Center for Research On the Wisconsin Economy
University of Wisconsin- Madison

Business Dynamism in the U.S. and in Wisconsin

Simeon Alder

Center for Research on the Wisconsin Economy, UW-Madison

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Abstract

The decline of business dynamism in the United States has garnered considerable attention in recent years. Academic research has highlighted various aspects of this decline in dynamism, among them the rise in market share concentration, the aging of firms, the rise in mark-ups, or the disappearance of young, high-growth firms. In this report, we review the available data with a particular focus on Wisconsin's entrepreneurial activity. In the process, we find that the lack of dynamism reported by the Kauffman indices, for example, is also on display in a number of other data sources like the Census' *Statistics of U.S. Businesses* or its *Quarterly Workforce Indicators*. We use standard growth accounting methods and a simple theoretical framework introduced by Hopenhayn et al. (2018) in conjunction with Census data on Business Dynamics Statistics (BDS) to decompose the evolution of startup rates over time. The decline in employment growth, which in turn is driven by a decline in the labor force participation rate, the secular aging of the population, and a drop the population growth rate, can account for about 70 percent of the drop in startup activity since 1977, in Wisconsin as well as the United States more broadly. In a second step, we use development accounting methods to compare Wisconsin's business dynamics to the broader trends in the United States. We find that Wisconsin's low exit rate accounts for the bulk of the gap in startup activity. While we cannot identify the *causes* of Wisconsin's low exit rate, it clearly is quantitatively important and in need of further research and policy attention.

1 Introduction

The decline in business dynamism has garnered considerable attention in recent years. A recent special report in The Economist magazine, for instance, lamented this decline, not just in the United States but in Western economies more generally.[1] Various aspects of this trend have also been the subject of a very active research program. Decker et al. (2016) document the decline of young, high-growth firms in the United States. Pugsley et al. (2018) argue that high-growth firms, "gazelles", are crucial for economic prosperity. Based on detailed longitudinal data they find that both the birth rate and growth potential of these gazelles has declined and argue that this has entailed substantial losses.

A corollary of this decline in startup and entry rates is a maturing of firms in terms of age and, thanks to the positive correlation between age and firm size, a rise in *concentration*. Using Herfindahl indices Gutiérrez and Philippon (2017) find that the concentration among Compustat firms has been rising since the mid-1990s and that turnover rates have been dropping at the same time. Loecker et al. (2018) find indirect evidence to support this rise in concentration in the form of increasing *markups* since the 1980s and argue that this reflects a rise in market power.

Arguably, the term "business dynamism" isn't particularly well defined, but there is a broad consensus that falling entry or startup rates, lower turnover, rising concentration, and increasing markups are symptomatic for the lack of factor reallocation from inefficient to more productive firms or establishments.[2]

While the causes underlying the decline of firm dynamism are beyond the scope of this paper, we are going to analyze recent trends in the United States and Wisconsin using standard growth and development accounting methods. To do so, we are going to follow the approach in Hopenhayn et al. (2018), where a simple accounting identity connects entry rates to employment growth, changes in firm size, and exit rates. This simple exercise will enable us to decompose the decline in entry rates and to identify what sets Wisconsin's trends apart from those in the rest of the nation.

Before we take this step, however, it's useful to briefly review how and to what extent Wisconsin's dynamism differs from the broader national trends.

1.1 Kauffman Indices

Based on data from the Current Population Survey (CPS), the Kauffman index finds that Wisconsin's entrepreneurship rate has been declining gradually relative to the corresponding rate for the U.S. as a whole.[3] In recent years, the rate in Wisconsin has hovered around ⅔ of the national rate, with some signs of a narrowing of this gap in 2016 and 2017. Among entrepreneurs, Wisconsin's fraction of so-called "opportunity" entrepreneurs – in contrast to "necessity" entrepreneurs – exhibits a pattern that

[1] "America v Europe: Dynamism has declined across Western economies", Special Report, The Economist, November 17, 2018

[2] In 2018, the Center released a report on the decline of new business formation since the Great Recession (Guo, 2018) with a particular focus on Wisconsin. It is available at https://crowe.wisc.edu/business-formation-in-wisconsin-during-and-after-the-great-recession/.

[3] The entrepreneurship rate is measured as the number of new entrepreneurs relative to the adult population.

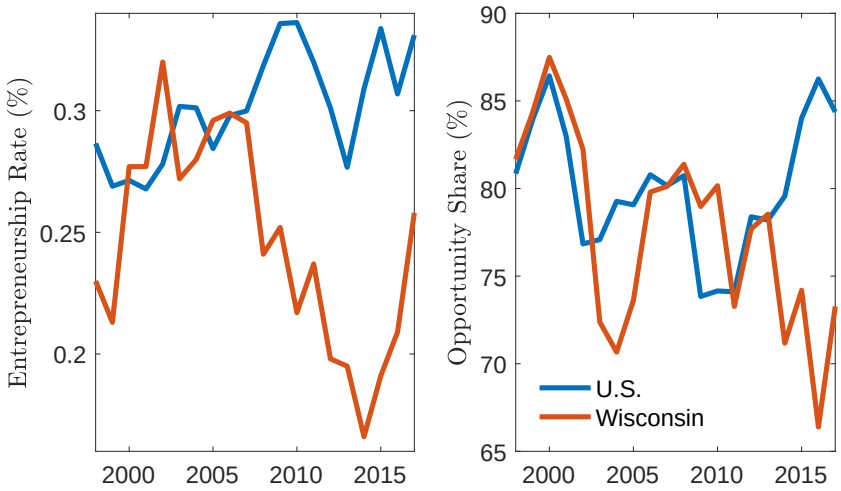

Figure 1: Kauffman Indicators of Entrepreneurship

is reminiscent of its entrepreneurship rate. In the late 1990s and all the way up to the eve of the Great Recession, the state and national shares followed similar trajectories. Since 2011, however, the U.S. rate has been on an upward trajectory whereas Wisconsin's has gone the other way. In 2016 the gap in the fraction of opportunity entrepreneurs reached 20 percentage points (66 percent in Wisconsin vs. 86 percent in the U.S.).[4] The gap shrunk by a few percentage points in 2017, the most recent available year in the data.

While entry rates (the number of startup firms relative to the incumbent firm population, "startup density" in Kauffman parlance) in the U.S. and the state follow similar downward trajectories since the late 1970s, Wisconsin lacks dynamism in relative terms since the rate is approximately 2 percentage points lower throughout the time period.

The overall picture of subdued dynamism relative to the country as a whole is mirrored in other firm and labor force data.

1.2 Statistics of U.S. Businesses (Census)

The Statistics of U.S. Businesses (SUSB) reports firm birth, death, expansion, and contraction rates (in terms of employment) at the state and national level and the rates suggest a relative lack of dynamism in Wisconsin. In many respects, it is reminiscent of trends and patterns implied by the CPS, Business Dynamics Statistics (BDS), and Business Employment Dynamics (BED) source data underlying the Kauffman indices.

The percentage change in employment that can be attributed to firm entry and expansion is about 1.2 percentage points lower than the corresponding national change. What's more, Wisconsin also com-

[4]The Kauffman index defines opportunity entrepreneurs as those new entrepreneurs who were *not unemployed* before starting their businesses. The indices for entrepreneurship are available here (for Wisconsin) and here (for the U.S.).

pares unfavorably to Illinois, Michigan, and Minnesota, although these differences are not statistically significant. Compared to Iowa, on the other hand, Wisconsin's change is 1.2 percentage points higher, although the difference is not statistically significant at conventional levels.

Similarly, Wisconsin's employment change due to exits and contractions is two full percentage points higher than the national rate and, again, the state compares unfavorably with neighboring states, except Iowa. Qualitatively, the same pattern emerges when we restrict our attention to the *extensive* margin (entry and exit) and this corroborates the evidence based on firm counts discussed earlier. The regression specifications and estimates are summarized in Appendix A.

Lastly, the lack of dynamism is also evident from labor force data.

1.3 Evidence from Labor Force Surveys

The Census Bureau's *Quarterly Workforce Indicators* (QWI) paints a picture of the Wisconsin labor force that mirrors the patterns in firm dynamism.[5] Apart from "mining, quarrying, and oil & gas exploration" (NAICS code 21) and "arts, entertainment, and recreation" (NAICS code 71), Wisconsin lags the nation in terms of hiring, separation, job creation, and job destruction rates, regardless of firm size or age, and in virtually all industries (at the two-digit NAICS level).[6] Appendix B contains plots of job creation and destruction rates by firm size, age, and sector.

2 Accounting for Business Dynamics

The business and labor force statistics as well as the reduced form evidence corroborate the state's lackluster business dynamism in the Kauffman indictors. An obvious next step is to identify the underlying sources of this deficit and we will use standard growth and development accounting tools to decompose the evolution of the startup (or entry) rate into its key components.

2.1 Accounting for the Startup Rate in the BDS

In a recent paper, Hopenhayn et al. (2018) derive an accounting identity from the definition of the average firm size:

$$\text{AFS} \equiv {}^{\text{EMP}}/_{N}, \tag{1}$$

where AFS is the average firm size, EMP is total employment, and N is the number of firms. A few steps of algebra yield the following identity:

$$\lambda = \xi - \widehat{\text{AFS}} + \widehat{\text{EMP}}, \tag{2}$$

[5] The QWI data is available at www.census.gov.

[6] A handful of sectors have rates that are roughly in line with national averages ("Real Estate and Rental and Leasing", "Accommodation and Food Services", and "Administrative and Support and Waste Management and Remediation") while the remaining sectors are less dynamic.

where λ is the startup rate (defined as the number of entrants divided by the number of incumbent firms), ξ is the exit rate, and $\widehat{\ }$ denotes percentage changes in average firm size and total employment.[7]

We can use this identity to decompose *changes* in λ over time or differences in λ across geographic units. Let's first look at the growth decomposition for Wisconsin and the U.S. separately. We will carry out the level decomposition – or "development" accounting – in a second step.

2.2 Growth Accounting: 1977-2014

Table 1 reports average rates for the 1977-2014 time period.

	U.S.	Wisconsin
Startup Rate	9.8%	7.6%
Exit Rate	8.7%	7.0%
Average Firm Size Growth	0.5%	0.8%
BDS Employment Growth	1.6%	1.4%

Table 1: Business Dynamics (1977-2014)

Clearly, Wisconsin differs from the aggregate economy in most dimensions. Both the entry and exit rates are significantly lower and employment growth in Wisconsin lags the US by about 0.2 percentage points. The average firm size in Wisconsin, on the other hand, has been growing 0.3 percentage points faster than its U.S. counterpart over the same time period.[8]

While the differences themselves are noteworthy – and we will decompose them in section 2.3 – three of the data series also exhibit time trends worth exploring.[9] In particular, we can decompose the change in the entry (or startup) rate into the contributions from the change in the exit rate, the change in the growth rate of the average firm size, and the change in the growth rate of employment.

Rather than using raw changes in the data, which is somewhat noisy at the annual frequency, we are estimating time trends for the individual data series by running the following regression:

$$x_t = \alpha_0 + \alpha_1 \cdot t + \epsilon_t,$$

where x_t is the entry rate, exit rate, average firm size growth rate, or the employment growth rate; ϵ_t is a zero-mean normal random variable. The coefficient of interest is α_1 and we report the estimates for the annual percentage point changes for the four data series in Table 2.

[7] We can derive equation (2) by taking logs on both sides of (1) and differentiating with respect to time. We can then further decompose the raw change in the number of firms into the number of new firms net of the number of exiting firms, i.e. $\dot{M} = E - X$. The corresponding entry and exit *rates* are denoted by λ and ξ.

[8] The employment numbers are from the BDS and include the near-totality of private non-agricultural workers. Among the excluded employee types are railroad employees, most government employees, the self-employed, and agricultural production workers. Consequently, BDS employment does not add up to the full size of the civilian labor force.

[9] The one exception is the growth rate of the average firm size. It's positive in Wisconsin as well as the aggregate economy, but the rate itself doesn't change very much over time. See also Table 2.

	US		Wisconsin	
Dependent Variable (x_t)	Annual	Cumulative	Annual	Cumulative
Startup Rate	-0.10 pp	-3.7 pp	-0.10 pp	-3.8 pp
Exit Rate	-0.04 pp	-1.5 pp	-0.03 pp	-1.0 pp
Average Firm Size Growth	-0.01 pp	-0.5 pp	0.00 pp	0.1 pp
BDS Employment Growth	-0.07 pp	-2.7 pp	-0.07 pp	-2.7 pp

Table 2: OLS Estimates for α_1 (cumulative, 1977-2014)

The startup rate is declining by a cumulative 3.7 (3.8) percentage points between 1977 and 2014 in the United States (Wisconsin). Now, recall that the startup rate is the sum of the exit rate and employment growth, net of average firm size growth. Thanks to this relationship, we can use rows 2-4 in Table 2 to decompose the observed drop in the startup rate. The employment growth rate declines by the same magnitude in the U.S. and Wisconsin. What sets Wisconsin apart from the U.S. is the evolution of the exit rate and average firm size growth. Since the exit rate in the U.S. drops by an additional 0.5 percentage points relative to the Wisconsin, the evolution of the average firm size has to account for the remaining 0.6 percentage point gap between exit rates. Average firm size grows at a mean rate that is 0.3 percentage points higher in Wisconsin (0.8% vs. 0.5% in Table 1). While this growth rate is fairly steady in Wisconsin (it declines a mere 0.1 percentage points over 37 years), it drops a more substantive 0.5 percentage points in the U.S. economy over the same time period.

We can use standard growth accounting tools to decompose the cumulative change in the startup rate – one of the standard measures according to which businesses have become less dynamic in recent decades – into the contributions from the change in the exit rate, the change in the average firm size, and the change in the employment growth rate.

	US	Wisconsin
Change in exit rate	39.5%	27.3%
Change in average firm size growth	-12.5%	1.9%
Change in BDS employment growth	72.9%	70.8%
Total	100%	100%

Table 3: Growth Accounting: Contributions to Change in Startup Rate

The negative contribution of the average firm size growth rate for the U.S. is explained be the negative coefficient on the time trend: the average firm size growth rate is declining over time while the entry (or startup) rate is doing the same. The simple accounting equation (2), on the other hand, establishes a *negative* relation ship between λ and $\widehat{\text{AFS}}$. Clearly, then, the negative change in the growth rate of the average firm size for the United States as a whole *withholds* rather than *contributes* to the declining entry rate. The negative effect of the U.S. average firm size growth is almost exactly offset by a larger contribution from the change in the exit rate compared to Wisconsin (39.5% vs. 27.3%) and $^7/_{10}$ of the

decline in the entry rate can be accounted for by changes in the employment growth rate, both in the U.S. and in Wisconsin.

Broadly speaking, the bulk – approximately 70 percent – of the decline in the startup rates is driven by the 2.7 percentage point drop in the employment growth rate we observe in both Wisconsin and the U.S. Put differently, the *trend* in startup rates is accounted for largely by the same forces.

To shed some light on differences in the *raw* rates rather than the time trands, we can use *development accounting* tools in order to decompose the difference between Wisconsin's and the U.S.'s startup rate into the contributions from differences in exit rates, average firm size growth, and employment growth.

2.3 Development Accounting: Wisconsin and the U.S.

	$\lambda_{US} - \lambda_{WI}$	$\xi_{US} - \xi_{WI}$	$\widehat{\text{AFS}}_{US} - \widehat{\text{AFS}}_{WI}$	$\widehat{\text{EMP}}_{US} - \widehat{\text{EMP}}_{WI}$
Average Difference (1977-2014)	2.2 pp	1.7 pp	-0.3pp	0.2 pp
Contribution to $\lambda_{US} - \lambda_{WI}$		79.4%	12.6%	8.0%

Table 4: U.S. vs. Wisconsin

Table 4 shows the simple average from 1977 to 2014 for each of the four time series. While the U.S. vs. Wisconsin gap is virtually constant for the employment growth and the startup (λ) rates, the difference tends to shrink slightly over time for the exit (ξ) and average firm size growth rates.

The bottom row in Table 4 decomposes $\lambda_{US} - \lambda_{WI}$ into the contributions from ξ, $\widehat{\text{AFS}}$, and $\widehat{\text{EMP}}$ gaps. In contrast to the growth accounting exercise, where the change in employment growth rates contributed the most to the *evolution* of startup rates in the U.S. and Wisconsin, respectively, the difference in the exit rate (+1.7 pp) accounts for almost 80 percent of the entry rate *gap*. While it's quite clear that the low exit rate plays an important role, we cannot identify the underlying causes with the available data.

While the growth and development accounting exercises cannot establish any causal relationship between λ, ξ, $\widehat{\text{AFS}}$, and $\widehat{\text{EMP}}$, we can draw two uncontroversial conclusions. First, while Wisconsin's business dynamism has diminished in the last four decades, the contributing factors are no different from those that are associated with the decline of the startup rate for the U.S. economy at large. In this respect, Wisconsin's business dynamism is declining for the same reasons as the United States'. The key contribution comes from changes in the employment growth rate, which, in turn, is driven by demographic change and secular shifts in the labor force participation rates for males and females. We will return to these broader demographic trends and their respective roles in Wisconsin compared to the U.S. in section 3 of this report.

Second, almost ⅕ of the 2.2 percentage point *gap* in startup rates between the U.S. and Wisconsin can be accounted for by differences in the *exit* rates. Wisconsin's annual exit rate is 1.7 percentage points

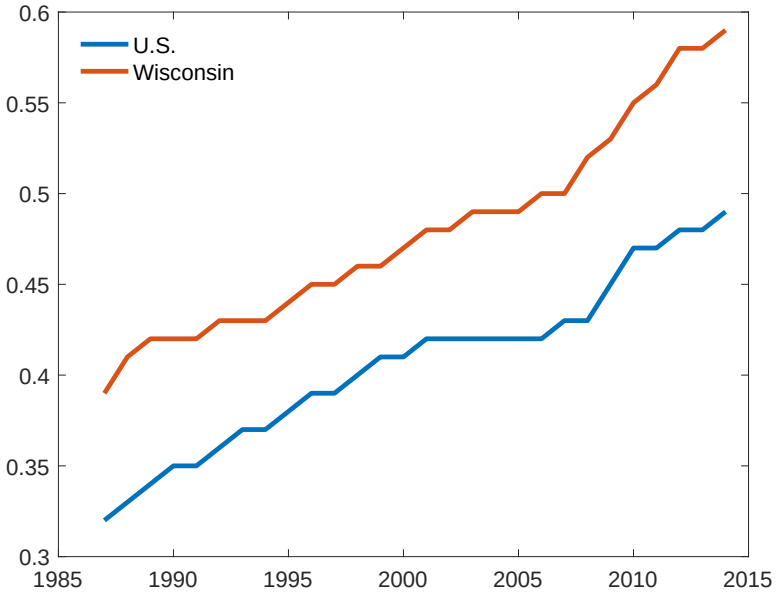

Figure 2: Fraction of Firms Aged 11+ Years

lower, on average, between 1977 and 2014. This lower-than-average exit rate can also account for differences in the age distribution of firms. Due to left-censoring in the Business Dynamics Statistics, we cannot compute moments like the mean or variance of the age distribution.[10] To circumvent this data limitation, a common statistic for the age distribution of firms is to compute the fraction of firms above a certain age. Following Hopenhayn et al. (2018), we compute the fraction of firms in existence for 11 years or more. We can accurately calculate this fraction from 1987 to 2014 and two stylized facts stand out.

The fraction of "old" firms in Wisconsin is, on average, 7.3 percentage points higher than the corresponding fraction for the whole economy. What's more, the population of firms in Wisconsin is aging more rapidly. The fraction of 11+ year old firms rises from 39 percent in 1987 to 59 percent in 2014 (+20 percentage points) while the corresponding numbers for the U.S. are 32 percent in 1987 and 49 percent in 2014, a rise of 17 percentage points.

Since firm age is positively correlated with firm size (in terms of employment) it's not surprising that the average firm size is rising more rapidly in Wisconsin than in the rest of the country. Figure 3 plots the average firm in the U.S. and in Wisconsin size over time. A simple regression of the average firm size on calendar time yields coefficients of +0.10 employees per firm per year in the U.S. and +0.17 employees per firm per year in Wisconsin.

[10] Left-censoring occurs since the birth year of firms that existed before 1977 is unknown.

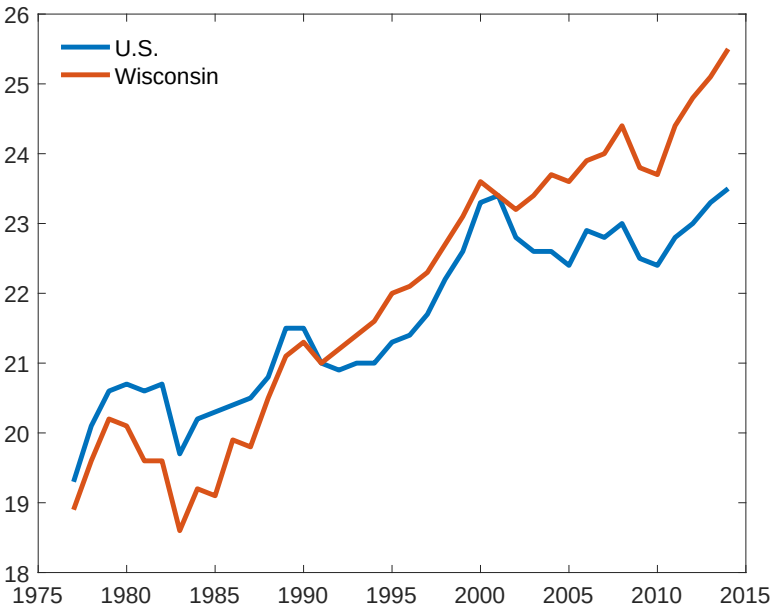

Figure 3: Average Firm Size (Employment)

3 Role of Broader Demographic Trends

The growth accounting exercise in 2.2 identifies the decline in employment growth as a key contributor to the decline in business dynamism. It doesn't, however, shed any light on the factors that contribute to the decline in employment growth among firms in the Business Dynamics Statistics (BDS). We can use a simple accounting identity to characterize the evolution of BDS employment growth in terms of broader demographic trends.

To begin with, recall that employment in BDS firms is a subset of aggregate employment, which in turn is a subset of the labor force. The labor force, in turn, is a subset of the working age population, which itself is a subset of the total population. We can characterize BDS employment as a function of the total population by way of simple accounting identity:

$$\text{EMP} = \underbrace{\frac{\text{EMP}}{\text{AEMP}}}_{\equiv \text{CR}} \times \underbrace{\frac{\text{AEMP}}{\text{LF}}}_{\equiv \text{ER}} \times \underbrace{\frac{\text{LF}}{\text{WAP}}}_{\equiv \text{LFPR}} \times \underbrace{\frac{\text{WAP}}{\text{POP}}}_{\equiv \text{DEM}} \times \text{POP}, \tag{3}$$

where EMP is employment in BDS firms, AEMP is aggregate employment, LF is the labor force, WAP is the working-age population (age 15 to 64), and POP is the total population.

Recall that EMP is effectively private, non-agricultural employment (see footnote in section 2.2 for details). Given the secular decline in agricultural employment and similar trends in public sector employment, it is no surprise that the ratio $\frac{\text{EMP}}{\text{AEMP}}$ is rising over time. We call this the "coverage ratio" and label it by CR.

Moreover, we define $\text{ER} \equiv \frac{\text{AEMP}}{\text{LF}}$ to be the employment rate. The ratio $\frac{\text{LF}}{\text{WAP}}$ is the labor force participa-

tion rate (LFPR) and DEM $\equiv \frac{\text{WAP}}{\text{POP}}$ captures broad demographic changes like aging.

We can then rewrite equation (3), take natural logs, and differentiate with respect to time:

$$\widehat{\text{EMP}} = \widehat{\text{CR}} + \widehat{\text{ER}} + \widehat{\text{LFPR}} + \widehat{\text{DEM}} + \widehat{\text{POP}} \tag{4}$$

On average, BDS employment grows at annual rates of 1.6 percent (U.S.) and 1.4 percent (Wisconsin), respectively. Over the same 37-year horizon, the gap in the average annual population growth rates is wider: 1.0 percent in the U.S. compared to 0.6 percent in Wisconsin. The percentage changes in CR, ER, LFPR, and DEM account for the 0.6 point gap in the U.S. and the corresponding 0.8 point gap in Wisconsin.

Table 5 decomposes employment growth into the five components on the right hand side of equation (4).[11]

	$\widehat{\text{EMP}}$	$\widehat{\text{CR}}$	$\widehat{\text{ER}}$	$\widehat{\text{LFPR}}$	$\widehat{\text{DEM}}$	$\widehat{\text{POP}}$
U.S.	1.6%	0.2%	0.2%	0.1%	0.1%	1.0%
Wisconsin	1.4%	0.2%	0.3%	0.3%	0.1%	0.6%

Table 5: Population and Employment Trends

While population growth accounts for almost $^2/_3$ of employment growth at the national level (1 percentage point out of 1.6), it only contributes 43 percent toward $\widehat{\text{EMP}}$ in Wisconsin. Growth in the employment rate (ER) and the labor force participation rate (LFPR), on the other hand, play a more significant role in Wisconsin compared to the nation as a whole. Put differently, Wisconsin "compensates" unfavorable population growth rates with stronger growth in the labor force participation and the employment rates. Demographic change, at least when measured by the simple working-age-to-total-population ratio, does not set Wisconsin apart from the rest of the United States.

Once we combine the decompositions in Tables 1 and 5, the 0.4 percentage point gap in $\widehat{\text{POP}}$ between Wisconsin and the U.S. accounts for less than 20 percent of the 2.2 percentage gap in startup rates.[12]

Recall, however, that we're not only interested in the growth rates themselves. We have shown earlier that startup rates have dropped significantly in the past four decades and that the *change* in the employment growth rate accounted for more than 70 percent of the roughly 4 percentage point *decline* in the startup rate, both in Wisconsin and in the United States. To identify the sources of the change in BDS employment growth, which was 2.7 percentage points in both places, we can again use the growth accounting tools from section 2.2. Just like we did using equation (3), we're estimating the coefficient on a linear time trend and we're reporting the cumulative linear change (i.e. $\alpha_1 \cdot (2014 - 1977) = \alpha_1 \cdot 37$) in Table 6.

What stands out immediately is that the slow-down of the labor force participation growth rate can account for two thirds of the decline in employment growth in Wisconsin. In the broader context of the

[11] Note that columns 2-6 may not add up to column 1 due to rounding.
[12] The exit rate gap accounts for almost 80 percent of the startup rate gap (see Table 1).

	U.S.	Wisconsin
Change in $\widehat{\text{EMP}}$	-2.7 pp	-2.7pp
Change in $\widehat{\text{CR}}$	-0.9 pp	-0.5pp
Change in $\widehat{\text{ER}}$	-0.1 pp	-0.2pp
Change in $\widehat{\text{LFPR}}$	-1.1 pp	-1.8pp
Change in $\widehat{\text{DEM}}$	-0.4 pp	-0.2pp
Change in $\widehat{\text{POP}}$	-0.2 pp	0.0pp

Table 6: OLS Estimates for α_1 (cumulative, 1977-2014)

numbers reported in Tables 2 and 6, the change in $\widehat{\text{LFPR}}$ accounts for almost half of the 3.8 percentage point decline in the state's startup rate. The contribution of $\widehat{\text{LFPR}}$ at the national level is a more modest 30 percent (-1.1 percentage points out of -3.7), approximately. While the population growth rate gap can account for at least some of the difference in startup rates, *changes* in population growth rates cannot shed much light on the decline of startup rates, particularly in Wisconsin where the population growth rate is low but steady (with no appreciable time trend).

4 Role of Manufacturing in Wisconsin Business Dynamics

One potential explanation for Wisconsin's older and larger firms is the relatively high share of employment and value added in the manufacturing sector. Figure 4 plots the aggregate concentration of old firms (11+ years) against the concentration in the manufacturing sector. Not only are manufacturing firms older, the concentration of 11+ year firms also rises more rapidly in manufacturing than in other sectors between 1977 and 2014 (+21 percentage points compared to +17 percentage points). Conceivably then, Wisconsin's high manufacturing employment share could contribute toward the observed concentration gap in Figure 2.

It turns out, however, that the heavy manufacturing presence is unlikely to contribute toward Wisconsin's rise in average firm sizes. The reason is that manufacturing has been bucking the upward trend that characterizes the size distribution when all sectors are combined. The average firm size in manufacturing has dropped from more that 70 employees in the 1970s to about 53 by 2014, a drop of about 20 employees per firm. While older firms tend to be larger in manufacturing as well as in the aggregate, firm sizes in manufacturing have been trending down *within* age groups while they have stayed fairly flat when we look at all sectors combined. Based on the size-by-age evidence in the right panel of Figure 5, Hopenhayn et al. (2018) argue that the rise in average firm sizes is mostly driven by the *aging* of firms rather than a trend in size for a given age. In manufacturing, however, firm size for a given age *is* dropping over time and is more than offsetting the composition effect associated with aging.[13]

[13]Unfortunately, the Census Bureau doesn't publish firm characteristics by state and sector in the BDS. For this reason, we cannot establish a tighter link between the sectoral composition and the age/size distribution of firms in Wisconsin.

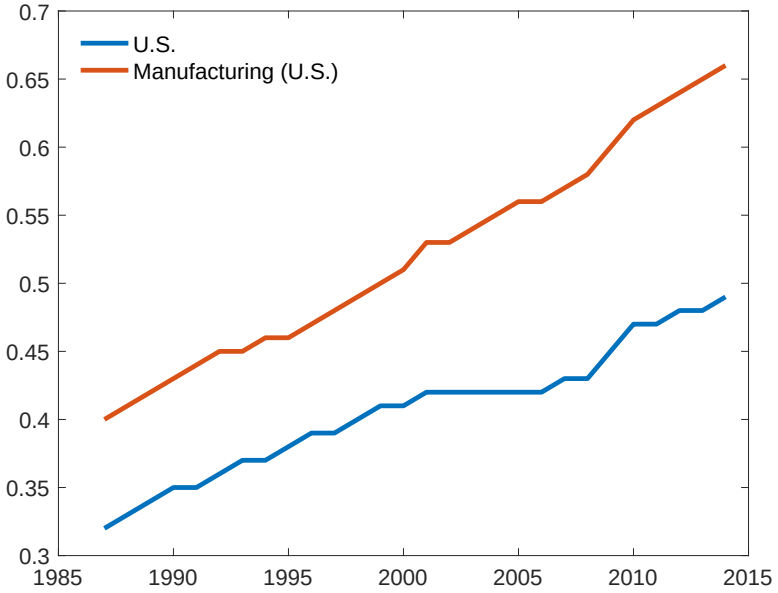

Figure 4: Fraction of Old (11+ Years) Firms

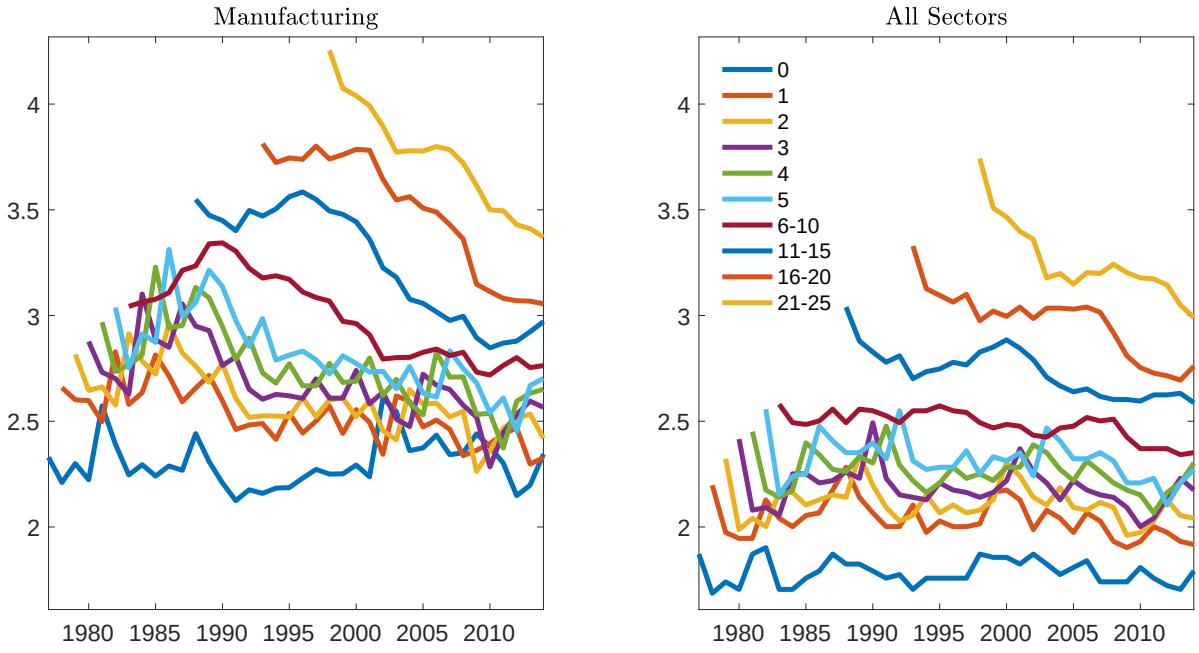

Figure 5: Firm Size by Age

5 Conclusion

The Hopenhayn et al. (2018)-style accounting exercise highlights the fact that the *decline* in firm dynamism in Wisconsin is driven by the same factors as the broader national trend: the change in employment growth can account for more than 70 percent of the decline in the state and at the national level. The growth in employment itself is driven by a combination of demographic trends and changes in the labor force participation rates. While we do not separately account for migration in this particular exercise, it is worth mentioning that Wisconsin has experienced significant out-migration in recent years and decades, which has certainly contributed to lackluster labor force growth but we do not attempt to quantify this effect here.

What is more salient from a policy viewpoint is the consistent *gap* in dynamism between Wisconsin and the rest of the country. The results in 2.3 suggest that the low exit rate is a key contributing factor toward the slow churn of firms, a result that has been documented by Conroy et al. (2018), for instance.[14] We cannot shed any light on the *causes* of the low exit rate using growth and development accounting tools, but this certainly is an aspect of the Wisconsin worthy of further attention by policymakers and future research.

References

CONROY, T., I.-C. CHEN, C. CHRIESTENSON, M. KURES, AND S. DELLER (2018): "Slow Churn: Declining Dynamism in America's Dairyland," Technical report, University of Wisconsin Extension.

DECKER, R. A., J. C. HALTIWANGER, R. S. JARMIN, AND J. MIRANDA (2016): "Where has all the skewness gone? The decline in high-growth (young) firms in the US," *European Economic Reviewe*, 86, 4–23.

GUO, J. (2018): "Business Formation in Wisconsin During and After the Great Recession," *CROWE Policy Brief*.

GUTIÉRREZ, G. AND T. PHILIPPON (2017): "Declining Competition and Investment in the U.S." *NBER Working Paper*, 1–74.

HOPENHAYN, H., J. NEIRA, AND R. SINGHANIA (2018): "The Rise and Fall of Labor Force Growth: Implications for Firm Demographics and Aggregate Trends," *NBER Working Paper*, 1–28.

LOECKER, J. D., J. EECKHOUT, AND G. UNGER (2018): "The Rise of Market Power," *Working Paper*, 1–84.

PUGSLEY, B. W., P. SEDLACEK, AND V. STERK (2018): "The Nature of Firm Growth," *Working Paper*, 1–90.

[14] Available at https://cced.ces.uwex.edu/files/2018/07/2018-07-20-Declining-Dynamism.pdf.

A S.U.S.B. Regression Results

The S.U.S.B. data contains information on establishments and employment. Given our focus business dynamics, we are particularly interested in employment changes due to establishment births (entry), deaths (exit), expansions, and contractions. The data are tabulated by state, industry, and employment size bins of the enterprise and uses the 2012 NAICS codes to classify industries. This level of detail enables us to estimate the following regression:

$$y_{sit} = \gamma \mathrm{I}_{WI} + \alpha_1 \mathrm{I}_{\text{NAICS}} + \alpha_2 \text{time} + \beta_1(\text{initial employment}) + \beta_2(\text{initial establishment size}) + \epsilon_{sit} \quad (5)$$

The left-hand-side variable y_{sit} is (1) change in employment attributable to firm entry and expansions or (2) employment change due to exit and contractions. Since we're interested in Wisconsin's business dynamism compared to the nation as a whole as well as neighboring states, we estimate the coefficients separately on the following subsets of states: all states, WI & IA, WI & IL, WI & MI, WI & MN.

In the table below we report the estimates for the Wisconsin dummy. Each row is a different dependent variable. Each column lists estimates for a different set of comparison states. The standard errors are reported in parentheses.

	WI vs. US	WI vs. IA	WI vs. IL	WI vs. MI	WI vs. MN
Due to entry and expansions	-1.20*	1.16	-0.98	-3.41	-0.61
	(0.52)	(0.73)	(0.58)	(1.72)	(0.62)
Due to exit and contractions	2.02*	-0.49	1.77**	5.38***	1.84
	(0.59)	(0.95)	(0.50)	(1.37)	(1.17)

Table 7: Employment Change

Wisconsin's employment change is smaller, in absolute value, in comparison with the U.S. and neighboring states, except Iowa. In most cases, however, the difference is not statistically significant. The employment change due to entry and expansions is positive and a negative estimate for the Wisconsin dummy means that employment expands less. The interpretation of the dummy for the employment change due to exit and contractions is analogous. Since the actual change in employment is negative, a positive dummy means that employment due to exit and contractions shrinks *less* compared to the control group of states. This corroborates the lack of dynamism in labor markets. The same picture emerges when we estimate the Wisconsin dummy with establishment birth and death rates as the dependent variable.

	WI vs. US	WI vs. IA	WI vs. IL	WI vs. MI	WI vs. MN
Entry	-1.20*	1.16	-0.98	-3.41	-0.61
	(0.52)	(0.73)	(0.58)	(1.72)	(0.62)
Expansion	0.62	0.59	1.39*	0.40	-0.40
	(0.33)	(0.44)	(0.53)	(0.54)	(0.47)
Exit	-1.85***	-0.12	-2.11*	-2.09**	-0.94
	(0.46)	(0.73)	(0.78)	(0.59)	(0.50)
Contraction	1.02*	1.62**	1.51*	0.67	1.29*
	(0.47)	(0.48)	(0.57)	(0.51)	(0.49)

Table 8: Establishment Entry, Expansion, Exit, and Contraction Rates

B Job Creation and Destruction: U.S. Wisconsin

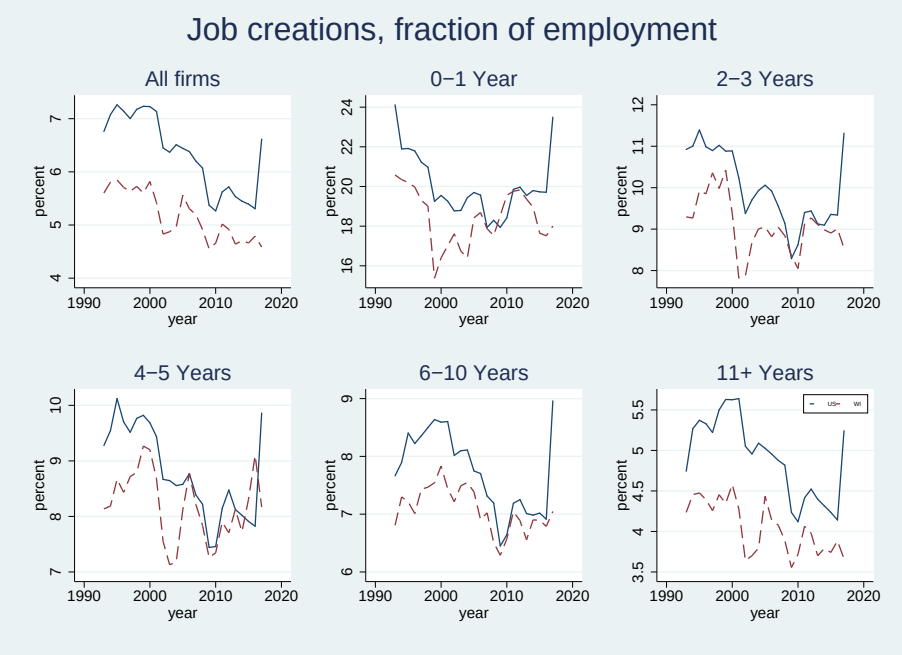

Figure 6: Job Creation Rate, By Firm Age

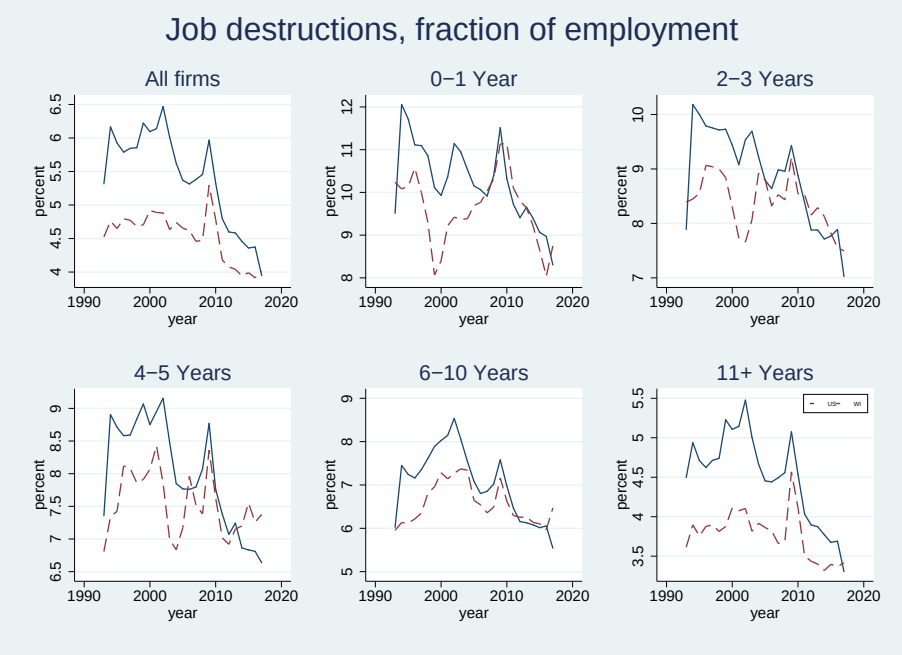

Figure 7: Job Destruction Rate, By Firm Age

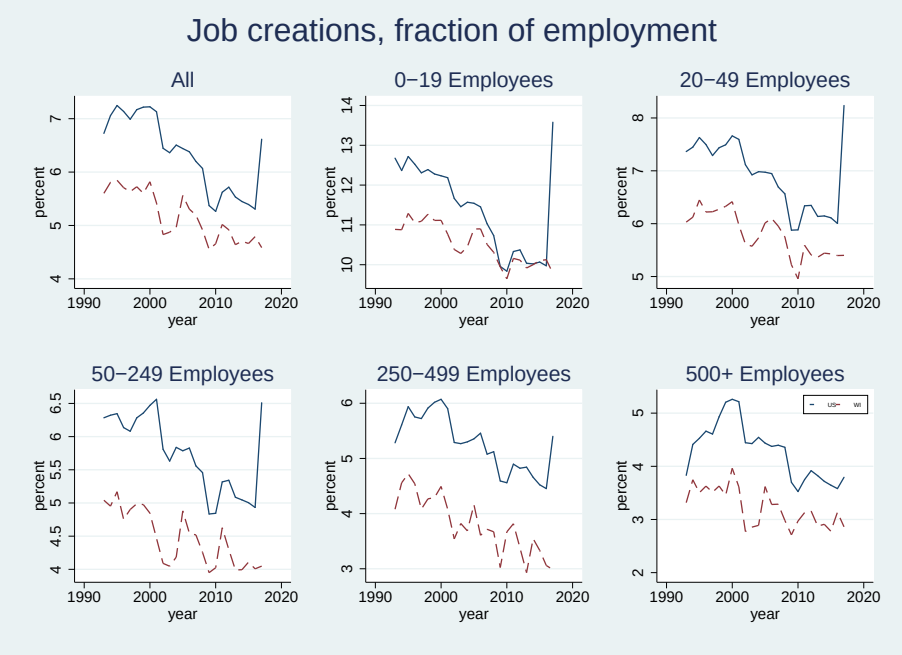

Figure 8: Job Creation Rate, By Firm Size

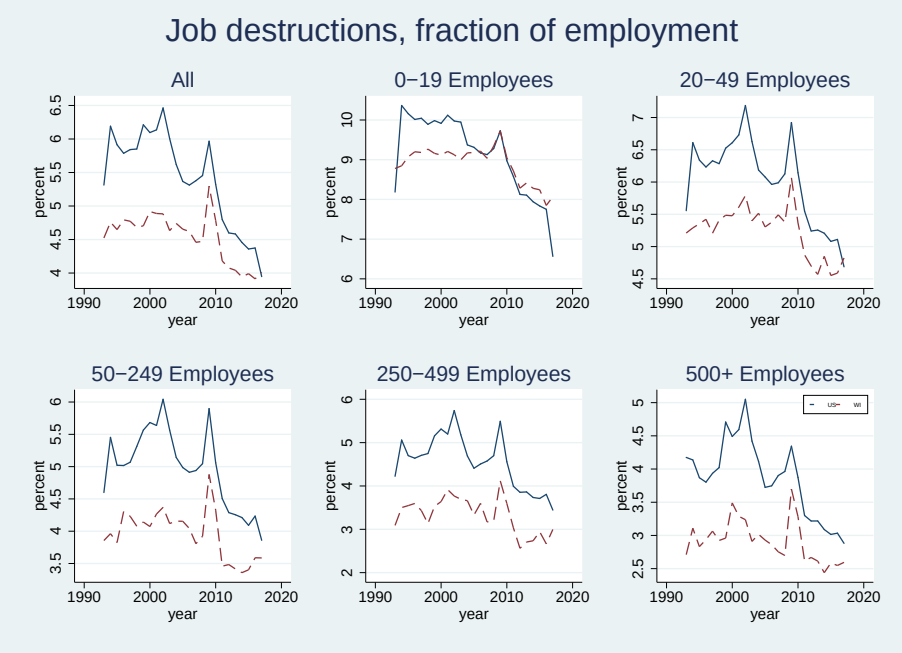

Figure 9: Job Destruction Rate, By Firm Size

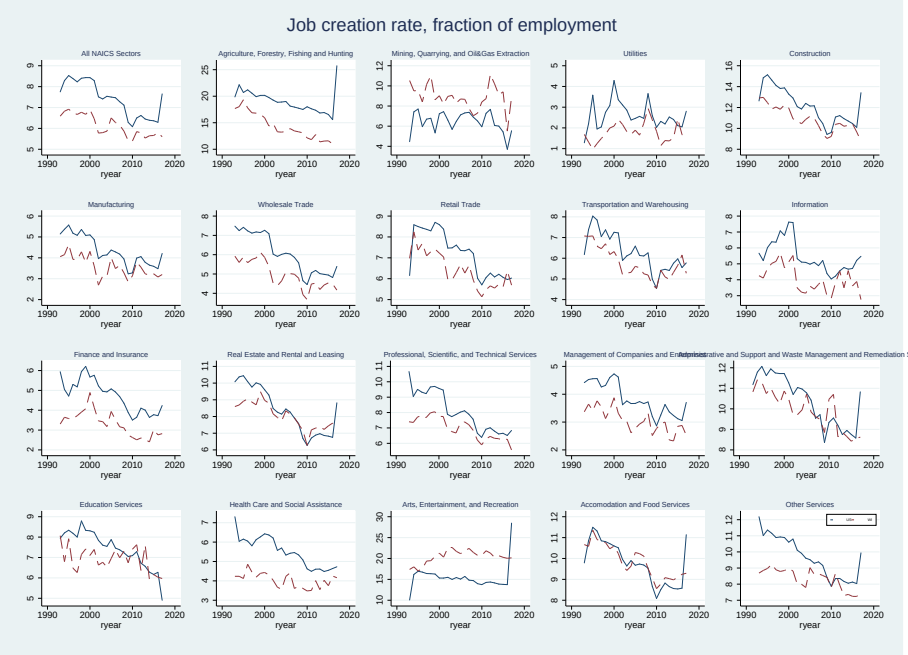

Figure 10: Job Creation Rate, By 2-Digit NAICS Sector

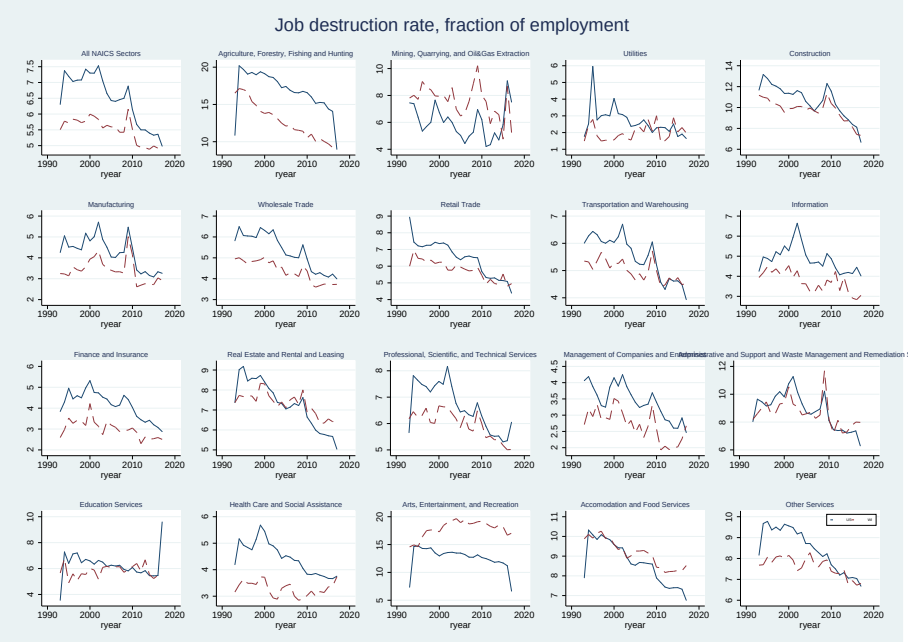

Figure 11: Job Destruction Rate, By 2-Digit NAICS Sector