Job flows and labor dynamics in the U.S. Rust Belt

From 1992 to 2000, high employment and wage growth occurred together with low unemployment in a number of U.S. Rust Belt metropolitan areas; localities with these characteristics had larger and younger establishments, on average, in environments with high rates of both job creation and job destruction

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Differences in growth, wages, and unemployment across metropolitan areas are well documented in the urban and regional economics literature.[1] Researchers, however, know little about the underlying labor dynamics and establishment characteristics related to such differences. With establishment microdata, linked across time, one can analyze employment growth in terms of the number of jobs created and the number of jobs destroyed. One can also look at how various establishment characteristics (for instance, age, size, and wages paid) relate to growth and unemployment. Many of these analyses have been done at the national level,[2] but research on the regional aspects of these statistics is sparse, and as a result, economists know little of how the microdata-based statistics behave in *local* labor markets.[3] This article documents that behavior so that both researchers and policymakers can better understand how local labor markets function.

The Rust Belt region of the United States, comprising mostly States in the Upper Midwest and Mid-Atlantic portions of the country,[4] gets its name from the large concentration of manufacturing activity located there. When manufacturing began a steep decline that lasted throughout the 1970s and 1980s, many of the region's local economies followed suit. Consequently, employment growth in the Rust Belt lagged national growth over the period. It was not until the latter part of the 1980s that the rates of employment growth in the Rust Belt came close to those for the entire Nation. Even during the economic expansion of the 1990s, the Rust Belt lagged the rest of the United States in employment growth.[5] However, over the same period, economic conditions within the Rust Belt varied substantially. Several local areas saw their economies expand, while others maintained the trend of past decades. This variation in growth makes the Rust Belt a favorable setting for exploring employment dynamics across a range of local labor markets.

Traditionally, economists have relied almost entirely on aggregated data for their research purposes, particularly for studies involving employers and labor demand. Until a decade or so ago, access to more detailed microdata simply was not available. At that time, however, several economists[6] appealed to establishment-level microdata in a series of studies analyzing the U.S. macroeconomy and aggregate labor dynamics. With those data, they were able to study employment growth, the entry and exit of firms into and from the economy, and gross job flows.[7] In addition, this line of research has been able to track variations in job flows not only over time, but across industries, sizes of firms, and a variety of other establishment characteristics. Still, most of the research was limited to manufacturing, the only industry for which, until recently, data were available. Now, new data from the Bureau of Labor Statistics encompass all industries. With a greater breadth and scope, these data mitigate many of the problems encountered in previous research.

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It is useful to note some key facts that have emerged regarding job flows. First, within manufacturing, job destruction is relatively more important than job creation over time; that is, business cycles are driven primarily by large episodes of job destruction, with relatively stable levels of job creation. Second, the rates of both job creation and job destruction are highest in small, young, low-wage establishments. Third, job flows and establishment characteristics vary widely by industry. For example, manufacturing tends to have older, larger plants and low rates of job creation and destruction, while more seasonal sectors, such as retail, construction, and some services, have smaller, younger establishments and high rates of creation and destruction. Few studies look at job flows below the national level.[8] From these studies, however, some relationships emerge. For example, it has been found that job creation and job destruction are positively correlated across regions; that is, places with high creation rates also have high destruction rates. In addition, places with high rates of both creation and destruction tend to have higher employment growth, on average, than places with lower job turnover.

The study presented here looks at 35 metropolitan statistical areas (MSA's)[9] located in three Rust Belt States: Michigan, Ohio, and Pennsylvania. (See appendix.) The study covers the period from March 1992 to March 2000 on a quarterly basis. The focus is the long-run variation in labor market characteristics across MSA's. The findings indicate that traditional labor market statistics behave as expected: MSA's with high employment growth tended to have high wage growth and low unemployment. In addition, the microdata indicate that (1) MSA's with high employment growth had high rates of both job creation *and* job destruction, (2) MSA's with high employment growth had *larger* establishments, on average, than did MSA's with lower employment growth, and (3) MSA's with high employment growth had *younger* establishments, on average, than did MSA's with lower employment growth. Given the strong manufacturing presence in the Rust Belt (even in the 1990s), one would expect that a local economy 's industrial makeup would play a large role in these findings. However, further analysis by industry reveals that *industry mix explains only a part of these results*.

The next section outlines the data and terminology used in what follows. The section after that presents the general results obtained from the study. An analysis decomposing those results by industry follows. The final section summarizes the conclusions.

Data

The BLS Longitudinal Database (LDB) of linked establishment microdata contains quarterly employment and wage data on nearly all establishments in the U.S. economy. Data of this kind are essential to the current study. The Unemployment Insurance (UI) records from the BLS ES–202 program provide the raw data for the LDB.[10] The longitudinal nature of the data allows one to observe when establishments start up, shut down, expand their employment, or contract. That the LDB consists of microdata allows one to observe an establishment's characteristics, such as its industry, age, and number of employees, as well as the wages it offers. The LDB is unique in its coverage (approximately 98 percent of all employees) and frequency (quarterly). The coverage makes a study at a fine level of regional and industrial detail possible, while the frequency allows a better tracking of employment movements over time. [11]

The sample used in the analysis that follows includes all private-sector establishments in the metropolitan areas of Michigan, Ohio, and Pennsylvania covering March 1992 to March 2000. This represents 35 MSA's over 32 quarters and covers all private industries.[12] The entire longitudinal panel includes more than 1.03 million establishments with positive employment at some point during the sample period. The average quarter had 11.26 million workers in about 587,000 establishments. On average, MSA employment ranged from 40,000 (Sharon, PA, MSA) to 1.88 million (Philadelphia, PA–NJ, PMSA). The analysis also appeals to unemployment data from the Local Area Unemployment Statistics program of the Bureau of Labor Statistics as a supplement to the LDB,[13] using the unemployment rate from the third month of each quarter.

The LDB yields rates of *job creation* and *job destruction* for every MSA, each quarter. Job creation is defined as the number of jobs created at establishments that are expanding their workforce and at establishments that are just starting up.[14] Job destruction is the number of jobs lost at establishments that are contracting their workforce and at establishments that are shutting down. These statistics are repre sented as rates by dividing them by the average of the current and previous quarters ' employment levels.[15] The employment growth rate is simply the difference between the job creation and job destruction rates. Wages are the total quarterly payroll, divided by employment. Other statistics used in the analysis are the average size (in employees) and average age (in quarters) of the establishments in each MSA. The average establishment size is the number of employees per establishment, averaged across all the establishments in an MSA. The average establishment age is the age[16] of each establishment, averaged across all the establishments in an MSA.

General findings

In the analysis that follows, MSA's are ordered by their employment growth and then divided into thirds. The three groups thereby obtained are referred to simply as the high-, middle-, and low-growth groups. Condensing metropolitan areas into these simplified groups makes the analysis more tractable. Table 1 presents the general findings for the three

groups. The appendix presents the same statistics for all MSA's, ordered as described; a glimpse at the size distribution of the MSA's shows that no single metropolitan area drives the results for its group. All reported statistics are quarterly averages. Each group's statistics represent the weighted averages across all the MSA's within that group.[17] The row labeled "Full sample" represents the quarterly average statistics for all metropolitan areas in the study.

Table 1 indicates that the more traditional labor market measures behaved as expected. The MSA's in the highest-growth group had the highest wages, the highest wage growth, and the lowest unemployment rate. The statistics that are unique to the microdata present additional findings. Areas with higher growth had substantially higher rates of job creation and somewhat higher rates of job destruction. Low- and moderate-growth MSA's had similar job creation rates. Of the three groups, MSA's of moderate growth had the lowest destruction rate. High rates of job creation in the highest-growth labor markets are not surprising: the observed employment growth must stem from *something*. However, high rates of job*destruction* in these metropolitan areas *are* surprising. Areas with high employment growth are not often thought of as destroying many jobs. The finding suggests that high employment growth is not related to the simple occurrence of either strong job creation or weak job destruction. Instead, high employment growth occurs through more complicated labor dynamics involving high job *turnover*. Similarly, low employment growth occurs in more stagnant labor markets. It is not that these areas lose a good deal of jobs or that they are unable to create jobs. Instead, they simply are not dynamic, producing little in the way of either job creation or job destruction.

On average, establishments were larger in the high–growth MSA's. These areas had 1.2 to 1.4 more workers per establishment than did MSA's in the other groups. Metropolitan areas in the other two groups had establishments of similar size, on average. Overall, there was a positive trend relating average establishment size to employment growth. Chart 1 illustrates this trend across all 35 MSA's. The high-growth MSA's also had the youngest firms, on average; the low-growth MSA's had the oldest. The difference in average age between the high- and low-growth groups was 2.7 quarters, a figure that hints at a negative relationship between employment growth and the average age of the establishments in a metropolitan area. Chart 2 illustrates this trend across the 35 MSA's. Note that the age trend is considerably stronger than the size trend.[18] Overall, MSA's with high growth have establishments that are larger and younger, on average, while MSA's with low growth have establishments that are smaller and older.

Putting the results together supplies a picture which implies that establishments in high-growth labor markets are more dynamic. They create more jobs, but destroy many jobs at the same time. As a result, these establishments tend to be younger, on average, as well as relatively larger. Several hypotheses could explain this outcome; one plausible explanation is that establishments which survive the higher turnover are "better" than those which do not and so can create more jobs as a consequence. Low-growth labor markets have low rates of both job creation and job destruction, occurring chiefly in relatively smaller, older establishments. Low job turnover allows these establishments to survive longer, but at the same time, they may be relatively inefficient at creating jobs and so remain small.

Industry decomposition

Table 1 presents some new findings concerning local labor markets. Job turnover is highest in the fastest-growing labor markets, in which wages are high, unemployment is low, and establishments are larger and younger, on average, than their counterparts in other labor markets. Decades of research in urban and regional economics detail the industrial specialization of metropolitan areas; more often than not, cities are very different in the mix of industries represented there. Research also shows that job flows and establishment characteristics vary widely by industry.[19] For instance, manufacturing plants tend to be larger and older and have low rates of job turnover, while more seasonal retail and construction establishments tend to be smaller and younger and have very high job turn-

Table 1. Rust Belt metropolitan area quarterly means, grouped by employment growth

Group	Employment growth[1]	Wages (1992 dollars)	Wage growth[1]	Unemployment rate[1]	Job creation[1]	Job destruction[1]	Average establishment size[2]	Average establishment age[3]
Full sample	0.47	6,728	0.44	5.0	7.2	6.7	18.5	40.4
High-growth MSA's	.60	6,927	.58	4.4	7.4	6.8	19.2	39.5
Moderate-growth MSA's	.40	6,779	.34	5.2	7.0	6.6	18.0	40.2
Low-growth MSA's	.29	6,216	.30	6.0	7.0	6.7	17.8	42.2

[1] Percent.
[2] Number of workers.
[3] Number of quarters.
NOTE: Estimates are based on author's tabulations. Statistics are for March 1992 to March 2000. The unemployment rate comes from the BLS Local Area Unemployment Statistics program. (See text for details.) All other statistics are from the sample of ES–202 LDB establishments.

Chart 1. Relation between average size of establishment and employment growth

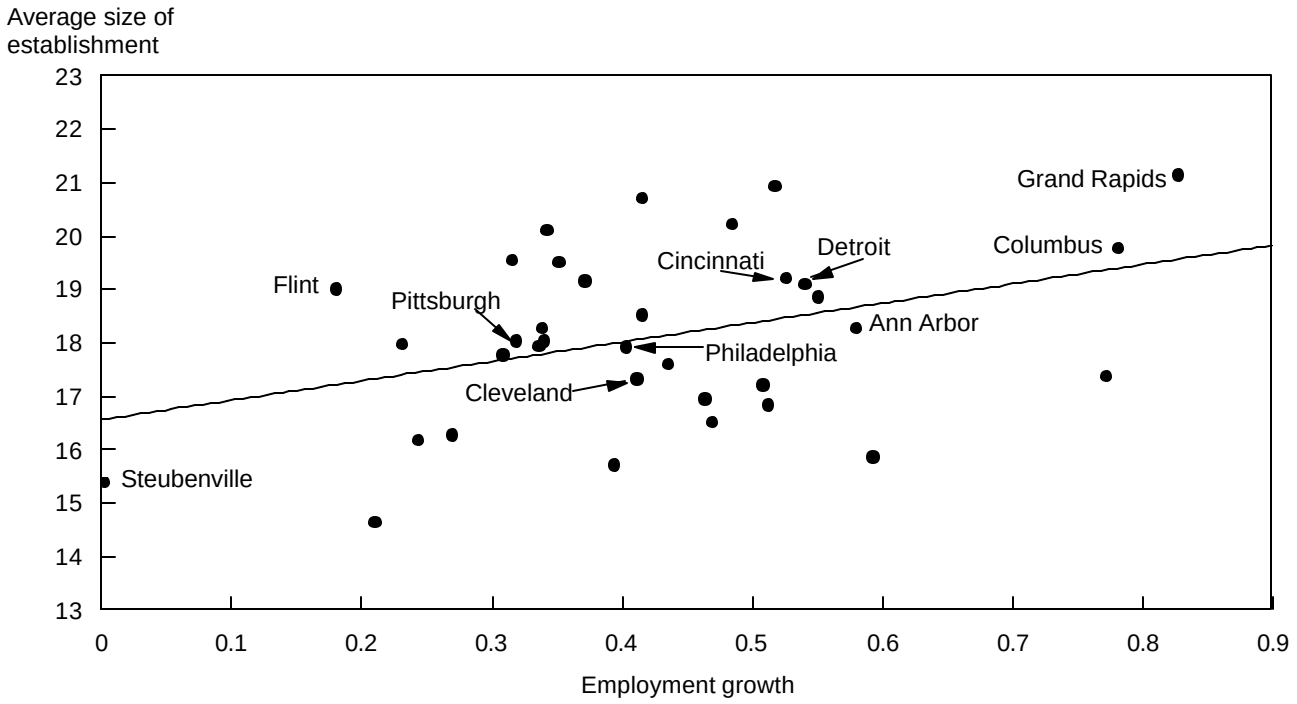
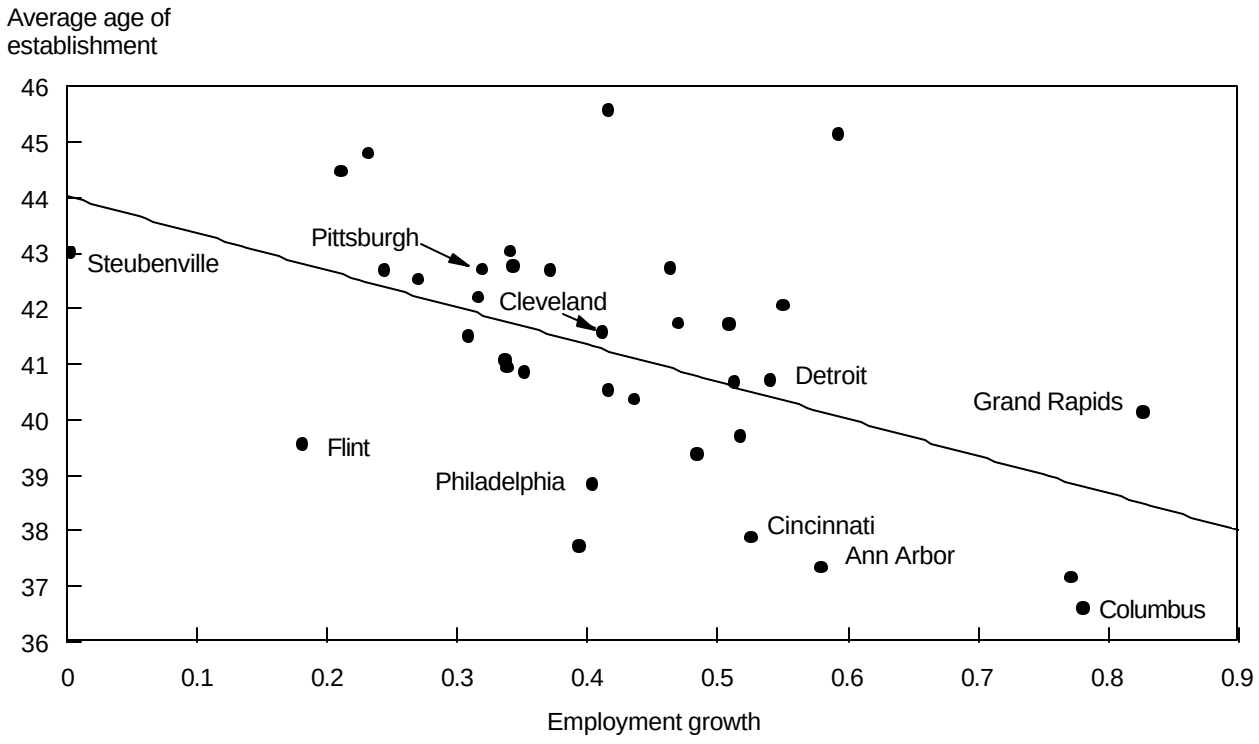


Chart 2. Relation between average age of establishment and employment growth



over rates.[20] Therefore, it is plausible that the findings yielded by table 1 come from differences in industry composition across MSA's. A useful exercise would isolate the portion of observed trends due to only industry differences. The analysis presented here uses a "shift-share" decomposition to address this question. The shift-share decomposition is a common tool in the regional economics literature and can take several forms.[21] In what follows, the difference between two regional values of a variable (for example, MSA growth rates) is decomposed into two parts: a share effect and a shift effect. The share effect captures the portion of the deviation due to differences in industry shares (that is, differences in the industry mix). The shift effect captures the portion of the deviation due to differences within each industry (that is, differences which are independent of the industry mix).

Mathematically, the decomposition is as follows: let X^j represent the value of some variable X (which will denote one of the labor market statistics described in table 1) for area j. This value can be represented as the sum of its industry values (with X_i^j representing the value in the ith industry), each weighted by the employment share of the industry, $s_i(j)$ (which is just E_i^j/E^j);[22] that is,

$$(1) \quad X^j = \sum_i s_i^j X_i^j .$$

When one subtracts the high-growth MSA value of a variable from its low-growth MSA value and takes the weighted averaging just described into account, one can algebraically rearrange terms to get the following shift-share equation for $X^h - X^l$:[23]

$$(2) \quad X^h - X^l = \Sigma_i \bar{s}_i (X_i^h - X_i^l) + \Sigma_i (s_i^h - s_i^l) \bar{X}_i .$$

The first term on the right-hand side of this equation is the shift, or "within," effect. It measures the industrial deviations of X, holding the employment share constant at $\bar{s}_i \equiv 0.5 \cdot (s_i^h + s_i^l)$. In other words, this term captures the industry-specific deviations in X, holding the industry mix constant. The second term is the share effect, which measures deviations from the aggregate industry shares, holding X constant at $\bar{X}_i \equiv 0.5 \cdot (X_i^h + X_i^l)$. In simpler terms, the share effect captures differences in industry mix by focusing on the MSA's deviation from the aggregate industry mix, holding all else constant.

Table 2 reports the results of the shift-share analysis performed on employment growth, job creation, job destruction, average establishment size, and average establishment age. The decomposition uses the four-digit Standard Industrial Classification (SIC) level of detail.[24] MSA's are grouped by employment growth prior to the decomposition. Within and share effects are listed in levels and percentages of deviations and sum to the deviation of the high-growth group mean from the low-growth group mean. A positive share effect implies that the industry composition of MSA's within the given group causes a variable's mean to be greater in high-growth, rather than low-growth, MSA's. In contrast, a negative share effect implies that the industry mix makes the average greater in low-growth MSA's. A positive within effect implies that factors other than industry composition (that is, MSA-specific factors) cause a variable's mean to be greater in high-growth MSA's, while a negative within effect implies the opposite.

While industry mix played a considerable role, overall it could account for only a part of the variation across metropolitan areas. Within effects accounted for 70 percent of the differences in employment growth. Within effects accounted for almost half of the differences in job creation among the high- and low-growth groups. Industry mix accounted for one-and-one-half times the difference in job destruction in high-growth, compared with low-growth, MSA's; note, however, that both the within and between effects oppose each other and that the difference across areas is very small. Researchers often hold up structural change (for example, a shift from manufacturing to services) to explain labor market differences across MSA's. The analysis presented here indicates that structural change, while playing a (perhaps even major) role, cannot be the whole story. Certainly, differences in industry mix account for a sizable share of the differences in job creation and job destruction, particularly the latter. However, much of the differences in job creation, as well as overall job turnover, is due to differences that are independent of industry.

The final two panels of table 2 present results for average establishment size and age. For average establishment size, within and share effects play a nearly equal role in explaining the overall size difference between the high- and low-growth groups: of the 1.4-worker difference between the two, 0.6 worker was due to MSA-specific effects, and 0.8 was due to the industry mix. The same can be said for the average establishment age: of the 2.7-quarter difference in average age between the high- and low-growth groups, 1.5 quarters are attributable to MSA-specific differences, while 1.2 are attributable to differences in industry composition.

THE ANALYTICAL USE OF THE BLS ES–202 LONGITUDINAL DATABASE presents some appealing findings on the dynamics of local labor markets. Some results are not surprising: higher employment growth occurred in places with high wages, high wage growth, and low unemployment. Other results, particularly those unique to the microdata, yield some insightful new findings. First, *expanding labor markets have not only higher rates of job creation, but also higher rates of job destruction*. Thus, slow-growing metropolitan areas are not falling behind their counterparts from a mass exodus of available jobs. Instead, they are stagnant labor markets, where both job creation and job destruction lag behind job creation and job

destruction in expanding metropolitan areas.

In addition, *expanding labor markets have establishments that are both younger and larger, on average, than establishments in stagnant labor markets*. Younger establishments may come about through a higher rate of entry: new firms simply choose the expanding labor markets over the stagnant ones. Expanding labor markets may have features (more favorable local policies, a better infrastructure, or more skilled workers) that are attractive to entering firms. Younger establishments also may be more common in these labor markets because of a higher survival rate of new establishments there. Intrinsic features of expanding labor markets may give entrants a higher chance of survival, relative to their chances in other areas, thereby allowing younger firms to make up a relatively larger share of employment. The presence of younger *and larger* establishments lends itself more to the latter explanation: the same intrinsic factors that allow greater survival also allow greater firm-level growth.

When one examines all the observed trends—higher growth, higher wages, higher job turnover, and younger and smaller establishments, all present together in certain labor markets—specific economic theories on job growth and firm entry and exit emerge as possible explanations. How these findings relate to such theories merits further research. One notable theory is that of creative destruction, whereby across-MSA differences in technology growth may give rise to high entry and high turnover rates in areas with the highest technology growth. According to this theory, the firms in different labor markets are themselves different. Intrinsic features of certain MSA's may make regular firms more productive, or certain areas may simply be more attractive to more productive firms. Another theory posits the notion that firms do not know the extent of their productive capabilities and must learn them over time. According to this theory, differences in how well or how fast firms learn in different labor markets can lead to regional variations in the growth and survival of those firms. It is not necessarily that firms are different across different labor markets, but that the labor markets themselves are different. The mechanisms that determine firms' growth and survival dictate how productive a firm must be to survive and thrive in a particular labor market. Further work relating the theory to the empirical results found in this article may distinguish whether either or both of these theories can truly explain the dynamics of the various labor markets.

Table 2. Shift-share analysis for job flows and establishment characteristics, high- and low-growth metropolitan areas

Variable	High–low deviation	Amount of deviation accounted for by—	
		Within effects	Share effects
Employment growth	0.31	0.21	0.09
Percent of difference	65.5	70.0	30.0
Job creation	.39	.17	.22
Percent of difference	5.8	43.5	56.5
Job destruction	.08	–.04	.13
Percent of difference	1.3	–52.7	152.7
Average establishment size	1.4	.6	.8
Percent of difference	7.8	44.5	55.5
Average establishment age	–2.7	–1.5	–1.2
Percent of difference	6.6	54.8	45.2

NOTE: Results are for the cross-sectional deviations across the 35 MSA's in the sample. Within and share effects are based on 964 four-digit industries. The percent of difference below the deviation is the high-low group deviation as a percentage of the sample mean. The details of the shift-share decomposition are described in the text. The sum of the amount of deviation accounted for by share effects and the amount of deviation accounted for by within effects may not equal the high-low deviation, due to rounding.

Irrespective of the theories, a major counter to the findings presented is that differences in industry mix may explain them all. For example, manufacturing is a contracting industry that makes up a disproportionate share of employment in many of the metropolitan areas studied. One could easily imagine a strong presence of manufacturing in low-growth areas, along with a greater share of services and a rapidly expanding industry, in high-growth areas. Add to this picture the previous evidence showing that the lowest job turnover and the oldest establishments are in manufacturing, and the industry-mix idea becomes compelling. Still, despite all these presuppositions, the analysis of industry composition shows that its role is limited. Industry mix played a significant role in accounting for differences across metropolitan areas, particularly with regard to job destruction. However, industry mix could not account for all the variation in the other statistics. Instead, MSA-specific (not industry-specific) differences accounted for a large part of the differences in employment growth, job creation, establishment size, and establishment age. □

Notes

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[1] For example, see Edward L. Glaeser, Hedi D. Kallal, Jose A. Scheinkman, and Andrei Schleifer, "Growth in Cities," *Journal of Political Economy*, December 1992, pp. 1126–52; and Edward L. Glaeser, Jose A. Scheinkman, and Andrei Schleifer, "Economic Growth in a Cross-Section of Cities," *Journal of Monetary Economics*, February 1995, pp. 117–43.

[2] For a review of the research findings, see Steven Davis and John C. Haltiwanger, "Gross Job Flows," in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics,* vol. 3 (Amsterdam, Elsevier Science, 1999), pp. 2711–2805.

[3] For the purposes of this article, "local labor market" generally refers to the labor market of a metropolitan area.

[4] Conceptions of which States make up the Rust Belt vary. Most often, the five core Midwest States of Illinois, Indiana, Michigan, Ohio, and Wisconsin are defined as the Rust Belt. Some add Pennsylvania to the list, others include New York and New Jersey as well, and still others even count at least some of the New England States in the category. In this article, metropolitan areas from three representative Rust Belt States—Michigan, Ohio, and Pennsylvania—are examined.

[5] On the basis of aggregate employment data from the BLS Current Employment Statistics program, growth in the United States averaged about 2.1 percent annually from 1970 to 2000. Growth in the Rust Belt States averaged 1.2 percent annually over the same period. For the United States, average annual employment growth was comparable in the 1970–84 and 1985–2000 periods. However, for the Rust Belt States, annual growth in the 1970–84 period averaged 0.7 percent (about one-third of the U.S. average), while growth in the 1985–2000 period averaged 1.7 percent (just over three-quarters of the U.S. average).

[6] Most notably, Timothy Dunne, Mark J. Roberts, and Larry Samuelson, "Patterns of Firm Entry and Exit in U.S. Manufacturing Industries," *RAND Journal of Economics,* winter 1988, pp. 495–515; "Plant Turnover and Gross Employment Flows in the U.S. Manufacturing Sector," *Journal of Labor Economics,* January 1989, pp. 48–71; and "The Growth and Failure of U.S. Manufacturing Plants," *Quarterly Journal of Economics*, November 1989, pp. 671–98; and Steven Davis and John C. Haltiwanger, "Gross Job Creation and Destruction: Microeconomic Evidence and Macroeconomic Implications," in *NBER Macroeconomics Annual 5* (Cambridge, MA, National Bureau of Economic Research,1990), pp. 123–68; and "Gross Job Creation, Gross Job Destruction, and Employment Reallocation," *Quarterly Journal of Economics,* August 1992, pp. 819–63.

[7] Job flows in this context deal with changes in employment at the *place of work*. These changes are associated with the startup or closing of an establishment, as well as the expansion or contraction of an establishment's workforce. Such flows are in contrast to what are often referred to as "worker flows"—changes in employment from the perspective of the worker (that is, hires and separations associated with employment, unemployment, and job vacancies).

[8] Randall W. Eberts and Edward Montgomery, "Cyclical versus Secular Movements in Employment Creation and Destruction," NBER Working Paper No. 5162 (National Bureau of Economic Research, 1995), is the most notable, using establishment microdata to explore State-level job flows.

[9] For a definition of *MSA*, see *Revised Statistical Definitions of Metropolitan Areas (MAs) and Guidance on Uses of MA Definitions*, Bulletin 99–04 (Office of Management and Budget, 1999).

[10] A detailed description of the LDB, its creation, and its uses is given in Timothy R. Pivetz, Michael A. Searson, and James R. Spletzer, "Measuring job and establishment flows with BLS longitudinal microdata," *Monthly Labor Review,* April 2001, pp. 13–20.

[11] Among several other studies that have appealed to the LDB at various stages of its development are David Card and Alan B. Krueger, Minimum Wages and Emploment: A Case Study of the Fast-Food Industry in New Jersey and Pennyslvania: Reply," *American Economic Review,* December 2000, pp. 1397–1420; James R. Spletzer, "The Contribution of Establishment Births and Deaths to Employment Growth," *Journal of Business and Economic Statistics,* January 2000, pp. 113–26; and R. Jason Faberman, "Job creation and destruction within Washington and Baltimore," *Monthly Labor Review,* September 2001, pp. 24–31.

[12] These MSA's also include primary metropolitan statistical areas (PMSA's)—MSA's that are subregions of larger metropolitan areas. If an MSA crosses State boundaries, the State it is identified with is the one in which the majority of its employment (either employees or establishments) resides. For those MSA's which cross the boundaries of States outside of the three studied (namely, the Philadelphia, PA–NJ, PMSA; Cincinnati, OH–KY–IN, PMSA; and Steubenville–Weirton, OH–WV, MSA), the relevant data from the outlying States are appended to the sample.

[13] Data from this program are available on the Internet at the BLS website, **http://www.bls.gov**. The data include, among other things, monthly estimates of employment, unemployment, the labor force, and the unemployment rate for all States and MSA's back to 1991.

[14] In this study, "startup" establishments are establishments with positive employment in the current quarter of observation after having either zero or missing employment reported in the data for at least three previous quarters. Analogously, "shutdown" establishments are establishments with positive employment in the previous quarter and with either zero or missing employment reported for three subsequent quarters. These definitions differ from their BLS counterparts.

[15] This methodology is identical to that employed by Steven Davis, John C. Haltiwanger, and Scott Schuh, *Job Creation and Destruction* (Cambridge, MA, MIT Press, 1996).

[16] The age of an establishment is calculated from the "Initial Date of Liability" recorded on each establishment's UI record. For missing values, an age is assigned to all establishments that were classified as startups during the sample period. The age is assigned by simply noting the first quarter in which the establishment's entry appeared. For those establishments already in operation when they entered the sample, it is assumed that they had an age equal to the mean age of establishments with reported age data in the first quarter of 1992 for their State.

[17] The weighting is done with average employment (for employment growth, wages, job creation, and job destruction), establishments (for average size and age), or labor force (for unemployment). Wage growth is recalculated on the basis of the weighted average wage.

[18] The correlation between employment growth and average size is 0.33, while the correlation between employment growth and average age is –0.50. Both Pearson correlation coefficients are statistically significant.

[19] See Davis, Haltiwanger, and Schuh, *Job Creation and Destruction*, 1996; and Davis and Haltiwanger, "Gross Job Flows," 1999.

[20] See, for example, Patricia Anderson and Bruce Meyer, "The Extent and Consequences of Job Turnover," *Brookings Papers on Economic Activity: Microeconomics* (Washington, DC, Brookings Institution, 1994), pp. 177–249; Christopher Foote, "Trend Employment Growth and the Bunching of Job Creation and Destruction," *Quarterly Journal of Economics*, August 1998, pp. 809–34; and Simon Burgess, Julia Lane, and David Stevens, "Job Flows, Worker Flows, and Churning," *Journal of Labor Economics,* July 2000, pp. 473–502.

[21] A summary of this approach is in Peter Nijkamp, Piet Reitveld, and Folke Snickars, "Regional and Multiregional Economic Models: A Survey," in Peter Nijkamp and Edwin S. Mills (eds.), *Handbook of Regional and Urban Economics,* vol. 1 (Amsterdam, Elsevier, 1987), pp. 257–94.

[22] Weights are referred to as employment weights only for simplicity. See note 17 for the actual weight used for a particular statistic.

[23] The decomposition illustrated here follows that of Eli Berman, John Bound, and Zvi Griliches, "Changes in the Demand for Skilled Labor within U.S. Manufacturing: Evidence from the Annual Survey of Manufactures," *Quarterly Journal of Economics,* May 1994, pp. 367–97, except that it decomposes variables across areas, rather than across time.

[24] In the sample, 964 four-digit industries are represented. The decomposition was also done at the one-digit level; the results were qualitatively similar and so are not reported.

Appendix: Quarterly means, all Rust Belt metropolitan areas, by employment growth

Metropolitan area	Employment growth[1]	Wages (1992 dollars)	Wage growth[1]	Unemployment rate[1]	Job creation[1]	Job destruction[1]	Average establishment size[2]	Average establishment age[3]	Employment (thousands)
Grand Rapids–Muskegon–Holland, MI, MSA	0.83	$6,300	0.39	4.2	7.3	6.4	21.1	40.1	462
Columbus, OH, MSA	.78	6,226	.47	3.4	7.6	6.8	19.8	36.6	643
Hamilton–Middletown, OH, PMSA	.77	6,205	.33	4.5	7.5	6.7	17.4	37.2	97
Jackson, MI, MSA	.59	6,090	.23	5.4	7.3	6.7	15.9	45.1	47
Ann Arbor, MI, PMSA	.58	6,988	.74	3.1	7.4	6.8	18.3	37.3	212
Toledo, OH, MSA	.55	6,054	.40	5.3	7.5	6.9	18.8	42.1	259
Detroit, MI, PMSA	.54	8,050	.71	5.0	7.6	7.0	19.1	40.7	1,742
Cincinnati, OH–KY–IN, PMSA	.53	6,640	.76	4.4	7.4	6.8	19.2	37.9	670
Harrisburg, PA, MSA	.52	6,025	.31	3.6	6.5	6.0	20.9	39.7	261
Akron, OH, PMSA	.51	6,286	.23	4.9	7.3	6.8	16.8	40.7	264
Altoona, PA, MSA	.51	4,869	.25	6.0	6.7	6.2	17.2	41.7	47
Lancaster, PA, MSA	.49	5,860	.30	3.3	6.2	5.7	20.2	39.4	185
Sharon, PA, MSA	.47	5,183	–.07	6.1	7.2	6.7	16.5	41.7	40
Canton–Massillon, OH, MSA	.46	5,631	.23	5.5	6.8	6.4	16.9	42.7	151
Lansing–East Lansing, MI, MSA	.44	6,171	–.13	3.7	7.3	6.8	17.6	40.4	157
Lima, OH, MSA	.42	5,693	.30	5.8	6.9	6.4	18.5	45.6	64
York, PA, MSA	.42	6,014	.27	4.3	6.4	6.0	20.7	40.5	141
Cleveland–Lorain–Elyria, OH, PMSA	.41	6,676	.41	5.4	7.0	6.6	17.3	41.6	945
Philadelphia, PA–NJ, PMSA	.40	7,331	.39	5.5	7.1	6.7	17.9	38.8	1,877
State College, PA, MSA	.39	4,913	.25	3.3	7.6	7.2	15.7	37.7	40
Erie, PA, MSA	.37	5,661	–.02	6.0	6.7	6.3	19.1	42.7	110
Dayton–Springfield, OH, MSA	.35	6,346	.33	4.5	6.9	6.6	19.5	40.8	383
Reading, PA, MSA	.34	6,320	.27	4.6	6.5	6.1	20.1	42.8	141
Williamsport, PA, MSA	.34	5,087	.17	6.7	6.2	5.9	18.0	43.0	45
Allentown–Bethlehem–Easton, PA, MSA	.34	6,385	.24	5.3	6.9	6.5	16.8	40.7	227
Scranton–Wilkes-Barre, PA, MSA	.34	5,192	.26	7.2	7.0	6.6	17.9	41.1	231
Pittsburgh, PA, MSA	.32	6,463	.39	5.4	6.9	6.6	18.0	42.7	903
Kalamazoo–Battle Creek, MI, MSA	.32	6,260	.25	4.4	7.4	7.1	19.5	42.2	174
Saginaw–Bay City, MI, MSA	.31	6,910	.46	5.5	6.6	6.3	17.8	41.5	146
Benton Harbor, MI, MSA	.27	5,808	.54	5.7	7.9	7.7	16.3	42.5	59
Youngstown–Warren, OH, MSA	.24	5,823	.16	6.8	7.2	7.0	16.2	42.7	207
Mansfield, OH, MSA	.23	5,414	.25	6.9	7.0	6.8	18.0	44.8	67
Johnstown, PA, MSA	.21	4,714	.02	8.1	7.0	6.7	14.6	44.5	69
Flint, MI, PMSA	.18	7,520	.05	7.1	7.1	6.9	19.0	39.6	147
Steubenville–Weirton, OH–WV, MSA	.00	5,887	.00	7.8	6.4	6.4	15.4	43.0	42

[1] Percent.
[2] Number of workers.
[3] Number of quarters.
NOTE: Estimates are based on author's tabulations. Statistics are for March 1992 to March 2000. The unemployment rate comes from the BLS Local Area Unemployment Statistics program. (See text for details.) All other statistics are from the sample of ES–202 LDB establishments.