worker hours. I obtain total plant hours (*tph*) by using the ratio of total wages to production worker wages in order to capture the relationship between total hours and production worker hours. (The ratio of total wages to production worker wages is used to scale production worker hours up to total hours.) Real value of the variables are found using the Bartelsman-Gray Industry deflators from 1972 to 1992 (1987 constant price).[26]

  - LP (Labor Productivity) : TVS/TE, where TVS is total value of shipments and TE is total employment
  - LPV (Labor Productivity, Value-added used instead of TVS) : VA/TE, where VA is value added
  - RLP (Relative Labor Productivity) : LP/ALP, where ALP is average four-digit industry labor productivity[27]

[26] Calculation of total plant hours is due to Power (1998), who explains the construction of labor productivity using the information available in the LRD in more detail.
[27] See McGuckin and Nguyen (1995) for more details on the relative productivity measures.

- RLPV (Relative Labor Productivity, Value-added used) : LPV/ALPV, where ALPV is average four-digit industry labor productivity obtained using value-added instead of gross output

- Capital intensity: There are two capital stock variables in the CM: machinery asset end of year (*mae*) and building asset end of year (*bae*). Capital intensity of a plant is the ratio of capital asset to total employment ((*mae* + *bae*) / *te*). I also use the ratio of building asset to labor (*bae / te*) and the ratio of machinery asset to labor (*mae/te*).
- Non-production worker share: The ratio of number of non-production workers to total number of workers.
- Non-production worker wage share: The ratio of salaries and wages paid to non-production personnel (ow) to total salaries and wages (sw: gross earnings paid to employee). I use this variable as a proxy of skill intensities of a plant.
- Energy intensity : The ratio of total energy expenditure to total value of shipments
- Specialization (PPSR) : Primary Product Specialization Ratio (Five-digit Product Code)

A.2. Firm specific variables:

- Firm size measures: Firm level size measures (total employment, output, and number of plants) are obtained by summing up the values of all plants that belong to the firm.
- Market share: The ratio of total value of shipments the firm produces in all plants the firm owns in the industry to total output in the industry.
- Number of states: A count of the number of different states a firm operates in.
- Labor Productivity

  Following McGuckin, Nguyen, and Reznek (1995), I calculate the firm productivity as a weighted sum of plant productivities.

  - RLP of the firm (RLP^F: Relative Labor Productivity of the firm):

    $$RLP^F = \sum_j w_j RLP_j ,$$

    where RLP_j is Relative labor productivity (*RLP*) of the plant j and the weight w_j is the ratio of plant *j*'s employment to the total number of employees of the firm.

- RLPV (Relative Labor Productivity using the value-added) of the firm: RLPV of the firm is obtained in the same way as RLP of the firm.

- Growth Rates

  The growth rate of variable X (size or productivity measures) at time t is obtained as follows:

  $$Gr\_X_t = \frac{X_t - X_{t-5}}{(X_t + X_{t-5})/2}.$$

A.3. Location specific variables:

- County average wage
  - County average wage (manufacturing): average manufacturing wage rates for each county (sum of salaries and wages paid to production workers in all manufacturing plants in the county divided by total hours of production workers in the county).
  - County average wage in two-digit sector: average manufacturing wage rates for each county in the two-digit industry of the plant produce in (sum of salaries and wages paid to production workers in manufacturing plants that produce in the same two-digit industry in the county divided by total hours of production workers in the same two-digit industry in the county.)
- County electricity price: average price per kilowatt-hour of electricity purchased by plants in the two-digit sector operating in the county.

<u>Economic activities in the neighborhood (the own county and the neighboring counties within 50 miles)</u>

The following variables are introduced to examine the effects of economic activities (or agglomeration) in the neighborhood counties of a plant on the plant turnover and relocation decisions

- Neighborhood employment densities
  - Neigh_te4dn: number of workers in the same four-digit industry per square kilometer in the neighborhood of a plant

    - Neigh_te2dn: number of workers in the same two-digit industry per square kilometer in the neighborhood of a plant
    - Neigh_tedn: number of workers per square kilometer in all manufacturing plants in the neighborhood of a plant
- Neighborhood Capital Intensity (neigh_cap_lab) : average capital stock per each worker in the neighborhood of a plant (total capital stock in the neighborhood divided by total employment in the neighborhood).
- Neighborhood Skill Intensity (neigh_nonp_wagesh) : average non-production worker wage share in the neighborhood of a plant (total salaries and wages paid to non-production personnel in the neighborhood divided by total salaries and wages paid to employees in the neighborhood)

State level measures (union participation and business tax rate)

It is not easy to find complete and consistent series of tax rates and unionization rates defined at the county-level and available from 1972-1992. I use state level variables for the union membership density and business tax rates.

- Union: Union membership rates among wage and salary workers in each state (Source: Hirsch, Macpherson, Vroman (2001))
- Tax rate:
    - Tax Effort Index (TEI): ACIR's (Advisory Commision on Intergovernmental Relations) tax capacity and tax effort indexes. This variable is not available for all years. I use estimated state values in Berry and Fording (1997) in years for which ACIR did not calculate values.
    - Effective business tax rate: average effective tax rates (taxes levied upon business divided by tax base (pi) for each state)

      I calculate aggregate state effective tax rates on businesses following the method suggested by Wheaton (Wheaton, Interstate Differences in the Level of Business Taxation). I sum up all taxes that businesses are legally liable for and divide the sum by a single denominator (net business income or the value of the business capital stock). Since net business income is not available, I use the

state personal income as a proxy. The following taxes from the Census of Government (1972~1992) are collected for each state for each year:

- State tax revenue (corporation net income tax, property, severance, document and stock transfer)
- Sales and Gross Receipts Tax Revenue (Insurance, Public Utilities)
- License Tax Revenue (Corporations in general, Public Utilities, Occupations and businesses, n.e.c)

State personal income is available from the Bureau of Economic Analysis website (www.bea.gov).

Table A8: Probit of Plant Exit

	[1]	[2]	[3]	[4]	[5]
constant	0.191*	0.709*	0.170*	0.243*	0.330*
	(0.016)	(0.031)	(0.036)	(0.037)	(0.037)
6 – 10 years old	-0.246*	-0.185*	-0.181*	-0.183*	-0.184*
	(0.006)	(0.013)	(0.013)	(0.013)	(0.013)
11 – 15 years old	-0.337*	-0.228*	-0.220*	-0.221*	-0.223*
	(0.009)	(0.019)	(0.019)	(0.019)	(0.019)
Plants in 1972 CM	-0.314*	-0.201*	-0.202*	-0.205*	-0.207*
	(0.004)	(0.009)	(0.009)	(0.009)	(0.009)
Size (log Total employment)	-0.195*	-0.273*	-0.274*	-0.272*	-0.272*
	(0.001)	(0.003)	(0.003)	(0.003)	(0.003)
Market share	-1.563*	-1.797*	-1.669*	-1.954*	-1.998*
	(0.286)	(0.336)	(0.337)	(0.340)	(0.341)
Log labor productivity	-0.082*	-0.176*	-0.177*	-0.178*	-0.178*
	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)
Specialization (PPSR)	0.004*	0.002*	0.002*	0.002*	0.002*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital intensity	0.000*	0.000*	0.000*	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Non-production worker wage share	0.062*	0.238*	0.171*	0.162	0.155*
	(0.009)	(0.016)	(0.016)	(0.016*)	(0.016)
Energy intensity	0.000	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Average Hourly Wage	-0.005*	0.011*	0.007*	0.007*	0.006*
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Nearby Plant 1 (within 100 miles)		0.094*	0.080*	0.077*	0.075*
		(0.009)	(0.009)	(0.009)	(0.009)
Nearby Plant 2 (between 100 and 250 miles)		-0.003	0.022**	0.027*	0.035*
		(0.010)	(0.010)	(0.010)	(0.010)
Number of State The parent firm operates in		-0.002*	-0.001**	-0.001**	-0.001**
		(0.000)	(0.000)	(0.000)	(0.000)
Firm Size (Total Employment)		0.000*	0.000*	0.000*	0.000
		(0.000)	(0.000)	(0.000)	(0.000) *
County average wage (same 2-digit SIC)			0.014*	0.012*	0.015
			(0.002)	(0.002)	(0.002)
County Electricity price			-0.002	-0.002	-0.003
			(0.005)	(0.005)	(0.006)
Union participation			0.003*	0.002*	0.000
			(0.000)	(0.000)	(0.000)
Business Tax Rate			4.589*	4.368*	4.069*
			(0.625)	(0.625)	(0.626)
Neighborhood Capital Intensity			0.000*	0.000*	0.000*
			(0.000)	(0.000)	(0.000)
Neighborhood Skill Intensity			1.109*	0.966*	0.745*
			(0.043)	(0.044)	(0.047)
Neighborhood Employment Density (4-digit)			0.073*		
			(0.006)		
Neighborhood Employment Density (2-digit)				0.022*	
				(0.001)	
Neighborhood Employment Density (Manufacturing)					0.003*
					(0.000)
SIC and Year Dummy	Y	Y	Y	Y	Y

* Std errors in parentheses. * Statistically significant at the 1% level. ** 5%. *** 10%.