Firm and City Dynamics*

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Abstract

Several measures of business dynamism, including job reallocation rates, business entry rates, and young firms' share of economic activity, have all been declining over the recent decades in the United States. How do these changes in business dynamics interact with the evolution of cities? This paper documents the growing importance of agglomeration economies of cities and the horizontal expansion of multi-establishment firms in job creation and business entry. I use establishment-level data from the Census Bureau to document the following facts connecting firm and city dynamics. (1) U.S. cities have become similarly less dynamic, measured by the narrowing and the leftward shift in the distribution of job creation and destruction rates. (2) Larger cities are associated with even faster job creation and more business entry compared to the 1980s. City size alone accounts for more than 70% of total variation in employment changes across U.S. cities in the 2010s, compared to just over 50% in the 1980s. (3) The share of total establishment entry that takes place in the largest 5% metropolitan areas rose from 44% in 1978 to more than 51% in 2020. (4) About 40% to 60% of local job creation from establishment openings is due to the horizontal expansion of multi-establishment firms. This (average) share rises monotonically with city size. (5) The pace of industry churning within cities has slowed, and the diversity of industry composition has been mildly increasing.

1 Introduction

Each year about 90% of total new jobs created in the United States are located in metropolitan areas, which together represents 25% of the nation's toal land areas. Employment opportunities are unevenly distributed across these places as well. The largest 25 cities account for more than 50% while the largest two of them, the New York metropolitan area and the Greater Los Angeles area, alone account for about 15% of total job creation in the 381 Metropolitan Statistical Areas (MSAs)[1]. Over the past forty years, various measures of "business dynamism" including rates of job reallocation, business entry, or young firms' share of economic activity, have all declined. These long-run changes have attracted much attention and influential works such as Decker et al. (2020) links the decline in job reallocation to lower aggregate productivity. This paper documents new facts on the changing patterns of employment dynamics in U.S. cities, and points to the growing importance of agglomeration economies in job creation and establishment entry.

I first use disaggregated data covering the near-universe of firms in the U.S. to document that (1) employment growth, (2) industry churning, (3) job reallocation rate, and (4) share of young firm activity in U.S. cities have all declined compared to periods before 2000. A closer look at the data reveals

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[1] Throughout the paper MSAs are defined by the U.S. Office of Management and Budget (OMB) 2013 delineation.

that cities are changing their industry compositions more quickly than they are growing in employment. A decomposition of gross job reallocation reveals that even though the pace of employment turnover has declined substantially, the relative importance of the within-city, within-sector component has not decreased and still account for about 80% of total reallocation, consistent with the long-established observation in the literature that gross job flows reflect significant firm-level heterogeneity in response to the myriad economic events associated with business operations.

I then document the striking change in the distribution of job creation and destruction rates across metro areas. U.S. cities have become much similarly less dynamic, and the narrowing of dispersion is too big to be explained by a proportional decline of pace in all cities. I show that there has been a stronger positive association of city size and job creation. This increase in the dependence of employment dynamics on the external scale economies reflects the growing importance of the size of a city on establishment entry. A city that is 1% larger is associated with a 1% more new establishments in the 2010s. The correlation was 0.89% in the 1980s. This spatial aspect of the effects of economic density on employment dynamics has been relatively unexplored, and to the best of my knowledge these patterns are new to the literature.

This paper is related to the large literature that studies gross employment flows. There is also a long tradition in the urban literature that studies agglomeration economies and, mostly separately, the evolution of cities. Finally, this paper is broadly related to the firm dynamics literature and works that study the aggregate implications of the concentration of economic activities.

2 Data and Measurement

2.1 County Business Patterns Datasets

The U.S. Census Bureau's County Business Patterns (CBP) data series contains the information on employment, payroll, and establishments by six-digit NAICS industry for every county at an annual frequency. I use the 1975 to 2016 panel constructed by Eckert et al. (2021) which has a consistent set of 2012 North American Industry Classification System (NAICS) classification. The original CBP files by the Census Bureau saw changes of industry classification over time–using the Standard Industry Classification (SIC) system prior to 1998, and subsequently changing to the NAICS 1997 during the 1998-2002 period, updating to NAICS 2002, NAICS 2007, NAICS 2012, and so on. Eckert et al. (2021) reclassify employment during the 1975-2016 sample period to the same system and impute missing employment data in some county-industry cells, which were suppressed in the original files to preserve confidentiality. The data includes the number of establishments, employment during the week of March 12, first quarter payroll, and annual payroll.

2.2 Business Dynamics Statistics (BDS) Datasets

The Business Dynamics Statistics (BDS) data provide annual statistics on business dynamics, including measures of establishment openings and closings, job creation and destruction, and firm entries and exits. This dataset complements the region-industry employment patterns in CBP by providing statistics on the dynamics underlying the net employment changes. The BDS data measure the net change in employment at the establishment level and make available to the public various tabulations of the Census Bureau's administrative data at different levels of aggregation. For example, in the MSA-level one-way dataset, establishment-level employment changes are aggregated into year-MSA cells that represent the sum of individual changes within that city in a given year. The job flow measures include (1) the count of employment gains within the cell from establishment openings (births) between the week of March 12 of the prior year to the current year, (2) gains within the cell from continuing establishments that expanded, (3) losses from establishment closings, and (4) losses from continuing establishments that contracted. Table X (relabel later) summarizes the relationship between these four variables and other job flow measures I use in this paper. Table X in Appendix A (relabel later) include more detailed variable descriptions from the BDS documentations and Davis et al. (1996).

Notation	Variable name	Description
JCB_{st}	Job creation births	(1) in text
JCC_{st}	Job creation continuers	(2) in text
JDD_{st}	Job destruction deaths	(3) in text
JDC_{st}	Job destruction continuers	(4) in text
JC_{st}	(Gross) job creation	(1) + (2)
JD_{st}	(Gross) job destruction	(3) + (4)
NJC_{st}	Net job creation	$JC_{st} - JD_{st}$
GJR_{st}	(Gross) job reallocation	$JC_{st} + JD_{st}$
EJR_{st}	Excess job reallocation	$GJR_{st} - \lvert NJC_{st}\rvert$

Table 1: Job Flow Variables

The gross job flow statistics provide information about employment dynamics that is unavailable from net employment change figures. The following example from Davis et al. (1996) illustrate this idea. An employment growth of 2 percent in one city could be supported by either 4 percent job creation and 2 percent job destruction rates, or by 22 percent creation and 20 percent destruction rates. Specifically, let $E_{i,t}$ denote employment in year t for establishment i and $X_{i,t} = 0.5 \times \left(E_{i,t} + E_{i,t-1}\right)$ the average of employment in periods t and $t-1$. This quantity is referred to as the Davis-Haltiwanger-Schuh (DHS) denominator in the BDS's documentation. Job creation in year t for establishments classified in group s, e.g., in New York City or in the manufacturing sector, is the sum of all employment gains from expanding establishments from year $t-1$ to year t including establishment startups

$$JC_{s,t} = \sum_{i \in s^+} \left(E_{i,t} - E_{i,t-1}\right), \tag{1}$$

and job destruction is the sum of all employment losses from contracting establishments from year $t-1$ to year t including establishments shutting down

$$JD_{s,t} = \sum_{i \in s^-} \left(E_{i,t} - E_{i,t-1}\right), \tag{2}$$

where the superscripts + and − indicate the subset of establishments in group s that expand and contract, respectively. For growth rates, the analagous relationships are given by

$$jcr_{s,t} = \frac{JC_{s,t}}{X_{s,t}} \text{ and } jdr_{s,t} = \frac{JD_{s,t}}{X_{s,t}}.$$

Net Empl. Change $njcr = jcr - jdr$	Job Creation jcr	Job Destruction jdr	Gross Job Realloc. $gjr = jcr + jdr$	Excess Job Realloc. $gjr - \|njcr\|$
2%	4%	2%	6%	4%
2%	22%	20%	42%	40%

2.3 Data on Working-Age Population and Worker Education

The working age population is defined as those aged 15 to 64 following the Organisation for Economic Co-operation and Development (OECD). Population data is obtained from the Census Bureau's County Population by Characteristics Data. These county-level statistics are then aggregated to the Core-Based Statistical Areas (CBSAs) level using OMB's February 2013 definitions. The data on U.S. cities' workforce education attainment are from the 5 percent samples of the Census Bureau's 1980, 2000, and 2019 Integrated Public Use Microdata Series (IPUMS) Ruggles et al. (2023). Following Diamond (2016), the sample is restricted to workers who are between 25 to 55 years old working at least 35 hours per week and 48 weeks per year. The number of MSAs in the final sample is 213 in 1980, 223 in 2000, and 236 in 2019.

3 Empirical Patterns

3.1 Pace of Urban Evolution

3.1.1 Employment Growth and Gross Industry Turnover

Single industries expand or contract in cities. Local compositions of economic activities change over time. To summarize the pace of employment reallocation across sectors within each city, or industry "churning", I follow Duranton (2007) and Findeisen and Südekum (2008) to compute the following index for every city

$$Churn_c = \frac{1}{T} \sum_t \sum_j \frac{|\Delta E_{cj,t}|}{E_{c,t-1}}, \tag{3}$$

where $E_{c,t}$ is total employment in city c for year t and $\Delta E_{cj,t} = E_{cj,t} - E_{cj,t-1}$ is the net change in employment within each sector j. As noted in Findeisen and Südekum (2008), this index measures the average gross industry turnover in a given place over an observation period of T years, and the inner sum

$$\sum_j \frac{|\Delta E_{cj,t}|}{E_{c,t-1}} = \sum_j \frac{|E_{cj,t} - E_{cj,t-1}|}{E_{cj,t-1}} \frac{E_{cj,t-1}}{E_{c,t-1}}$$

is the average annual industry employment growth rates (in absolute values) weighted by the local employment shares. In the urban growth literature, this raw churning index $Churn_c$ is often compared to an index of city-level total employment reallocation for the same time period and sector definition,

$$\Delta EMP_c = \frac{1}{T} \sum_t \frac{|\Delta E_{c,t}|}{E_{c,t-1}} \tag{4}$$

to quantify the different paces at which a city changes its industry composition than it moves up or down the nation's city size distribution. That is, $Churn_c$ is the disaggregate version of the average rate of change

	Period	$Churn_c$	ΔEmp_c	$Churn_c/\Delta Emp_c$	$\Delta SecEMP$
Simple	1980-2000	8.33	3.87	2.15	3.84
Average	2000-2016	6.61	2.69	2.45	2.74
Population	1980-2000	8.70	3.48	2.50	4.20
Weighted	2000-2016	7.44	2.48	3.00	3.57

Table 2: Industry Churing

ΔEMP_c, and is by construction larger in magnitude than ΔEMP_c whenever some industries grow while others shrink in a city c.

Table 2 reports the national averages of these indices for the subsample periods before and after 2000. Both $Churn_c$ and ΔEMP_c declined on average, but their ratio $Churn_c/\Delta EMP_c$ actually increased, regardless of whether we classify sectors at the two-digit (the level of "economic sector" in the NAICS definition), the three-digit ("subsector"), or the four-digit (industry group) NAICS level. The rate at which the industrial mix within an average U.S. city changes is more than twice the rate at which that city's total employment expands or contracts. In other words, industry churning occurs at a faster pace than metropolitan employment growth. However, we see that this difference in speed increased after 2000, in spite of the fact that both industry churning and employment growth have slowed.

We can compare the average churning index to the national rate of sectoral employment changes, defined by

$$\Delta SecEMP = \frac{1}{T}\sum_t \sum_j \frac{|\Delta E_{j,t}|}{E_{t-1}} \tag{5}$$

where $\Delta E_{j,t} = E_{j,t} - E_{j,t-1}$ and $E_{j,t}$ is employment in sector j for all metropolitan areas in year t, and E_t is the national employment level at time t. The inner sum

$$\sum_j \frac{|\Delta E_{j,t}|}{E_{t-1}} = \sum_j \frac{|E_{j,t} - E_{j,t-1}|}{E_{j,t-1}} \frac{E_{j,t-1}}{E_{t-1}}$$

is the average annual industry employment growth rates (in absolute values) weighted by the employment shares of each sector. The index is a measure for the general structural change that has occurred during the T sample periods. Table 2 reports this measure in the last column. The average industry turnover at the local level is larger than the national average, reflecting that regional employment does not co-move perfectly in magnitude with the national changes. For example, in 2000 the Transportation Equipment Manufacturing (NAICS: 336) subsector employed 2.13% of workers in the U.S. Its employment dropped by 6.3% from 2000 to 2001, and its average annual rate of change (in absolute value) between 2000 and 2016 was 5.15%, growing 62.5% of the time. Panel (A) in Table 3 compares these descriptions at the national level to the ten largest transportation equipment manufacturing MSAs whose local employment share of this industry is closest to the national level.

Panel (A)

MSA	Share	$\%\Delta_{2001}$	Avg. $\%\Delta_t$	% Grow	Avg. Emp.
Los Angeles-Long Beach-Anaheim, CA	2.07	2.92	6.86	31.25	32,838
Riverside-San Bernardino-Ontario, CA	2.15	6.08	8.79	37.50	5,899
St. Louis, MO-IL	2.29	1.10	11.83	43.75	1,613
Cincinnati, OH-KY-IN	2.49	7.64	8.18	50.00	1,602
New Orleans-Metairie, LA	2.34	8.70	16.60	56.25	1,277
Greenville, NC	2.50	9.09	13.70	43.75	1,001
Columbus, OH	2.21	5.93	9.15	50.00	1,581
Reading, PA	2.16	2.42	19.70	62.50	1,692
Dallas-Fort Worth-Arlington, TX	2.17	9.21	7.61	43.75	3,883
Mount Vernon-Anacortes, WA	2.22	1.27	12.87	50.00	1,023

Panel (B)

MSA	Share	$\%\Delta_{2001}$	Avg. $\%\Delta_t$	% Grow	Avg. Emp.
Los Angeles-Long Beach-Anaheim, CA	2.07	2.92	6.86	31.25	32,838
Riverside-San Bernardino-Ontario, CA	2.15	6.08	8.79	37.50	5,899
St. Louis, MO-IL	2.29	1.10	11.83	43.75	1,613
Cincinnati, OH-KY-IN	2.49	7.64	8.18	50.00	1,602
New Orleans-Metairie, LA	2.34	8.70	16.60	56.25	1,277
Greenville, NC	2.50	9.09	13.70	43.75	1,001
Columbus, OH	2.21	5.93	9.15	50.00	1,581
Reading, PA	2.16	2.42	19.70	62.50	1,692
Dallas-Fort Worth-Arlington, TX	2.17	9.21	7.61	43.75	3,883
Mount Vernon-Anacortes, WA	2.22	1.27	12.87	50.00	1,023

Table 3: Transportation Equipment Manufacturing (NAICS 336)

The second column of Table 3 shows the local employment share of the Transportation Equipment Manufacturing sector in 2000. The third column shows the rate of growth of this industry measured in absolute terms for each city. Even when a particular region has an employment share for an industry similar to that at the national level, its industries can change significantly more or significantly less than the national average. Transportation equipment manufacturing employment in the Dallas-Fort Worth metroplex fell by 9.21% from 4,405 in 2000 to 3,999 in 2001, and its average annual rate of change (in absolute value) between 2000 and 2016 was 7.61%, with employment declining from one year to another more than half of the time. On the other hand, the Greater Los Angeles metro area saw the continual decline of the transportation equipment manufacturing and by 2016 its local employment share was reduced to less than 0.85%, while the industry's national share was 1.55%.

There are significant variation in annual local industry growth rates as well as in employment shares. Panel (B) in Table Table 3 hints that industry employment compositions within cities can have spatial patterns, at least for the transportation equipment manufacturing industry in Miami and Indiana. However, even among places that have similar local employment shares, the trajectories of growth can greatly differ. Transportation equipment manufacturing employment in Tuscaloosa, Alabama, fell by 55.99% from 3,752 in 2000 to 1651 in 2001, and its average annual rate of change (in absolute value) between 2000 and 2016 was 38.79%, with employment declining from one year to another half of the time. However, at 2016 this sector still employed 19.67% of workers in Tuscaloosa, while the share in the Flint metropolitan area, Michigan, dropped from 10.95% in 2000 to a mere 4.32% in 2016.

3.1.2 The Magnitude and Sources of Urban Job Reallocation

An important limitation of using sectoral or regional net employment changes to study the process of reallocation is that there are significant offsetting employment flows within sectors or regions at any time period. As documented by Dunne et al. (1989a,b) there are "large numbers of jobs being created in contracting industries (regions) and lost in expanding industries (regions)", and this simultaneous job creation and destruction gives rise to a substantially larger gross employment flows than the resulting net employment changes. In this section I use the BDS datasets, which contain job creation and destruction constructed from the near universal coverage of establishment level records, to document the changing patterns of U.S. city dynamics and decompose the gross employment flows into three components that track the evolution of a city's net employment growth, employment reallocations across sectors within city, and reallocations that happen within given sectors and within city.

Gross job reallocations in each city reflect the contributions of net employment changes as well as simultaneous job creation and destruction. The latter can be further decomposed into the between-sector employment shifts and the within-sector excess job reallocations in the city. Following Dunne et al. (1989a), gross job reallocation in city c at time t, $GJR_{c,t}$, can be written as the sum of three components,

$$GJR_{c,t} = \underbrace{|\Delta E_{c,t}|}_{\text{Net}} + \underbrace{\sum_j |\Delta E_{cj,t}| - |\Delta E_{c,t}|}_{\text{Across}} + \underbrace{\sum_j \left(GJR_{cj,t} - |\Delta E_{cj,t}|\right)}_{\text{Within}}, \tag{6}$$

where $\Delta E_{cj,t} = E_{cj,t} - E_{cj,t-1}$ is the net change in employment within each sector j and $GJR_{cj,t}$ is the gross job reallocation or total within-sector employment turnover in sector j.

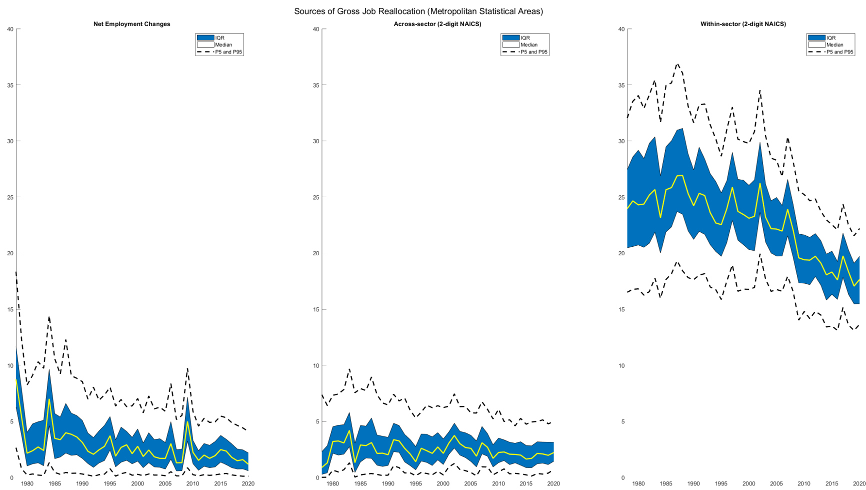


Figure 1: Decomposing Urban Job Reallocation

The first term in the above equation is the component of gross job reallocation which arises from the net expansion or contraction of city's employment. The second term, $\sum_j \left|\Delta E_{cj,t}\right| - \left|\Delta E_{c,t}\right|$, is the amount of job reallocation accounted for by different levels of net employment change across industries located in the same city that could not be attributed to growth or contraction of the metropolitan area. The third component is the within-sector employment turnover, which is the total of each industry's excess job reallocations in the city.

To compare the relative contributions of the three components to the overall decline in job reallocation rates across cities, I plot the evolution of each component for the median city, the interquartile range (IQR), and the 5-th and and 95-th percentiles over time. Figure 1 reveals several patterns about the distribution as well as the evolution of the pace of job reallocation over the last four decades. First, there is a large establishment-level heterogeneity, measured by the magnitude of within-sector turnover rates, as well as regional-level heterogeneity, measured by the differences in turnover rates. Second, the within-sector component (panel (c)) accounts for the majority of the gross job reallocation rate as well as its secular decline. Third, the dispersion of job reallocation rates measured by the IQR or the distance between the 95-th and 5-th percentile cities has also shrunk. This pattern is most pronounced in the right tail of the city distribution, that is, the more drastic change over time of the upper dashed lines in each of the three panels.

Table 4 summarizes these observations in numbers what Figure 1 conveys graphically. As a proportion of employment (the average of current and previous period employment in the given city, which is the DHS denominator $X_{c,t}$), all three components of total employment turnover are lower in the 2010s compared to the 1980s. The median rate of (the absolute value of) net employment growth of a city dropped by 1.92% from 3.94% to 2.03%. This slowing down implies lower movement of individual cities up and down the city size distribution measured in terms of an area's total work force. Decomposing excess job reallocation reveals two patterns. First, in both periods, sectoral shifts of employment opportunities from one industry

	Net Empl. Changes		Across-Sector Shifts		Within-Sector Shifts	
	1980s	2010s	1980s	2010s	1980s	2010s
A. As % of Employment						
5-th Pct.	2.30	1.13	1.53	0.93	18.89	14.81
25-th Pct.	3.19	1.62	2.48	1.71	22.07	16.90
50-th Pct.	3.94	2.03	3.24	2.31	25.16	18.75
75-th Pct.	4.87	2.66	4.06	2.87	29.60	20.47
95-th Pct.	7.46	3.53	5.19	3.59	33.32	22.69
B. As % of Total Turnover						
5-th Pct.	7.08	5.23	4.80	3.56	68.22	73.20
25-th Pct.	9.93	7.09	7.86	7.05	74.79	77.94
50-th Pct.	11.99	8.92	9.93	10.24	77.57	81.07
75-th Pct.	14.47	10.86	12.25	12.74	80.86	83.95
95-th Pct.	19.25	13.84	16.28	16.28	84.92	87.52

Table 4: Sources of Gross Job Reallocation (Metropolitan Statistical Areas)

to another are unable to account for excess job reallocation. The majority of simultaneous job creation and destruction happens within the same industry and metropolitan area. Second, the median rate of the across-sector and within-sector components declined by 0.92 and 6.41 percentage points, respectively, while the IQR dropped from 7.53 in the 1980s to 3.57 in the 2010s. Finally, even though all three components of urban job reallocation declined unanimously, their relative importance changed. The median net change component accounts for less of total turnover, while that of the excess reallocation components rise in importance. Table 4 treats the disaggregated turnovers as separate variables and reports the order statistics accordingly. However, for an individual city, an increase in the relative importance of one factor means a decrease in the relative importance of the others. This prompts the examination of the same results from a different angle in the next table.

The first three columns of Table 5 rank the 381 metropolitan areas in terms of gross job reallocation rates in the 1980s and the 2010s. The last three columns disaggregate the magnitude of each place's employment turnover into three components, expressed as a proportion of employment as well as a proportion of total turnover (indicated in brackets below the former rates). The Miami metropolitan area (33100, Miami-Fort Lauderdale-West Palm Beach, FL), one of the most populous places in the Southeast, has an average gross job reallocation rate of 27.29% in the 2010s and is among the highest 5% of all U.S. cities in terms of employment turnover rates. However, by the 1980s standard, this area would be considered one of the least dynamic of all urban regions. During that period the first quartile gross job reallocation rate was 29.11, about 11% coming from net employment changes in the city, 9% from reshuffling employment opportunities among 2-digit NAICS sectors, and 80% from reallocations across employers within the same industry and city. The table shows that there are substantial establishment-level heterogeneity within a city as well as across cities. The large within-sector component shows that employment growth outcomes exhibit enormous heterogeneity among establishments and firms that operate in the same sector and the same metropolitan area. At the same time, employment growth patterns differ across cities. As a proportion of the city's employment, less than 0.5% of total employment turnover came from between-sector shifts in South Florida, but in Springfield, Ohio, that number is 4.12%. There is no systematic relationship

Gross Reallocation Rate			MSA	Population	Net	Across	Within
5-th Pct.	1980s	25.45	Winston-Salem, NC	192,433	2.93	2.20	20.33
					(11.31)	(8.59)	(80.10)
	2010s	19.37	Waterloo-Cedar Falls, IA	110,042	1.72	2.70	14.94
					(7.67)	(14.46)	(77.87)
25-th Pct.	1980s	29.11	Dayton, OH	313,554	3.11	2.59	23.42
					(10.74)	(8.85)	(80.41)
	2010s	21.37	Springfield, OH	86,604	1.84	4.12	15.41
					(8.64)	(18.91)	(72.45)
50-th Pct.	1980s	32.61	Idaho Falls, ID	31,899	3.46	4.37	24.78
					(10.31)	(13.46)	(76.23)
	2010s	22.99	Gainesville, FL	200,677	2.43	1.56	19.00
					(10.74)	(6.51)	(82.75)
75-th Pct.	1980s	37.23	Salt Lake City, UT	267,686	2.18	3.69	31.35
					(6.13)	(9.73)	(84.14)
	2010s	24.93	Monroe, LA	115,918	1.74	3.42	19.77
					(6.75)	(13.77)	(79.47)
95-th Pct.	1980s	42.31	Cape Coral-Fort Myers, FL	108,866	7.16	1.34	33.80
					(16.96)	(3.11)	(79.93)
	2010s	27.29	Miami-Fort Lauderdale-West Palm Beach, FL	3,830,448	3.14	0.44	23.71
					(11.46)	(1.62)	(86.93)

Table 5: Metropolitan Statistical Areas and Gross Job Reallocation

between the size of a city's working-age population (represented by the average of an area's working-age population at the beginning and end of the decade for each period) and its job reallocation rates, but the relative importance of the within-sector component is positively correlated with the population size (the correlation coefficients are 0.44 in the 1980s and 0.48 in the 2010s).

3.2 Declining Business Dynamism and Growing Importance of Scale Economies

The literature on business dynamism has focused primarily on national-level changes or individual sectors, the majority being the manufacturing sector. However, over the past four decades several notable changes in the spatial patterns of employment have occurred. The section documents these patterns and presents evidence that suggests the growing importance of agglomeration economies may shed light on the changing patterns of aggregate business dynamics even when the geographic aspect is not of one's primary interest.

3.2.1 Distribution of Jobs and Employment Dynamics

The creation and destruction of employment opportunities is distributed unevenly across space. Panel (A) and (B) of Figure 2 show the distributions of (the logarithms of) job creation and destruction levels for the 381 metropolitan statistical areas in the U.S. Each observation is the 10-year average of the corresponding job flow for a given city, and the panels overlay the histograms that represent the 1980-1989 and the 2010-2019 sample periods. The distributions of both job creation and destruction are very right skewed. In the 1980s the median MSA created (destroyed) about 8,900 (8,100) jobs in an average year, but the national average (over all MSAs) was 33,000 (28,900). The mean job creation (destruction) level is almost 3.7 (3.6) time that of the median city in both sample periods. In the 2010s the median MSA created (destroyed) about 9,730 (9,000) jobs while the national average was about 36,800 (32,300). Over time the standard deviation of job creation (destruction) increased from about 89,500 (79,200) to 92,500 (81,100), and skewness decreased from 7.78 (7.93) to 6.55 (6.72). However, these changes in the distribution of the levels of job flows pale in comparison to that of job creation and destruction rates.

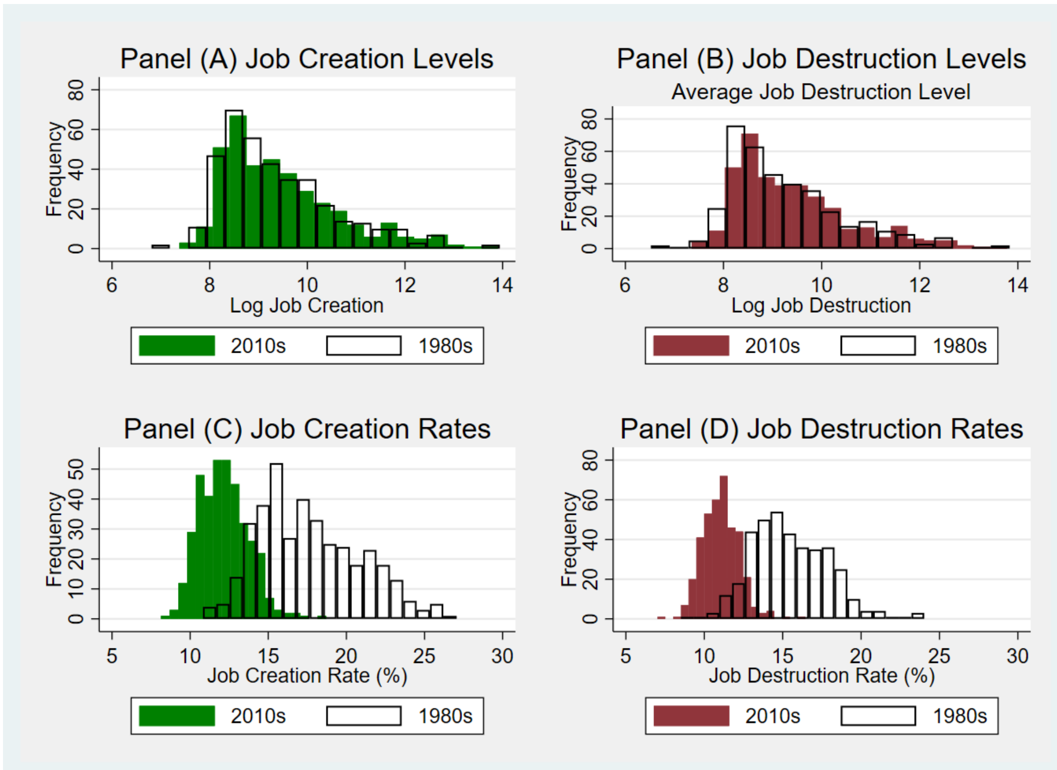


Figure 2: Distribution of MSAs

Panel (C) and (D) of Figure 2 show the drastic changes in the distributions of gross employment growth rates. U.S. cities have become much similarly less dynamic. The average job creation rate dropped from 17.62% in the 1980s to 12.15% in the 2010s, and the average job destruction rate dropped from 15.47% in the 1980s to 11.05% in the 2010s. The dispersion narrowed by too much to be explained by the proportional decrease with the mean. The standard deviation of job creation (destruction) rate was 3.23 (2.46) in the 1980s, but it decreased to 1.56 (1.16) in the 2010s.

The striking feature shown in Figure 3 is that cities have become much similar in terms of regional employment dynamics, but job creation and destruction remains very unequally distributed across cities. From 1978 to 2020, the spatial Gini coefficients for U.S. job creation in the 381 metropolitan areas average to 0.716 with very little time variation (standard deviation is 0.0069). Figure 3 displays the Lorenz curves of these Gini coefficients for each of the 43 years. Not only do the largest 20 cities create nearly half of all new jobs each year, the Lorenz curves are basically overlaps of each other. This shows that the similarity in employment dynamics observed in Panel (C) and (D) of Figure 2 is not caused by the covergence in the number of jobs created across places.

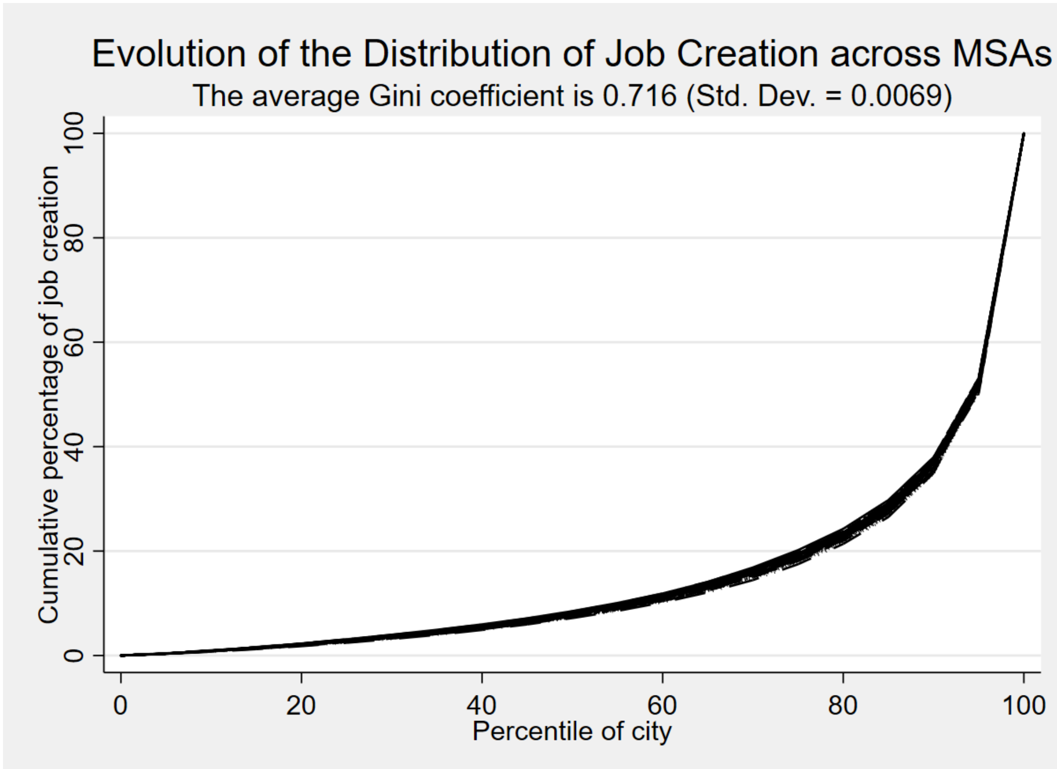
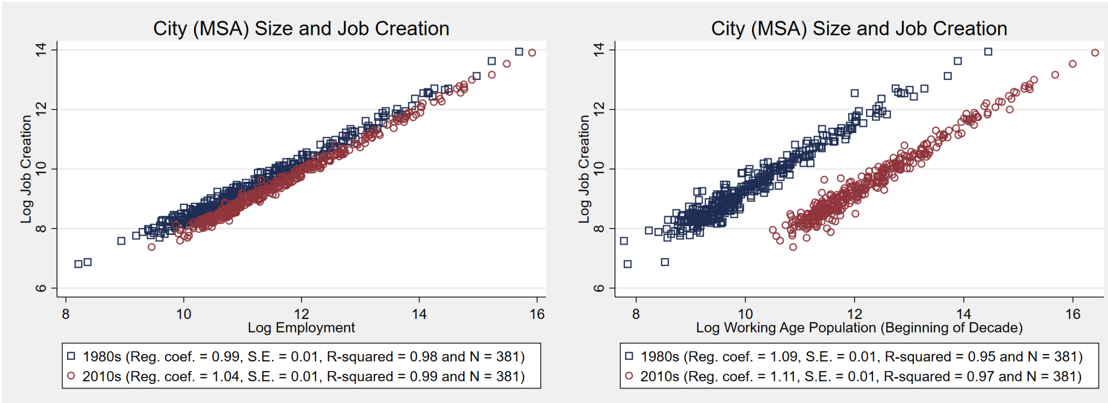


Figure 3: Lorenz Curves of Job Creation for U.S. MSAs

3.2.2 Job Creation and City Size

Larger cities have been associated with larger job creation, but over the last forty years this dependence of job growth on the size of a city has significantly gone up. Put differently, where jobs are matters more for how many jobs will be created, compared to four decades ago. A 1% increase in the size of a city, measured by the average of total employment in the MSA in t and $t-1$, is associated with a 1.04% increase in job creation in the 2010s, compared to a less than 1% increase in 1980s. The left panel of Figure 4 shows the evolution of this correlation between the logarithm of employment and job creation in the two time periods. This relationship has grown tighter and stronger over time, but the changes in these two variables are not proportional. The regression coefficient is larger, and the variation of job creation accounted for by this one variable grew from 98% to 99%. However, as cities grew larger, which can be seen from the shift to the right of the entire distribution, there is much less increase in the number of new job opportunities. This is reflected in the changing patterns of the distributions of urban business dynamism measures: even though the distribution of job creation levels across cities barely changed (Panel (a) of Figure 4), the distribution of job creation rates not only shifted to the left but also grew much more concentrated compared to the 1980s (Panel (b) of Figure 4). The disappearance of the right tail of job creation rate distribution indicates that we no longer observe "small" cities adding "large" amounts of new positions from one to another. Instead, there is a stronger alignment between a city's size and its job creation, which is reflected in the higher correlation between the two variables.



(a) Measuring Size Using DHS Denominator

(b) Measuring Size Using Working-Age Population

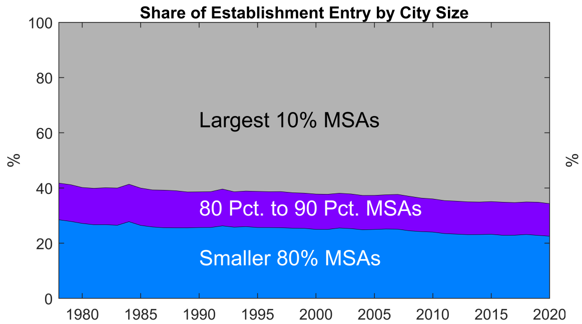
Figure 4: MSA Size and Job Creation

	Panel (A) Dependent Variable (in Logs)						Panel (B) Dependent Variable (in Logs)					
	JC		JD		$\|NJC\|$		JCB		JCC		$EstEntry$	
	1980s	2010s	1980s	2010s	1980s	2010s	1980s	2010s	1980s	2010s	1980s	2010s
Log Emp.	0.99	1.04	0.99	1.01	0.96	1.22	0.97	1.04	1.01	1.04	0.89	1.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.05)	(0.04)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
R^2	0.98	0.99	0.98	0.99	0.52	0.72	0.95	0.97	0.99	0.99	0.92	0.94
Log Pop.	1.09	1.11	1.10	1.08	1.06	1.30	1.08	1.11	1.10	1.10	0.99	1.08
	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)	(0.04)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
R^2	0.95	0.97	0.96	0.97	0.51	0.70	0.94	0.96	0.96	0.96	0.92	0.95

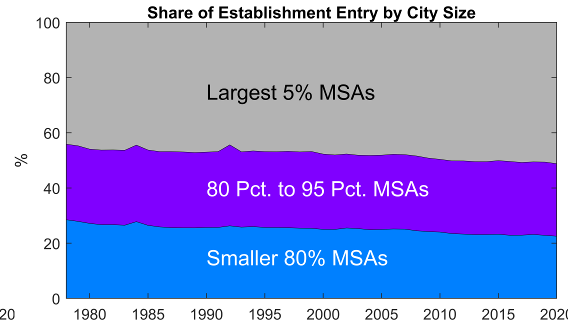
Table 6: Metropolitan Statistical Areas and Gross Job Reallocation

Panel (b) of Figure 2 shows an alternative measure of city size. The growth of working-age population in U.S. cities is larger than the corresponding growth of employment. In 1980 the 381 MSAs account for 82.10% of total population and 87.45% of total job creation in the U.S. These figures increased by 3.39 percentage points to 85.49% and by 1.5 percentage points to 88.95%, respectively. This results in the clear separation of the city distributions in the two periods shown in the scatter plot. In the 1980s, a 1 percent increase in a city's initial size, measured by its working-age population at the beginning of the decade, is associated with a 1.09 percent increase in the city's job creation level, measured by the 10-year average of its annual job creation levels. The alternative measure of city size explains 95 percent of variation of job creation levels across cities. Over time the positive association between size and job creation grew stronger, a regression coefficient of 1.11, and tighter, a R-squared of 0.97.

Table 6 summarizes the relationship between alternative measures of city size and job flow statistics. The job flow variables are as defined in 1, $EstEntry$ is establishment entry, Log Empl. is the log of DHS denominator, and Log Pop. is the log of working-age population. The rows labeled by the regressors



(a)



(b)

Figure 5: Share of Establishment Entry by City Size

present the regression coefficients for each dependent variable in the corresponding column. The numbers in round brackets are the standard errors corresponding to the coefficients above them. For job creation, its elasticity with respect to size has the same increasing pattern over time regardless of the choice of employment or working-age population to measure city size. For job destruction, however, the correlation with employment slightly increased but that with working-age population slightly decreased. The net change, measured by the absolute value of the difference of job creation and destruction, sees a much larger growth in its positive association with size measures. Furthermore, in the 1980s only about half of the variation in net employment changes across cities was explained by size, but the role of size increased dramatically by about 20% for both toal employment and working-age population.

Panel B of Table 6 further break down job creation into the entry component–job creation births, which is the count of employment gains from establishment openings, and the expansion component–job creation continuers, which is the count of employment gains from continuing establishments that expanded between the week of March 12 of the prior year to the current year. We see that job creation due to new establishments grows to be more dependent on city size over time, while the changes for those due to establishment expansions are less pronounced. The pattern can be seen by looking at establishment entry, the count of new establishments born within the city during the last 12 months. A one percent larger city is associated with one percent more establishment openings. This relationship was about 10% less as strong three decades ago.

3.2.3 Establishment Entry and Horizontal Expansion of Firms

Large cities attract disproportionately more business entries. Figure 5 shows that the smaller 80% of MSAs account for less than 30% of total establishment openings in the U.S. each year, and this fraction has been declining continually to less than 23% in 2020. In contrast, the largest 5% of metro areas have seen a steady increase in the share of establishment entries from about 44% in 1978 to more than 51% in 2020.

An establishment opening can either reflect a newly founded company starting up business or an existing firm opening a local branch or plant. The first case represents a startup entry and is recorded with a firm age of zero in the BDS data, while the second case represents the horizontal expansion of incumbent

	Year	Smallest 25%	Lower-middle	Upper-middle	Largest 25%
Average Share of Local Establishment Entry (%)	1980	23.03	23.93	24.40	24.41
	2000	32.88	33.73	34.27	35.52
	2020	34.60	34.37	33.59	32.79
Average Share of Local Job Creation from Establishment Opening (%)	1980	38.85	41.45	43.09	46.16
	2000	51.17	54.46	56.32	60.46
	2020	46.14	46.72	48.48	53.94

Table 7: Share of Multi-Establishment Firm Entry in U.S. Metropolitan Areas

firms at least one year of age. The contribution of multi-establishment firms in local job creation has been rising over the decades. The upper panel of Table 7 presents the fraction of local establishment openings that are due to the horizontal expansion of existing firms. Each cell reports the ratio

$$\frac{\text{\# of establishments from firms of age} \geq 1}{\text{\# of establishments from firms of age} \geq 1 + \text{\# of establishments from firms of age} = 0}$$

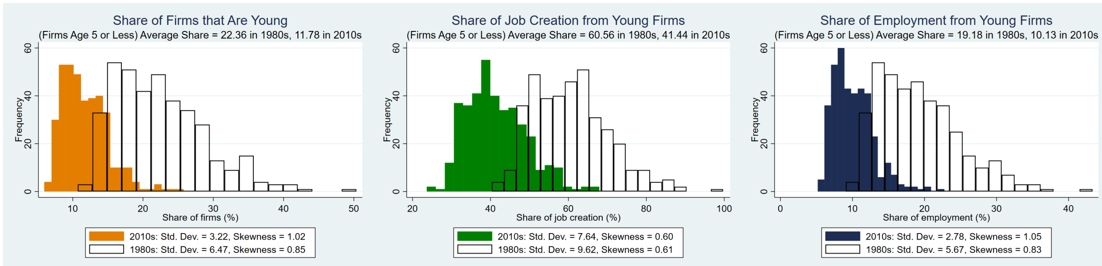
in an average city in the size group indicated by the corresponding column. The panel shows the growing importance of the horizontal expansion of firms in driving business entry, but the positive relationship between multi-establishment firm entry share and city size curiously reverted after 2000. The lower panel shows that the significant role of horizontal expansion in local job creation. Among all job creation from establishment openings, the new branches of incumbent firms can account for more than half of the job growth in the largest 25% of cities. Combining the observations from the two panels show that new establishments due to horizontal expansions are larger than the typical startups. The national average size of a startup establishment is 5.56 workers, while that of a multi-establishment one is 13 workers.

3.3 Employment Composition

Having documented that most job reallocations occur within rather than across the confines of cities and that idiosyncratic factors dominate total turnovers, the natural next question is, how has the process of reallocation changed the composition of urban economic activities? In this section I document patterns along three dimensions of employment composition: (1) firm demographics, (2) specialization and diversity, and (3) employee education attainment.

3.3.1 Firm Demographics

This section documents the changing patterns of urban employment in terms of (1) the share of firms that are young, (2) the share of job creation from young firms, and the share of employment from young firms.



(a) Firms (b) Job Creation (c) Employment

Figure 6: Young Firms' Share of Economic Activity

Following Decker et al. (2014), young firms are defined as firms less than or equal to 5 years old in the BDS data.

Young firms are more concentrated in larger cities, and this spatial distribution has become more uneven, as measure by the gap between the national average and the median city.

3.3.2 Specialization and Diversity

To measure the degree of specialization or diversity in a place and to compare across places, I use the Census Bureau's County Business Patterns data to calculate the following statistics. The relative specialization index for city c, denoted by RZI_c following Duranton and Puga (2000), is defined as

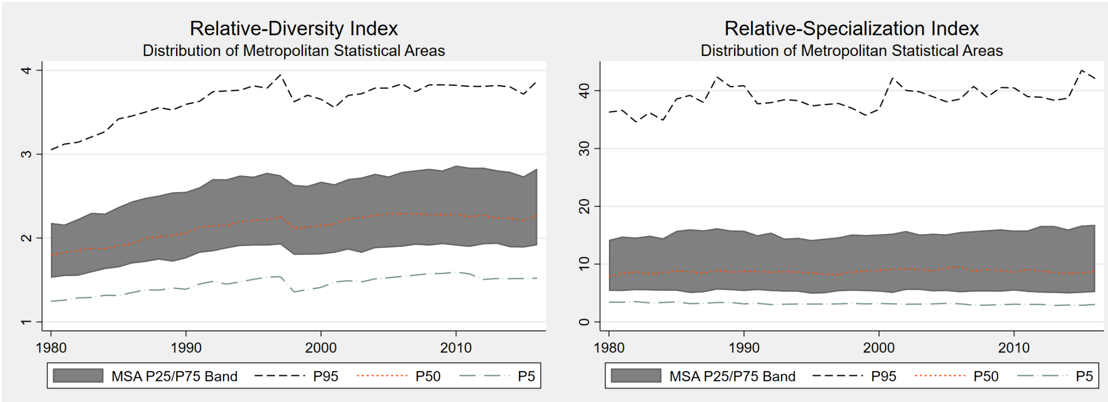
$$RZI_c = \max_j \frac{s_{cj}}{s_j},$$

where s_{cj} is the share of industry j in city c and s_j is the share of industry j in national employment. This variable s_{cj}/s_j measures how specialized a city is in an industry by comparing the local employment share of that industry with its national share. For example, in the year 2000 the Transportation Equipment Manufacturing (NAICS: 336) subsector employed 2.13% of workers in the U.S., but the employment share of this industry in Springfield, Ohio, was 13.27%. The relative specialization index summarizes that the share of transportation equipment manufacturing in Springfield was 6.23 times larger than its share in national employment. The relative diversity index for city c, RDI_c, is defined as

$$RDI_c = \frac{1}{\sum_j \left| s_{cj} - s_j \right|},$$

which is the inversely proportional to the sum of absolute differences of a sector's local and national share of employment.

The following table summarizes the percentage of time from 1980 to 2016 that a city's largest or specializing sector, measured by the employment share of a particular sector or the sector corresponding to the largest location quotient RZI_c, respectively, is the same as the previous year.



(a) Diversity

(b) Specialization

Figure 7: Specialization and Diversity

Sector Definition	Largest	Second Largest	Most Specialized	Second Most
2-digit NAICS	87.05	71.22	81.10	61.15
3-digit NAICS	86.52	69.06	76.97	53.99

Figure 7 presents the evolution of the distribution of MSAs. The indices are calculated with respect to 3-digit NAICS classifications. Figure 8 shows the changes in specialization patterns for the same set of statistics grouped by a higher hierarchy. For example, changes in RZI for the NAICS sector 31 is the average change over all the 31x subsectors. The broadly defined manufacturing sector, NAICS 31-33, saw increases in the relative specialization index. The national employment shares of manufacturing sector 31, including food and apparel manufacturing, and sector 32, including wood product and chemical manufacturing, have declined from 18.3% to 16.4% and from 15.6% to 16.4%, respectively. The employment share of manufacturing sector 33, which includes metal, machinery, and furniture manufacturing, has increased from 15.1% to 16.0%.

3.3.3 Education

Employment opportunities and compensation differ greatly across places and for workers with different skill sets. The second column of Table 8 summarizes the wage gap between college and noncollege workers in 1980, 2000, and 2019. The difference between the average wage and salary incomes of workers with and without at least four years of college education rose from 0.4 log points in 1980 to 0.6 in 2000 and then to 0.64 in 2019. Not only do employment compensations between workers of different education levels diverge over the past four decades, the skill mix of workforce between different cities diverged as well. Table 8 also presents the quartiles of college employment share, defined as the percentage of workers in a MSA that have college education, for each period. In 1980, college workers composed of less than a third of a city's workforce in at least 75% of the 213 MSAs in our sample. The difference between the highest and lowest 25% of cities was about 10 percentage points. Over time the distribution of cities' college

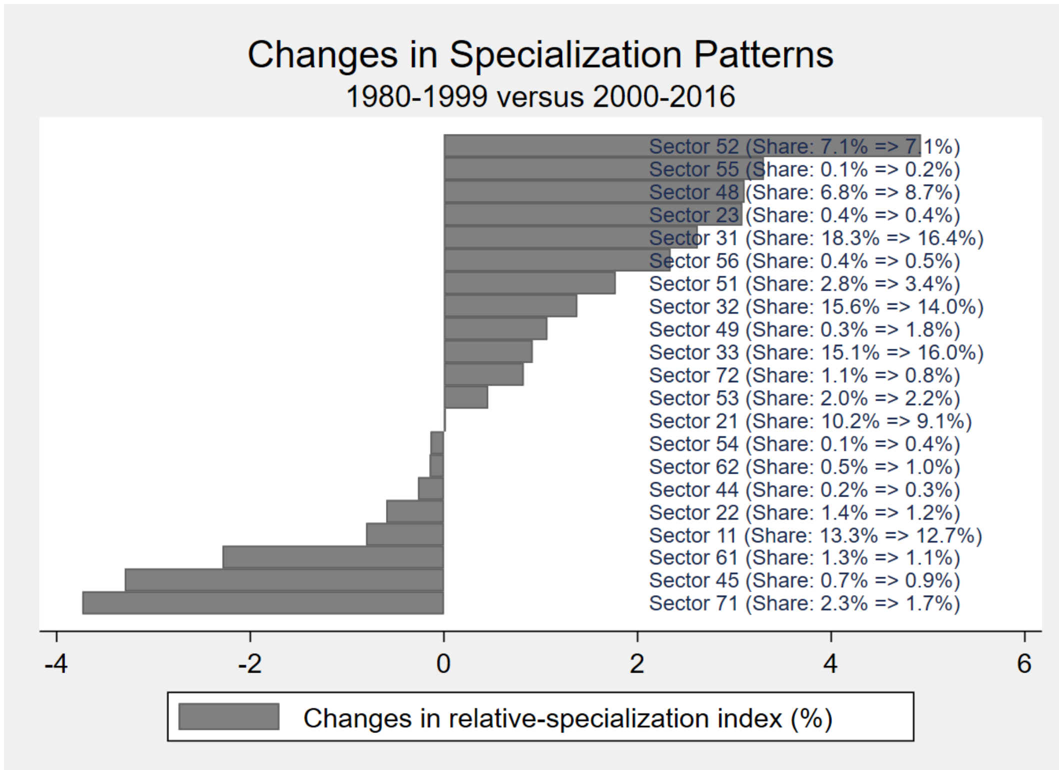
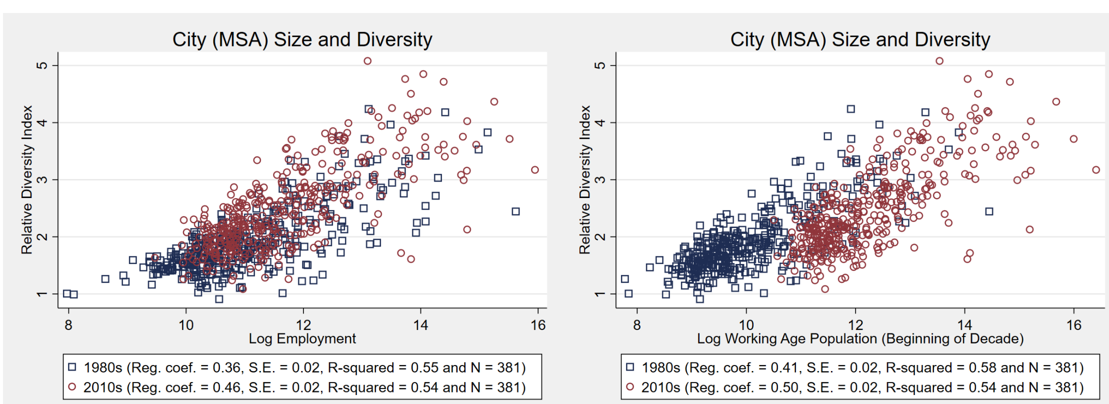


Figure 8: Specialization by 2-Digit NAICS Sectors



(a) Diversity

(b) Specialization

Figure 9: City Size and Diversity

employment share continually shift to the right. The 25-th percentile city in 2019 has a higher share of college-educated workers than the 75-th percentile city in 1980, and more than half of 25- to 55-year-old full time workers had college education in at least 25% of the 236 MSAs in our sample. The difference between the highest and lowest 25%, however, rose from 13.21 percentage points in 2000 to 16.9 in 2019.

Year	College Wage Premium (log difference)	College Employment Share 25-th pct.	College Employment Share 50-th pct.	College Employment Share 75-th pct.	Number of MSAs
1980	0.40	21.39	25.84	31.40	213
2000	0.60	26.36	33.44	39.57	223
2019	0.64	34.23	42.51	51.13	236

Table 8: Divergence of College Employment Ratio among U.S. Cities

Why are cities growing apart, then, while the education level of workers is rising in all places? In an influential paper, Diamond (2016) explains that an increase in skilled workers change a city's wages, rents, and amenities. These changes in turn make the city more attractive to skilled workers, thus reinforcing the geographic sorting according to skills. Empirically, Diamond (2016) shows that a higher share of college graduates in a city is associated with a higher subsequent growth of college graduates from 1980 to 2000. Alternatively, this higher growth is consistent with a scale-based explanation as well. I first replicate the regression result (Panel A of Figure 1) in Diamond (2016) using the 2013 definition of MSAs and extend the sample to 2019. I then carry out the estimation with the alternative regressor of city size, measured by the MSA's working-age population, and show that a larger initial size is also associated with a higher subsequent growth in college employment ratio.

	Dependent Variable					
	$\Delta \ln ColRatio$		$\Delta \ln ColRatio$		$\Delta \ln ColRatio$	
	1980-2000	2000-2019	1980-2000	2000-2019	1980-2000	2000-2019
$\ln ColRatio$	0.07 (0.05)	0.11 (0.02)			-0.20 (0.05)	-0.06 (0.03)
$\ln Pop$			0.09 (0.02)	0.04 (0.01)	0.12 (0.02)	0.04 (0.01)
R^2	0.01	0.05	0.16	0.06	0.23	0.07

Table 9: Education and City Size

Table 9 reports the regression results using three different specifications. The first column follows Diamond (2016) and regresses $\Delta \ln ColRatio$ on $\ln ColRatio$ using the 1980 sample total employment in each city as analytic weights for the 1980-2000 period and the 2000 employment for the 2000-2019 period. The second column runs the simple regression of $\Delta \ln ColRatio$ on $\ln Pop$, where Pop is the working-age population of a MSA. The third specification includes both $\ln ColRatio$ and $\ln Pop$ as regressors. The results suggest that both factors seem to be plausible contributors to faster college employment growth, but without further qualifications we can not tell whether it is the city's higher-educated workforce that further attracts more college graduates or it is because larger cities have more opportunities for college workers, or both.

4 Conclusion

The processes of firm entry, growth, decline, and exit create and destroy jobs within cities, but at the same time, where people live and work shapes the evolution of cities. Over the recent decades the external economies of scale offered by large cities is growing in importance even when one's primary interest is not in the spatial patterns but in the dynamics of firms. Compared to the more dynamic decades of the 1980s or 90s, when most cities had job creation rates of above 16%, cities now have lower job reallocation rates and less young firms economic activity, and business entry rates much more heavily depend on city size. Instead of regional convergence, what we see is that the 5% largest cities attract rising shares of all establishment entry in the U.S., while the smaller 80% of the metro areas' share gradually declined to less than 23% in 2020.

The observations made in this paper points to the dependence of growth on scale. The substantial amount of local job creation from establishment openings that is due to the horizontal expansion of multi-establishment firms, which is especially pronounced in the 2000s, points to a potential mechanism in understanding this agglomeration effect. This distinction between business entry from starting-up firms versus spatially-expanding incumbent firms have implications for regional development policies as well as for understanding the concentration of economic activity in the broader economy. These are the immediate next steps along the research agenda explored in this paper.

References

Davis, Steven J., John C. Haltiwanger, and Scott Schuh (1996) *Job Creation and Destruction*, Cambridge, Massachusetts: The MIT Press.

Decker, Ryan A., John Haltiwanger, Ron S. Jarmin, and Javier Miranda (2016) "Declining Business Dynamism: What We Know and the Way Forward," *American Economic Review*, 106 (5), 203–07, 10.1257/aer.p20161050.

——— (2020) "Changing Business Dynamism and Productivity: Shocks versus Responsiveness," *American Economic Review*, 110 (12), 3952–90, 10.1257/aer.20190680.

Decker, Ryan, John Haltiwanger, Ron Jarmin, and Javier Miranda (2014) "The Role of Entrepreneurship in US Job Creation and Economic Dynamism," *Journal of Economic Perspectives*, 28 (3), 3–24, 10.1257/jep.28.3.3.

Diamond, Rebecca (2016) “The Determinants and Welfare Implications of US Workers’ Diverging Location Choices by Skill: 1980-2000,” *American Economic Review*, 106 (3), 479–524, 10.1257/aer.20131706.

Dumais, Guy, Glenn Ellison, and Edward L. Glaeser (2002) “Geographic Concentration as a Dynamic Process,” *The Review of Economics and Statistics*, 84 (2), 193–204, http://www.jstor.org/stable/3211771.

Dunne, Timothy, Mark J. Roberts, and Larry Samuelson (1989a) “Plant Turnover and Gross Employment Flows in the U.S. Manufacturing Sector,” *Journal of Labor Economics*, 7 (1), 48–71, http://www.jstor.org/stable/2534989.

——— (1989b) “The Growth and Failure of U. S. Manufacturing Plants*,” *The Quarterly Journal of Economics*, 104 (4), 671–698, 10.2307/2937862.

Duranton, Gilles (2007) “Urban Evolutions: The Fast, the Slow, and the Still,” *American Economic Review*, 97 (1), 197–221, 10.1257/aer.97.1.197.

Duranton, Gilles and Diego Puga (2000) “Diversity and Specialisation in Cities: Why, Where and When Does it Matter?” *Urban Studies*, 37 (3), 533–555, 10.1080/0042098002104.

Eckert, Fabian, Teresa C. Fort, Peter K. Schott, and Natalie J. Yang (2021) “Imputing Missing Values in the US Census Bureau’s County Business Patterns,”Technical report, National Bureau of Economic Research.

Findeisen, Sebastian and Jens Südekum (2008) “Industry churning and the evolution of cities: Evidence for Germany,” *Journal of Urban Economics*, 64 (2), 326–339, https://doi.org/10.1016/j.jue.2008.02.003.

Ruggles, Steven, Sarah Flood, Matthew Sobek, Danika Brockman, Grace Cooper, Stephanie Richards, and Megan Schouweiler (2023) “IPUMS USA: Version 13.0 [dataset],” Minneapolis, MN: IPUMS.