The Effect of Deindustrialization on Local Economies: Evidence from New England Textile Towns

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Abstract

This paper documents the persistence of a local labor demand shock from a key episode of deindustrialization in the US: the decline of the New England textile industry in the 1920s. Although spatial equilibrium models predict worker migration in response to a loss of local employment, New England towns that heavily depended on the textile industry in 1900 did not experience a significant decline in population compared to other towns. Individuals in these towns, especially those with a lower level of wealth, were less likely to out-migrate. Adult workers switched to the agricultural sector and faced decreased occupational earnings. Using a matched difference-in-differences design that exploits variation in timing and location of large textile plant closures, I find that young individuals in plant closure towns increased their eighth-grade completion, but their labor market outcomes did not improve by 1940. My findings provide policy implications for local economic recovery, such as promoting diversity in the local industrial base.

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1 Introduction

Deindustrialization, a decline in industrial activity in a region or local economy, is a common process of economic development. During industrialization, agglomeration forces often create local labor markets with concentrated industrial activity, and the industrial boom improves residents' economic well-being. However, industries may face a decline or decide to relocate for various reasons, including an increase in trade (Autor *et al.*, 2013, Batistich and Bond, 2022) and an increase in outsourced production for cheaper costs (Fort *et al.*, 2018, Antràs *et al.*, 2017). When an industry leaves a local labor market that has specialized in that industry, the local labor market experiences a decrease in employment opportunities.[1] Understanding how local labor markets and residents react to deindustrialization, for instance how local population adjusts and economic activities are restructured, has important policy implications for regional economic recovery and growth.

Migration has been a highlighted channel of swift adjustment to local economic shocks under the spatial equilibrium framework. However, recent literature has found muted migration response and lagged local recovery. This pattern is often attributed to modern policy changes that can reduce mobility, such as an increase in social welfare benefits (Notowidigdo, 2020, Coen-Pirani, 2021).

In this paper, I document the persistent local labor market effects of deindustrialization from a setting with limited social insurance. In particular, I examine one of the first significant yet under-explored episodes of deindustrialization in the US, the decline of the New England textile industry in the 1920s. New England's textile industry was once the center of industrial development in the US, the site of one of the country's first factory systems. While the industry employed more than 15 percent of the New England labor force in 1920 and roughly 30 percent of the US textile labor force was in the region, the industry faced a massive disruption starting in the 1920s. In over one decade, between 1920 and 1930, the industry shed roughly twenty percent of its labor force.[2]

[1] This pattern is observed in many examples of once-booming local labor markets. For instance, the Rust Belt and the Sun Belt manufacturing towns were factory towns with specialized industrial bases that faced a long process of economic decline.

[2] The decline of the New England textile industry occurred in two phases, one during the 1920-1930s and another during the 1950-1960s. In this paper, I focus on the first phase of the decline.

The size and speed of the shock were comparable to that of the Rust Belt decline: Michigan experienced roughly a 5 percentage-point decline in the car manufacturing share of the labor force between 1970 and 1980 and a 9 percentage-point drop in the share from 1970 to 1990.[3] New manufacturing industries did not emerge in New England until the 1980s, in a manner similar to the lack of re-industrialization in the Rust Belt.[4]

New England's rapid industrial decline is an empirically advantageous setting for studying long-run worker responses to deindustrialization and outcomes. I link full-count historical censuses using an automated method from Abramitzky *et al.* (2022) to follow residents over time. This allows me to examine various worker adjustment margins, including migration, labor force participation, education, and industry-switching. I am also able to explore whether workers' responses translated to local economic recovery or improved workers' labor market outcomes.

To examine whether and how the textile industry decline in New England states impacted town-level and individual-level outcomes, I construct a town-level measure of exposure to the textile industry decline using the textile share of the labor force in 1900 and compare towns with more or less exposure using a continuous difference-in-differences framework. The empirical strategy relies on the identifying assumption of parallel trends, which is examined for each response margin using event-study analysis. I also flexibly control for the potential confounders, such as the Great Depression or change in immigration policy that may have affected the economic conditions of textile-heavy towns after 1920.

This paper highlights several patterns of worker responses that provide insights into policies for local economic recovery. First, I document the muted migration response from the local shock, even in the absence of sufficient social insurance: I find that both the working-age population and net in-migration rate were not significantly affected by the exposure to the industrial decline. I

[3]The Rust Belt states, spanning Indiana, Illinois, Michigan, Missouri, New York, Ohio, Pennsylvania, West Virginia, and Wisconsin, experienced more than a 3 percentage-point decline in the car manufacturing share of the male labor force between 1970 and 1990.

[4]Parts of Connecticut and Massachusetts were home to machinery and metalworking industries since the 1880s that benefited from the war production act in the 1940s, but most parts of New England states went through a continued decline in manufacturing activities until the late twentieth century other than during WWII (Rosenbloom, 1999).

have the power to reject even a small population decline.

I track male individuals using linked census data and examine the effect of industrial decline on these workers regardless of where they live after the shock. This individual-level analysis isolates worker-level effects from the compositional effects measured from the cross-sectional census data, which may mask the in- and out-migration dynamics. I find that workers who were initially located in a town with a greater share of textile presence are *less* likely to out-migrate from their initial town.

I provide suggestive evidence that the fixed cost of moving may have played a role in the migration decision, as wealth measured by homeownership and mortgage status was positively associated with the migration likelihood. Also, individuals in textile-heavy towns increased co-habitation or living in multigenerational housing, documenting a potential role of social networks (e.g., family support) in weathering the reduced economic opportunities.

Second, I show that young and older residents were both likely to stay in their affected towns but responded differently to the local economic shocks. Young residents of age 14-18 reduced their labor force participation in response to the industrial decline. Child labor was a significant part of manufacturing employment in the 1920s, implying that the decline in labor force participation among young residents may be a positive result for their educational attainment and future labor market outcomes. Adult workers did not significantly reduce their labor force participation.

I document that older workers in towns responded by switching to the agricultural sector, which had on average lower occupational earnings than the textile industry. My findings, together with the limited migration results, suggest if residents do not leave their local labor market experiencing a downturn, place-based policies that aid the transition of workers to different industries or promote diversity in the industrial base will help the local labor market resilience.

Lastly, I explore how younger residents reacted to the local labor market shock. To do so, I build a dataset on major plant closures in New England towns from newly collected historical data. The dataset is created by first digitizing all of the records on New England plants found in the 1920-1930 Official American Textile Directories. For each plant, I digitize the plant name, the town it is located in, and the types and number of machinery. Each plant is geolocated based on its town of record and assigned to its closest census town. By tracking plants across time, I define major plant closures as the closure of plants that are large relative to the town population and plant closure towns as towns that experienced at least one major plant closure. I then use a propensity score matching procedure to create matched control towns with similar characteristics to plant-closure towns. Using linked census data and matched difference-in-differences design, I exploit the variation in the timing and location of plant closures and the variation of exposure *within* towns based on "critical" age of education to examine individual-level responses to the textile industry decline.

Using the plant-closure design, I find that large plant closures in towns are associated with a higher likelihood of completing the eighth grade for young individuals by 1940.[5] In New England, the eighth grade was the modal grade for individuals choosing between finishing education or entering the workforce in the 1920s. The plant closure did not affect the likelihood of attending or completing the high school degree. The increased schooling reflects the reduced opportunity cost of education from the shock.

The young individuals in closure towns who obtained additional schooling, however, were not more likely to out-migrate from their original towns, and they were more likely to face reduced wage income. The lack of migration response from young individuals affected by plant closure indicates that they were negatively affected by the same deindustrialization shock despite their increased education. The returns to schooling were low in the 1940s (Feigenbaum and Tan, 2020).[6] In the absence of an industry that offers high returns to education and in the absence of migration response, their educational attainment may lead to a decreased level of experience and lower wages conditional on age (Mincer, 1974; Lemieux, 2006).

[5]This is consistent with the findings from the town-level event-study analysis where I document that exposure to the textile decline was associated with a reduced labor force participation rate and increased school attendance.

[6]Feigenbaum and Tan (2020) estimate that each additional year of schooling raises earnings by 4 percent in 1940, compared to the modern estimates of 6 to 15 percent (Card, 1999).

Related Literature

This paper contributes to the extensive literature on local labor market recovery in two ways. First, this paper provides some of the first evidence of the long-lasting effect of deindustrialization from the early twentieth century. Second, this paper thoroughly explores various mechanisms behind such persistence.

A key prediction from spatial equilibrium models is that local economic shocks dissipate in equilibrium with labor and capital mobility and lead to short-run regional economic recovery. Blanchard and Katz (1992) and Dao *et al.* (2017) find a transient nature of local economic shocks, but literature on more recent shocks has documented the long-term scarring effects and muted population response from various modern local economic shocks, especially in the US (Autor *et al.*, 2013; Dix-Carneiro and Kovak, 2017; Yagan, 2019; Pierce and Schott, 2020; Choi *et al.*, 2021)[7].

One hypothesis for the mixed evidence for migration responses to local shocks is the changing migration response to local shocks over time. The studies finding rapid local recovery examine the shocks in the 1970s while the others study the shock in the 1990s and 2000s, which was a period with decreased mobility and an increase in social benefits that may have affected the worker migration decision. My findings suggest that the pattern of lagged local economic recovery is not a modern phenomenon and document the persistent effect of local shocks in a period without social insurance. This paper further highlights the potential role of wealth on migration and the role of social networks as a worker adjustment margin to shocks, using the linked census data and rich individual-level information from the census, including homeownership, mortgage status, and habitation patterns.

Economists have conventionally focused on migration as a critical channel of mitigating local economic shocks based on spatial equilibrium theories, This paper provides empirical evidence of alternative mechanisms for local labor market adjustment, including educational attainment and

[7] Even in the setting of the 1970s, Hershbein and Stuart (2022) find the lagged local recovery from recessions in the 1970s, similar to my finding that documents the persistence of shock in the US before the 1990s.

industry-switching behavior.

This paper extends our knowledge about the relationship between education and local economic conditions. First, I document that the local bust increased the educational attainment of the residents, consistent with the overall finding in the literature that a negative local economic shock increases educational attainment and a local economic boom decreases schooling (Jaworski, 2014; Black *et al.*, 2005; Charles *et al.*, 2018; and Atkin, 2016).[8] Second, my analysis further tracks groups of individuals with increased educational attainment and examines whether their increased schooling improved the labor market prospects.

The paper contributes to the economics and history literature studying industrialization in the US. Many papers focus on examining the effect of deindustrialization on workers and the local labor market from the decline of the Rust Belts (Hobor, 2013; Alder *et al.*, 2014; Ohanian, 2014). I fill in the gap in the literature by offering a systematic analysis of deindustrialization in New England mill towns, which was an essential part of nineteenth-century industrialization in the US. Examining the deindustrialization episode also contributes to the literature on regional development and convergence in the US (Barro and Sala-i-Martin, 1992; Eriksson *et al.*, 2021), as this deindustrialization was an essential driver of the rise of the Southern economy and the slowdown of the Northeastern economy during the early twentieth century.

[8] Stuart (2022) documents a decline in the 4-year college attainment in response to the Great Recession. A potential distinction between other papers and Stuart (2022) is the cost of education—attending a four-year college is much more costly than attending high school or community college. My result is consistent with the prediction that local bust will increase the take-up in tuition-free education.

2 Historical background

The New England states, including Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont, played an essential role in the US textile industry development and industrialization in the eighteenth and nineteenth centuries, and the industry remained a necessary part of the New England economy until the early twentieth century. In the late eighteenth century, merchants from England realized that the New England states' geography with rivers and streams was advantageous for building water-powered plants. Some New England towns were often the first form of "factory" or "company" towns in the US, which were one of the prevalent forms of industrialization in the US.

The New England states, starting in Rhode Island and Massachusetts, had one of the first industrialized systems for textile manufacturing, such as the Rhode Island mill system, which employed families, including young children, and the Waltham-Lowell system hired young female workers. Figure 1 shows that more than 15 percent of the labor force in the Northeastern region was employed in the textile industry in 1920. Even though the emergence of the steam engine made geography less critical, the agglomeration forces kept the industry in the area for a long time. Appendix Figure A.1 plots the share of the textile workforce in each census region, and more than 30 percent of the national textile labor force was employed in the Northeastern part of the country.

The textile industry decline was a large shock to the New England states; over a decade from 1920 to 1930, the industry shed around 5 percentage points of its labor force, as shown in Figure 1. The level of the shock geographically varied within the states, creating a more considerable impact on mill towns that were developed around and relied on the textile industry. For instance, Manchester in New Hampshire, a town designed by the Amoskeag Manufacturing Company, started experiencing plant closures in 1922. The mills had once employed more than 15,000 workers, but all of them closed by 1935, leaving many town residents unemployed (Minchin, 2012).

Multiple reasons led to the textile industry decline in the New England states. The importance of the southern textile industry rose from the late nineteenth century, as shown in Appendix Figure A.1. First, proximity to raw cotton and cheaper labor costs made the South an ideal location for the cotton industry. At the beginning of the rise, New England textile merchants were able to keep their competitiveness by producing higher-quality fabrics. However, with the adoption of newer textile machinery, the Southern manufacturers gradually caught up with the New England producers on the range and quality of goods they produce. Second, with the end of World War I, which reduced the foreign demand for cotton, the New England cotton industry faced a more significant decline (Rosenbloom, 1999; Koistinen, 2002). Other textile industries, such as the woolen industry, experienced relatively less decline, even though the end of foreign demand affected these industries, too (Scully, 1951).

The decline of the textile industry led to some community-level efforts to mitigate the economic impact, but the role of local and state governments was minimal in the 1920s and 1930s. Even though there was an effort to introduce state-level Unemployment Insurance, there was no social safety net nor formal unemployment insurance in the New England states until 1935.[9] During the Great Depression, which coincided with the industrial decline in the 1930s, government expenditure increased with the New Deal policies. Still, the New England states were not the primary beneficiaries of the policies (Rosenbloom, 1999).

Instead, business and financial leaders in the states established the New England Council in 1925 as a response to the decline of the textile industry. The council tried to facilitate financial access to local textile manufacturers and promote the adoption of advanced managerial techniques and industrial research to increase product competitiveness. These were not helpful for short-term solutions in preventing mills from closing or mitigating unemployment in the area (Koistinen, 2000).

Labor unions of this era are known to be small and have weak organizational power, but the textile worker unions in some states, including Massachusetts, were able to protect labor-friendly

[9] New England states were aware of the need for the social safety net, however. New England states attempted to create unemployment statistics in the late eighteenth century. Massachusetts introduced the Unemployment Insurance bill in 1916, which was never passed until the passage of the Social Security Act of 1935.

legislations such as hours-of-work laws. The efforts of organized labor did not particularly help the recovery efforts, as these laws kept the labor cost higher in the region (English, 2003; Koistinen, 2007).

3 Conceptual framework on worker responses to textile industry decline

Given there was limited government welfare or economic policies to counter the textile industry decline, how the New England local labor markets adjusted during and after the deindustrialization mainly depended on workers' responses to the shock. Figure 2 summarizes how workers could respond to the decline of local industry.

First, workers could respond to deindustrialization by migrating out of their local labor markets for better economic opportunities. The migrant workers can increase employment probability and wages in the new local labor markets. The migration decisions can lead to an overall population decline in the original local labor market, decreasing local labor supply and increasing wages, serving as a mechanism for mitigating local economic shocks. This channel has been considered the key mechanism through which local labor markets recover from shocks under the spatial equilibrium models.

Workers, however, can also adjust *within* their initial location and adapt through non-migratory responses. Deindustrialization often decreases local labor demand, decreasing the number of available jobs and reducing local wages. Workers can give up seeking employment opportunities and detach themselves from the labor market. This will lead to a decline in the labor force participation rate in the local labor market.

Alternatively, if other industries in local labor markets can accommodate exposed workers, workers actively seeking employment may succeed in securing a job in a different sector. Workers in the affected local labor market may switch their industries in response to deindustrialization, and the share of the workforce employed in other sectors will rise in these local labor markets.

For young individuals, deindustrialization can affect their educational attainment decision. Under a simple theoretical framework of education decision, similar to the educational choice model from Atkin (2016), deindustrialization in a local labor market could alter the opportunity cost of schooling and increase the educational attainment of young residents. In this model, the decision for educational attainment depends on the returns to schooling and the opportunity cost of schooling.

The opportunity cost of schooling is determined by the utility difference between working and staying at school for one unit of time. The expected utility from working decreases with the industrial decline, which lowers the opportunity cost of schooling. The utility from schooling includes utility from family support and direct utility from education. The utility is lower for older workers, as their earnings are more likely to be the primary source of household income. The psychological cost (disutility) of schooling or the cost of "going back" to school often increases with age. Thus, young workers may be more likely to choose to increase education in response to local economic decline than their older counterparts. This framework highlights that the educational attainment decision could change with local economic conditions, even without the change in marginal returns to schooling.

In Sections 5 and 6, I examine how the textile industry's decline affected each adjustment margin in more detail.

4 Data and measuring exposure to the textile industry decline

In this section, I define town-level exposure measures to the textile industry decline and discuss their variations. First, I construct a measure of the town's exposure to the textile industry decline using its initial textile presence, which will be used to analyze all adjustment margins. For the educational attainment outcome, I construct an additional exposure measure by identifying whether each town experienced major plant closures using the newly constructed panel of New England textile plants, which allows me to exploit the quasi-experimental variation in location and timing of the plant closures.[10]

[10]There are multiple reasons that I use the plant closure measure only in the education analysis. First, education is the only outcome that can fully utilize the variation in the timing of plant closures. Education

4.1 Measuring the textile industry decline using the initial reliance on the textile industry

I construct a measure of town-level exposure to the textile industry decline that relies on the variation in the presence of the textile industry in 1900, before the regional industry decline. I use the microdata from the 1900 U.S. Census to construct the measure. I start by defining towns based on the 1329 places in New England states drawn from the Census Place Project (CPP) (Berkes *et al.*, 2022). The places are constructed using census sub-county geographic variables, including city and Minor Civil Divisions (MCDs). MCDs are administrative units of counties, often representing a civil township or local government. I create town-level economic statistics using crosswalk from Berkes *et al.*, 2022, which maps individuals recorded in the census to these places. The sub-county geographic units allow us to utilize heterogeneity in demographics or economic structure, including distinctions between urban and rural areas within a county (Michaels *et al.*, 2012; Berkes *et al.*, 2022).

For each town, the exposure measure is defined by the share of the labor force working in the textile industry in 1900. The CPP towns are defined from combinations of multiple sub-county geographies and detection of population clusters around the geographies, which makes it hard to delineate town boundaries (e.g., GIS shapefiles). For this reason, even though the exposure measure varies by town defined in CPP, I instead show the county-level geographic variation of the New England textile presence in Figure 3. The parts of Connecticut, Massachusetts, and Rhode Island exhibited the highest concentration of textile industry in 1900.

has the notion of critical age– there is a notion of when individuals are likely to receive a specific stage or grade of education. This allows for creating a control and treatment group *within* plant closure towns for the educational outcome. At the same time, other response margins, such as migration, have a less clear distinction on what age individuals are more likely to utilize the specific adjustment margin. Second, the educational outcome can be observed using the highest grade completed variable in the 1940 census, no matter when each individual completed the education. Other variables are less precisely estimated as they are constructed using a change over one or two decades. Using migration as an example, if two individuals faced plant closure in their town in 1925 and 1927, they might have migrated by 1940, not being able to know when they migrated at what age. The effect of plant closure on migration would then be less precisely estimated.

Characteristics of towns by the initial textile presence

Table 1 summarizes the average characteristics of towns by terciles of initial textile presence, with the average traits of towns with no textile employment in the first column. Towns in the highest textile share quartile in 1900 tend to have a higher population than towns with lower or no textile presence, as presented in Table 1. Textile-heavy towns tend to have a higher labor force participation rate as of 1900, around 4 percentage points more, and a higher share of foreign-born individuals. Half of New England townships reported no textile employment in 1900. These towns tended to be more rural, with a larger percentage of agricultural workers.

4.2 Measuring the textile industry decline using plant closures

The textile industry decline can be measured by identifying extensive plant closures. To identify the location and timing of plant closures, I digitize editions of the Official American Textile Directory from 1920 to 1930. The textile directory is an annual listing of textile mills in the United States compiled and published by the Textile World Journal. The directory is similar to typical industry-specific directories. It contains advertisements and detailed plant-level information on location and production capacities, enabling producers and intermediaries in the industry to market their products and facilitate commerce.

Appendix Figure A.2 presents an example of a plant-level description in the directory. The detailed plant information includes plant name, location and size of the town or city the plant belongs to, types of materials the plant handles (e.g., cotton, wool, silk), types of products (e.g., hosiery, clothes), and production capacity proxied by the number of textile machinery such as spindles, looms, and water wheels.

Using the data, I track plants that closed and disappeared during the 1920 to 1930 editions. A plant is considered closed in a year if it appeared in the year but not in any year after, or if the directory explicitly stated the plant had closed. In particular, I focus on identifying "large" plant closures, which were closures of a sizeable plant compared to the town population. I define large plants based on the number of machines per town capita and describe any plant with more machines per capita than the highest quartile number of looms or spindles per capita across all towns. Using this definition, I identify the location of 224 large plants and the timing of 84 closures that happened by 1930.

Towns and cities in the textile directory do not align with the census geography, such as census city, county, or Minor Civil Divisions. I geocode towns from the directories to assign latitude and longitude coordinates and assign them to their closest census places (towns) to identify census towns that experienced large plant closures. I define plant closure towns as towns that experienced at least one major plant closure, and I assign each town its closure year as the earliest year the town experienced a large closure.

Appendix Table A.1 summarizes the number of cotton textile plants covered in the 1929 Textile Directory. I also compare the coverage with the 1929 Census of Manufactures. I find that the textile directory covers *more* plants than the Census of Manufactures. The Census of Manufactures covers plants with an annual output of more than 5000 dollars, which may explain the difference in the coverage.[11]

5 The effect of the textile industry decline on workers' migration

This section examines how the textile industry's decline affected the town population and individual workers' migration decisions. I start the section by discussing the main specification for the analysis, identifying assumptions, and the first-stage relationship between the initial textile presence and the decline in textile share. Then, I present results on the muted population and decreased out-migration response to the industrial decline. The section discusses potential wealth and social network mechanisms explaining the muted migration response.

[11]The Census of Manufactures is not available between 1890 and 1929, which makes it hard to use the CM as the data source to study the deindustrialization and plant closure episodes in 1920-1930 period.

5.1 Main specification

Using the town-level initial share of the textile labor force in 1900 as the treatment variable, I employ a continuous difference-in-differences strategy and compare changes in economic outcomes between towns with higher textile exposure and towns with lower textile exposure. I use the cross-sectional census data from 1900 to 1940 and estimate the following equation:

$$Y_{mt} = \alpha_m + \gamma_t + \sum_{\tilde{t} \neq 1920} \beta_t \left(\text{Textile Share}_{m,1900}\right) \times \mathbb{1}\left(t = \tilde{t}\right) + \mathbb{X}_m \times \lambda_t + \varepsilon_{mt} \tag{1}$$

where Y_{mt} is the average outcome in town m in census year t, which includes population, labor force participation, the agricultural share of the labor force, occupational-based earning score, and educational attainment. The specification controls for fixed characteristics of towns and years using town and year fixed effects, α_m and γ_t, respectively. β_{1930} and β_{1940} are our parameters of interest, which are coefficients for the interaction between the initial textile presence of town m in 1900, Textile Share$_{m,1900}$, with indicators for the post-decline census decades, $\mathbb{1}\left(t = \widetilde{t}\right)$.

X_m includes a set of town characteristics which is further described in Section 5.2, and λ_t are time-varying coefficients estimated from X_m interacted with census-decade indicators. All specifications include a set of interactions between state and census year indicators to account for differences in town sizes across states due to the administrative nature of Minor Civil Divisions. I cluster standard errors at the town level.

5.2 Identification

My empirical strategy relies on the identifying assumption of parallel trends: towns with high and low textile presence had similar trends in the outcome before 1920, the onset of the industrial decline. I examine parallel trend assumptions and address identification concerns in multiple ways. First, in order to provide evidence for parallel trends assumption, I plot coefficients β_t for pre-decline census years in all analysis estimating Equation (1).

Second, secular economic trends may have affected the economic conditions of textile-heavy towns after 1920, potentially causing a violation of the assumption that towns with differential textile presence would have followed similar trends if there were no textile decline. Potential confounders during the post-decline periods include the Great Depression (1929-1939) and changes in immigration policy in the 1920s, which limited immigration flow to the US through country-specific quotas. In the analysis, I include a measure of the Great Depression severity using a county-level change in retail sales during 1929-33 drawn from Fishback *et al.* (2005) in the analysis as a flexible control interacted with census year indicators, so towns with differential exposure to the Great Depression could have their trends. Similarly, I also include a flexible control of the share of the foreign-born population in 1900 to control for the effect the change in immigration policy could have on the town's economic outcomes.

5.3 First-stage relationship between the exposure measure and textile share of the labor force

I start by presenting the first-stage results on whether the textile industry presence in 1900 properly measures how each town was affected by the textile industry decline that began in the 1920s. First, I plot the trend of the average textile share of the labor force for four quartiles of towns based on the textile share of the labor force in 1900 in Figure 4. The plot highlights two trends in the textile industry in New England: (1) the textile industry employment is heavily concentrated in towns in the highest quartile of initial textile presence; and (2) the textile industry experienced booms before the decline in the 1920s.

In Figure 5, I utilize variation across all towns instead of the four town quartiles to examine the relationship between initial textile industry presence and the textile share of the labor force in towns by estimating Equation (1). The first series plots the β_t coefficient estimates from a specification with state times year fixed effects. The second and third series plot the coefficient estimates from specifications that add to the first series the Great Depression severity measure interacted with year fixed effects and share of the foreign-born population in 1900 interacted with year fixed effects, respectively. In all specifications, I find that towns with a higher initial percentage of the textile labor force are more likely to experience a decline in the textile share of the workforce between 1920 and 1940, confirming the validity of the measure as a proxy for exposure to the industrial decline. The coefficient of β_{1940}, -0.4, implies that a 10-percentage point increase in initial textile presence, comparable to the 90-10 gap, is associated with a 4-percentage point decline in the share of the labor force working in the textile industry by 1940.

The coefficients for the pre-decline census period, 1900 and 1910, show a rising trend, which is reflective of the boom the New England textile industry experienced during the period, as shown in Figure 1. It is important to note that the coefficients on the pre-decline period on this graph indicate the industrial trend in the New England states.

5.4 Muted population and migration responses to the industrial decline

Net in-migration rate and log of working-age population

Towns with a larger textile industry presence experienced a decline in labor force participation and earnings following the textile industry decline starting in the 1920s. Workers in these towns may respond to these local shocks by out-migrating to towns with better economic opportunities. The out-migration response of affected towns could lead to a decrease in population.

I examine the migration response by estimating the effect of exposure to industrial decline on a town's net in-migration rate over time in Figure 6, which is defined by the change in the log of the working-age population over a decade divided by the log of the initial working-age population. The industry decline has no significant effect on the net in-migration. As discussed in Section 5.2, controlling for the share of the foreign-born population is crucial for population analysis. There is no significant relationship between the initial textile industry presence and the working-age population in the preferred specification with the foreign-born share times year fixed effects.

Figure 7 plots the relationship between the industrial decline and town working-age population.[12] The most negative value among the lower end of the confidence intervals for β_{1940} is -0.09.

[12] Appendix Figure A.3 plots the effect of the textile industry decline on the log of the native working-age population and finds a qualitatively similar result as Figure 7.

I can reject with 95 % confidence a population decline between 1920 and 1940 larger than 0.9 log points associated with the 90-10 gap in the textile decline exposure measure, a much smaller size of decline compared to the textile industry decline measured in Section 5.3.

My preferred unit of geography is towns defined from sub-county geographic units (e.g., MCDs) as I can exploit more variation in the industrial structure within counties. However, as there could be commuting across towns and within counties, counties may also serve as the definition of local labor markets. In Appendix B, I show the event-study analyses using counties as the geographic units. The county-level analyses yield analogous results, even though the coefficients are less precisely estimated as there are 68 counties in New England.

The textile industry decline decreased individual's likelihood of out-migration

The cross-sectional results in Figures 7 and 6 indicate the population level was not affected by the decline in the textile industry. The results reflect the net effect of the textile industry decline, including the compositional effect. To directly measure the impact on individual workers who experienced the textile decline in a town, I track individuals using linked census data and examine the effects of industrial decline on these workers regardless of where they were after the shock. Then, I examine how the textile presence in individuals' initial location affects their out-migration decisions ten years later. In particular, I estimate the following equation:

$$Y_{i,m_t,t} = \alpha_{m_{t-10}} + \gamma_t + \sum_{\tilde{t} \neq 1920} \beta_t \left(\text{Textile Share}_{m_{t-10},1900}\right) \times \mathbb{1}\left(t = \tilde{t}\right) + \varepsilon_{i,m_{t-10},t} \tag{2}$$

where m_{t-10} is the individual's initial town of residence, $\alpha_{m_{t-10}}$ include town fixed effects based on one's initial town and γ_t include year fixed effects. The sample comprises the working-age male population in both census years, between 28 to 65 years old in the destination years.

The automated census linking methods in Abramitzky *et al.* (2022) are currently able to match men only, as women often change their last names after marriage. Thus, in this analysis, I only match male individuals in New England states recorded in each decadal census from 1900 to 1930 to the next decadal census from 1910 to 1940. The matching method, match rate, and matched population characteristics are further discussed in Appendix C. Appendix Table C.1 shows that the matched male population in New England has very similar features to the overall male population, with close average age, average level of literacy, labor force participation rate, and share in textile labor force with those of all males in New England. The exception is that the matched group is less likely to be foreign-born than the male population.[13] I confirm that the difference in foreign-born share does not drive discrepancy in town-level results and matched individual-level analysis results, by running the town-level event-study analysis using the matched male population in Appendix C.

Figure 8 shows the estimation result of Equation (2). The plot summarizes two key results. First, during the pre-shock period between 1900 and 1910, individuals in textile-heavy towns were not more likely to out-migrate than individuals in towns with lower textile reliance, compared to the out-migration differences over one decade between 1910 and 1920. After the textile shock, from 1920 to 1930 and from 1930 to 1940, individuals in textile-heavy towns were significantly less likely to out-migrate from their initial towns. A 10-percentage point increase in the initial textile exposure is associated with a 1.5-percentage point decrease in migration likelihood by 1930 and a 2.2-percentage point decline in migration by 1940.

Role of wealth and social network in decreased migration

Unlike conventional predictions that workers who faced negative local economic shock will out-migrate from the local labor market, the workers in textile-heavy towns were *less* likely out-migrate from their towns. Here I highlight two mechanisms that may explain the decreased out-migration. First, I present evidence that wealth played a role in migration decisions: lack of wealth reduces the likelihood of migration. Second, I show that individuals increased utilizing the support from social networks with the local economic shocks by increasing cohabitation with their families.

There are several ways wealth could affect the migration decision during an adverse economic shock. First, migration requires a fixed cost of moving, and with the absence of wealth, the ability to afford migration may decrease migration with economic shocks (Bound and Holzer, 2000).

[13] Abramitzky *et al.* (2022) documents that immigrant groups have lower match rates than native men, as rarer last names with transcription errors can lead to higher false positive rates.

Also, the decrease in local labor demand may decrease housing prices. This may increase underwater mortgages, leading to a higher share of the population not being able to afford migration, but this can also affect poorer renters to be "compensated" and decrease the motivation to out-migrate (Notowidigdo, 2020).

In Table 2, I examine how the textile shock affected workers' likelihood of migration, conditional on owning a home in the initial decade. I utilize the home-ownership variable in the 1900-1940 census to construct a separate sample of homeowners. Table 2 column (1) contains the coefficient estimates of Equation (2), including all matched men. Columns (2) and (3) contain coefficient estimates of Equation (2) for a sample of men who do not own houses and a sample of homeowners, respectively. Homeownership heavily depends on age; the older population is more likely to own housing. As migration likelihood also depends on workers' age, I include age fixed effects for all of the specifications to control the age profile of homeownership and migration. Columns (2) and (3) of Table 2 indicate that homeowners were more likely to migrate from their towns affected by the textile industry decline, suggesting a potential role of wealth. Comparing the 1940 coefficients from Columns (2) and (3), I find that with a 10-percentage point increase in the exposure to textile shock, non-homeowners are 1.2 percentage-point less likely to out-migrate compared to homeowners.

Homeownership may not fully capture individuals' wealth, as homeowners may have mortgage obligations. In Table 3, I utilize the mortgage status variable from the census to examine whether homeowners' migration response to the textile shock differs by mortgage status. I find that homeowners with no mortgage obligations were more likely to migrate than homeowners with a mortgage.[14]

With the absence of social safety net, workers facing negative local economic shock may utilize the support from their social network. For instance, an unemployed or displaced worker may weather the income shock by living with their family members. Table 4 examines whether the tex-

[14]Mortgage variable is available only until 1920, which means that I could use the 1900-1910 matched sample as the pre-period, the 1910-1920 matched sample as the baseline, and the 1920-1930 matched sample as the post-period data point.

tile shock changed workers' likelihood of cohabitation with family members, measured by whether they lived in a multigenerational-family residence.[15] I find that young workers in towns with a higher textile presence were more likely to live in multigenerational housing in the era of textile decline. A 10-percentage point increase in the initial exposure to the textile decline is associated with a 0.8 percentage-point increase in cohabitation.

6 The effect of the textile industry decline on labor force participation, industry switching, and education

In the previous section, I documented the muted migration response from the workers affected by the textile industry decline. This section examines workers' non-migratory responses, including labor force participation, education, and industry switching.

6.1 Heterogeneous effects on labor force participation by worker age

The decline of a major industry in towns can lead to a decrease in labor demand and overall level of employment. Still, its impact on town-level labor force participation is ambiguous. On the one hand, if displaced or affected individuals cannot find new employment opportunities or the opportunity costs of other non-occupational activities (e.g., education) decrease, the labor force participation rate will decrease. On the other hand, if the towns offer different employment opportunities and their residents can find new jobs easily, the labor force participation may not be affected.[16]

In this subsection, I examine how the textile industry decline affected workers' labor force participation. I assign individuals in the census to be in the labor force if the respondent has

[15] Multigenerational living is defined as living with at least two generations of family that are not a direct parents-children relationship. For instance, if a worker lives with an aunt/uncle, the worker is in multigenerational housing. If a worker lives in three-generation housing with parents and grandparents, the worker is in multigenerational housing.

[16] Another potential proxy of non-employment is unemployment. However, the employment status variable that separates employment and unemployment (EMPSTAT) is not available in the 1900 and 1920 censuses, so I cannot follow the effect on unemployment using the town-level event-study analysis.

reported an occupational response. The labor force participation rate is then computed as the number of individuals in the labor force divided by the working-age (14-65) population of the town.

I find a heterogenous effect on labor participation by age groups. The decline in the labor force participation rate is concentrated among young individuals, particularly the school-going age population (age 14-18), as presented in Figure 9. A town with a 10-percentage point higher textile share of the labor force experienced a 1.5 to 2 percent decline in labor force participation rate among the school-going age population. In Figure 10, I find much flatter and smaller changes in labor force participation among older workers of age 28-65.[17]

6.2 Increased industry switching to the agricultural sector and decreased occupational income

In Section 6.1, I document a relatively small effect of the textile industry decline on the labor force participation of adult workers. This implies that the older labor force may have reacted to the textile industry's decline by securing new employment opportunities in other sectors.

I find that the towns affected by the industrial decline were more likely to increase the agricultural share of the labor force from 1920 to 1940 in Figure 11. This pattern of the rise in different industries in towns and the less pronounced decline in labor force participation among older workers suggests that workers in these towns may have switched their industries to the agricultural sector. Labor reallocation to the agricultural industry is also documented in Boone and Wilse-Samson (2021) during the Great Depression, serving as the informal insurance during this era. In a broader context, this highlights that having a diverse set of industries, or industries to fall back

[17] Appendix Figures A.4 and A.5 report estimates of the relationship between the initial textile industry presence and labor force participation rates. The overall trend in coefficients mirrors that of Figure 4, the first-stage results described in Section 5.3. Towns with higher textile presence in 1900 are likely to experience a decline in labor force participation; a 10-percentage point increase in initial textile share is associated with a 1 to 1.5 percent decline in labor force participation rate between 1920 and 1940. Groups of age 19-25, 26-45, and 46-65 demonstrate much smaller magnitudes of labor force participation decline by order of magnitude of ten, as shown in Appendix Figure A.5.

on, may serve as a buffer for industry-level shocks and assist the local labor market recovery.

Now, I examine how the decline of the textile industry affected town residents' overall earnings. I create a consistent measure of earnings across census years by utilizing the occupational-based income (OCCSCORE) variable in the census. OCCSCORE assigns income scores to each census occupation in the 1950 census occupational classification. I compute the average occupational income score for each town and examine its relationship with the exposure to the textile industry decline in Figure 12. Towns with more exposure to the industrial decline experienced a significant decrease in average occupational income scores.

The relatively small labor force participation response from the older labor force combined with the decline in occupational income implies that even though they were able to stay in the labor force without out-migrating, they ultimately took lower-paying positions. The decrease in the occupational income scores is mainly driven by the increase in the agricultural share of the labor force, which has a lower occupational score on average than the textile industry. The agricultural occupational income score is lower partly due to its seasonality, so the decline in the occupational income is due to both the decrease in the length of work and the decrease in wage per unit of time.[18]

As discussed in Section 5.4, the effect on the aggregate town-level outcomes may be driven by the compositional effect, so I estimate Equation (2) with the labor force participation, likelihood of working in the agricultural sector, and change in occupational income as outcome variables in Table 5. I find that individuals in textile-heavy towns were more likely to work in the agricultural industry and experience a significant decrease in occupational income in the next decade, but their likelihood of staying in the labor force was not significantly associated with exposure to the industrial decline.

[18]Given that the census industry and occupation are defined based on the respondent's job that gives the most source of income, the decline in occupational income score still implies that workers faced an overall decline in earnings.

6.3 Increased educational attainment in response to the deindustrialization

I document a sizable decline in labor force participation among the school-going age population in Section 6.1. For young individuals making decisions between employment and education, the reduction in employment opportunities from industrial decline could lower the opportunity cost of education, leading to increased educational attainment. The long-run impact of the industrial decline on these young individuals is ambiguous. On the one hand, the reduced employment opportunity may decrease earnings in the short run. On the other hand, the increased level of schooling may translate into increased employment opportunities and earnings in the future.

In this sub-section, I examine how the textile industry's decline affected young individuals' educational attainment and career. I start by showing educational attainment trends in New England states and presenting town-level evidence of increased educational attainment. Then, I further document individual-level responses by exploiting an additional source of variation from the location and timing of textile plant closures and utilizing individuals' age to identify which individuals within the closure towns are affected.

Educational attainment trends in New England states

New England states were pioneers in education and schooling systems in the US in the nineteenth and early twentieth centuries. Modern educational institutions were developed in the mid-to-late nineteenth century in New England, and the expansion of secondary education in the early twentieth century marked the onset of the high school movement in the US (Massachusetts Department of Education, 1930; Goldin and Katz, 2008). New England states had compulsory schooling laws in effect in the 1910-20s that required school attendance until 16 years old, except Maine, which needed schooling until 17; however, workers as young as 14 could obtain work permits (Lleras-Muney, 2005).

In Figure 13, I plot the share of the population attending school for each age cohort in New England using the 1920 full-count census. More than 80 percent of the population in New England attended school until 13 years of age. There are variations across states on when students start leaving school—Connecticut, Massachusetts, and Rhode Island experience up to 20 percentage point decline in school attendance in the age-14 cohort, which translates to an eighth-grade education. In contrast, young adults in Maine start leaving school at the age of 15, and in New Hampshire and Vermont at the age of 16.

The effect of textile industry decline on town-level educational attainment

If the textile industry decline affected young individuals' educational attainment in New England, we expect town-level average educational attainment to increase in towns with large textile industry presence. I test this hypothesis in Appendix Figure A.6 by estimating Equation (1) with the share of school attendance among the school-going aged population as the outcome variable. I find that school attendance increases in textile-heavy towns, in a similar magnitude as the decrease in labor force participation in Figure 9. [19,20]

If the decrease in employment opportunities induced the need for public school provision, the increased educational attainment might be explained by the increase in the supply side of education. I ran an analogous town-level analysis using the number of teachers per capita as the outcome variable in Appendix Figure A.8. The number of teachers per capita, controlling for the foreign-born share of the population, was not affected by the decline in the textile industry. This finding is consistent with an interpretation that the overall supply of education did not drastically change with the industrial decline and the supply-side effect is not the main driver of the increased educational attainment in these towns.

[19]The figure presents declining pre-trends from 1900 to 1910, which may be driven by the inconsistent definition of duration of schooling to be considered as "school-attending" across census years. This can categorize individuals in the labor force as school-attending in some census years, making the trends from the inconsistent definition be correlated with the initial textile share of the town labor force.

[20]Alternatively, I can avoid the issues from definitions of school attendance variable is to match individuals from each census to the 1940 census and use the highest grade completed information recorded in 1940. In Appendix Figure A.7, I create a town-level share of the eighth-grade completion among the population aged 11-14 and examine its relationship with the initial textile industry share. The caveat of the analysis, however, would be that the 1940 census won't be included in the analysis as the population of age 11-14 in 1940 wouldn't have completed the eighth grade. I find that towns with a higher initial textile presence were associated with a rise in the share of the population with at least an eighth-grade education by 1930.

The effect of plant closures on individual-level educational attainment and career

Earlier I documented town-level evidence of younger individuals increasing school attendance. Now, I ask whether younger individuals were more likely to increase schooling in response to the local economic shock and whether the additional educational attainment further affected future earnings and labor market outcomes. To capture individual-level responses, I exploit two sources of variation: (1) the location and timing of textile plant closures identified from a newly digitized data source; and (2) individuals' location and age in 1920 to identify which individuals were facing a decision between employment and education after the plant closure within the affected towns.

Even if young individuals are in the same affected town, their education and employment decisions may differ based on whether they had to make the decision before or after the textile industry shock in their towns. For instance, if a large textile plant closed in a worker's town when the worker was 12, the worker would have to decide on her educational attainment conditional on the plant closure. However, an older resident in the same town who was 20 years old when the plant closed would have already completed making the schooling decision.

Using individuals matched from the 1920 to 1940 censuses, I employ matched difference-in-differences method and compare young individuals in affected towns with individuals who already made their schooling decisions before the closures after controlling for the birth-cohort educational trend from the matched towns.

Matching algorithm and matched town characteristics

I employ a matching algorithm to create a set of control towns with similar observable characteristics to towns with sizable plant closures. Treated towns are towns that experienced at least one large plant closure between 1920 and 1930, and potential control towns must not have experienced any large plant closure between 1920 and 1930.

I use a propensity score matching algorithm to assign a control town to each treated town based on population and share of textile employment in 1910. Each town with a large plant closure is matched to a non-neighboring control town with the closest propensity score among towns located in a different county but in the same state. Choosing a non-neighboring town can address potential spillover effects from geographic proximity. Finally, control towns are assigned counterfactual closure years based on the year their treated counterparts experienced plant closures. Appendix Figure A.9 plots the location of plant closure towns and their matched control towns.

Table A.6 contains the summary statistics of closure and control towns and the rest of the New England towns. On average, the closure towns had 20 percent of the labor force in the textile industry in 1910, and control towns had 16.5 percent of the labor force in textiles. I find that the closure and control towns have a higher share of the foreign-born population than other New England towns. The closure and control towns are less likely to be rural, employing around 15 percentage points less of the labor force in the agricultural sector.

Empirical strategy for matched difference-in-differences design

My empirical strategy for understanding individuals' education responses is a matched difference-in-differences design. Using individuals in the 1920 census matched to the 1940 census, I examine whether young individuals who faced plant closures during their critical age responded by changing their educational attainment. I compare young individuals in affected towns with individuals who already made the schooling decision before the closures after controlling for the birth-cohort educational trend in the matched towns. In particular, I estimate the below equation:

$$Y_{i,town,1940} = \beta \cdot \left[\text{Age 11-14 at Closure}_{i,town}\right] + \alpha_c + \delta_{town} + \varepsilon_{town,t} \tag{3}$$

where town is i's town of residence in 1920, and c is i's birth cohort. $\textit{Age } 11-14 \textit{ at Closure}_{i,\ town}$ indicates whether individual i who were located in town in 1920 experienced a large plant closure between 10 and 16. Outcome variables include indicators for completing at least eighth or ninth grade, a log of income in 1940, and migration. I employ birth-cohort and town fixed effects.

The sample includes individuals who lived in closure towns or control towns in 1920 and those between 11 and 14 or between 20 and 23 at the time of plant closures. I exclude those between

15 and 19 years of age, as they are close to the exposure age. These individuals, even if they completed schooling at the time of plant closure, may decide to go back to school when they observe decreased employment opportunities and career prospects from the plant closures. Also, there can be measurement errors in either the age variable in the census or the plant closure years. In both cases, this group could be both in the critical exposure and control age groups, so I remove them from the analysis sample.

Effects of plant closure on education, labor market outcomes, and migration

Figure 14 plots the normalized trend of the average share of the town population who completed at least the eighth grade for plant closure towns and matched control towns. The graph is organized by the age-at-closure cohorts, and it shows that while the cohorts in both closure and control towns obtained similar educational attainment between 20 to 40 years of age at the time of plant closure, the educational attainment of the closure and control towns diverges for the cohorts of 14 years old or younger.[21]

Table 7 presents the estimated effect of plant closure on young individuals' educational attainment, labor market outcome, and migration. Column (1) shows that young individuals affected by large plant closures likely have a 3 percentage-point increase in eighth-grade completion. I find that this increase happens on the margin of completing at least the eighth grade of schooling, and there was no significant rise in the propensity to complete at least the ninth grade of education, as shown in columns (2).

In Columns (3) and (4), I find that the young individuals affected by plant closures did not significantly differ in employment probability by 1940, and plant closures were associated with a 5 percentage-point decrease in the log of wage income. Column (4) does not include individuals who reported zero wage income, which excludes those who are self-employed. In Column (5), I examine the likelihood of being self-employed separately. I find that the self-employment probability was not affected by the plant closures. Column (6) shows that plant closures did not change

[21] Appendix Figure A.10 shows the analogous graph for the log wage income trend.

the out-migration probability for those who received additional education. These results imply that the plant closure has positively impacted young individuals' human capital accumulation, but the additional schooling did not translate to better labor market outcomes.

There are potential mechanisms that could explain the worsened labor market outcomes. First, the additional educational attainment did not translate into a worker migration response as shown in Column (6). This implies that young workers with additional schooling still faced the negative local economic shock the same way as the others. Also, the amount of additional schooling was one or (at most) two years of schooling, as the critical exposure age was 13 or 14 years of age and the only significant margin of adjustment was completing the eighth grade of education. The returns to schooling were lower than the modern estimates of returns to schooling, which may explain why an additional year of schooling may have not created a large impact on future earnings (Goldin and Katz, 2008, Feigenbaum and Tan, 2020). Also, if the additional amount of schooling was not large enough to create an occupational upgrade, the education only delays the labor force entry and decreases the experience profile of workers in the absence of migration response and local industry with higher returns to education. Based on the Mincer earnings model, this implies that workers with additional schooling could experience a decline in their wages (Mincer, 1974; Lemieux, 2006).

7 Conclusion

This paper documents new evidence on the persistence of local shocks in the early twentieth century. I find that a severe local economic shock did not induce a significant out-migration response. Individuals with a lower level of wealth were more likely to stay in the affected towns, utilize family and social networks, and increase cohabitation. Instead of out-migration, individuals chose to increase educational attainment, even though the increased schooling did not help workers improve their labor market prospects or migration likelihood. Older workers switched to the agricultural sector but faced a reduction in income. My finding presents evidence that the lagged local recovery may not be a modern phenomenon.

My results speak to several important policy implications. Policies promoting transitions of workers to different industries and diversity of local industrial base can build local labor market resilience. Lastly, even though education is an important margin of worker adjustment to local shocks, in the absence of migration or local industry that offers higher returns to education, the workers may not benefit from the additional education.

The empirical setting of this paper, combined with the comprehensive individual-level data, provides several fruitful avenues for future research. First, while this paper does not focus on the female textile labor force, female workers were an important part of the New England textile industry. Understanding how deindustrialization affected their labor market outcome and marriage and fertility decisions can contribute to our understanding of how local economic conditions shape family formation.

Second, the setup is well-suited to study the effect of deindustrialization on political preferences. While political economy literature documents how economic shocks could elicit political responses in the late twentieth and early twenty-first century, a puzzle often remains about why the affected voters tend to turn rightward even though the redistribution policies are often supported by liberals. Examining how voters in the mill towns responded, in the absence of social safety net, can potentially shed light on this political trend.

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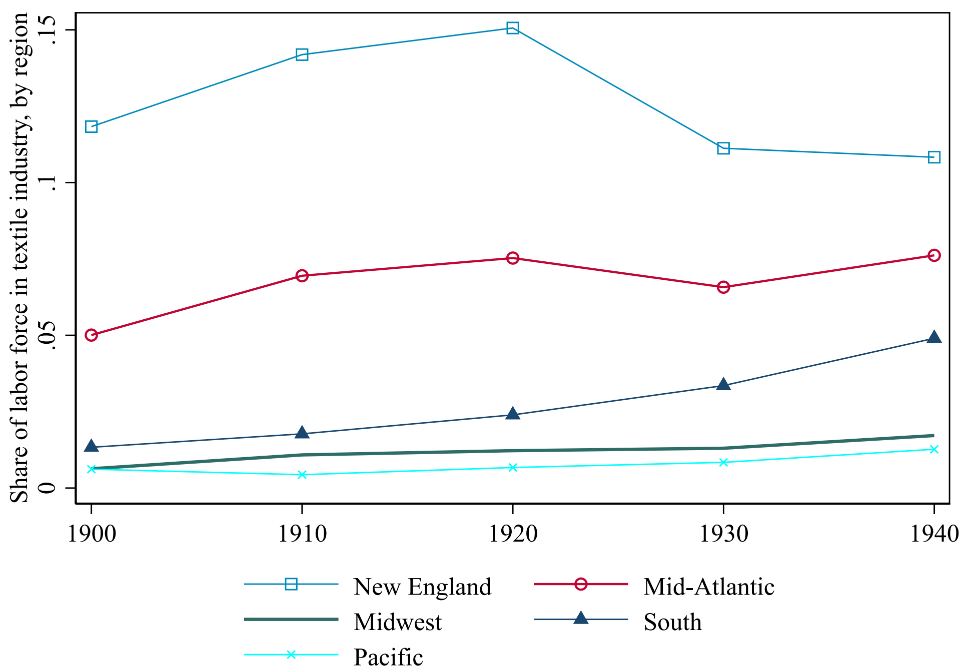
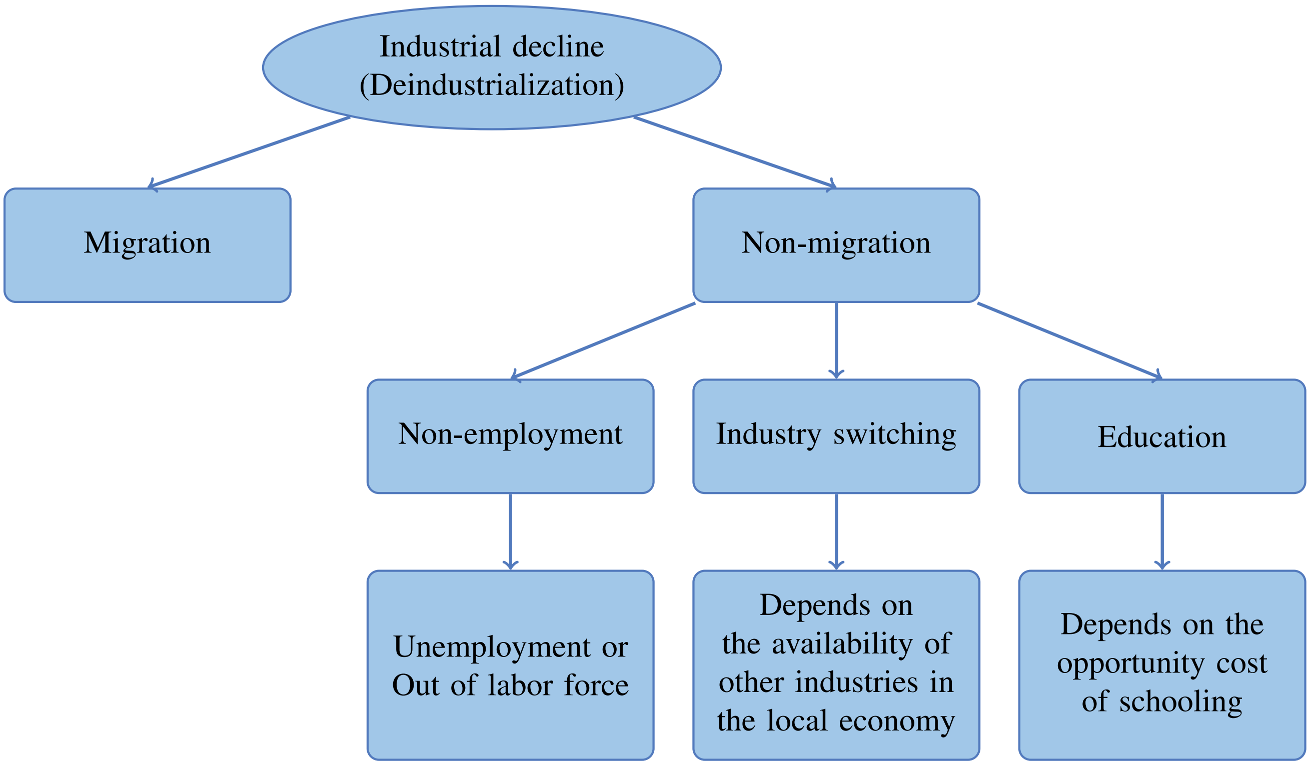
Tables and figures

Figure 1: Share of the labor force in the textile industry by region



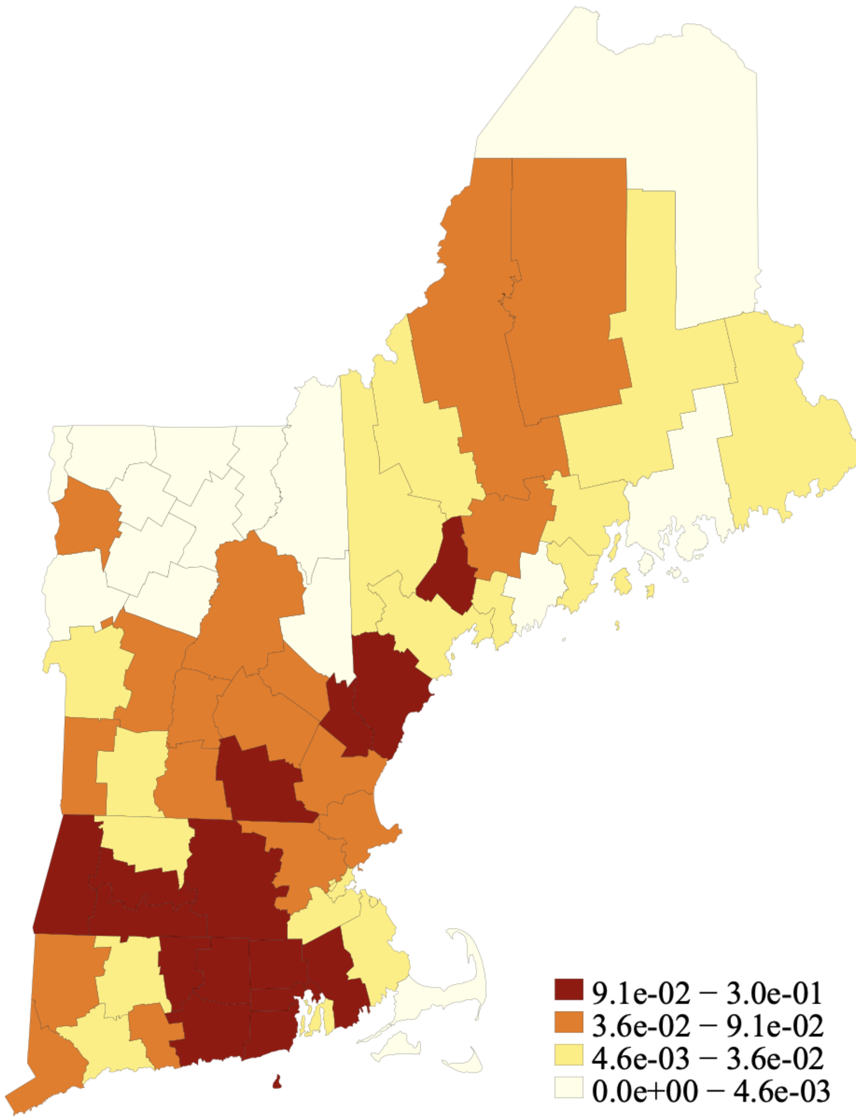
Notes: The figure plots the share of the regional labor force working in the textile industry, computed from the IPUMS 1% census sample. The textile industry is defined as the group of 1950 census industries: (1) Knitting mills, (2) Dyeing and finishing textiles, except knit goods, (3) Carpets, rugs, and other floor coverings, (4) Yarn, thread, and fabric mills, (5) Miscellaneous textile mill products, (6) Apparel and accessories, and (7) Miscellaneous fabricated textile products. The denominator is the number of working-age (14-65) population in each region and area who reported a gainful occupation.

Figure 2: Worker responses to deindustrialization



Notes: The figure summarizes worker responses to deindustrialization.

Figure 3: Textile share of the labor force by county in 1900



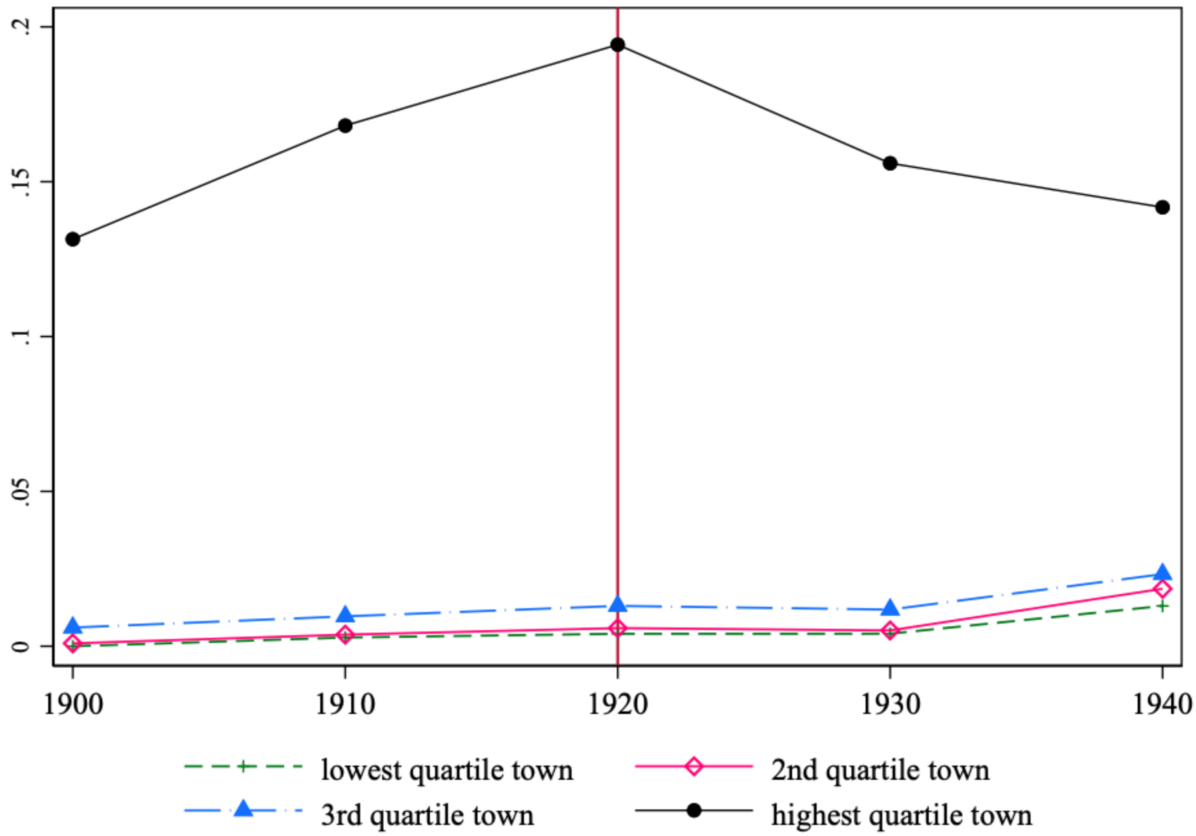
Notes: The figure plots the heatmap of New England counties, whose color intensity indicates which quartile each county belongs to based on the textile share of the county labor force in 1900. The textile industry is defined as the group of 1950 census industries: (1) Knitting mills, (2) Dyeing and finishing textiles, except knit goods, (3) Carpets, rugs, and other floor coverings, (4) Yarn, thread, and fabric mills, (5) Miscellaneous textile mill products, (6) Apparel and accessories, and (7) Miscellaneous fabricated textile products.

Table 1: Average town characteristics by initial textile presence

Tercile (lower tercile : smaller textile presence)	No textile presence	1	2	3
Demographics (1900)				
Working-age population	490.961	1726.326	5103.142	4550.736
Avg. socioeconomic index	9.561	11.383	11.664	12.020
Labor force participation rate	0.524	0.531	0.531	0.578
Share foreign-born	0.101	0.133	0.134	0.216
Share literate	0.753	0.779	0.788	0.748
Textile share of labor force	0.000	0.004	0.018	0.203
Agriculture share of labor force	0.517	0.357	0.342	0.196
Manufacturing share (net of textile)	0.074	0.127	0.140	0.122
Number of towns	622	288	281	284

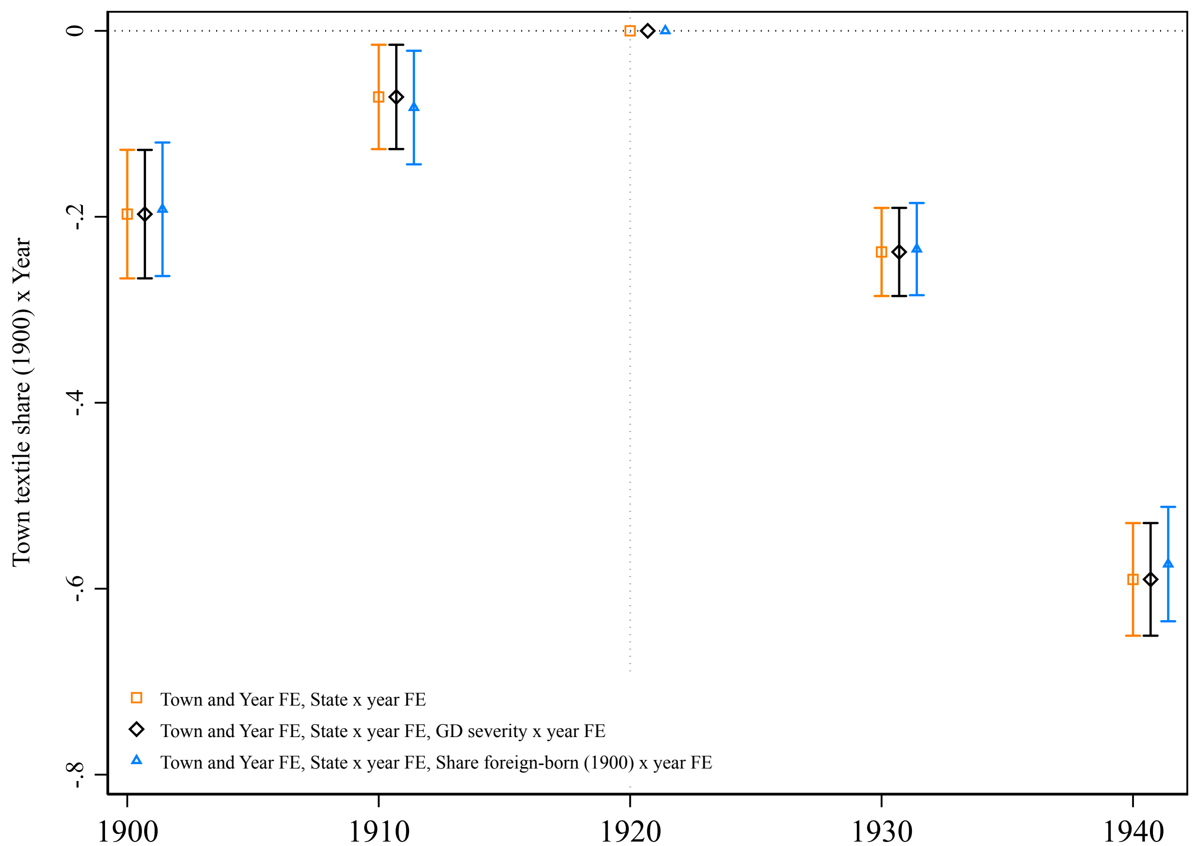
Notes: The table summarizes average town characteristics based on the initial textile presence in 1900. The initial textile presence is defined as the share of the town labor force reported to work in the textile industry. Each demographic characteristic is computed using the 1900 Census, and the average characteristics are computed using the information on the working-age (14-65) population in each town. A working-age worker is defined as participating in the labor force if the worker reports having a gainful occupation. The first column shows the average characteristics of towns with zero textile share of the labor force. The second to fourth columns present the average characteristics of towns in each tercile defined based on the initial textile presence.

Figure 4: Average textile share of the labor force by quartiles of initial textile presence in 1900



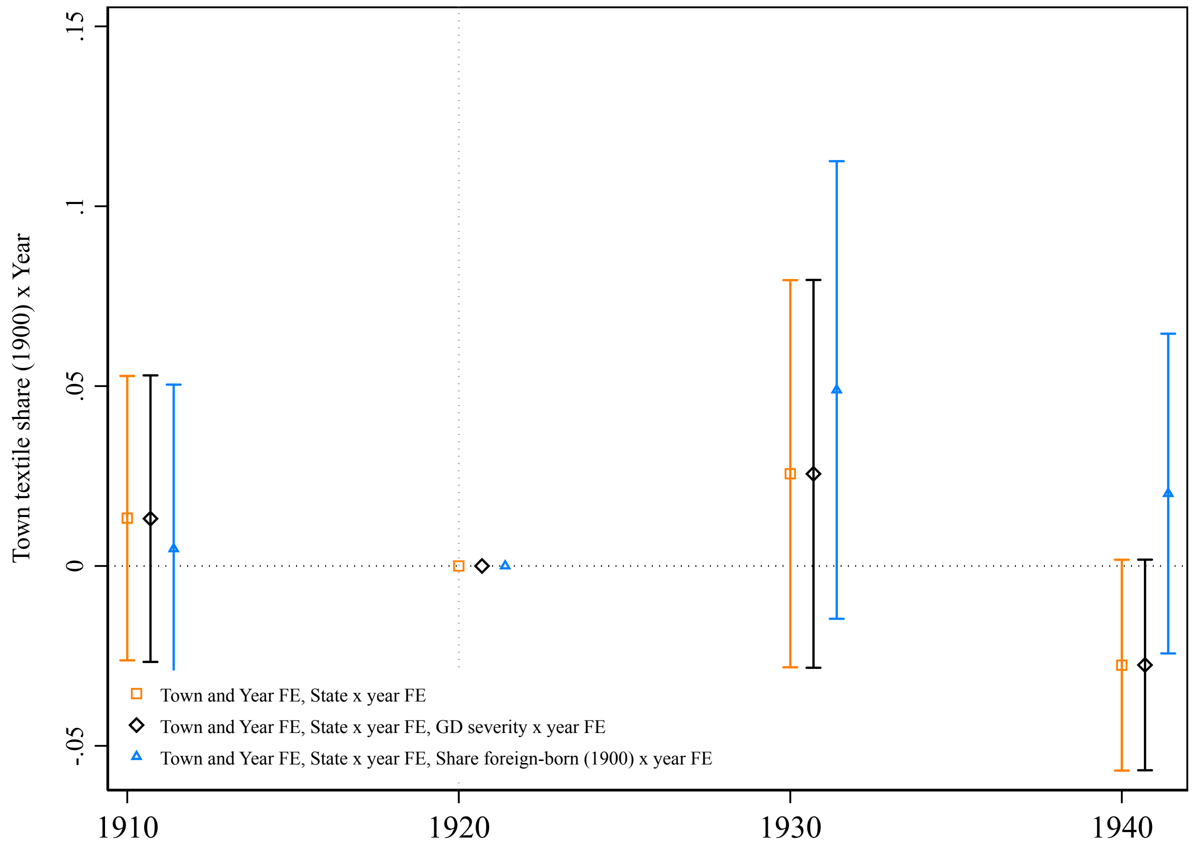
Notes: The figure plots the time series of average textile share of the labor force by quartiles defined by the initial textile share of the labor force in 1900. I compute the textile share of the town labor force by town and year. Each New England town is then assigned to a quartile based on its share of the labor force working in the textile industry in 1900. Finally, I compute the average textile share in each quartile by each census year from 1900 to 1940.

Figure 5: The effect of exposure to textile industry decline on the textile share of labor force



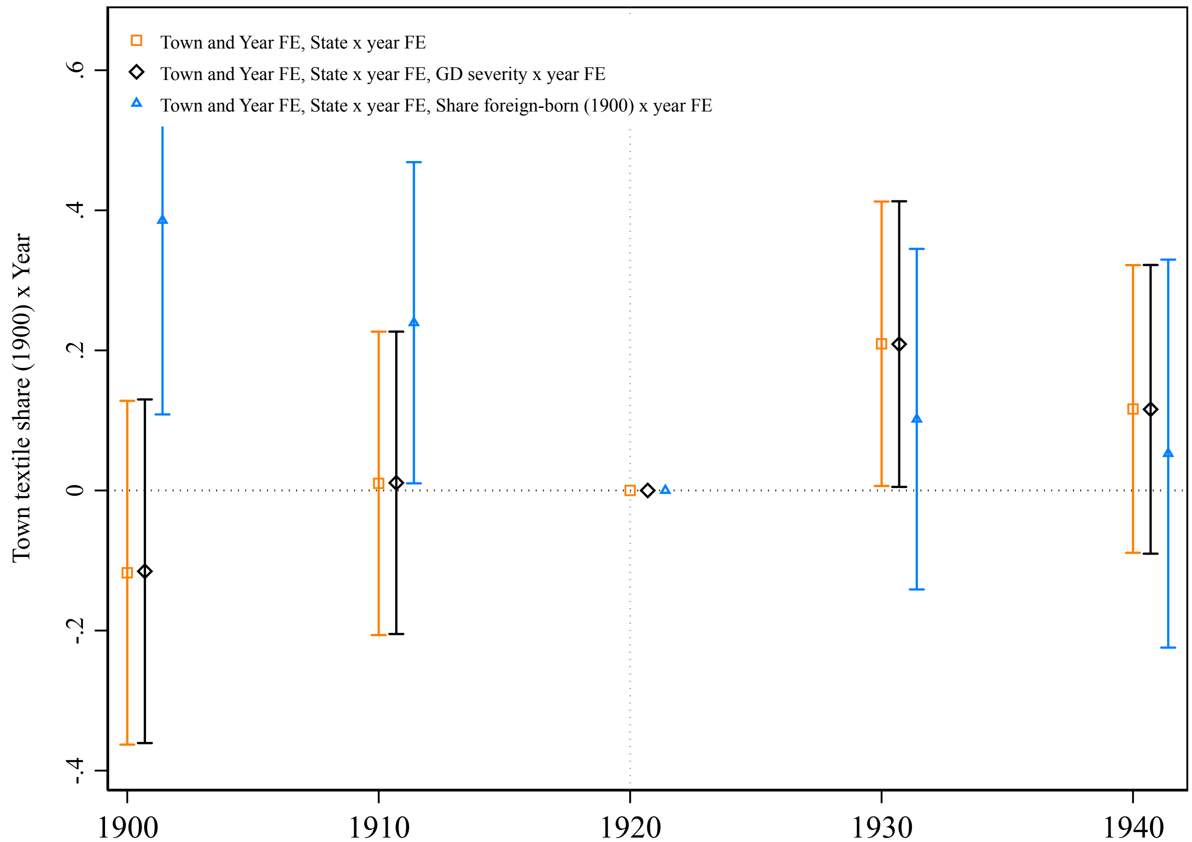
Notes: The figure presents the continuous difference-in-differences analysis results that use the annual textile share of the labor force as the outcome variable. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Figure 6: The effect of exposure to textile industry decline on net in-migration rate



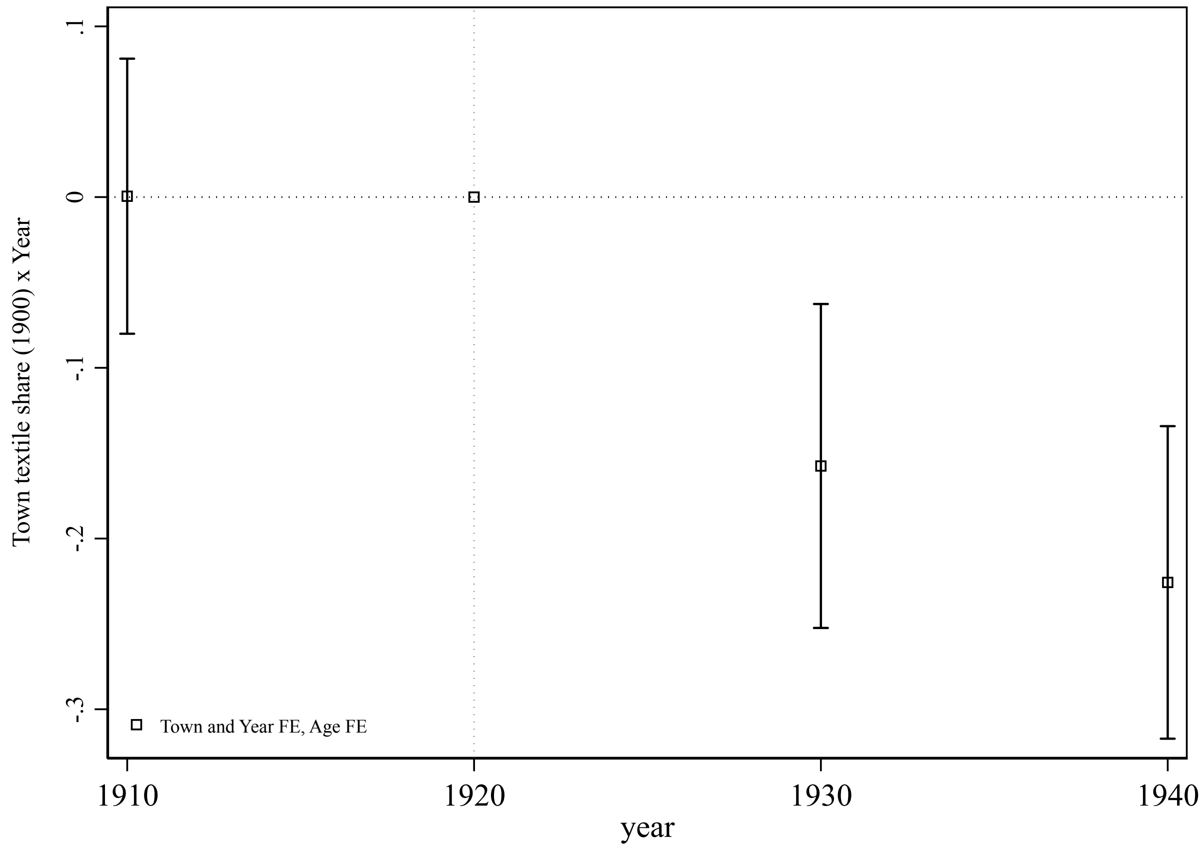
Notes: The figure presents the continuous difference-in-differences analysis results that use the net in-migration rate as the outcome variable. The net in-migration rate in each town is computed by the change in the log of the working-age population over each decade divided by the initial log working-age population. The sample includes each town's information for 1910, 1920, 1930, and 1940, omitting the data point for 1900, as the net rate is computed over a decade. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Figure 7: The effect of exposure to textile industry decline on working-age population



Notes: The figure presents the continuous difference-in-differences analysis results that use the log of the working-age population as the outcome variable. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Figure 8: The effect of exposure to textile industry decline on individual-level likelihood to out-migrate



Notes: The figure presents the estimates of Equation (2), using the individual-level indicator variable for out-migration as the outcome variable. Each individual in 1900, 1910, 1920, and 1930 censuses is matched to the adjacent census years, 1910, 1920, 1930, and 1940. Each individual is assigned an indicator variable of whether the individual moved out of their initial town by the next census decade. Each individual's exposure to the textile decline is defined by the 1900 textile share of the labor force in their original town of residence. The figure plots the coefficient estimates β_t from Equation (2), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects.

Table 2: Migration mechanism: wealth increases the likelihood for migration

	Out-migrate (All)	Out-migrate (Non-homeowners)	Out-migrate (Homeowners)
	(1)	(2)	(3)
Textile Share x 1910	0.0005	0.0139	-0.0519
	(0.0411)	(0.0441)	(0.0447)
Textile Share x 1930	-0.1575***	-0.1639***	-0.1289***
	(0.0484)	(0.0523)	(0.0465)
Textile Share x 1940	-0.2257***	-0.2642***	-0.1421***
	(0.0467)	(0.0486)	(0.0481)
Town FE	X	X	X
Year FE	X	X	X
Age FE	X	X	X
Dep. var. mean	0.363	0.421	0.290
Adjusted R^2	0.0495	0.0469	0.0593
N	1441039	799807	641214

Notes: The table presents the estimates of Equation (2), using the individual-level indicator variable for out-migration as the outcome variable. Each individual in the 1900, 1910, 1920, and 1930 censuses is matched to the adjacent census years, 1910, 1920, 1930, and 1940. Each individual is assigned an indicator variable of whether the individual moved out of their initial town by the next census decade. Each individual's exposure to the textile decline is defined by the 1900 textile share of the labor force in their original town of residence. The table presents the coefficient estimates β_t from Equation (2), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. Column (1) uses all matched workers as the sample. Column (2) uses matched workers who do not own their own house as the sample, based on the OWNERSHP variable in each census. Column (3) uses matched workers who reported owning a house as the sample.

Table 3: Homeowners with mortgages are less likely to migrate

	Out-migrate (Homeowners)	Out-migrate (No mortgage)	Out-migrate (Mortgage)
	(1)	(2)	(3)
Textile Share x 1910	-0.0467	-0.0432	-0.0376
	(0.0439)	(0.0467)	(0.0498)
Textile Share x 1930	-0.1225***	-0.0844*	-0.1581***
	(0.0439)	(0.0475)	(0.0482)
Town FE	X	X	X
Year FE	X	X	X
Age FE	X	X	X
Dep. var. mean	0.312	0.292	0.333
Adjusted R^2	0.0626	0.0700	0.0579
N	417414	215596	201799

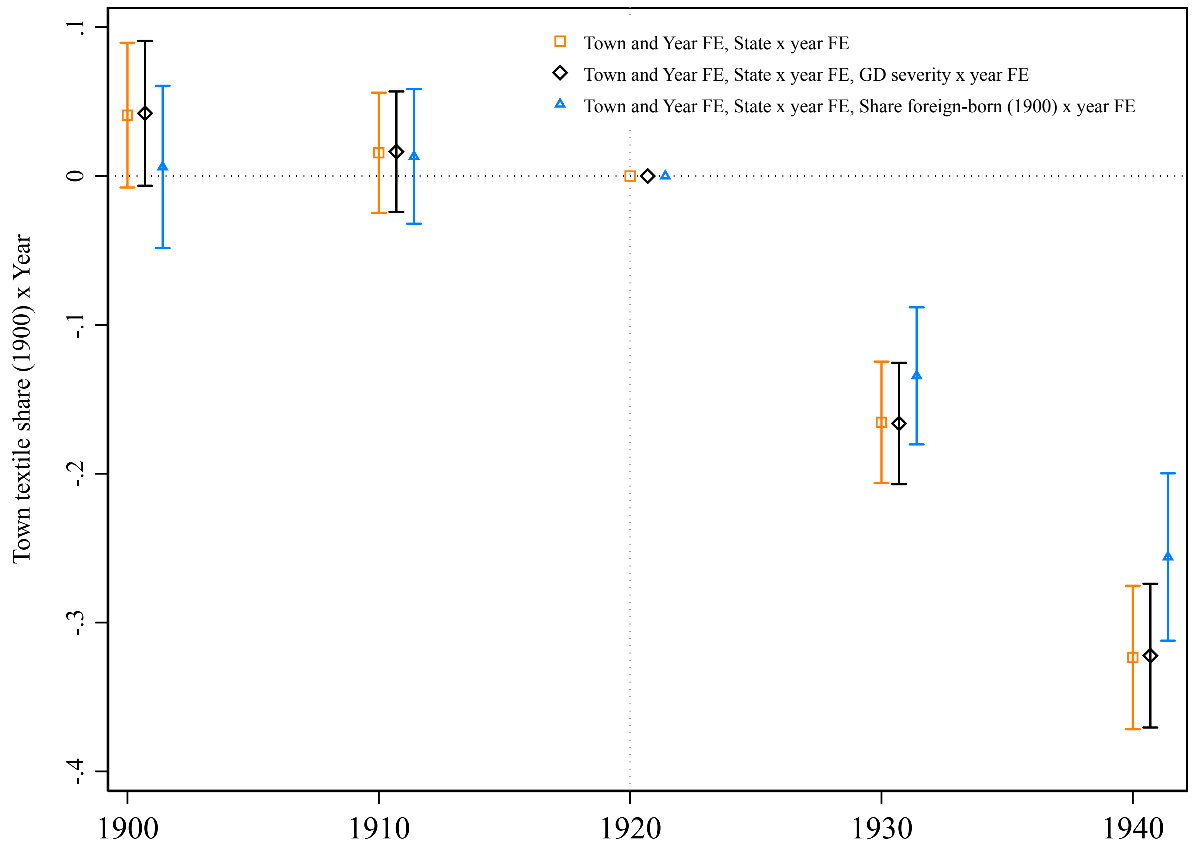
Notes: The table presents the estimates of Equation (2), using the individual-level indicator variable for out-migration as the outcome variable. Each individual in the 1900, 1910, and 1920 censuses is matched to the adjacent census years, 1910, 1920, and 1930. Each individual is assigned an indicator variable of whether the individual moved out of their initial town by the next census decade. Each individual's exposure to the textile decline is defined by the 1900 textile share of the labor force in their original town of residence. The table presents the coefficient estimates β_t from Equation (2), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. Column (1) uses all matched workers who reported owning a house. Column (2) uses matched homeowners with no mortgage obligation as the sample, based on the MORTGAGE variable in the 1900-1920 censuses. Column (3) uses matched homeowners who reported having a mortgage as the sample.

Table 4: Increased cohabitation

	Multi-gen. living (All)	Multi-gen. living (28-45)	Multi-gen. living (46-65)
	(1)	(2)	(3)
Textile Share x 1910	0.0030	0.0127	-0.0064
	(0.0142)	(0.0172)	(0.0209)
Textile Share x 1930	0.0134	0.0339**	-0.0196
	(0.0128)	(0.0143)	(0.0174)
Textile Share x 1940	0.0437**	0.0780***	-0.0076
	(0.0188)	(0.0235)	(0.0229)
Town FE	X	X	X
Year FE	X	X	X
Age FE	X	X	X
Dep. var. mean	0.4105	0.3202	0.5301
N	1441039	821359	619664

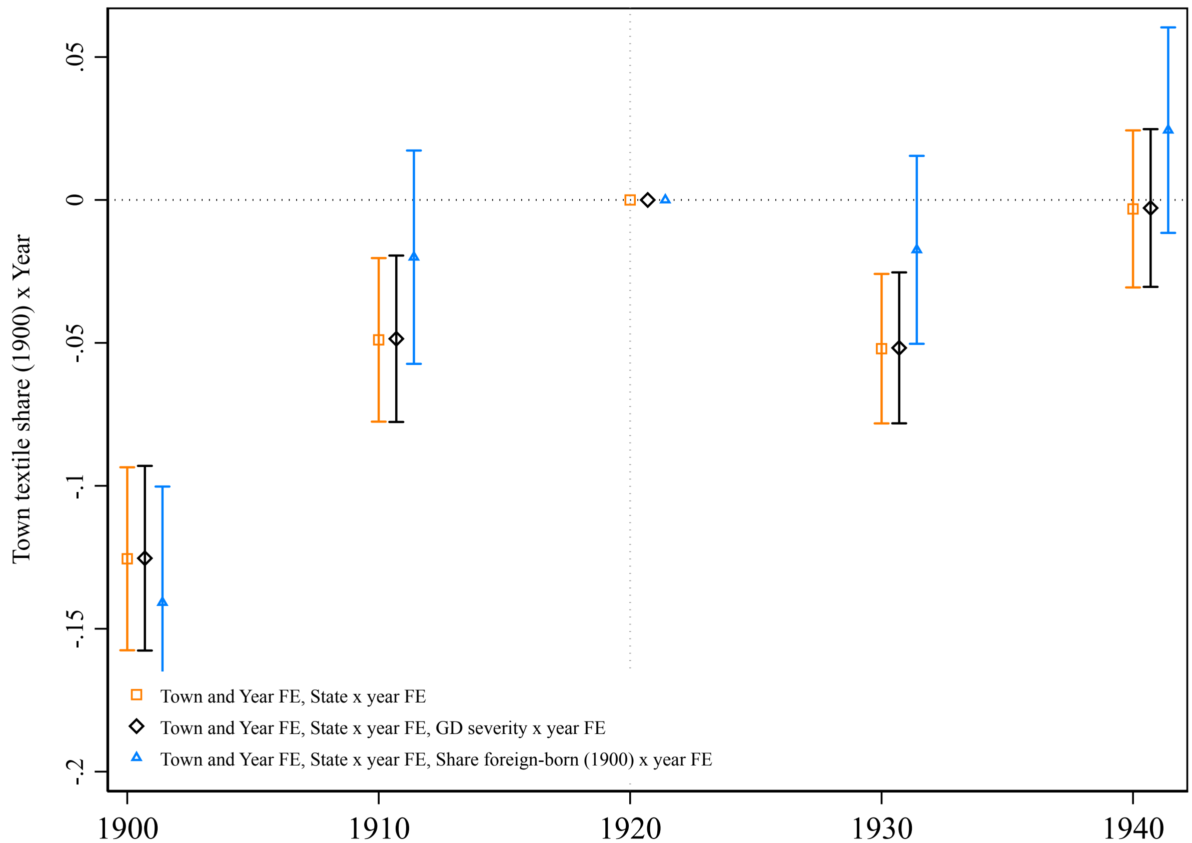
Notes: The table presents the estimates of Equation (2), using the individual-level indicator variable for cohabitation as the outcome variable. Each individual in the 1900, 1910, 1920, and 1930 censuses is matched to the adjacent census years, 1910, 1920, 1930, and 1940. Each individual is assigned an indicator variable whether individuals live with their extended family, indicated by living with more than one generation of the family other than their direct parents or children. Each individual's exposure to the textile decline is defined by the 1900 textile share of the labor force in their original town of residence. The table presents the coefficient estimates β_t from Equation (2), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. Column (1) uses all matched workers who reported owning a house. Column (2) uses matched homeowners with no mortgage obligation as the sample, based on the MORTGAGE variable in each census. Column (3) uses matched homeowners who reported having a mortgage as the sample.

Figure 9: Heterogeneous labor force participation by age: School-going aged population (age 14-18)



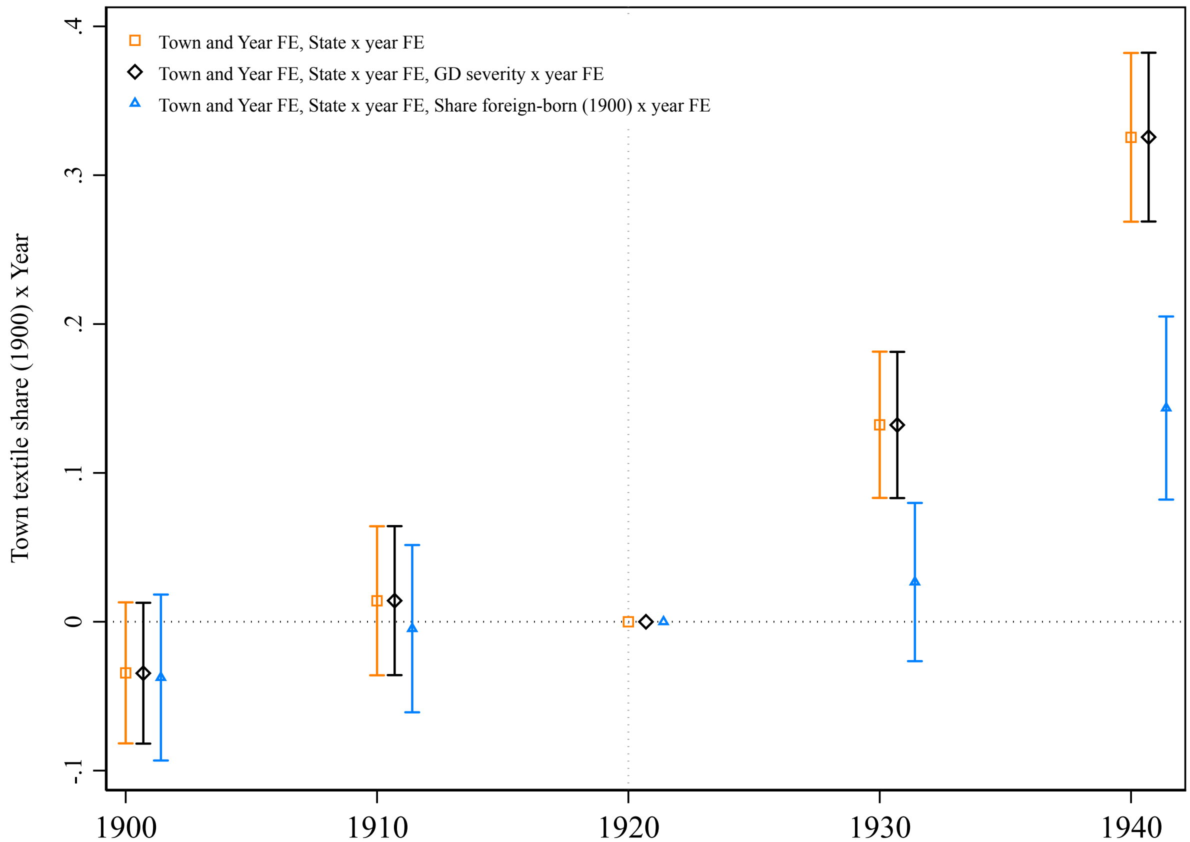
Notes: The figure presents the continuous difference-in-differences analysis results that use the labor force participation rate among the school-going aged population. Individuals with a gainful occupation recorded are considered in the labor force. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Figure 10: Heterogeneous labor force participation by age: Population of age 28-65



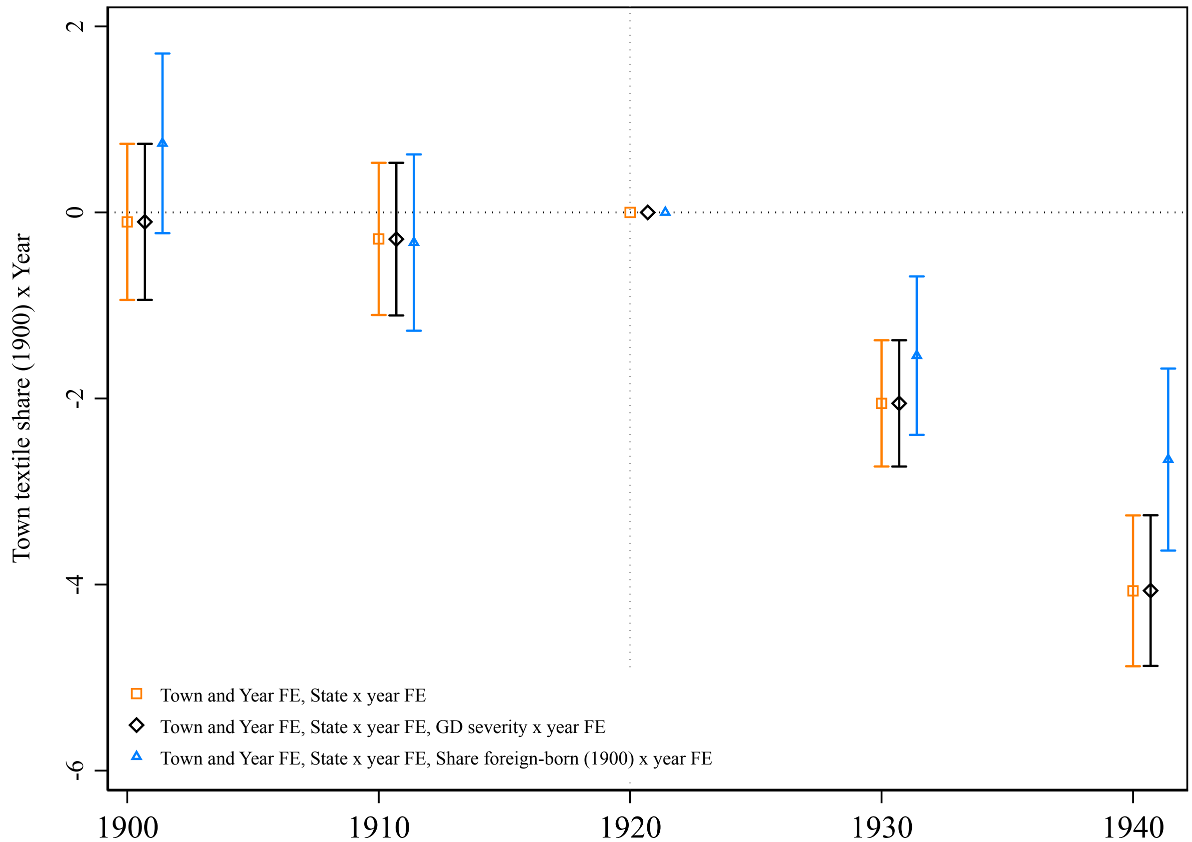
Notes: The figure presents the continuous difference-in-differences analysis results that use the labor force participation rate among the age 28-65. Individuals with gainful occupations are considered in the labor force. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Figure 11: The effect of exposure to textile industry decline on the share of agricultural labor force



Notes: The figure presents the continuous difference-in-differences analysis results that use the agricultural share of the town labor force as the outcome variable. The agricultural share of the town labor force is computed by the share of the town labor force who reported having agriculture (code 102 of IND1950) as their industry. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Figure 12: The effect of exposure to textile industry decline on occupation-based earning



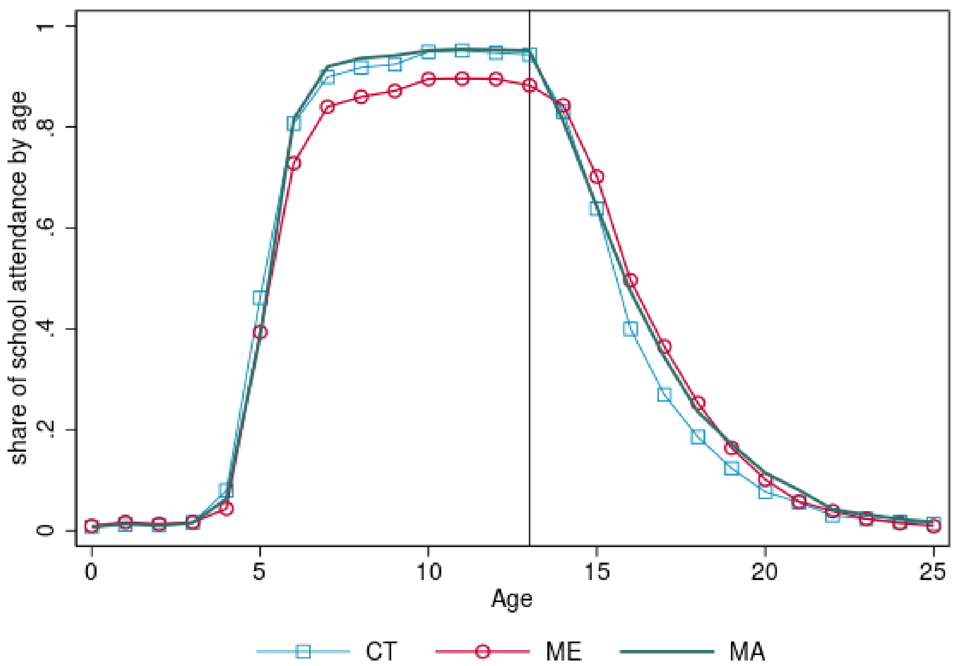
Notes: The figure presents the continuous difference-in-differences analysis results that use the average occupational income score (OCCSCORE) as the outcome variable. The town-level average is computed using the OCCSCORE of town working-age residents who reported having a gainful occupation. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. Standard errors are clustered by town.

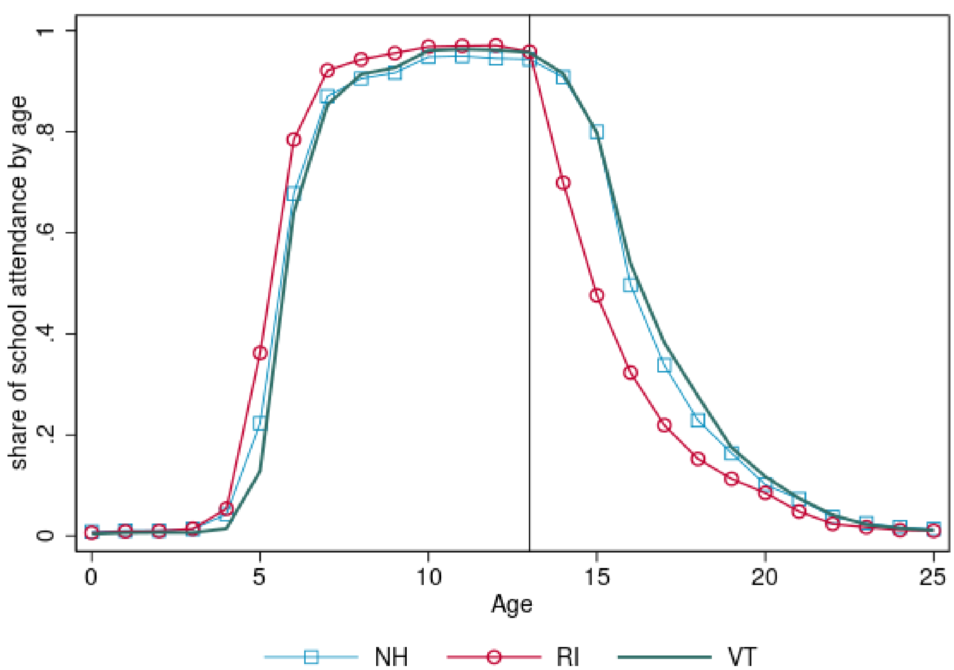
Table 5: The effect of exposure to textile industry decline on labor market outcomes using a matched sample of workers

	LFPR	Agric. Ind	Change in occscore
	(1)	(2)	(3)
Textile Share x 1910	0.0045	-0.0039	0.4550
	(0.0559)	(0.0115)	(0.3843)
Textile Share x 1930	-0.0224	0.0387***	-0.9743***
	(0.0689)	(0.0111)	(0.3403)
Textile Share x 1940	-0.0497	0.0580***	-0.6073*
	(0.0651)	(0.0177)	(0.3242)
Town FE	X	X	X
Year FE	X	X	X
Dep. var. mean	0.817	0.104	0.955
Adjusted R^2	0.0540	0.2143	0.0079
N	1441039	1441039	907121

Notes: The table presents the coefficient estimates of Equation (2) using the individual-level indicator variables for participating in the labor force, working in the agricultural sector, and change in occupational income score (OCCSCORE) as the outcome variables for columns (1)-(3). Each individual in 1900, 1910, 1920, and 1930 censuses is matched to the adjacent census years, 1910, 1920, 1930, and 1940. Each individual's exposure to the textile decline is defined by the 1900 textile share of the labor force in their original town of residence. The figure plots the coefficient estimates β_t from Equation (2), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects.

Figure 13: Share of the population attending school in 1920 by state-age cohort





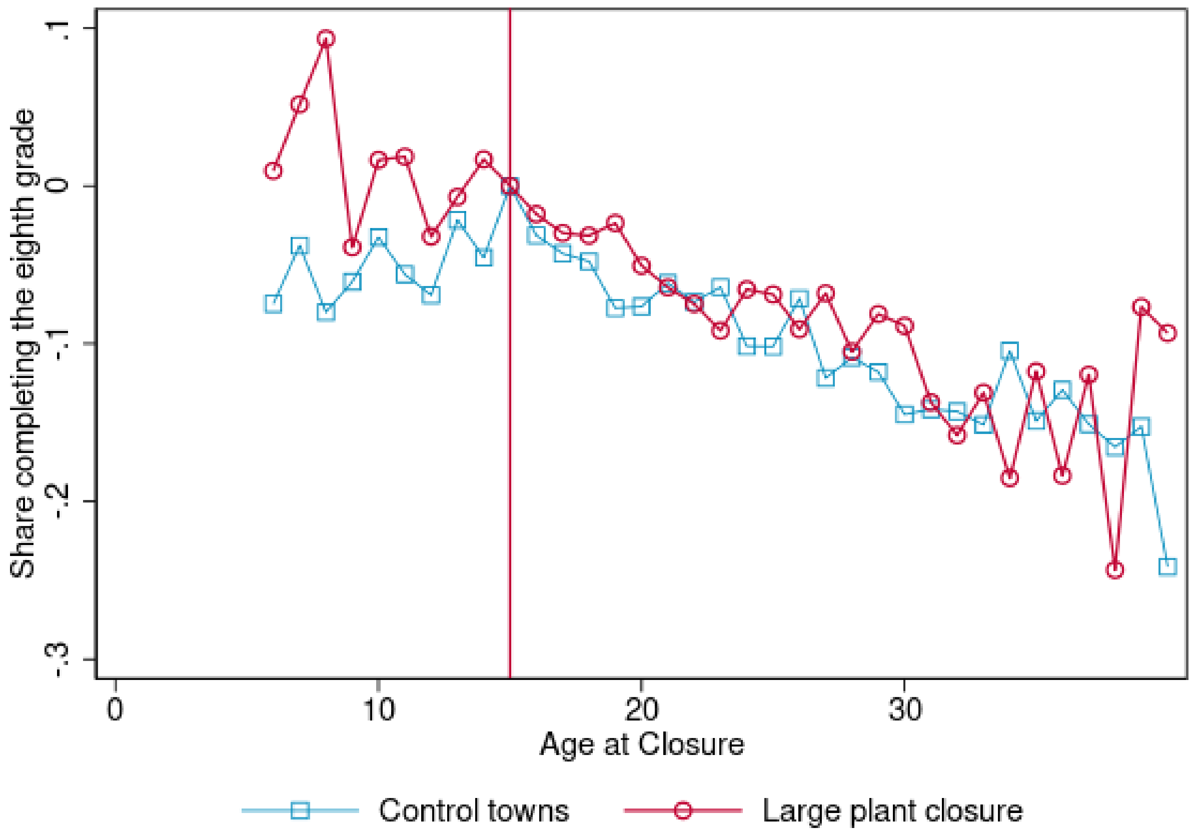
Notes: The figures plot share of each state-age cohort attending school in 1920. Using the school attendance variable (SCHOOL) from the 1920 census, I compute the share of each age cohort in New England states who reported attending school.

Table 6: Average town characteristics for closure towns and control towns

	Matched control towns	Large plant closure	Rest of New England towns
Working-age population	4771.889	3895.778	3979.167
Avg. socioeconomic index	10.034	9.810	9.645
Labor force participation rate	0.581	0.577	0.548
Share foreign-born	0.350	0.304	0.217
Share literate	0.913	0.907	0.944
Textile share of labor force	0.165	0.207	0.040
Agriculture share of labor force	0.166	0.199	0.336
Manufacturing share (net of textile)	0.118	0.096	0.110
Number of towns	36	36	687

Notes: The table summarizes average town characteristics for towns that experienced "large" plant closures, their matched control towns, and the rest of the towns in New England states. Large plant closures do not happen in Maine and Vermont, so the sample only includes Connecticut, Massachusetts, New Hampshire, and Rhode Island towns. The demographic characteristics are defined using the 1900 census.

Figure 14: Normalized trend of share completing at least the eighth grade



Notes: The graph plots the normalized trend of the eighth-grade completion share among plant closure town and matched control town population who completed at least eighth-grade of education, organized by age-at-closure cohorts. The large plant closure series is computed using the sample of individuals whose residences in 1920 were towns with large plant closures. The control town series is constructed using the sample of individuals located at matched control towns in 1920. The matched control towns are defined using the propensity score matching described in Section 6.3. The plant closure year is the earliest year a large plant closed in each closure town, and the closure year is assigned to their matched control towns. Using the closure year, I organize individuals in closure and control towns by their age at the time of the closure year. Then, I compute the average share of the population who completed the eighth grade of education and normalize each series by their average value at the cohort whose ages were 15 during the closure year.

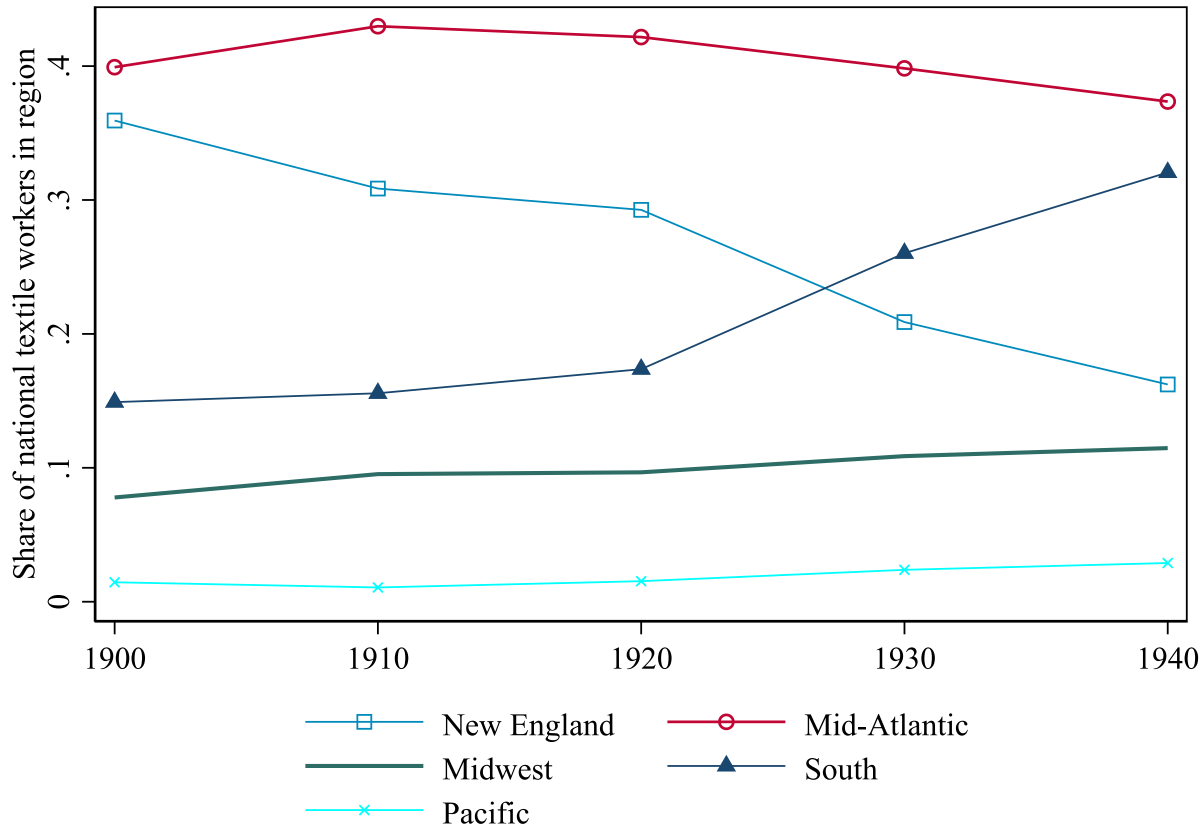
Table 7: The effect of large textile plant closures on educational attainment, income, and migration

	At least eighth	At least ninth	Employed	Log wage income	Self-employed	Out-migrate
	(1)	(2)	(3)	(4)	(5)	(6)
Affected by plant closure	0.0316*	0.0123	0.0060	-0.0554*	-0.0033	-0.0039
	(0.0179)	(0.0188)	(0.0117)	(0.0285)	(0.0107)	(0.0219)
Birth cohort FE	X	X	X	X	X	X
Town FE	X	X	X	X	X	X
Dep. var. mean	0.811	0.556	0.877	6.938	0.094	0.471
Adjusted R^2	0.0658	0.0783	0.0286	0.0837	0.0172	0.0388
N	11960	11960	11960	9037	10485	11960

Notes: The table presents the analysis result using the matched difference-in-differences specification as described in Equation (3). The sample includes matched individuals (from 1920 to 1940 censuses) in plant closure towns and their match control towns, those whose ages were between 11 and 14, and those between 20 and 23 at the year of plant closure. Individuals affected by plant closures are those who were at the plant closure towns and were aged between 11 and 14 at the time of plant closure in their towns. Each specification includes birth-cohort fixed effects based on age (in the 1920 census) and town fixed effects. The outcome variables are constructed using their matched 1940 census variables. The first and second columns use the individual-level indicator variable, whether one completed at least the eighth and ninth grade of education, as the outcome variables, using the HIGRADE variable. Column (3) uses the indicator variable, whether one was employed as an outcome, using the EMPSTAT variable. Column (4) uses the log of wage income as an outcome, constructed from the INCWAGE variable. Column (5) uses an indicator of self-employment as an outcome using the EMPSTAT variable. Lastly, column (6) uses an out-migration indicator as an outcome, constructed using the state and town information from the 1920 and 1940 censuses.

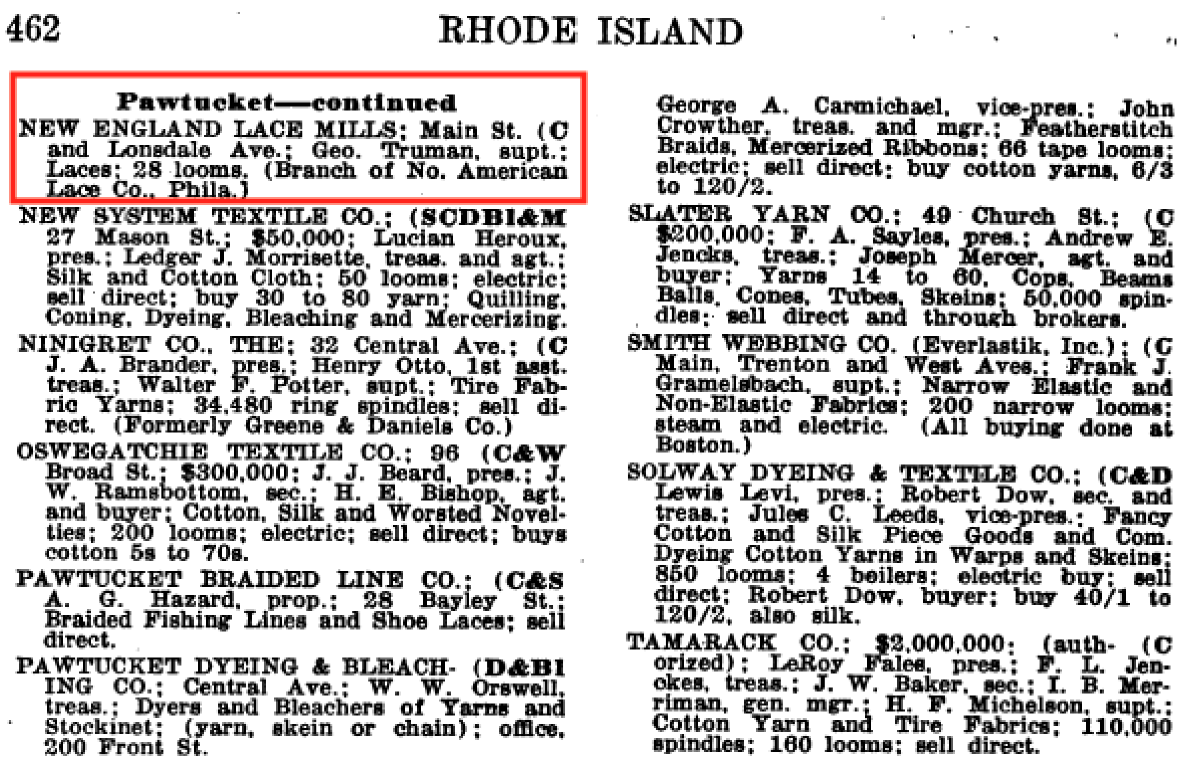
Appendix Figures and Tables

Appendix Figure A. 1: Share of the national labor force in the textile industry located in each region



Notes: The figure plots the share of the textile labor force located in each census region and area, computed from the IPUMS 1% census sample. The textile industry is defined as the group of 1950 census industries: (1) Knitting mills, (2) Dyeing and finishing textiles, except knit goods, (3) Carpets, rugs, and other floor coverings, (4) Yarn, thread, and fabric mills, (5) Miscellaneous textile mill products, (6) Apparel and accessories, and (7) Miscellaneous fabricated textile products.

Appendix Figure A. 2: Structure of the Official American Textile Directory



462 RHODE ISLAND

Pawtucket—continued

NEW ENGLAND LACE MILLS; Main St. (C and Lonsdale Ave.; Geo. Truman, supt.; Laces; 28 looms. (Branch of No. American Lace Co., Phila.)

NEW SYSTEM TEXTILE CO.; (SCDBI&M 27 Mason St.; $50,000; Lucian Heroux, pres.; Ledger J. Morrisette, treas. and agt.; Silk and Cotton Cloth; 50 looms; electric; sell direct; buy 30 to 80 yarn; Quilling, Coning, Dyeing, Bleaching and Mercerizing.

NINIGRET CO., THE; 32 Central Ave.; (C J. A. Brander, pres.; Henry Otto, 1st asst. treas.; Walter F. Potter, supt.; Tire Fabric Yarns; 34,480 ring spindles; sell direct. (Formerly Greene & Daniels Co.)

OSWEGATCHIE TEXTILE CO.; 96 (C&W Broad St.; $300,000; J. J. Beard, pres.; J. W. Ramsbottom, sec.; H. E. Bishop, agt. and buyer; Cotton, Silk and Worsted Novelties; 200 looms; electric; sell direct; buys cotton 5s to 70s.

PAWTUCKET BRAIDED LINE CO.; (C&S A. G. Hazard, prop.; 28 Bayley St.; Braided Fishing Lines and Shoe Laces; sell direct.

PAWTUCKET DYEING & BLEACH- (D&BI ING CO.; Central Ave.; W. W. Orswell, treas.; Dyers and Bleachers of Yarns and Stockinet; (yarn, skein or chain); office, 200 Front St.

George A. Carmichael, vice-pres.; John Crowther, treas. and mgr.; Featherstitch Braids, Mercerized Ribbons; 66 tape looms; electric; sell direct; buy cotton yarns, 6/3 to 120/2.

SLATER YARN CO.; 49 Church St.; (C $200,000; F. A. Sayles, pres.; Andrew E. Jencks, treas.; Joseph Mercer, agt. and buyer; Yarns 14 to 60, Cops, Beams Balls, Cones, Tubes, Skeins; 50,000 spindles; sell direct and through brokers.

SMITH WEBBING CO. (Everlastik, Inc.); (C Main, Trenton and West Aves.; Frank J. Gramelsbach, supt.; Narrow Elastic and Non-Elastic Fabrics; 200 narrow looms; steam and electric. (All buying done at Boston.)

SOLWAY DYEING & TEXTILE CO.; (C&D Lewis Levi, pres.; Robert Dow, sec. and treas.; Jules C. Leeds, vice-pres.; Fancy Cotton and Silk Piece Goods and Com. Dyeing Cotton Yarns in Warps and Skeins; 850 looms; 4 boilers; electric buy; sell direct; Robert Dow, buyer; buy 40/1 to 120/2, also silk.

TAMARACK CO.; $2,000,000; (auth- (C orized); LeRoy Fales, pres.; F. L. Jenckes, treas.; J. W. Baker, sec.; I. B. Merriman, gen. mgr.; H. F. Michelson, supt.; Cotton Yarn and Tire Fabrics; 110,000 spindles; 160 looms; sell direct.

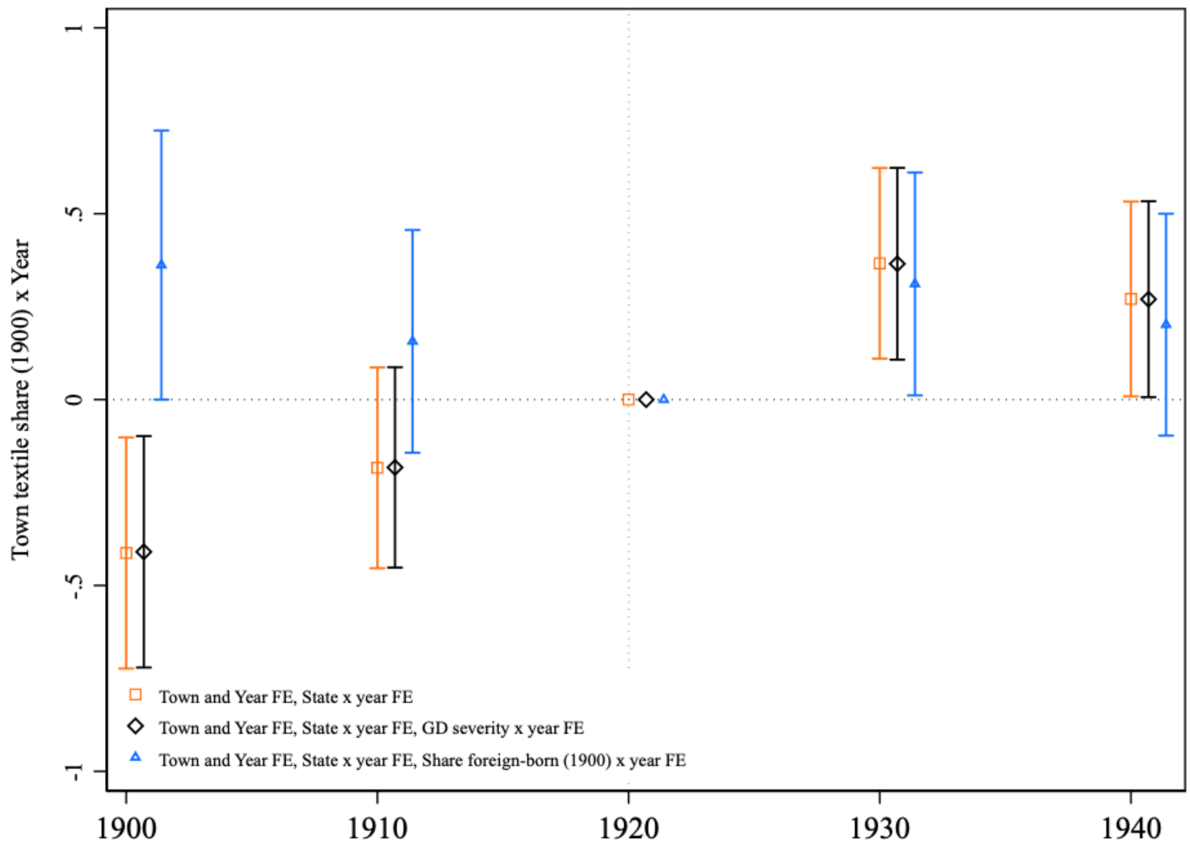
Notes: The figure presents an example of plant-level information contained in the Official American Textile Directory.

Appendix Table A. 1: Coverage of the American Official Textile Directory

States	Textile Directory (1929)	Census of Manuf. (1929)
Connecticut	80	33
Maine	20	15
Massachusetts	241	135
New Hampshire	27	18
Rhode Island	142	55
Vermont	3	3

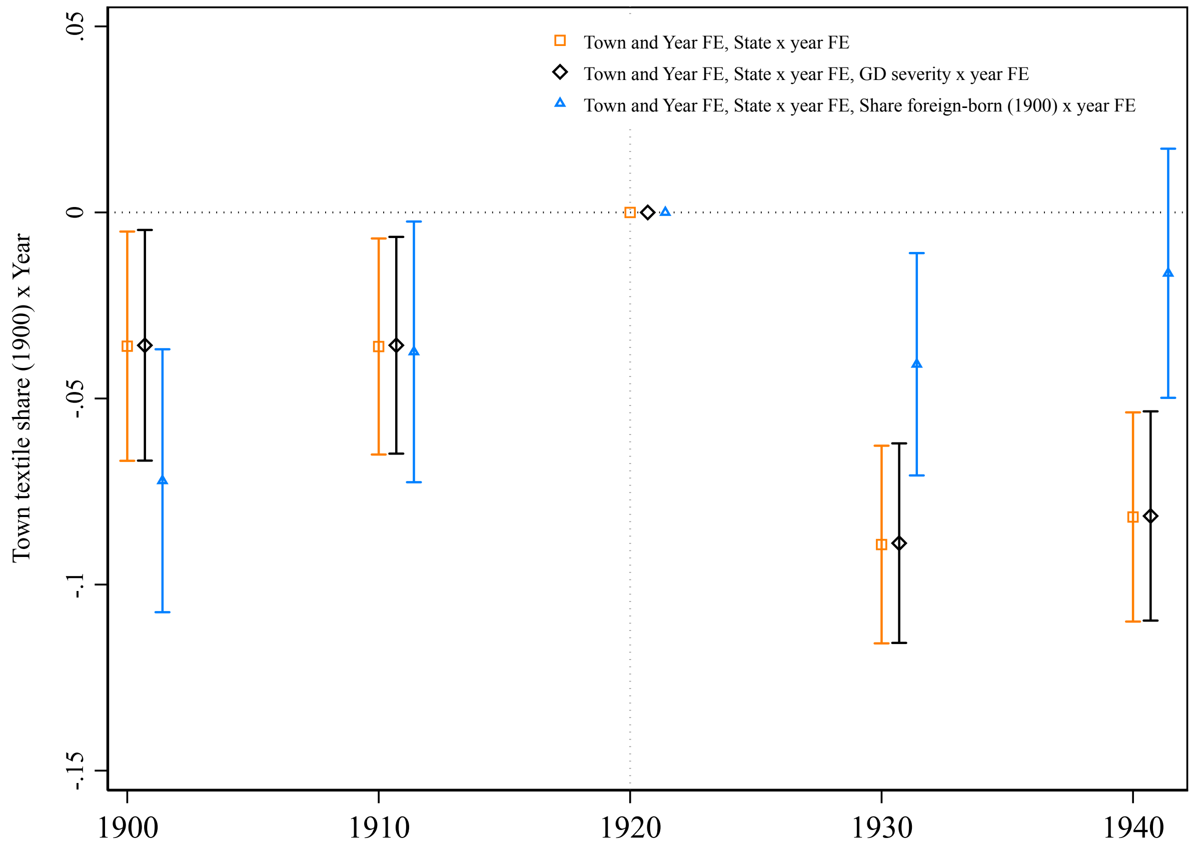
Notes: The table summarizes the number of cotton textile plants by state. The first column presents the number of cotton plants from the 1929 Official American Textile Directory, and the second column presents the statistics from the 1929 Census of Manufacturing digitized by Raff *et al.* (2015).

Appendix Figure A. 3: The effect of exposure to textile industry decline on the log of native working-age population



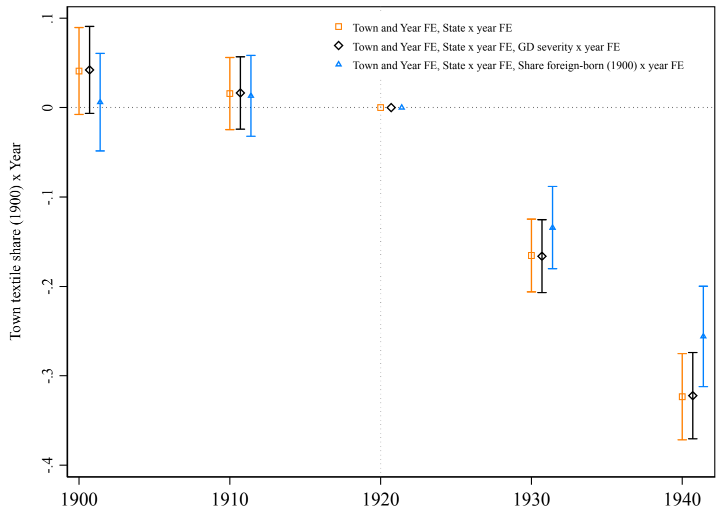
Notes: The figure presents the continuous difference-in-differences analysis results that use the log of native working-age population as the outcome variable. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Appendix Figure A. 4: The effect of exposure to textile industry decline on labor force participation rate

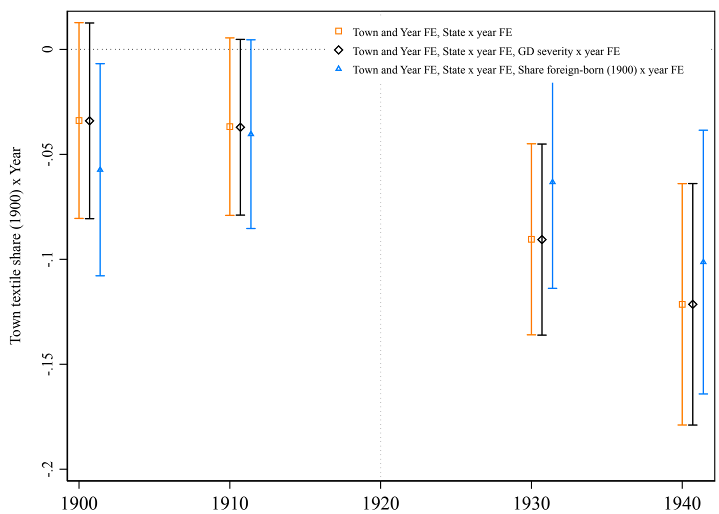


Notes: The figure presents the continuous difference-in-differences analysis results that use the labor force participation rate as the outcome variable. The labor force participation rate is computed by the share of the town's working-age (14-65) population who reported having a gainful occupation in each census year. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Appendix Figure A. 5: The effect of exposure to textile industry decline on labor force participation by age group

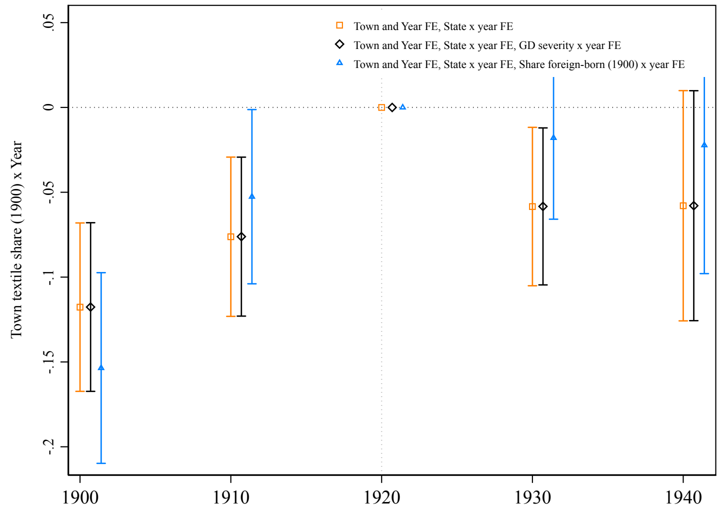


(a) Age 14-18

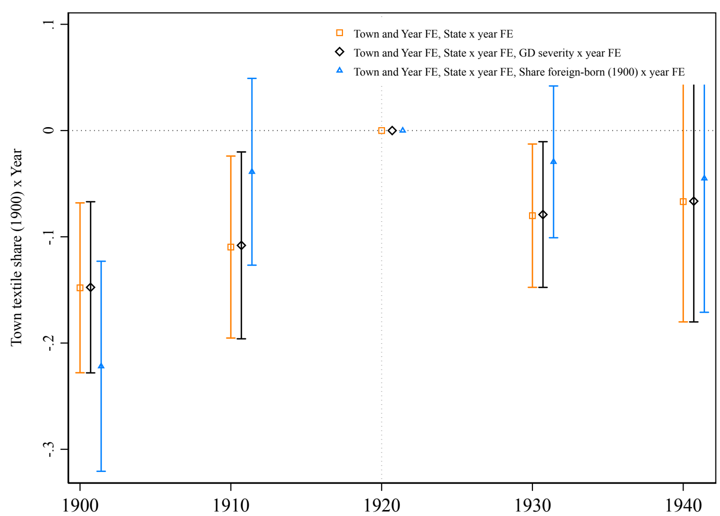


(b) Age 19-25

Notes: The figure presents the continuous difference-in-differences analysis results that use the labor force participation rate in each age group as the outcome variable. The labor force participation rate is computed by the share of four age groups of the town's working-age population who reported having a gainful occupation in each census year. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators.

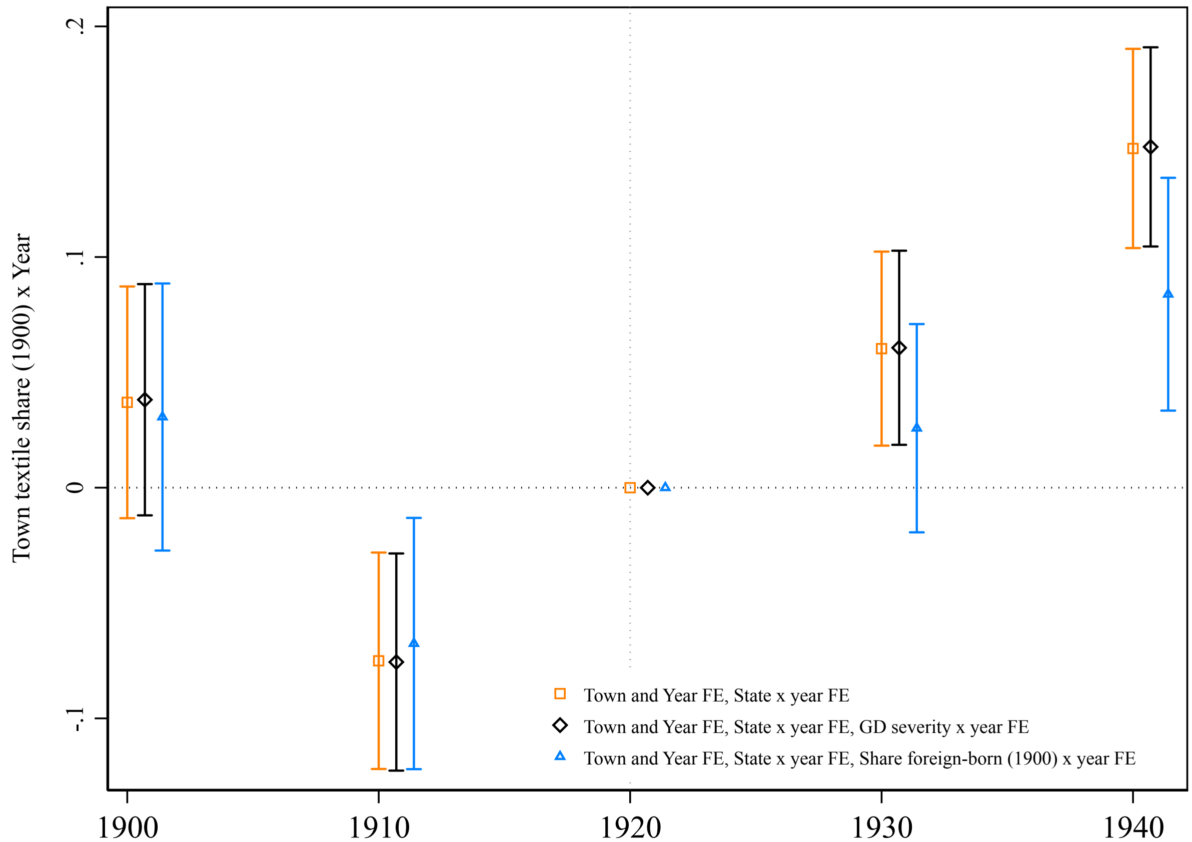


(c) Age 26-45



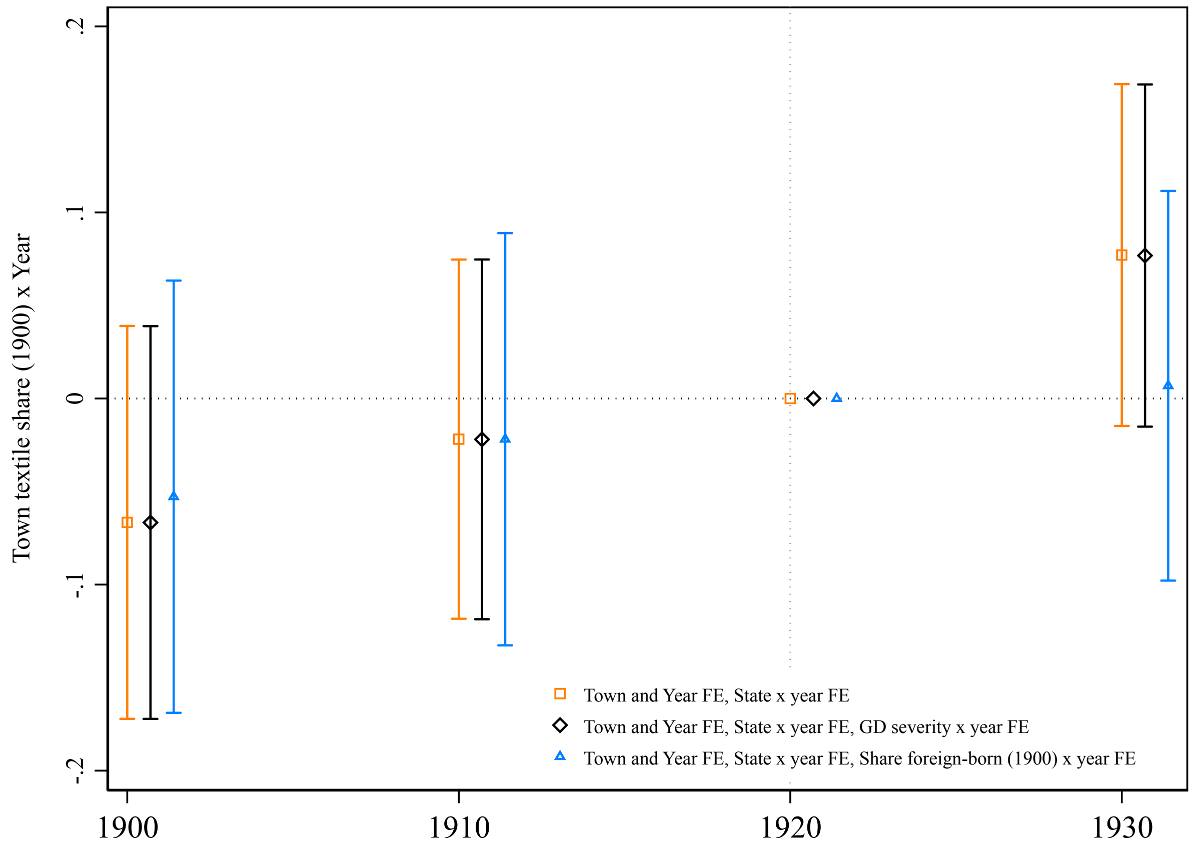
(d) Age 46-65

Appendix Figure A. 6: Effect of exposure to textile industry decline on school attendance rate among age 14-18 population



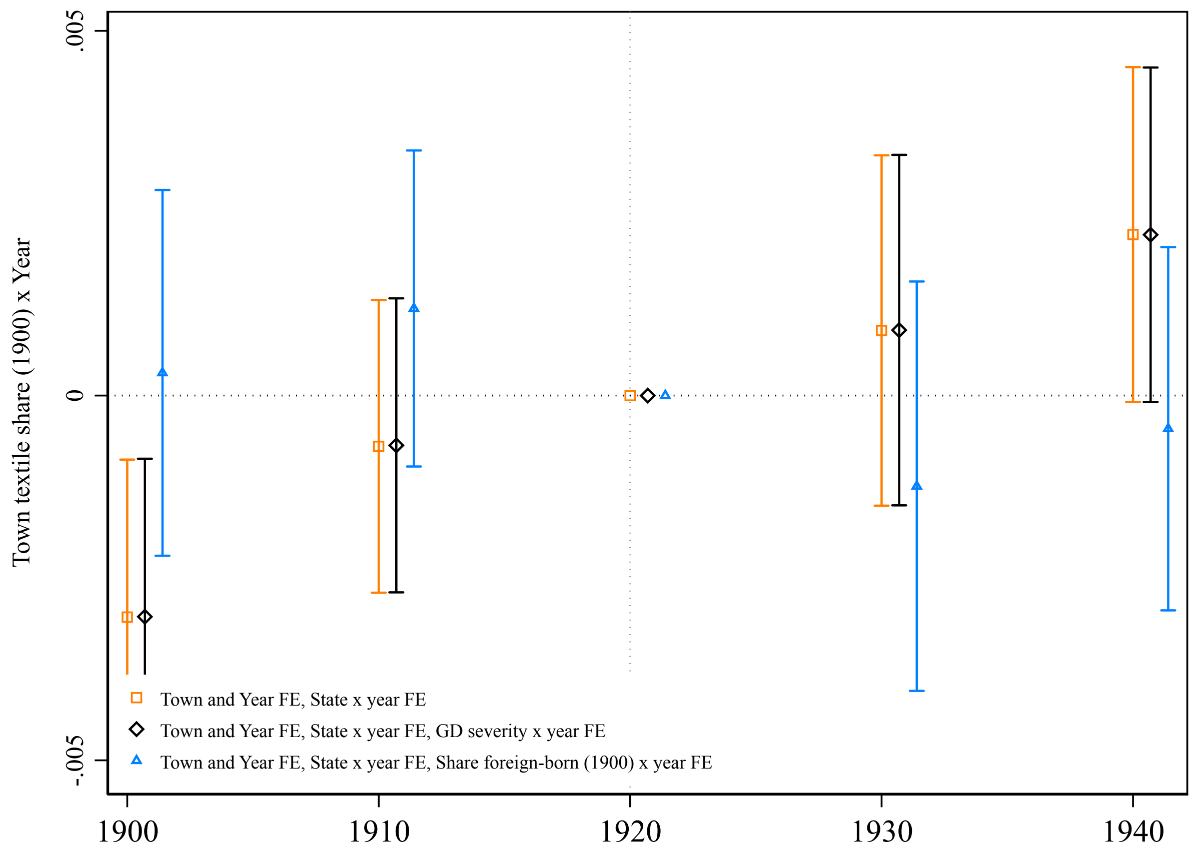
Notes: The figure presents the continuous difference-in-differences analysis results that use the school attendance rate as the outcome variable. The school attendance rate is computed by the share of the town population of 14-18 years of age who reported attending school in each census year. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Appendix Figure A. 7: The effect of exposure to textile industry decline on the share of the population (age 11-14) with the eighth-grade completion



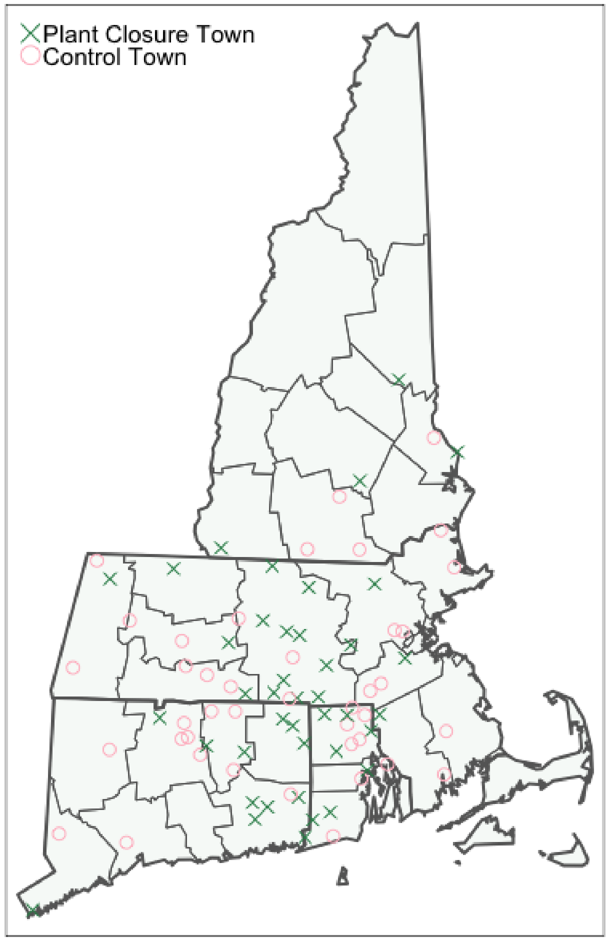
Notes: The figure presents the continuous difference-in-differences analysis results that use the share of the town population aged 11-14 who completed the eighth grade of education. Individuals aged 11-14 in New England towns are matched to the 1940 census to retrieve their completed years of schooling, and I compute the share of individuals whose highest grade of completion is higher than the eighth grade. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Appendix Figure A. 8: Effect of exposure to textile industry decline on teacher per capita



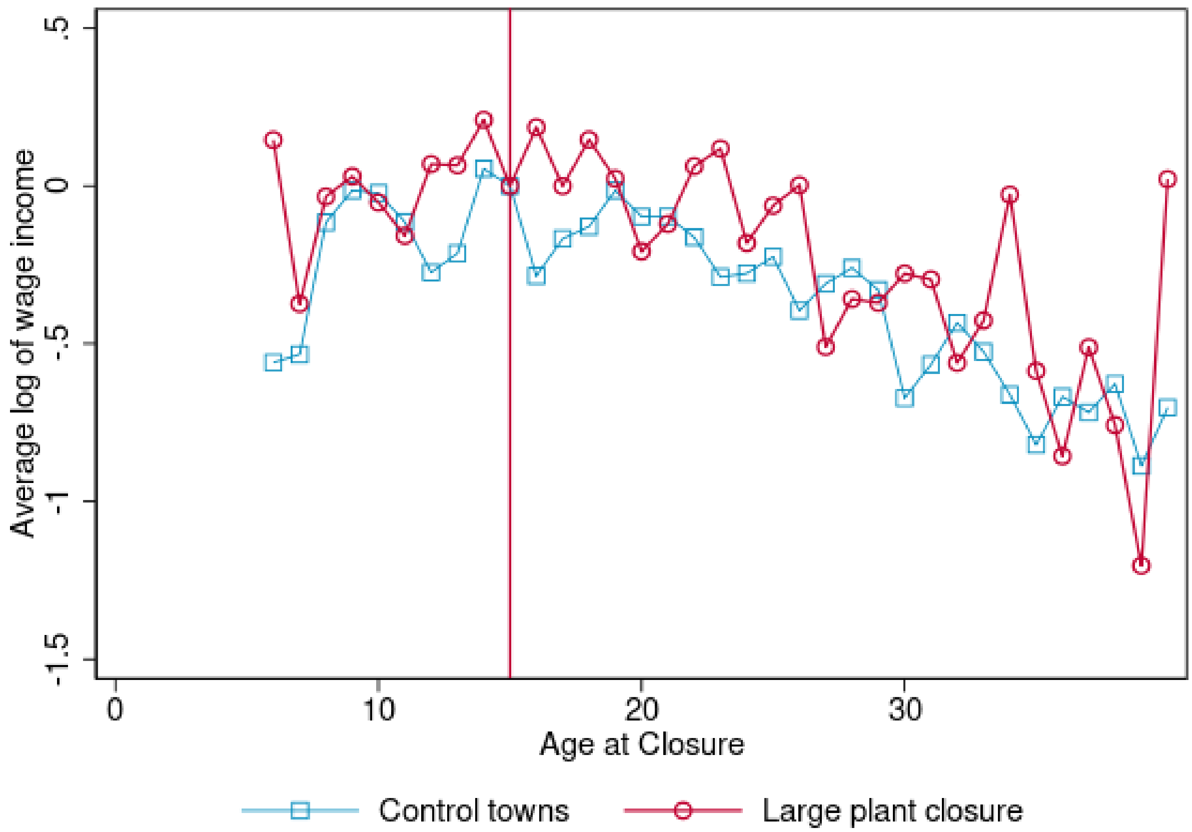
Notes: The figure presents the continuous difference-in-differences analysis results that use the number of teachers per capita as the outcome variable. The teacher per capita is computed by the number of individuals who reported their occupation as teachers divided by the town population. I only include those whose 1950 census occupation codes are 093 "Teachers (n.e.c.)," as most of the teachers are located in this category, as other teacher categories indicate art teachers (e.g., art, music, or dancing teachers). The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Appendix Figure A. 9: Map of matched control towns and plant closure towns



Notes: The figure plots the map of Connecticut, New Hampshire, Massachusetts, and Rhode Island with the location of plant closure towns and their matched control towns.

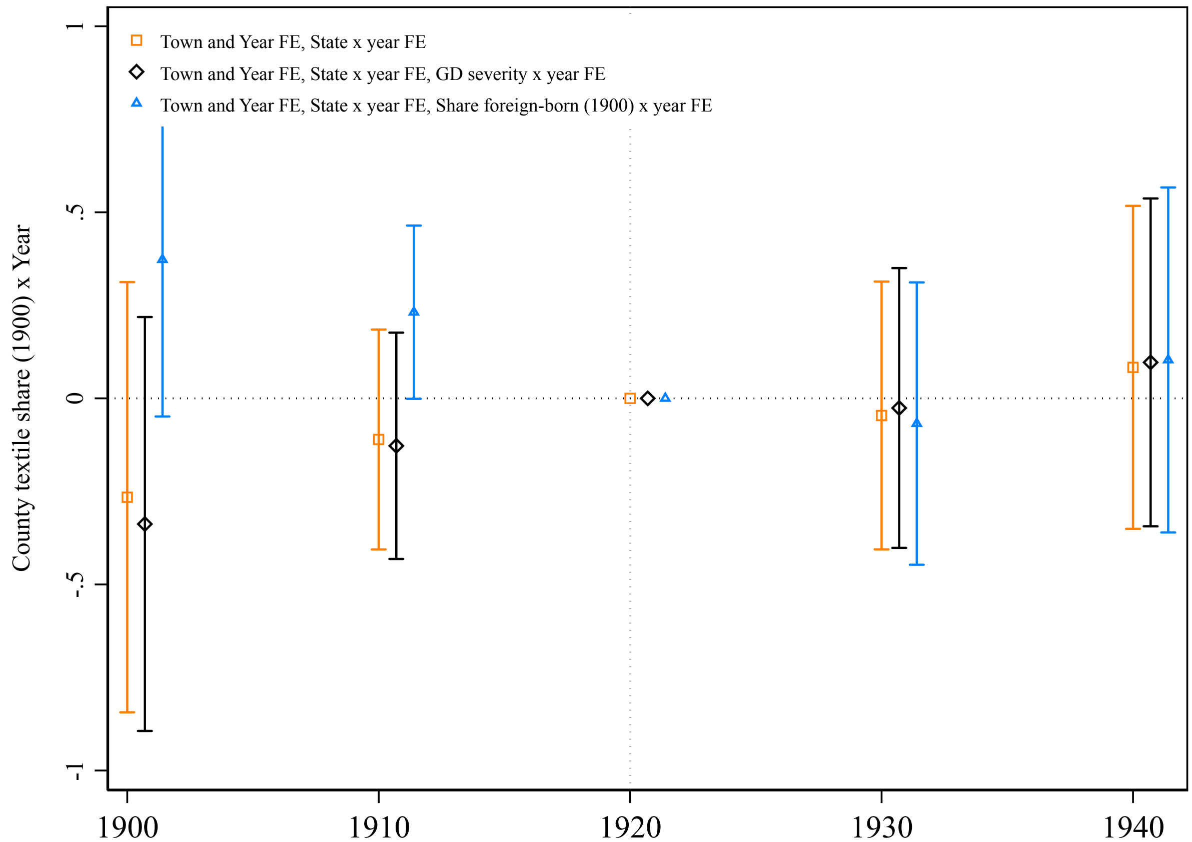
Appendix Figure A. 10: Normalized trend of log wage income



Notes: The graph plots the normalized trend of the average of log wage income among plant closure towns and matched control town populations, organized by age-at-closure cohorts. The large plant closure series is computed using the sample of individuals whose residences in 1920 were towns with large plant closures. The control town series is constructed using the sample of individuals located at matched control towns in 1920. The matched control towns are defined using the propensity score matching described in Section 6.3. The plant closure year is the earliest year a large plant closed in each closure town, and the closure year is assigned to their matched control towns. Using the closure year, I organize individuals in closure and control towns by their age at the time of the closure year. Then, I compute the average log wage income and normalize each series by their average value at the cohort ages 15 during the closure year.

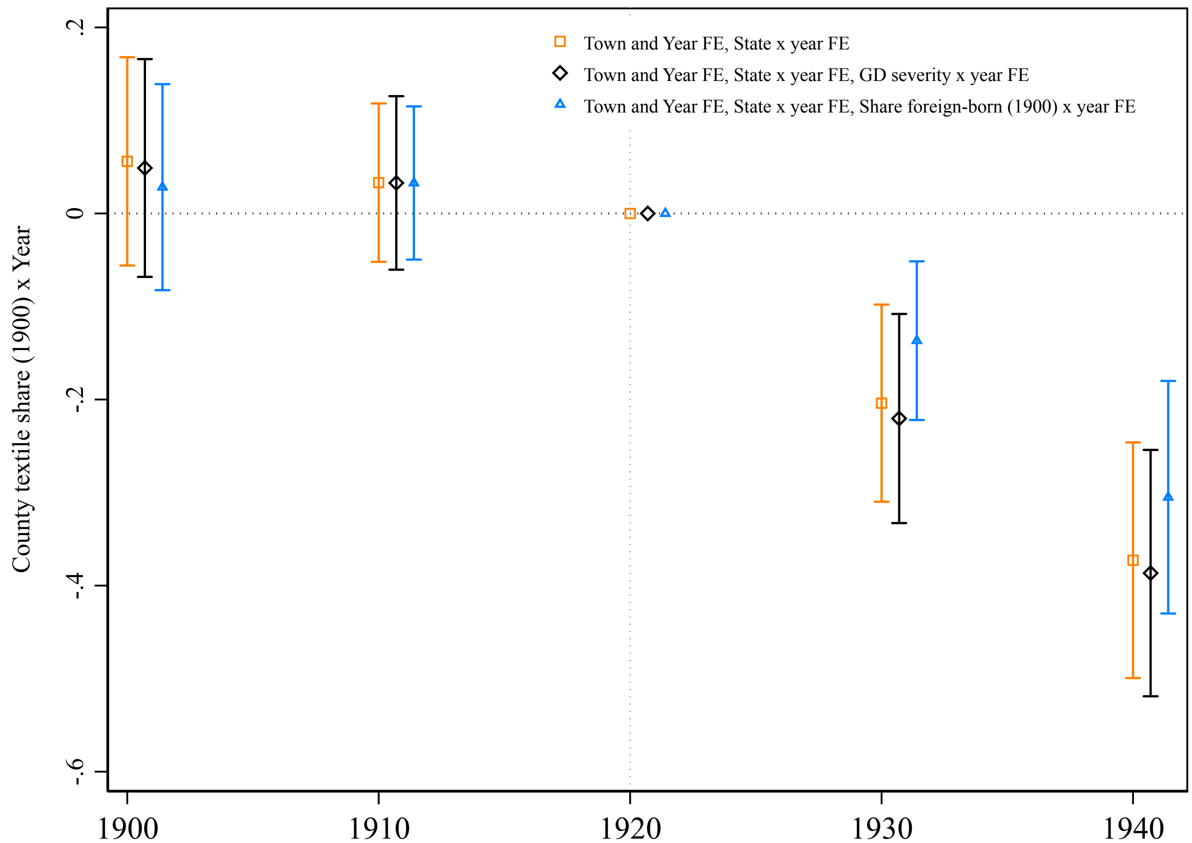
Appendix B. County-level event-study analysis

Appendix Figure B. 1: The effect of exposure to textile industry decline on county working-age population



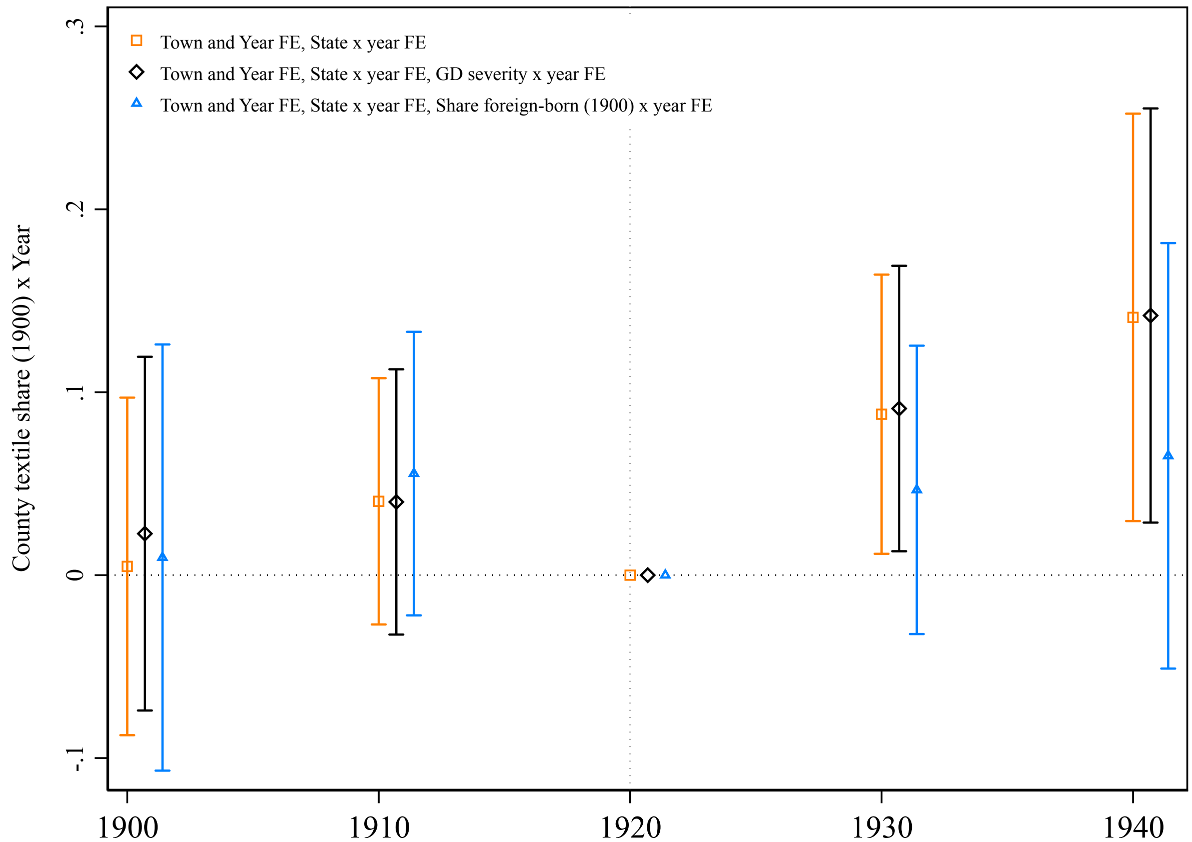
Notes: The figure presents the continuous difference-in-differences analysis results that use the log of the working-age population as the outcome variable. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each county (1900) interacted with census year indicators. The units of geography are counties defined from Berkes *et al.* (2022). All coefficient series include county and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the county-level measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each county interacted with census year indicators. Standard errors are clustered by counties.

Appendix Figure B. 2: The effect of exposure to textile industry decline on county labor force participation rate, school-going aged population (age 14-18)



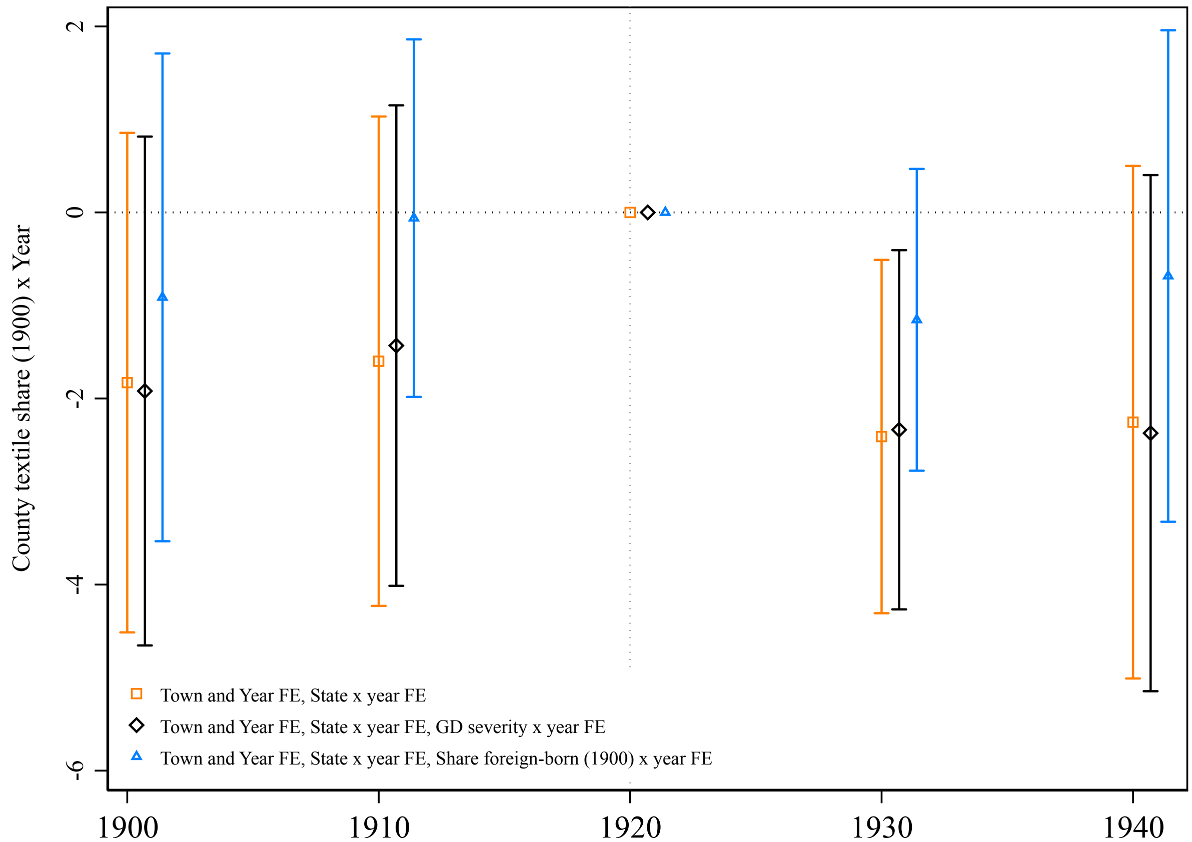
Notes: The figure presents the continuous difference-in-differences analysis results that use the labor force participation rate among the school-going aged population. Individuals with a gainful occupation recorded are considered in the labor force. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each county (1900) interacted with census year indicators. The units of geography are places counties defined from Berkes *et al.* (2022). All coefficient series include county and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each county interacted with census year indicators. Standard errors are clustered by counties.

Appendix Figure B. 3: The effect of exposure to textile industry decline on the county-level share of agricultural labor force



Notes: The figure presents the continuous difference-in-differences analysis results that use the agricultural share of the county labor force as the outcome variable. The agricultural share of the county labor force is computed by the share of the county labor force who reported having agriculture (code 102 of IND1950) as their industry. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each county (1900) interacted with census year indicators. The units of geography are counties defined from Berkes *et al.* (2022). All coefficient series include county and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each county interacted with census year indicators. Standard errors are clustered by county.

Appendix Figure B. 4: The effect of exposure to textile industry decline on county average occupation-based earning



Notes: The figure presents the continuous difference-in-differences analysis results that use the average occupational income score (OCCSCORE) as the outcome variable. The county-level average is computed using the OCCSCORE of county working-age residents who reported having a gainful occupation. The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each county (1900) interacted with census year indicators. The units of geography are counties defined from Berkes *et al.* (2022). All coefficient series include county and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. Standard errors are clustered by county.

Appendix C. Matching Algorithm and matched population characteristics

I use the automated linking methods from Abramitzky *et al.* (2022) that link individuals across censuses. The algorithm uses NYSIIS (New York State Identification and Intelligence System) standardized first and last names, ages, and places of birth of individuals to identify unique individuals in each census and link them to other censuses. I use the "ABE_NYSIIS_conservative" method, which requires individuals to be unique within a five-year age bandwidth. The individual-level identification number (histid) crosswalks from each census pair are downloaded from available in `https://censuslinkingproject.org/data/`.

Appendix Table C.1 shows the match rate and average characteristics of the matched male group in 1900 (matched to 1910) and the male population in 1900. I find that the match rate is 17 percent. The matched individuals have very similar average demographic and economic characteristics compared to the overall male population. The only notable difference is that they are less likely to be foreign-born than the overall population. This difference can be explained by the matching process because immigrants are more likely to have rarer first and last names that are more prone to errors, and this leads to a higher false positive rate (Abramitzky *et al.*, 2022).

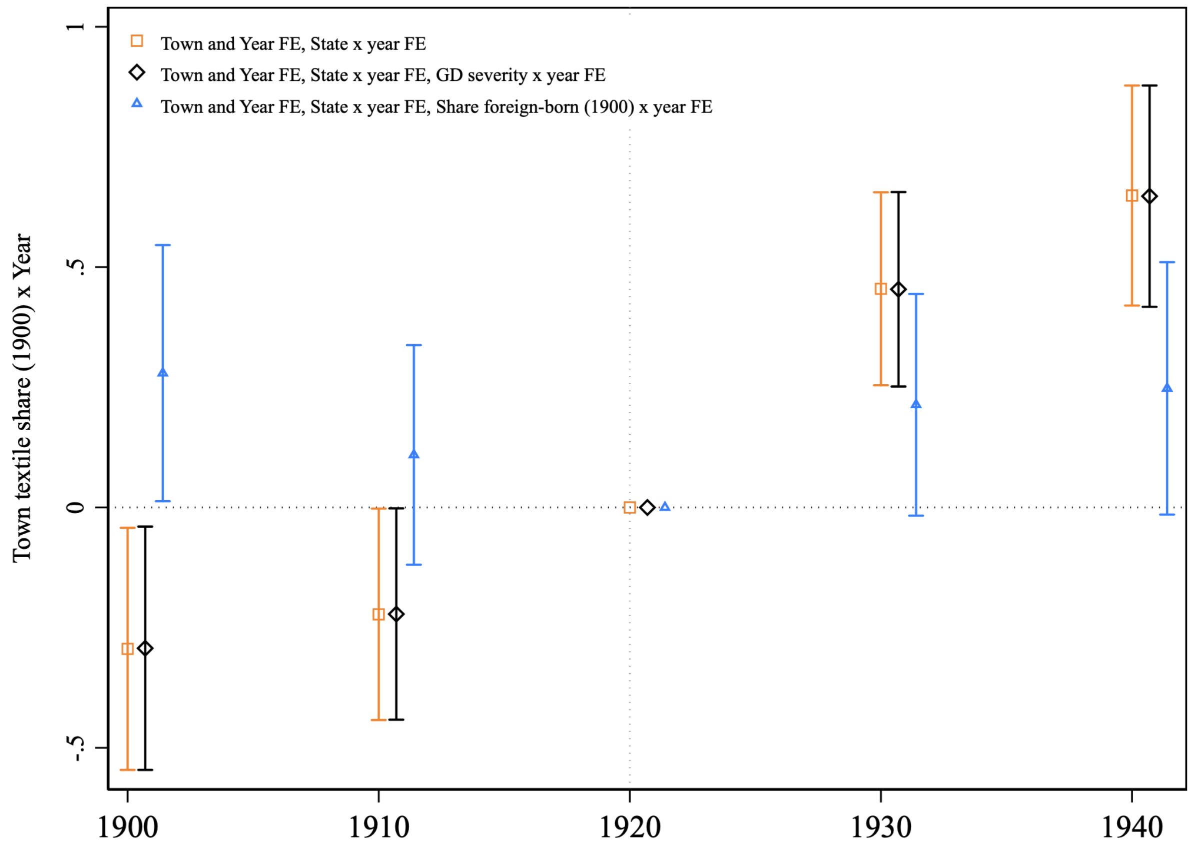
To ensure that this difference does not lead to differences between town-level analysis and matched individual-level analysis, I construct town-level statistics only using the matched individuals from the 1900 to 1940 censuses. I construct 1910, 1920, 1930, 1940 town-level statistics using the matched individuals in the destination census years, who are matched from previous years. For 1900, I use the matched individuals from the 1900 to 1910 census and construct the town-level statistics using their 1900 census information. For 1940Using the town-level data, I run the town-level event-study analysis and find that the results are analogous to the town-level analysis that used the entire town population.

Appendix Table C. 1: Average characteristics of matched male individuals and population in 1900

	Matched (18-55)	All (18-55)	Difference
Average age	33.98	33.82	0.17
Share literate	0.95	0.93	0.02
Labor force participation	0.85	0.85	0.00
Textile share of labor force	0.05	0.06	-0.01
Share foreign-born	0.21	0.36	-0.15
			Match rate
N	261910	1542033	0.17

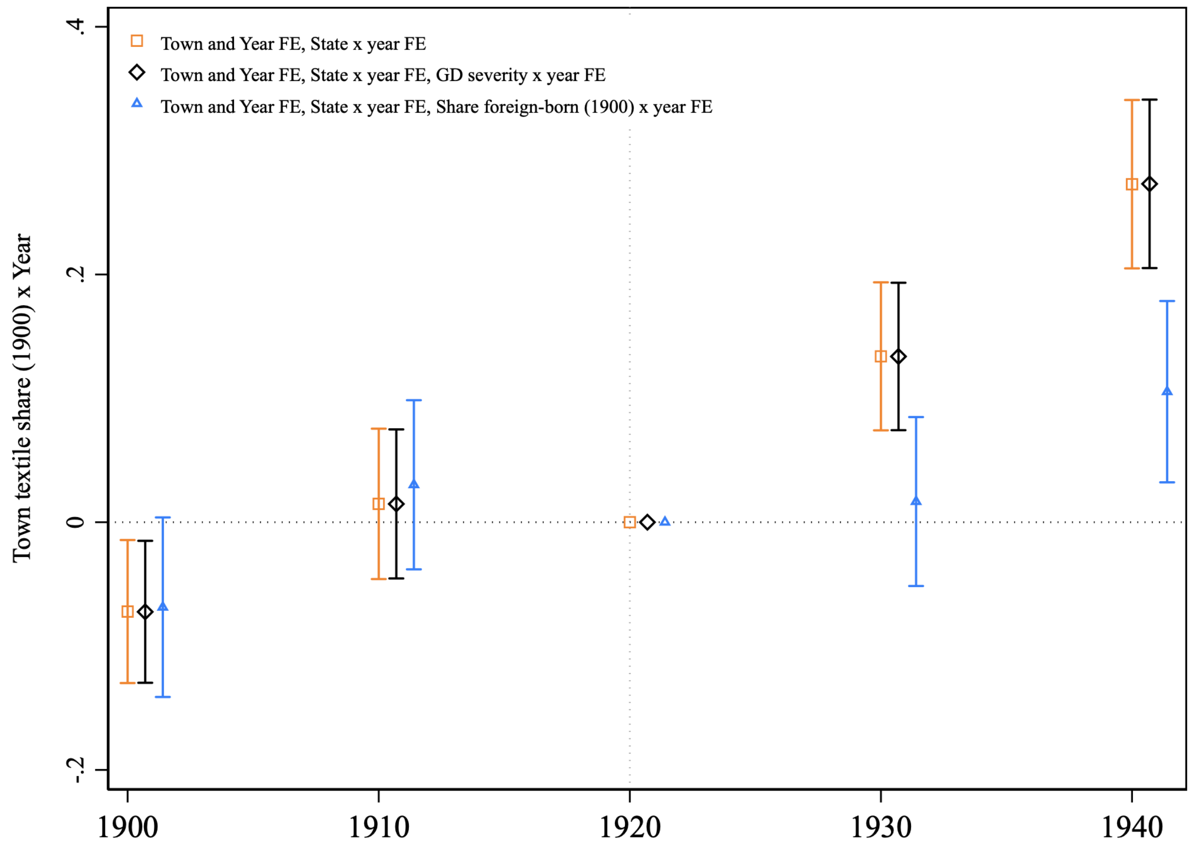
Notes: This table summarizes the average characteristics of the male individuals (age 18-55) used in the matched individual-level analysis, those of all male population (age 18-55), and the difference between the two. The matched individuals are those who are linked from the 1900 to 1910 census, using the "ABE_NYSIIS_conservative" linking method in Abramitzky *et al.* (2022). 'All (18-55)" column is constructed using all male population in New England from the 1900 census.

Appendix Figure C. 1: The effect of exposure to textile industry decline on working-age population using the matched male individuals only



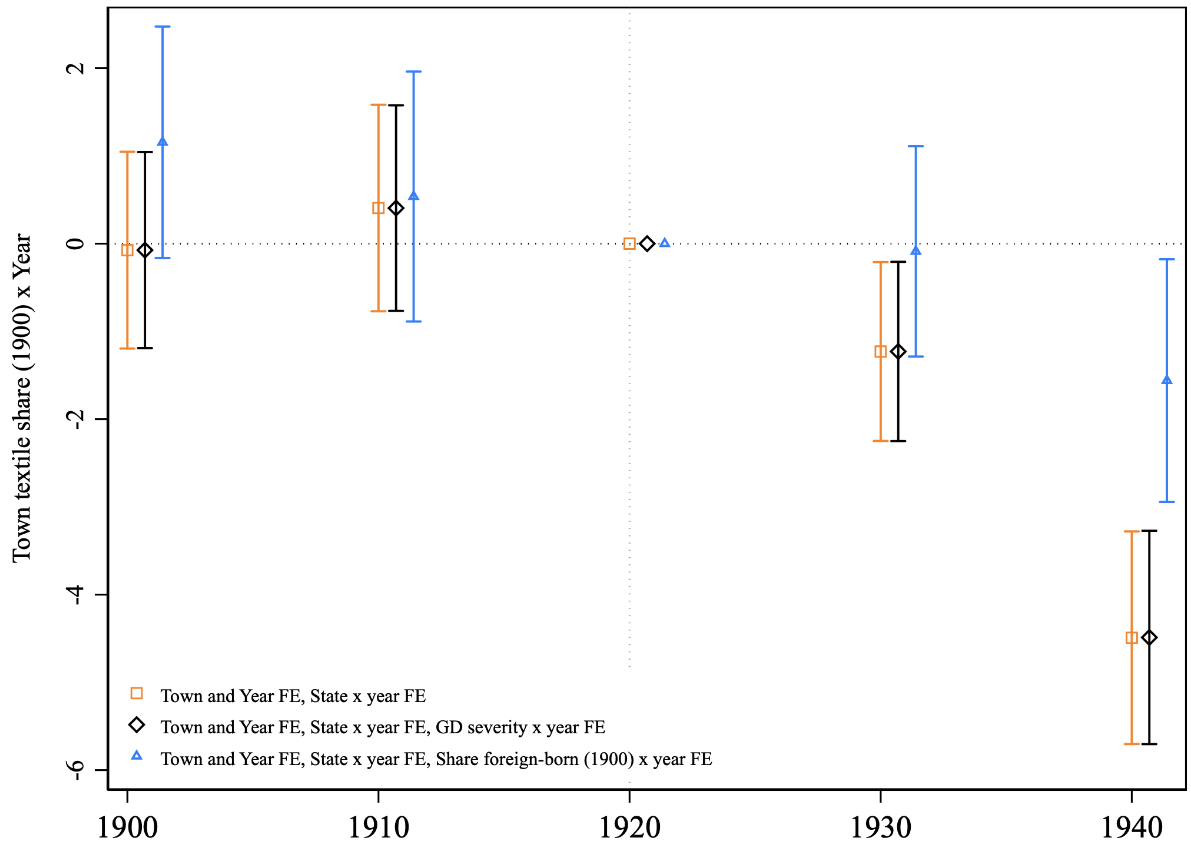
Notes: The figure presents the continuous difference-in-differences analysis results that use the log of the working-age population as the outcome variable, constructed only using the matched male individuals across censuses. The male individuals are matched to the next adjacent census, for instance, from 1900 to 1910, and from 1910 to 1920, using the automated linking method in Abramitzky *et al.* (2022). The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Appendix Figure C. 2: The effect of exposure to textile industry decline on the agricultural share of the labor force using the matched male individuals only



Notes: The figure presents the continuous difference-in-differences analysis results that use the agricultural share of the labor force as the outcome variable, constructed only using the matched male individuals across censuses. The male individuals are matched to the next adjacent census, for instance, from 1900 to 1910, and from 1910 to 1920, using the automated linking method in Abramitzky *et al.* (2022). The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.

Appendix Figure C. 3: The effect of exposure to textile industry decline on occupational earnings using the matched male individuals only



Notes: The figure presents the continuous difference-in-differences analysis results that use the average occupational earning score (OCCSCORE) as the outcome variable, constructed only using the matched male individuals across censuses. The male individuals are matched to the next adjacent census, for instance, from 1900 to 1910, and from 1910 to 1920, using the automated linking method in Abramitzky *et al.* (2022). The figure plots the coefficient estimates β_t from Equation (1), the coefficients of the initial textile share in each town (1900) interacted with census year indicators. The units of geography are places (towns) defined from Berkes *et al.* (2022). All coefficient series include town and year fixed effects. The first series includes state $\times$ year fixed effects, including all interactions between state and census year indicators. The second series includes the measure of Great Depression severity interacted with census year indicators. The third series includes the share of the foreign-born population in 1900 in each town interacted with census year indicators. Standard errors are clustered by town.