Published in final edited form as:
Soc Sci Res. 2009 December 1; 38(4): 897–920. doi:10.1016/j.ssresearch.2009.04.001.

Immigration and the American Industrial Revolution From 1880 to 1920

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Abstract

In this study, we measure the contribution of immigrants and their descendents to the growth and industrial transformation of the American workforce in the age of mass immigration from 1880 to 1920. The size and selectivity of the immigrant community, as well as their disproportionate residence in large cities, meant they were the mainstay of the American industrial workforce. Immigrants and their children comprised over half of manufacturing workers in 1920, and if the third generation (the grandchildren of immigrants) are included, then more than two-thirds of workers in the manufacturing sector were of recent immigrant stock. Although higher wages and better working conditions might have encouraged more long-resident native-born workers to the industrial economy, the scale and pace of the American industrial revolution might well have slowed. The closing of the door to mass immigration in the 1920s did lead to increased recruitment of native born workers, particularly from the South, to northern industrial cities in the middle decades of the 20th century.

1. Introduction

Within the span of a few decades from the late 19th to the early 20th century, the United States was transformed from a predominately rural agrarian society to an industrial economy centered in large metropolitan cities. Prior to the American industrial revolution, most Americans were reared in largely isolated agricultural households and small towns that were linked to the external world by horse drawn wagons (Olmstead and Rhode 2000: 711). Except for towns that were connected to railroads or water borne shipping, isolation and the costs of overland transportation meant that many rural communities were largely self sufficient in food, clothing, and many other essentials of everyday life. This changed dramatically in the early decades of the 20th century, as the supply and lowered costs of manufactured goods created a consumer revolution for both urban and rural households. Many of these goods, which did not even exist a few decades earlier, were manufactured, marketed, and transported through a rapidly expanding national network of rail lines and highways. By 1920, one half of northern farms had automobiles and telephones (Olmstead and Rhode 2000: 712–713).

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Earlier versions of this paper were presented at the 2006 annual meetings of the Population Association of America and at colloquia at the Department of Sociology, University of British Columbia, the Center for Studies in Demography and Ecology, University of Washington, and the Minnesota Population Center at the University of Minnesota.

Theses changes were the direct result of the American industrial revolution that was founded on rising investment, employment, and productivity in the manufacturing sector. In 1880, when the agricultural frontier had largely disappeared, almost one-half of the American workers were still farmers and only one in seven workers (less than 15%) worked in manufacturing of any sort. The industrial sector, as late as 1870, consisted primarily of small firms and workshops that relied on artisan technology to produce tools, furniture, building materials, and other goods for local markets (Abramovitz and David 2000: 45). Many small industries, such as grain mills and sawmills, were often located in rural areas close to flowing rivers in order to power machinery. Following the technological revolutions of the early industrial age, workshops and small foundries were supplemented by large factories engaged in mass production. The development of commercial electricity at the end of the 19th century allowed industries to take advantage of the labor supply in large cities. The scale of change is illustrated by the rise in the share of manufacturing horsepower generated by electrical motors from 23% in 1909 to 77% in 1929 (Goldin and Katz 1998: 712).

Enormous gains in industrial productivity, accompanied by institutional change and much lower transportation costs, created national markets with goods and people moving in every direction. Perhaps the most consequential change of the American industrial revolution was the increasing urbanization of society and the shift of labor from farms to factories and offices (Guest 2005). In 1880, workers in agriculture outnumbered industrial workers three to one, but by 1920, the numbers were approximately equal. Employment in the manufacturing sector expanded four-fold from 2.5 to 10 million workers from 1880 to 1920.[1]

The decades surrounding 1900 were not only the age of industrialization in the United States, but were also the age of urbanization and immigration. The 1880s were the first decade in American history, with the exception of the Civil War decade, when the urban population increased more than the rural population (in absolute numbers). From 1880 to 1920, population growth was concentrated in cities—the urban fraction expanded from a little more than one quarter of the national population to more than one half (Carter et al. 2006: 1–105).

The pace of rural to urban migration of the native born picked up during this era, but domestic urbanward migrants were dwarfed by the flood of immigrants coming to cities. From 1880 to 1920, the number of foreign born increased from almost 7 million to a little under 14 million (Gibson and Jung 2006: 26). These figures, however, underestimate the economic and demographic contribution of immigration (Kuznets 1971b). Immigrants inevitably lead to a second generation—the children of immigrants—whose social, cultural, and economic characteristics are heavily influenced by their origins. Counting the 23 million children of immigrants[2], in addition to the 14 million immigrants, means that over one-third of the 105 million Americans in the 1920 population belonged to the "immigrant community," defined as inclusive of the first and second generations.

1.1 Immigration, Urbanization, and Industrialization

Immigrants, as well as manufacturing enterprises, were concentrated in the rapidly growing cities of the Northeast and Midwest during the age of industrialization (Gibson and Jung 2006: 72). In 1900, about three-quarters of the populations of many large cities were composed of immigrants and their children, including New York, Chicago, Boston, Cleveland, San Francisco, Buffalo, Milwaukee, and Detroit (Carpenter 1927: 27). Immigration and industrialization were correlated, both spatially and temporally in American history (Taeuber

[1]Industrial production experienced an almost five-fold expansion of value added in manufacturing and mining from 1880 to 1915 (Davis 2006: 3-23-24 and 3-25). Manufacturing's share of value added in commodity production rose more rapidly from 1879 to 1894 than in any other period of the 19th century (Fogel 1964: 121).

[2]The children of immigrants includes native born persons who have at least one foreign born parent.

and Taeuber 1971: 117), but is there a causal impact? Addressing this question, the objective of this analysis, requires consideration of the counterfactual of what would have been the course of the industrialization process in the United States if there had not been an immigrant workforce.

The most commonly cited reasons for the rapid American industrial revolution are the abundance of mineral resources, technological innovation, the evolution of the American system of manufacturing, railroads and lowered costs of transportation, education and human resources, and the rise of the managerial firm (Abramovitz and David 2000; Chandler 1977; Denison 1974; Hounshell 1984; Wright 1990). Among the studies that address the relationship between immigration and industrialization, few go beyond a general or abstract discussion. In a classic survey of the literature on the American industrial revolution in the *Cambridge Economic History of the United States*, the role of immigration is summarized in a single paragraph, which simply notes the overrepresentation of immigrants in the manufacturing labor force (Engerman and Sokoloff 2000: 387). There are some studies that conclude that the flood of immigration in the late 19th and early 20th centuries had an adverse impact on the per-capita economic growth, the wages of native workers, and diverted domestic migration away from industrializing cities (Hatton and Williamson 1998: Chapter 8; Goldin 1994). However, other researchers have questioned these conclusions and suggested that immigrants had a generally positive impact on the American economy and facilitated the economic mobility of native born workers during the age of industrialization (Carter and Sutch 1999; Haines 2000: 202; Muller 1993: 83–85; Thomas 1973: 174).

1.2 Research Objectives

In this study, we address two specific empirical questions, namely: "What was the role of immigration on changes in the industrial structure of the American economy from 1880 to 1920?", and "How much did immigrants and their descendents (children and grandchildren) contribute to the manufacturing sector in 1920?" The findings reported here show that recent immigrants and their descendents were the primary workforce in the rapidly expanding manufacturing economy of the early 20th century. Demographic and economic pressures on agricultural households in the late 19th and early 20th century pushed an increasing share of the children of farmers off the land, but only a minority were willing to join "the pool of eastern industrial and commercial labor" (Atack, Bateman, and Parker 2000: 322). When immigrant labor was cutoff in the 1920s, the native poor population, especially poor whites and blacks from the South, began migrating to northern industrial cities in much larger numbers. But in the early 20th century, when manufacturing jobs were dirty, dangerous, and heavily regimented, immigrant workers were the mainstay of industrial employment.

Native born of native parentage (NBNP) Americans continued to be over-represented in the agricultural sector in the early 20th century, but they were also well represented in many of the better jobs in the public and business sectors that were also expanding rapidly with the industrial economy. The managerial elite during the age of industrialization were almost exclusively native born whites (Zunz 1982: 2).

2. How Might Immigration Affect Industrialization

There is a long list of potential factors—variables or conditions—that *might* have caused the American industrial revolution, including the discovery or adoption of new technologies, the availability and mobility of capital, the expansion of markets as a result of new transportation systems, added demand from a growing population and the expansion of trade, increasing entrepreneurship, stable political and institutional systems that foster cheaper credit and the enforcement of contracts, improvements in human capital and meritocratic social mobility of talent, the increasing division of labor in production, and the specialization of enterprises (see

Engerman and Gallman 2000, especially volume 2). This list, which is neither exhaustive nor mutually exclusive, does not specify which factors are exogenous nor does it address the question of which factors are absolutely necessary and which may simply facilitate economic growth and industrialization.

Without a comparative analysis across countries or regions, it is impossible to test which factors were necessary or sufficient conditions to cause industrialization. Such studies are not always definitive, however, because labor, capital, and other resources can flow across regions and countries. The analytical strategy adopted here is of a detailed case study of one country, the United States, with a primary focus on measuring the increasing share of immigrants and their descendents in the mobilization of labor during the American industrial revolution from 1880 to 1920. The counterfactual, namely whether the domestic labor supply would have been sufficient for rapid industrial development in the absence of immigration, cannot be directly observed. Our strategy, which draws on theory and prior research in addition to empirical analysis, cannot fully adjudicate between competing explanations. Our conclusion about the centrality of immigrant labor is based on the fact that recent immigrants and their descendents were not just the majority of industrial workers, but the overwhelming majority of workers in the emerging manufacturing sector in early 20th century America.

2.1 Economic Theory

Labor is an indispensable source of economic production, and all other things being equal, more labor contributes to more economic production. The magnitude of the impact of immigration on economic growth and welfare depends on the availability of physical capital, the human capital of immigrants and natives, and assumptions about economies of scale (Frieberg and Hunt 1995: 39–42; Smith and Edmonston 1997: chapter 4). Although there was neither a slackening of economic growth nor a slowdown in the trend of rising wages of native born workers during the age of mass immigration in the late 19th and early 20th century (Carter and Sutch 1999: 314–344; Rees 1961), Hatton and Williamson (1998: chapter 8) argued that wages would have grown even faster in the absence of immigration. Differences in the interpretation (or speculation) of the economic impact of immigration are typically based on assumptions of possible effects rather than on measured differences. There is a wide range of mechanisms through which immigrants may affect labor markets and the economy, more generally.

One of the most fundamental effects of immigration is an increase in the number of workers relative to dependents in the population. Immigrants are generally concentrated in the younger working ages. Carter and Sutch (1999: 326) observe that well over 70% of immigrants to the United States during the peak years of the age of mass immigration (1907 to 1910) were between age 18 and 40. Even within the working-age population, immigrants are more likely to participate in the labor force than the native born population. The age selectivity of immigrants reduces the costs of social reproduction for a given population size in the receiving society. Although the costs of support for the dependent population of children and the elderly are generally borne privately by families, there are also public subsidies for education and health care. The costs of rearing and educating persons who immigrate as young adults have been borne by their foreign-resident families and their countries of origin, and might be considered a transfer payment to the taxpayers of the receiving society.[3]

[3]"Considering the magnitude and duration of this movement, it is difficult to exaggerate its importance as a factor in the economic growth of the United States. Since immigration brought in a large labor force, the cost of whose rearing and training was borne elsewhere, it clearly represented an enormous capital investment that dwarfed any capital inflows of the more orthodox type—a conclusion that stands with any reasonable estimate we can make of the money value of labor." (Kuznets 1971a: 357).

In an ingenious analysis of the potential impact of the differing age composition of immigrants and the native born populations, Neal and Uselding (1972) estimate the savings received by the United States through immigration from 1790 to 1913 relative to the costs that would have been incurred if all immigrants were replaced by children of the native born population (this counterfactual is posed by the "Walker hypothesis" that posits that native born fertility was depressed by the arrival of immigrants). Assuming these savings had been invested (not consumed by social reproduction), Neal and Uselding (1972: 87) conclude that immigration had contributed from 13 to 42 percent of the capital stock of the United States by 1912. Several analysts have noted that the large number of immigrants in the North in the 1860s provided the manpower surplus that allowed the Union to triumph in the Civil War (Gallman 1977: 31, Muller 1993: 78–79).

2.2 Empirical Studies

In their study of the impact of immigration on American industrialization and native born workers, Hatton and Williamson (1998: chapter 8) asked whether immigrants accelerated industrialization by solving labor bottlenecks by entering high-wage high-growth occupations faster than native born workers (Hatton and Williamson 1998: 161–164). Based on their findings that immigrants were more likely to be found in less skilled occupations and in slower growth occupations from 1890 to 1900, Hatton and Williamson conclude that immigration did not contribute to economic development and rapid industrialization. However, other analysts report that immigrants were no less skilled than native born workers (Schachter 1972). The real question, in our judgment, is not the skill level of immigrants, but their role in filling the demand for labor in manufacturing and other key sectors of emerging industrial economy. The central element of the industrial revolution is most appropriately measured by shifts across industrial sectors – the rise of manufacturing, in particular.

The other problem with Hatton and Williamson's account is their focus on relative growth as the index of labor demand. Starting from a small base (or zero), new industries may experience extraordinarily rapid relative growth, but the absolute number of added workers may be relatively small. For example, the telephone industry grew over 80 times faster than the workforce as a whole from 1880 to 1920, but the total growth was only a quarter of a million workers. On the other hand, the manufacturing sector grew much less rapidly—only about 2.4 times as fast as the work force as a whole, but added about 7.5 million workers. Are immigrant workers in manufacturing not to be considered part of the "shock troops of structural change" (Hatton and Williamson 1998: 161) simply because of their relative share in the growth in selected high demand occupations? The contribution of immigrants might be evaluated differently if the absolute numbers of workers in expanding industries were counted. In this analysis, we consider the contribution of immigrants to absolute and relative changes in the industrial structure.

One of the most important theoretical claims about the positive impact of immigration on industrialization centers on the creation of economies of scales—both in the production of and the demand for industrial goods (Abramovitz and David. 2000: 12; Carter and Sutch 1999: 331–332; Romer 1996). The creation of economies of scale was possible only with the growth of cities and urban industries. Before the age of industrialization, per-capita productivity was rarely increased by having large numbers of workers concentrated in one location (Ward 1971: 90). Artisan labor in most industries, such as grain milling, iron working, and leather goods, did not rely on a complex division of labor. Overall, there were few advantages of locating a factory in large cities. The important considerations for site location were access to sources of raw materials, nearby flowing water, and transportation. There is some evidence that some "non-mechanized" factories in the mid 19th century were more productive than artisan shops, but these factories were distinctive in employing women and children (e.g.

textiles), and economies of scale were only significant for factories with about 20 or fewer employees (Engerman and Sokoloff 2000: 375).

With electricity to power machinery, it became possible to redesign the organization of factories to create an integrated flow of work (assembly lines) to take advantage of a larger number of workers in one location. Larger factories were located in cities where labor was more plentiful. And cities were disproportionately the home of immigrants. Even in 1850, when only 15% of the American population lived in cities, more than one-third of the population of most large American cities was foreign born. Assuming that second generation immigrants (the children of immigrants) were as numerous as the foreign born, it seems reasonable to conclude that almost all large American cities were predominantly composed of immigrants and their children as early as 1850 (Gibson and Jung: 2006: 82).[4]

In the middle decades of the 19th century, new immigrants were the ready source of labor to unload ships, to build roads and canals, and to transport goods (Carter 2006: I-590-591). With the growth of factories and the demand for unskilled labor, immigrants, primarily young men in the working years, continued to be the ideal source of labor. Immigrants were generally more willing to accept lower wages and inferior working conditions than native born workers (Zolberg 2006: 69). Great efficiencies in production led to higher profits that could be reinvested in new technology, which led to even more production and eventually higher wages for workers.

Although the demand for manufactured goods gradually grew to encompass the entire country, the initial demand was from the urban population. Unlike farm families that were largely self sufficient in food and made most of their clothing, urban families needed to purchase everything in the market. The large and growing urban populations, primarily fueled by immigration throughout the second half of the 19th century and the first two decades of the 20th century, created a huge demand for the increased production of the emerging industrial sector. Carter and Sutch (1999: 330–331) claim that economies of scale in demand and production also stimulated inventive activity and the diffusion of technological knowledge and innovation. In his analysis of long swings, or Kuznets cycles, Easterlin (1968) found that immigration (and population growth) and subsequent family formation stimulated economic growth through increasing demand for housing, urban development, and other amenities. This association was strongest, Easterlin noted, in the century prior to World War II. In the post World War II era, the federal government assumed more responsibility for maintaining aggregate demand regardless of population dynamics.

If capital is fixed, additional immigrant labor would lead to lowered productivity as capital stocks are spread more thinly and as less capital is invested per worker (capital dilution). However, there is some evidence that capital follows the international movements of labor, especially in labor scarce economies (Hatton and Williamson 1998: 214–215). In addition to international capital flows, immigrants are thought to save a higher proportion of their incomes than native born workers. Much of this savings is remitted to family and kin in their countries of origin, but there is also evidence that immigrants purchase homes, open small businesses and invest heavily in the education of their children. These claims suggest that immigrants contribute to economic growth by increasing the supply of (or attracting) capital as well as the supply of labor. Rosenberg (1972: 32–33) concludes that immigrants to the United States also brought European technology that increased the productivity of American industry.

Carter and Sutch (1999: 323) review the historical evidence on the debate over immigration and capital dilution at the turn of the 20th century, with a focus on the claim that immigrants

[4]The major exceptions were Charlestown, South Carolina and Washington, DC.

increased the returns to capital (and hence capitalists), but harmed the economic fortunes of native born workers. They conclude that the division between capital and labor was not as clear cut as many assume. A substantial share of American workers owned capital through home ownership and as operators of farms and small shops. About half of American households in 1905 might have been considered as equity investors through their ownership of insurance policies that were self-financed pensions (Ranson and Sutch 1987 cited in Carter and Sutch 1999: 323).

3. Data and Measurement

The decennial census data analyzed here have been extracted from the IPUMS (Integrated Public Use Microdata Samples) files that have been produced and distributed by researchers at the University of Minnesota (Ruggles et al. 2004). The IPUMS files are created by extracting samples of household records and all persons in sampled households from the original manuscript (microfilm) records. The samples of the IPUMS census files are sufficiently large to reproduce, within the range of sampling error, published figures in the original census reports. Moreover, the IPUMS files, with complete individual (and family) unit records, can be recoded and tabulated, limited only by the scope and detail of the original census questions and classifications. In addition to the standard census variables, the IPUMS files also contain many new recoded variables to facilitate comparisons across censuses (Sobek 2001).

Although the classification of workers by industrial sectors is sometimes conflated with occupations, these two dimensions of work are conceptually distinct. Industries refer to product produced or service delivered (by a firm or family run enterprise) while occupations refer to actual work activities and skills of workers (Sobek 2006, Sutch 2006). There is overlap in some categories – most farmers (occupations) work in the agricultural sector, but there are significant differences in the wide range of occupations (e.g., unskilled labor, clerical workers, managers) for those who work in the manufacturing, construction, and retail trade sectors.

The process of industrialization is associated with industrial restructuring as well as changes in the skills and actual tasks performed by workers. We focus on the shifts in the industrial distribution of workers because technological and organizational change typically results in the origin, growth, decline, and disappearance of businesses and forms of production. As agricultural productivity increased, workers were drawn into manufacturing and services.

Shifts in occupations and the division of labor are likely to be derivative of the changes in industrial structure and technological change. As factories replaced farms (the prototypical shift in the organization of work), many new occupations were created. Aside from the link to industrial structure, there is less theoretical clarity in the expected changes in occupations with industrialization. A widespread assumption is that technological change leads to an upgrading of occupational skills. However, early mass production probably led to a replacement of skilled craft workers with unskilled production workers. Goldin and Katz (1998) argue that this process was reversed in the years around World War I when technological change may have had a pro skill bias. Regardless of changes in the content of nonfarm occupations, the shift from farming to factory work was probably not considered as a step upward, or to a more technologically challenging job, by farmers.[5] In addition to their autonomy, farmers have to master a number of trades including animal husbandry, crop management, and the entrepreneurial activities of buying and marketing. With our focus on industrial sectors, we attempt to capture the direct impact of industrialization on the structure of the labor force without additional assumptions of the skill levels or status of workers.

[5]Occupational prestige scales rank farmers above unskilled workers, while occupational socioeconomic scales consider them about the same, see Duncan 1961.

3.1 A Detailed Industrial Classification

For this analysis, we rely on the IPUMS variable "IND 1950," which represents a recoding of the reported industries from each decennial census from 1850 to 2000 to the 1950 census industry classification (for additional details, see http://www.ipums.org/usa/pwork/ind1950a.html). The industry question was first asked in the 1910 census. For prior censuses, IND 1950 was inferred from responses to the census question on occupations. The IND 1950 classification consists of 152 detailed (three-digit) categories plus "nonclassifiable" and "industry not reported" categories.[6] Detailed industrial categories are generally nested within primary (one digit) and secondary (two digit) categories. The classification includes some detailed industries that emerged from technological change over time. For example, the detailed category #376 "Motor vehicles and motor vehicle equipment" did not include any workers until the 1910 census.

Any study of industrial change must attempt to reconcile the need for detail revealed by the tertiary level categories with the need for parsimony evident in the broader categories. The summary industrial classification used here is ad hoc, reflecting elements of both principles with the objective of understanding the creation and expansion of specialized industries during the Age of Industrialization. Two major sectors, AGRICULTURE and CONSTRUCTION, are only reported at the primary level, while TRADE is shown for only the two major secondary levels: WHOLESALE TRADE and RETAIL TRADE. The other primary sectors are subdivided into their detailed (tertiary) industries, though quite a few of the detailed categories have been aggregated. Our primary emphasis is on the MANUFACTURING sector which includes all secondary level categories and most of the tertiary industries. Following Singlemann (1978: 31), we reorganized the very heterogeneous SERVICE sector into three new major categories: BUSINESS SERVICES, PERSONAL SERVICES, and SOCIAL SERVICES. Our final classification is displayed in Appendix 1.

4. Changes in the Industrial Structure and Immigrant Participation: 1880 to 1920

Our first objective is to describe changes in the industrial structure of the gainful workforce from 1880 to 1920, and the share of recent immigrants and their descendents in this industrial transformation. Figure 1 shows the dramatic changes in the structure of the workforce in 1880 and 1920 for the 9 major industrial sectors. The single most striking change was the decline in agriculture (from 48 to 25% of the workforce) and the rise of manufacturing employment (up from 14 to 25%). There are also significant increases in the proportions working in mining, transportation and utilities, trade, producer services and social services. There was relative stability (from 4.6 to 4.8%) in construction, and a relative decline of employment in personal services (from 11.5 to 9.5%).

The source percentages in Figure 1 are presented for detailed industry categories in the first two columns in Table 1, which provides an overview of the growth and transformation of the American workforce from 1880 to 1920. Columns 3 and 4 show the absolute and relative growth of workers in each industry over the forty years. Columns 5 and 6 show the immigrant share (both first and second generation) of each industrial sector. The final column shows the ratio of the growth of immigrant workers to the overall growth (or decline) of workers in each industry from 1880 to 1920.

[6]About 13% of workers in the 1880 census IPUMS file did not have a known industry (codes 997 and 998). However, almost all did have a reported occupation (most were laborers), and this allowed us to impute industries based on the distribution of industries for those with a known occupation. We are grateful to Matthew Sobek who suggested this method.

Although we consider these data comparable to the labor force during this period, technically, the data refer to gainful workers or all persons who reported a "gainful occupation" in the census enumeration (Bancroft 1958: Appendix C; Carter 2006: 1–2 – 1–14). Accordingly, we refer to the gainful working population as the workforce, which does not connote the precision of the modern labor force concept and measurement.

Rapid growth and structural transformation are the two major trends in the American workforce from 1880 to 1920. The number of gainful workers in the United States more than doubled from 1880 to 1920 (18.1 to 40.5 million).[7] Even more significant was the shift from an employment structure centered on agriculture to a much more diversified industrial employment structure. These patterns are illustrated with summary measures of "absolute growth" (indexed by the increase in the number of workers in the industry from 1880 to 1920) and "relative growth" (indexed by dividing the absolute growth in each industry by the expected growth, assuming that every industry grew at the same rate as the national workforce). A relative growth index value of 1.0 means the particular industry grew at the same rate as the national workforce (which more than doubled). A value of less than 1.0 means the industry experienced a below-average growth rate, and values greater than 1.0 above-average growth for the sector.

In 1880, at the eve of the age of mass migration and when almost half of the workforce was in the agricultural sector, immigrants and their children comprised about one-third of all workers. We include the second generation (the children of immigrants) as part of the immigrant community because they are reared and socialized by their foreign born parents and would not have been in the United States except for the migration of their parents. [8] The immigrant share increased to 40 percent of the workforce in 1920. Almost half of the total growth of 22 million workers from 1880 to 1920 can be attributed to the increase of first and second generation immigrant workers (the last column of Table 1).

4.1 Agriculture

For the first century after the nation's founding, the United States was an agricultural society, and most American farms were small scale household enterprises that relied on family labor. In the early 19th century, upwards of two-thirds of the working population was employed in agriculture (Taeuber and Taeuber 1971: 175). At the turn of the twentieth century, nearly two-thirds of Americans lived on farms or in villages and towns of less than five thousand residents (Katz and Stern 2006: 8). Throughout the 19th century, government priorities and spending reflected the dominance of rural and agricultural interests. One of the landmark expansions of the federal government was the Morrill Act of 1862, which created the Department of Agriculture and authorized the founding of land grant colleges (Carter et al. 2006: 4–24; Atack, Bateman, and Parker 2000: 273).

From 1880 to 1920, agriculture added 2.1 million more workers (mostly prior to 1900), but the rate of growth in agriculture was only one-tenth (0.1) of the overall growth rate of the national workforce. By 1920, only one in four American workers remained in agriculture, and the American economy was increasingly centered in urban factories and offices rather than on farms. Although many immigrants were drawn to the agricultural frontier in the 18th and 19th centuries, only one of every five farmers was an immigrant or the child of an immigrant during the age of mass immigration from 1880 to 1920.

[7]This fast pace of growth has not slackened. The U.S. labor force also doubled from about 70 to 140 million workers from 1960 to 2000 (Carter et al. 2006: 2: 83–86).

[8]The second generation is defined by census practice to include those with two foreign born parents and those with one foreign born parent.

4.2 Manufacturing and Related Industries

The largest shift in the American workforce from 1880 to 1920 was the expansion of manufacturing employment from 14 to almost 25 percent of the workforce. If mining and construction were combined with manufacturing, one-third of Americans were industrial workers in 1920. Manufacturing employment grew more than twice as fast as the workforce as a whole from 1880 to 1920. In absolute terms, the manufacturing sector expanded from 2.5 to 10 million workers.

Within the manufacturing sector, the largest increases were registered in metals (iron and steel), which grew from 1.3 to 3.7% of the workforce, and in machinery, which grew from 0.7 to 5.0% of the workforce. Closely related to this was the expansion of coal mining (used to produce steel) from 0.5 to 2.1% of workers. More than one out of ten workers in the American economy in 1920 were producing steel, extracting the raw materials used to produce steel, or making machinery from steel (e.g., automobiles).[9] The Chemical/Petroleum/Rubber sector, which included the automobile related industries of tire manufacturing and gasoline production, grew from 0.2 to 1.6% of workers.

Another important shift was the rise in apparel (clothing) manufacturing from 0.3 to 1.1% of workers, which paralleled the decline of relative workers in dressmaking shops (listed under Personal Services) from 1.3 to 0.6% of the workforce. In the early 20th century, American women and men were able for the first time to buy inexpensive manufactured (ready made) dresses, shirts, and suits, and there was less dependence on home made and hand tailored clothing. With less expensive ready made clothing, fashions changed as well. Men and women replaced simple cloaks with fitted coats (Cahan 1917).

The rapid growth of manufacturing from 1880 to 1920 relied heavily on immigrant labor. In the latter part of the 19th century, the cotton manufacturing industry and the iron and steel industry relied heavily on “old immigrants” from Great Britain and Northwestern Europe, but in the early decades of the 20th century, the rapid growth of these industries became increasingly dependent on “new immigrants” from Southern and Eastern Europe (Perry 1978).

More than one-half of the net growth of 7.5 million workers in manufacturing from 1880 to 1920 was due to the increase of first and second generation workers over this period. The immigrant share was significant in all manufacturing industries, but proportionally less in wood and mineral products and a few other categories. Immigrants provided the majority of added workers in the rapidly growing iron and steel industry, machinery manufacturing, and textiles and apparel. The dominance of the Eastern European immigrants in apparel manufacture (and trade) in New York City is well known (Kahan 1978), but immigrants were also over-represented in mining and construction and throughout the heavy industries in the Northeast and Midwest.

4.3 Transportation, Communications, and Utilities

The consequences of expansion in the manufacturing sector rippled through other sectors. This led to major changes in the organization of the economy and the structure of employment. The distribution of goods from manufacturing plants to households also required massive investments and expansion in transportation, communications, retailing, and a supportive institutional structure for the expansion of business, and an increasingly urban society. A governmental bureaucracy was needed to build roads, manage cities, and to educate the population for employment in factories and offices.

[9]This is the sum of coal mining, metals (iron and steel) manufacturing, and machinery manufacturing.

The transportation and communication sector added more than 2.3 million workers from 1880 to 1920, of which 1.2 million were added to the railway and railroad sector alone. The two million workers employed in the railroads and railway sector in 1920 comprised 5% of the total workforce. The telegraph was the only means of rapid long-distance communication in 1880 and the small number of workers employed in the sector (about 27,000) reflected the limited role of long distance communications (there were an additional 26,000 workers employed in postal services). By 1920, a brand new communications industry—the telephone—grew from zero to 279,000 workers or about 0.7 of the 1920 workforce.[10]

Immigrants played an important role in the growing transportation and communications sector, but their role was secondary to the 3rd and higher generation population—the NBNP (Native Born of Native Parentage) population. For example, nearly two-thirds of the added workers in railroads were 3rd and higher generation Americans. There was a great boom in railroad construction in late 19th century America. By 1899, "every major city had a rail head that was connected to the national system" (Cain 2006: 4–771; also see Mayer 1989: 928). The geographic dispersion of railroads, and relatively good wages in the industry, undoubtedly pulled many descendents of the native born workers into the railroad sector.

4.4 Wholesale and Retail Trade

The enormous outpouring of goods from the nation's factories had to be distributed and sold, mostly to domestic markets. Wholesale trade added almost 600,000 workers from 1880 to 1920, and retail trade grew by almost 2.4 million workers. One of every eight American workers in 1920 was employed in retail or wholesale trade—about one-half of the size of the manufacturing sector.

The late 19th century witnessed the beginnings of mass retailing and the emergence of department stores in large cities (Ward 1971: 94; Raff 2006: 4–706). Although most studies in the business literature focus on larger firms, most retail enterprises were probably small family owned stores. As late as 1899, the number of proprietors in retail sales was approximately equal to the number of employees in the sector (Carter et al. 2006: 4–713). The rapid growth of workers in sales were most likely employed in very small shops or as peddlers who sold goods to farm families and other households in scattered rural communities. The availability of new manufactured goods, linked by an expanding transportation system and a network of wholesale and retail enterprises, created a national market for consumer goods that would gradually supplant home production

Immigrants, especially the second generation, provided for about half of the added workers in trade from 1880 to 1920, primarily in general merchandise, food, and apparel stores. Immigrant merchants were often reputed to create new markets through peddling goods to remote regions and in extending credit to people without accumulated savings.

4.4 Services

The very heterogeneous collection of service industries is reorganized here to emphasize the key distinctions between producer, personal, and social services (Singlemann 1978). Producer services include banking, insurance, real estate, accounting, and other business services that play an important intermediary role in urban and industrial economies. Social services include education, health care, public administration, and other services that are generated by the government to meet the collective needs of communities and individuals. Personal services is the residual category and corresponds most closely to the image of service occupations, and it includes private household workers, dressmakers, and shoe repair shops. This sector also

[10]The absolute figures are not reported in Table 1, but can be obtained by multiplying the proportion in the industry by the total workforce.

includes repair services (including auto repair), and entertainment services (including movie theaters and recreation). There is a certain amount of arbitrariness in all industrial classifications, including this one. Hotels and lodging places are classified as a personal service, but eating and drinking establishments are considered as part of the retail trade sector.

Concurrent with the creation of an industrial society from 1880 to 1920 was the expansion of business and the beginnings of public provision of education, health care, and welfare – these are evident in the increases of workers in producer services and social services. As business and social services expanded from 1880 to 1920, personal services declined. The decline of personal services was primarily of private household workers (domestics), which declined from 7 to just over 4% of workers from 1880 to 1920. There were also relative declines in some other traditional personal services (dressmaking and repair services), but increases in some "modern" personal services, such as auto repair services, hotels, and the theatre and motion picture industry.

Producer services grew almost 4 times as fast as the overall workforce from 1880 to 1920, and more than doubled their relative share from 1.6 to 4.1% of all workers. The largest components of the increase in producer services were in banking, insurance, real estate, and related business services (Ward 1971: 99). The absolute number of workers in these business industries is small, but rapid expansion reflects the increasing complexity of an industrial economy. The efficient management and coordination of large firms and corporations required a growing army of accountants, bookkeepers, and other office personnel.

The relative growth of social services from 3.2 to 6.9% was fueled by increasing numbers of teachers, health and hospital workers, and governmental employment at all levels, including postal workers. The expansion of government services was shaped by the increasing urbanization of the population. The concentration of people in cities made it easier to provide proximate access to schooling, health care, and other services including transportation, sanitation, and public safety. Custom, kinship networks, and voluntary associations are often sufficient to satisfy collective welfare needs in low density settlements and rural areas, but the growth of government appears to be an inevitable concomitant of an urban and industrial society. Government employment grew from 3 to 5 times faster than the workforce as a whole.

As the new service industries, including education, government employment, and business services, grew from 1880 to 1920, the second generation participated proportional to their numbers, but 3rd and higher generation Americans were the majority of added workers. This was particularly true in social service fields such as health, education, the post office, and government employment more generally. By and large, these were good jobs that required educational credentials and social capital, which immigrants were much less likely to possess.

The growth of professional employment in the service economy was a natural accompaniment of the expansion and development. Perhaps, immigrants were more likely to "push up" native born workers than to crowd them out. Michael Haines (2000: 202) observes that as immigrants occupied "a disproportionate share of the lower skill and lower status positions, they made possible, in some sense, the better-paid higher status occupations of the native white population." This interpretation has also been made by Lieberson (1980: chapter 10) in his theory of labor market queues. Lieberson's focus was on the concentration of African Americans in the least desirable occupations in 1900, as they had few resources and encountered the greatest discrimination in northern labor markets. Although new immigrants were ahead of African Americans in most labor queues, the growth of the overall labor market through immigration created demand for managerial, professional, and clerical employment that was more likely to be filled by older stock white Americans than by immigrants or African Americans.

5. A Model to Estimate the 3rd Generation Immigrants by Industry

The underlying question that motivates this analysis is the impact of immigration on the transformation of the American economy from a primarily agrarian structure to one based on manufacturing and associated industries. Would it have been possible to have had the American industrial revolution without immigrants? Or alternatively, would the industrial revolution have been smaller, slower, or more costly? In the prior section, we focused on the magnitude and economic roles of the first and second generation immigrant population. In this section, we extend the analysis with an estimate of magnitude of 3rd generation immigrants—the grandchildren of immigrants and their economic roles.

The grandchildren of immigrants are unlikely to have attachments to their ancestral homeland and are probably well assimilated into American society. If we desire to attribute the 3rd generation as part of the immigrant contribution, the skeptical reader may wonder why we do not also count the 4th and higher generations as also part of the immigrant share. Clearly, there is a thin line from "reasonable" assumptions to a *reductio ad absurdum* argument that the immigrant contribution includes all Americans. Our claim is that 3rd generation immigrants in the early 20th century are the recent descendants of European immigrants who were more likely to have settled in cities than to have moved to the agricultural frontier. In 1880, one-third of all workers were composed of first and second generation immigrants and most lived in cities. We assume that 3rd generation immigrants were much more likely to have been exposed to emerging opportunities in the urban industrial economy than older stock native born Americans in the late 19th and early 20th century.

In this section, we present the methods and results of a "Shift-Share" estimation (akin to indirect standardization) of the industrial structure of the grandchildren of immigrants in 1920. There are two components to estimate: immigration generations and the industrial structure by immigrant generation. We first address the measurement of immigration generations.

The 1920 work force can be divided into two components: immigrants (counting both the foreign born and the second generation) and the native born of native parentage (NBNP). Although the NBNP population is typically assumed to reflect a society without immigration, the distinction between the immigrant and NBNP populations is not fixed, since the 3rd and higher order generation descendents of immigrants are counted as part of the native born population. Since immigrants were disproportionately living in cities and held industrial jobs in 1880, it seems plausible to assume that their grandchildren are probably over-represented in industrial employment in 1920 relative to the grandchildren of the 1880 NBNP Population.

The logic of our analytical approach is diagrammed in Figure 2. The two columns represent the 1880 and 1920 work force by immigrant generation. In both years, we can measure only three generational groupings: (1) the foreign born, (2) the second generation—the children of immigrants, and (3) third and higher generations—NBNP. The 1920 workforce is composed of some 1880 workers (those age 20 in 1880 would be age 60 in 1920), the descendants of the 1880 population, and recent immigrants and their descendants. It is impossible to make precise estimates of generational continuity and succession because of the complexity of demographic structure and changes, including variations in age structure, labor force exits and entries, mortality, and differential fertility (Duncan 1966a). Although most workers in 1880 would have retired (or died) before 1920, some are still working. Some 1880 workers have no children (or no working children) 40 years later, while other 1880 workers may have been "replaced" by one or more descendents.

Nonetheless, we can provide a crude estimate of the contribution of recent immigration to the 1920 workforce with several simplifying assumptions. The first assumption is that the majority of the first and second generation workers in 1920 were recent immigrants. Some of these

immigrants (or their parents) may well have arrived before 1880. Thus, the label of "recent immigrants" is somewhat broader than the 1880 to 1920 period. The estimation of the third generation requires even more heroic assumptions about the fraction of the 1920 third and higher generation workers (NBNP) that are descendents of immigrants in 1880.

The analytical task is illustrated in Figure 2, by the dashed line that identifies the 1920 3rd generation from the broader category of the 3rd and higher generation population. To do this, we *assume* that the ratio of the 3rd generation population (grandchildren of immigrants) to the 3rd and higher generation population in 1920 is proportional to the ratio of the 2nd generation to the 2nd and higher generation population in 1880. We have three of the four numbers in this equation (1880 2nd generation, 1880 2nd and higher generations, and 1920 3rd and higher generation populations), and it is straightforward to estimate the missing element—the 1920 3rd generation. 1920 3rd Gen = [1880 2nd Gen/1880 2nd & Higher Gen]* 1920 3rd & Higher Gen

This equation assumes that the relative magnitude of 1920 3rd generation is roughly comparable to the descendents of the 1880 2nd generation. The demographic metabolism that leads to generational replacement over time is exceedingly complex, and our simple model does not directly measure these processes (for more discussion, see Blau and Duncan 1967: 112). Our estimation rests on an assumption about proportionality—that the 1880 2nd generation (relative to the 2nd and higher generational total) is proportional to the 1920 3rd generation (relative to the 3rd and higher generational total). One virtue of this assumption is its transparency – it does not specify demographic mechanisms, but simply assumes that generational replacement over a 40 year period (from all mechanisms) is roughly proportional to the initial generational composition.

The next step is to measure the industrial composition of the 1920 labor force within each immigrant generation: 1st, 2nd, 3rd, and 4th and higher. The industrial composition of the 1st and 2nd generations is directly measured, but estimating the industrial classification of 1920 3rd generation (and 4th & higher) can be done with an adaptation of the standard "Shift-Share" model. The Shift-Share model is often used to measure the expected changes in a subset of the population (state or locality) by assuming that change (share) is proportional to the change in the total population (national). The difference between the expected distribution and the actual distribution for the local area is a residual (shift) that is due to local factors that are independent of the national trend.

In this analysis, we first estimate an expected distribution by industry assuming that the growth rate of workers in each industry from 1880 to 1920 is equal to the national growth rate of the workforce. The next step is to measure the difference between the expected and actual workers in each industry. The logic of the estimation of these two components of industrial transformation—Continuity and Shifts—is diagramed in Figure 3.

Continuity is measured as the "expected 1920 work force by industry", which assumes 1920 workers are distributed by industry proportional to the industry structure of their ancestors in the 1880 workforce. In other words, the expected workers in each industry in 1920 are assumed to increase at the same rate as "natural growth" of the workforce from 1880 to 1920. The natural growth of the workforce (excluding 1st generation immigrants) "r" is measured as the ratio of the 3rd and higher generation population in 1920 to the 2nd and higher generation labor force in 1880. Specifically, we assume that 24.2 million 3rd and higher generation workers in 1920 are (approximately) the descendents of the 12.9 million 2nd and higher generation workers in 1880. This succession process or "continuity" includes a host of demographic processes including aging and the differential "replacement" of 1880 workers by their adult children and grandchildren in 1920. The multiplication of this ratio (approximately 1.9) times the number

of 1880 2nd and higher generation workers in each industry in 1880 yields an "expected" number of 1920 3rd and higher generation workers in each industry.

$$\text{Exp 1920 3rd\&Higher Gen in Ind(i)} = \text{1880 2nd\&Higher Gen in Ind(i)} * r \quad (1)$$

5.1 Estimation of Expected Number of Workers by Industry and Generation

This formula assumes that the overall growth rate "r," is the same across all industries. This formula can be extended to divide the 1920 3rd & higher generation expected populations into two components: the expected 1920 3rd generation population and the expected 1920 4th & higher generation population.

$$\text{Exp 1920 3rd Gen in Ind(i)} = \text{1880 2nd Gen in Ind(i)} * r \quad (2)$$

$$\text{Exp 1920 4th\&Higher Gen in Ind(i)} = \text{1880 3rd\&Higher Gen in Ind(i)} * r \quad (3)$$

The overall natural growth rate is assumed to be equivalent for the 3rd generation population and the 4th and higher generation population. The expected distributions of the labor force by industry (and generation) from 1880 to 1920 assume continuity—1920 workers followed their parents (or grandparents) in the same industries. This assumes that skills, preferences, and informal mechanisms of recruitment are passed along across generations. As measured by the index of dissimilarity, the industrial structure of the 1880 first generation is more similar to that of the 1920 second generation than to the 1920 3rd and higher generations. Of course, workers change employment from time to time, and children do not always follow in the same line of work as their parents. The forces of supply and demand, technological change, and other market forces create pressures to which workers must respond. The measured differences between the "actual" 1920 workers in each industry and the "expected" number are labeled (net) "Shifts."

$$\text{Shift of 1920 3rd\&Higher Gen in Ind (i)} = (\text{Actual 1920 3rd\&Higher Gen in Ind(i)}) - (\text{Exp 1920 3rd and Higher Gen in Ind(i)}) \quad (4)$$

The next step is to allocate the Shifts between industries to the 3rd generation and the 4th and higher generations in 1920. The overall Shift for the 3rd and higher generations in 1920 is distributed proportional to the relative size of the 1880 generations. Specifically,

$$\text{Shift of 1920 3rd Gen in Ind (i)} = [\text{Shift of 1920 3rd\&Higher Gen in Ind (i)}] * [\text{1880 2nd Gen in Ind (i)} / \text{1880 2nd \& Higher Gen in Ind (i)}] \quad (5)$$

$$\text{Shift of 1920 4th Gen in Ind (i)} = [\text{Shift of 1920 3rd\&Higher Gen in Ind (i)}] * [\text{1880 3rd Gen in Ind (i)} / \text{1880 2nd \& Higher Gen in Ind (i)}] \quad (6)$$

The results of this simple estimation of Continuity and Shifts are show in Table 2.

Column 1 through 4 in Table 2 show the 1920 workforce by industrial sector for all workers and for each immigrant generation (3rd and higher, 2nd, and 1st). The next two columns show the estimated workforce for the 4th and higher and the 3rd generations by industry in 1920, assuming intergenerational continuity. The next columns show net shifts, or the differences between the actual and expected workforce by industry, for the same immigrant generations. Let's consider the manufacturing sector as an example to illustrate these calculations.

5.2 The Contribution of the 3rd Generation

There were a little more than 10 million workers in manufacturing in 1920—about one quarter of the total workforce. This figure is in the first column of Table 2 in the row labeled MANUFACTURING. The next three columns show the absolute number of workers in each industry by generation in 1920. First and second generation immigrants comprised 2.9 and 2.5 million workers in manufacturing –or about 53% of the 10 million workers in the sector in 1920 (as noted in Table 1). This figure, as large as it is, is an underestimate of the contribution of immigration to the manufacturing sector in 1920. Recall that 58% of 1880 immigrant workers (which included both 1st and 2nd generation) were employed in manufacturing (Table 1). Some of the 1880 immigrants and their descendents are included in the 1st and 2nd generation in 1920, but many others have been absorbed into the NBNP (3rd and higher generation).

Following the logic of the formulae presented above, Columns 5 and 6 show the expected numbers of 1920 workers in each industry for the 1920 4th & higher generations and the 1920 3rd generation, respectively. A shorthand designation of these calculations is that the expected 1920 4th and higher workers are the descendents of the 1880 3rd and higher generation workers and the expected 1920 3rd generation are the descendents of the 1880 2nd generation. However, descendents is only an approximate term, since there are multiple demographic mechanisms that might be responsible for the replacement of the 1880 workforce by workers in 1920, including some individuals who are in the workforce at both time points. The expected generational figures in each industry are generated by an assumption of intergenerational continuity whereby each generation follows their parents (or grandparents) in the same sector of the economy. The measurement of this process is generated by the assumption of proportionality—workers in 1920 by generation were distributed by industrial sector in similar proportions to the prior generation in 1880.

The next two columns, 7 and 8, in Table 2 show the net Shifts (for the 4th and higher and the 3rd generations) between the actual and expected numbers in 1920 workforce by industry. Although we have only the actual 1920 workforce for the 3rd and higher generation, we can estimate shifts for the 4th and higher and the 3rd generation in 1920, by assuming proportionality with the 1880 generational composition (the 3rd and higher generation and the 2ndgeneration).

These estimates are combined in columns 9, 10, and 11, which show the percentage of 1920 workers in each industry that can be attributed to 1st and 2nd generation workers, 3rd generation continuity, and 3rd generation shift. These three components are totaled in column 12 to show our estimates of the share of 1920 workers that might be thought to be the result of recent immigration. The results of this exercise are summarized in Figure 4, which shows the composition of the 9 major industrial sectors in 1920 by immigrant generation.

In the case of manufacturing, 53% of 1920 workers are immigrants (first and second generation), another 10% might be attributed to 3rd generation continuity (based on the distribution of 2nd generation workers in 1880), and the other 6% are estimated to be 3rd generation shifts or the share of the descendents of 1880 2nd generation workers who left their parental (grandparental) industry to become a worker in manufacturing. These estimates

suggest that over two-thirds of manufacturing workers in 1920 are immigrants or the descendents of recent immigrants.

Most farmers in 1920 were the descendents of old stock Americans. Of the 10 million agricultural workers in 1920, only a quarter was first or second generation immigrants. There was a substantial exodus out of farming—the shift-share model estimates that 4 million 4th (or higher) generation NBNP descendants of farmers were working in some other sector in 1920.

The mining sector, as shown in Table 1, grew rapidly from 1880 to 1920 with relative decline in the immigrant share from 64 to 47%. The estimates (and assumptions) in Table 2, show that all of the native born (NBNP) increase in mining is composed of the grandchildren of immigrants. This is also true of many other sectors in which it appears that the immigrant share declined from 1880 to 1920, such as railroad workers. Note, however, that the workforce in the new petroleum and natural gas industry was disproportionately composed of 4th and higher generation Americans.

As noted earlier, almost 7 in 10 workers in manufacturing in 1920 were 1st, 2nd or 3rd generation immigrants. This was particularly true in the growth sectors of iron and steel, machinery (but only one half of workers in the new motor vehicle industry), meat packing, and textiles and apparel. More than one half of railroad workers in 1920 had some foreign roots as did two thirds of workers in retail sales.

Although the addition of the 3rd generation increases the participation of recent immigrants to the service sector, the role of immigrants in many of the relatively good jobs in teaching, health, the post office, and other government services is much lower than in manufacturing and other sectors with less desirable jobs. By virtue of their education and social connections, the descendents of long resident Americans had a leg up on entry into many of the better jobs in 1920. To the extent that there are differential intergenerational transition rates because of proximity, ethnic recruitment, and discrimination, these figures underestimate the advantages of long resident Americans relative to newcomers.

6. The Counterfactual

Would native born workers have been more willing to enter the industrial sector had immigrant labor not been available? Although it is impossible to answer this question definitively, we can review the potential labor reserves and speculate about their likely responses based the extensive research literature on domestic migration patterns.

The potential source of reserve labor in the United States in the late 19th century and early 20th century were the sons and daughters of small scale farmers in the Northeast, Midwest, and South. Many of these farms were relatively small and could barely support a family. With a growing population, many of the second and third sons of independent farmers had to descend to the ranks of tenancy or farm laborer, secure funds to purchase a farm (or marry a woman who was an heir to a farm), or seek their fortune elsewhere (Wright 1988).

Some segments of the rural population were worse off than others. Over the last half of the 19th century, a large fraction of Southern white famers had lost their land, and became tenant sharecroppers growing cotton on marginal lands (Raper and Reid 1941, Newby 1989). Even more precarious was the situation of African American tenant farmers, whose plight was comparable to those of persecuted peasantry (Raper 1936). In addition to the economic privations shared by white and black sharecroppers, African Americans encountered omnipresent racism and rising violence in the Jim Crow South.

Poverty, even abject poverty, is not always an impetus to long distance migration. The thresholds that break the bonds of place vary across time and place. Depravation creates push factors but knowledge of opportunities in other locations, cultural preferences, and the support of family and friends in destination areas are also important (Massey et al. 1993).

When mass migration from Europe was interrupted during World War I and then halted in the 1920s, Southern blacks migrated in large numbers to become industrial laborers in Northern cities. The African American Great Migration from the 1920s through the 1950s was an epochal movement (Fligstein 1981; Tolnay 2003). The spread of the boll weevil and farm mechanization laid waste to even marginal employment in much of the rural South. There was a parallel trek of white workers from the South to northern cities (Berry 2000; Gregory 2005; Kirby 1987: Ch. 9). The destinations and timing of these domestic migrations suggest that Southern born blacks and whites were a partial substitute for European immigrant labor in industrializing cities of the North. Collins (1997) concludes that mass migration from Europe delayed the migration of black workers from the South.

The situation of white farmers outside the South, and their children, is more difficult to assess. A common presumption is that farming was a preferred way of life and migration, especially to the city, was the last resort even for the landless children of farmers. This assumption seems to be consistent with evidence on migration patterns. In the early decades of the twentieth century, the majority of the farm origin population remained on farms or in rural small town areas as adults, though not necessarily in their exact place of origin (Taeuber 1967: 25). Only a small percentage moved to large metropolitan cities.

This preference for an agricultural way of life was grounded in the historical settlement of the United States. Prior to the late 19th century, cities were not engines of economic growth, but were primarily centers of commerce and administration and transportation hubs. For the first half of the 19th century, over 90% of the American population lived in rural areas. Immigrants arrived in port cities, but most probably moved on as soon as they could. During the 18th and the first half of the 19th century, the shortage of land in eastern states impelled most immigrants as well as many of the children of older settlers to seek their fortunes on the American frontier, first in Appalachia, then in the Ohio Valley, and eventually in the Great Plains (Ferrie 2006: 1: 489). As the Eastern seaboard was filled in—at least in terms of agriculture—the western frontier was the source of land for agricultural settlement by immigrants and native born Americans without an inheritance (Atack, Bateman, and Parker 2000).

The situation changed in the late 19th century as most of the potential arable land on the American frontier was settled and the economic development of urban industries expanded employment opportunities in cities. With the development of the modern industrial economy, cities offered expanded employment in factories, commerce, and in offices. For persons with the right set of education, skills, and ambitions, the urban economy offered opportunities for social mobility that was impossible in any other location. There is evidence that the well educated sons of farmers were able to find well paid jobs as teachers, clerks, merchants, and in the skilled trades (Wright 1988: 201).

But for most white Americans with limited skills and ambitions, it was not obvious that menial factory or office work in a city was a step up from living on a farm or in a small town. Most factory jobs were probably not highly desirable. As the author of the 1920 census report on immigrants commented, “It would seem that, generally speaking, the foreign born population is engaged in more laborious, disagreeable, and probably, less skilled and less remunerative work than are the native born white” (Carpenter 1927: 271). One study reported that the accident rate for non English-speaking workers in one steel mill was twice the average for all workers and that one quarter of all recent immigrant steel workers were injured or killed (Brody

1960: 100–101). Most historical and comparative studies conclude that the process of industrialization was a profoundly alienating experience for most workers (Kerr et al. 1964: Chapter 6, Rodgers 1981). Factories that tried to impose industrial discipline were plagued by high rates of absenteeism and turnover.

The children of farmers who left farming were disproportionately represented in the lower rungs of the occupational hierarchy (Freedman and Freedman 1956, Blau and Duncan 1967: 28). In addition to the loss of autonomy in factory employment, migrants from farm families had to give up the familiarity of family and friends and the economic security of food production. If forced to migrate, many native born white Americans from rural or small towns may have preferred to seek their fortune in the West than to join the ranks of the urban proletariat in industrializing cities. In the late 19th and early 20th century long distance (interstate) migration was much more likely to lead to greater occupational mobility than short distance moves (Ferrie 2005: 213).

Almost 90% of native-born white inter-state migrants went to rural areas during the 19th century, and the proportion migrating to cities remained modest in the early decades of the 20th century (Hall and Ruggles 2004). Similar patterns are also evident in Table 3, which shows net lifetime migration of African Americans and of whites by nativity for each decade from 1870 to 1950. The rapidly expanding industrial economy of the North and Midwest drew disproportionately on immigrant labor and then on African American workers from the South. From 1870 to 1920, the population growth of the Northeast and Midwest included almost 14 million immigrants, but there was negative net migration of 2.5 million native born whites out of the region. Following the closing of the immigration door, more than 2.5 million African American net migrants (from the South) were added to the population of the Northeast and Midwest from 1920 to 1950, while there was a continuing exodus of native born whites from the region (3.3 million from 1920 to 1950).

Examining these data, Hatton and Williamson (1998: 164–173) conclude that the competition with immigrants for jobs lowered the wages of the native born (or slowed their rate of increase) and that native born workers were crowded-out from urban labor markets in the Northeast and Midwest. In a detailed empirical study of the relationship between immigrant concentrations, manufacturing wages, and the inter-state (and inter-county) migration of the native born, Carter and Sutch (2006) find no support for Hatton and Williamson's claims that the presence of immigrants lowered the wages and "crowded out" native born workers in industrial labor markets.[11] Wages, adjusted for cost of living, rose for manufacturing workers and unskilled workers during the age of immigration (Rees 1961; Margo 2006). Moreover, Carter and Sutch (2006) show that there is a positive correlation between the destinations of immigrants and native born workers from 1900 to 1910. Rural laborers, both native-born and from abroad, were responding to declining prospects in their places of origin and to the new opportunities in the same destinations.

Many native born workers did go to the industrial cities, but many more sought their fortune in the West. The majority of immigrants, and the African Americans that followed them, settled in the industrial cities of the Northeast and Midwest. The willingness of immigrants and African Americans to work in the lowest rungs of urban employment may have been largely due to the lack of better alternatives. Most immigrants had been pushed out of their places of origin and had to brave considerable costs and hardship to emigrate to the United States. The fact that one-third of European immigrants from 1908 to 1923 returned to Europe is testimony of the

[11]A less technical version of Carter and Sutch's working paper is available from the Social Science Research Council website (Carter and Sutch 2007).

difficulties of adjusting to life and of finding employment in industrializing America (Wyman 1993: 10).

Although industrial wages continued to rise during the age of industrialization and immigration, it seems that the prevailing wages, working conditions, and urban life were not sufficiently attractive to many native born workers who had social attachments and security, if not prosperity, in their places of origin. Immigrants and their children remained the mainstay of industrial labor until the 1920s. Perhaps higher wages and better working conditions were necessary to attract a sufficient supply of domestic labor to work in the steel mills, stockyards, and other sectors of the industrial economy in the middle decades of the 20th century.

7. Discussion and Conclusions

As the American industrial revolution spread in the late 19th century and the early decades of the 20th century, the United States passed Great Britain to become the most productive industrial nation in the world (Romer 1996). In one of the most widely cited studies of this transition, Wright (1990) identifies a number of factors, including the discovery and development of mineral resources (coal, iron, petroleum, copper, and others) and the export of high quality producer goods as key to the American industrial development and rapid economic growth. Other researchers have emphasized the significance of the early American investment in human capital and the spread of public schooling as the primary reason for the ascendance of the American economy during the age of industrialization. In an interesting aside, Wright (1990: 662) notes that most of the workers in the heavy industries were not well educated native born Americans, but immigrants who were not particularly well educated by world standards. He goes on to say, “Key industries like iron and steel and motor vehicles paid high wages to unskilled workers (who were nonetheless much cheaper than the skilled craft workers used with older technologies) presumably because it was rough, disagreeable, demanding work, and because it was vital to have an ample excess labor supply available” (Wright 1990: 662).

In this study, we have estimated the representation of the immigrant population, including the children and grandchildren of immigrants, in the industrial transformation of the American workforce from 1880 to 1920. This exercise involves a number of assumptions, mostly about the relative proportionality of the 3rd generation in 1920 to the 2nd generation in 1880. There are also many other potential problems of measurement, including inferring industry from occupational reports and unclear boundaries of the gainful worker population. Although we make no claims to exactitude, there is little doubt that the American workforce was heavily dependent on immigrant labor in the early 20th century, and the manufacturing workforce was almost completely dependent on immigrant workers. Most prior studies of the role of industrial labor during these years have acknowledged the centrality of immigrant labor, but they underestimated their numbers because second and third generation immigrants were counted as part of the native born workforce.

Adjusting the immigrant share to include second generation workers is straightforward because parental birthplace was routinely measured in American censuses. Adding the 3rd generation required a more complicated estimation procedure that relied on fairly crude assumptions. Our estimates of the 3rd generation add another 15 to 20 percentage points to the prior estimates that about 50% of workers in most manufacturing industries were of immigrant stock. The results presented here show that 1st, 2nd and 3rd generation immigrants comprised 70 to 80% in several core manufacturing industries.

These are conservative estimates (which would underestimate the true level of the 3rd generation in manufacturing) because third generation immigrant workers are assumed to be no more likely to shift to the manufacturing sector than the workforce as a whole. We expect

that the children and grandchildren of urban residents from the mid 19th century would have been much more likely to have entered industrial employment than the descendents of farmers. In 1880, even before industrialization was in full swing, 1st and 2nd generation immigrants comprised over one-third of the American workforce. Almost two-thirds of all miners, 41% of construction workers, 57% of manufacturing workers, 41% of railway workers, and 49% of retail sales workers in 1880 were immigrants or the children of immigrants.

The disproportionate concentration of the immigrant community in cities and nonagricultural employment in 1880 meant that their progeny were proximate to the exploding growth of employment in factories, offices, and retail trade in the late 19th and early 20th century. The 3rd generation immigrants, with their American education, were probably able to rise above the less desirable jobs on the factory floor and found employment as foremen and even in the front office.

If we assume that the urban children and grandchildren of immigrants were prone to find employment in the industrial economy, can we also assume that the children of farmers were motivated to avoid industrial employment? We do not have direct measures on preferences, but over 50% of the sons of farmers found their first job in agriculture circa 1920 and about 40% were still in agricultural jobs several decades later (Blau and Duncan 1967: Tables 3.3 and 3.8). Most of the decline in agricultural employment over the first half of the 20th century was a result of inter-cohort shifts rather than intra-cohort changes (Duncan 1966b). These figures suggest that, in spite of the economic pressures on farmers, the primary reasons for departure were the lack of an inheritance rather than discouragement with farming as a way of life. Most of the farm origin migrants in the early 20th century went to rural areas or small towns and relatively few moved to large metropolitan cities (Taeuber 1967: 25). As noted earlier, there was substantial net lifetime out-migration of native born whites during the age of industrialization from the Northeast and Midwest to the West.

This avoidance of large cities, and industrial employment, by old stock white Americans who were reared in rural areas and small towns was probably reinforced by popular culture. For most of American history, cities, where most immigrants settled, were derided and feared as places filled with dangerous people and radical ideas (Hawley 1972: 521).[12] Popular beliefs about the natural superiority of a rural way of life were intertwined with ethnic stereotypes of urban residents and the corruption of people who moved to cities. These stereotypes probably discouraged the children of farmers in the late 19th century and early 20th century from migrating to cities and taking the unskilled jobs in the industrial economy.

The continued demand for unskilled labor in industrial cities after the cutoff of immigration in the 1920s certainly played a major role in continuing, if not originating, the African American Great Migration from the 1920s to the 1960s (Collins 1997; Tolnay 2003). There was also a parallel wave of Southern white labor to Northern industrial cities that began during World War I and grew during the 1920s, 1940s, and 1950s (Berry 2000; Gregory 2005). If there had not been the massive wave of European immigration from 1880 to 1920, the demand for labor may have started earlier and drew even larger numbers from the dispossessed Southern peasantry. There is substantial literature on the poverty and hardships of sharecroppers and tenant farmers, both black and white in the rural south (Raper 1936, 1943; Raper and Reid. 1941).

However, the scale of the demand for industrial employment from 1880 to 1920 might have overwhelmed the potential labor reserves. For readers who may not accept the assumptions

[12]Henry Ford, who as much as anyone created the American automobile age, “looked upon big cities as cesspools of iniquity, soulless, and artificial” (Higham 1988: 283).

used to pad our estimate of the impact of immigration with 2.8 million 3rd generation workers in 1920, there were still 5.3 million 1st and 2nd generation workers in manufacturing (directly measured in the 1920 census). Replacing these 5.3 million immigrant workers in manufacturing would have required shifting one-quarter of all 3rd and higher generation workers in 1920 from other sectors to manufacturing.[13] To accomplish even some fraction of this would have required much greater incentives, both in terms of pay and working conditions, than those offered to immigrants. Without immigrant labor, it seems unlikely that the American industrial revolution would have been achieved at the same pace, scale, and profitability that it did. Our claim is not that immigrant labor caused the American industrial revolution; there were a number of factors that played an important role in this epochal process. Immigrant labor, however, may well have been a necessary condition for the pace and scale of the rise of the manufacturing sector from 1880 to 1920.

References

Abramovitz, Moses; David, Paul A. American Macroeconomic Growth in the Era of Knowledge-Based Progress: The Long Run Perspective. In: Engerman, Stanley L.; Gallman, Robert E., editors. The Cambridge Economic History of the United States. Vol. 3. Cambridge: Cambridge University Press; 2000. p. 1-92.

Atack, Jeremy; Bateman, Fred; Parker, William N. The Farm, the Farmer, and the Market. In: Engerman, Stanley L.; Gallman, Robert E., editors. The Cambridge Economic History of the United States. Vol. 2. Cambridge: Cambridge University Press; 2000. p. 245-284.

Bancroft, Gertrude. The American Labor Force: Its Growth and Changing Composition. New York: John Wiley and Sons; 1958.

Berry, Chad. Southern Migrants, Northern Exiles. Urbana: University of Illinois Press; 2000.

Blau, Peter; Duncan, Otis Dudley. The American Occupational Structure. New York: Wiley; 1967.

Brody, David. Steelworkers in America: The Nonunion Era. New York: Harper; 1960.

Cahan, Abraham. The Rise of David Levinsky. New York: Harper and Brothers; 1917.

Cain, Louis P. Transportation. In: Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin, editors. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. New York: Cambridge University Press; 2006. p. 4-761.p. 4-778.

Carpenter, Niles. Immigrants and Their Children. Census Monograph. Washington, D.C: Government Printing Office; 1927.

Carter, Susan. Labor Force. In: Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin, editors. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. New York: Cambridge University Press; 2006. p. 2-13.p. 2-35.

Carter, Susan; Sutch, Richard. Historical Background to Current Immigration Issues. In: Smith, James P.; Edmonston, Barry, editors. The Immigration Debate: Studies on the Economic, Demographic and Fiscal Effects of Immigration. Washington, D.C..: National Academy Press; 1999. p. 289-366.

Carter, Susan; Sutch, Richard. “Resident Impacts of Immigration: Perspectives from America’s Age of Mass Migration.” Unpublished paper (August 3, 2006). Department of Economics. University of California-Riverside. 2006. Downloaded on November 10, 2008 from: http://www.economics.ucr.edu/papers/papers08/08-08.pdf

Carter, Susan; Sutch, Richard. Labor Market Flooding? Migrant Destination and Wage Change during America’s Age of Mass Migration. 2007. Available from the Social Science Research Council “Border Battles: U.S. Immigration Debates” website at: http://borderbattles.ssrc.org/

[13]There were 24.3 million NBNP workers in 1920 and 4.7 were already employed in manufacturing. The 5.3 million immigrant (1st and 2nd generation) workers in manufacturing are 27.2 % of the 19.5 million non-manufacturing NBNP workers.

Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. New York: Cambridge University Press; 2006.

Chandler, Alfred. The Visible Hand: The Managerial Revolution in American Business. Cambridge: Harvard University Press; 1977.

Collins, William J. When the Tide Turned: Immigration and the Delay of the Great Migration. Journal of Economic History 1997;57:607–632.

Davis, Joseph P. Index of Industrial Production. In: Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin, editors. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. New York: Cambridge University Press; 2006. p. 3-24.p. 2-25.

Denison, Edward F. Accounting for United States Economic Growth, 1929–1969. Washington, D. C.: 1974.

Duncan, Otis Dudley. A Socioeconomic Index for All Occupations. In: Reiss, Albert J., editor. Occupations and Social Status. New York: Free Press; 1961. p. 109-138.

Duncan, Otis Dudley. Methodological Issues in the Analysis of Social Mobility. In: Smelser, Neil J.; Lipset, Seymour Martin, editors. Social Structure and Mobility in Economic Development. Chicago: Aldine; 1966a. p. 51-97.

Duncan, Otis Dudley. Occupational Trends and Patterns in Net Mobility in the United States. Demography 1966b;3:1–18.

Easterlin, Richard. Population, Labor Force, and Long Swings in Economic Growth: The American Experience. New York: Columbia University Press; 1968.

Eldridge, Hope T.; Thomas, Dorothy Swaine. Population Redistribution and Economic Growth, United States, 1870 – 1950. Vol. III. Demographic Analyses and Interrelations. Philadelphia: American Philosophical Society; 1964.

Engerman, Stanley L.; Gallman, Robert E., editors. The Cambridge Economic History of the United States. Vol. 3. Cambridge: Cambridge University Press; 2000.

Engerman, Stanley L.; Sokoloff, Kenneth. Technology and Industrialization, 1790–1914. In: Engerman, Stanley L.; Gallman, Robert E., editors. The Cambridge Economic History of the United States. Vol. 2. Cambridge: Cambridge University Press; 2000. p. 367-401.

Ferrie, Joseph P. History Lessons: The End of American Exceptionalism? Mobility in the United States since 1850. The Journal of Economic Perspectives 2005;19:199–215.

Ferrie, Joseph P. Internal Migration. In: Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin, editors. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. Vol. 1. New York: Cambridge University Press; 2006. p. 489-494.

Fligstein, Neil. Going North: Migration of Blacks and Whites from the South, 1900–1950. New York: Academic Press; 1981.

Fogel, Robert William. Railroads and American Economic Growth: Essays in Econometric History. Baltimore: The Johns Hopkins Press; 1964.

Fogel, Robert William; Engerman, Stanley L., editors. The Reinterpretation of American Economic History. New York: Harper and Row; 1971.

Freedman, Ronald; Freedman, Deborah. Farm Reared Elements in the NonFarm Population. Rural Sociology 1956;21:50–61.

Friedberg, Rachel; Hunt, Jennifer. The Impact of Immigrants on Host Country Wages, Employment and Growth. Journal of Economic Perspectives 1995;9:23–44.

Gallman, Robert. ‘Human Capital in the First Eighty Republic: How Much Did America Owe the Rest of the World? The American Economic Review: Papers and Proceeedings 1977;67:27–31.

Gibson, Campbell; Jung, Kay. Historical Census Statistics on the Foreign-Born Population of the United States: 1850–2000. Working Paper no. 81. Washington, D.C.: Population Division, U.S. Bureau of the Census; 2006. Accessed at http://www.census.gov/population/www/documentation/twps0081/twps0081.pdf

Goldin, Claudia. The Political Economy of Immigration Restriction in the United States, 1890 to 1921. In: Goldin, Claudia; Libecap, Gary D., editors. The Regulated Economy: A Historical Approach to Political Economy. Chicago: University of Chicago Press; 1994. p. 223-257.

Goldin, Claudia; Katz, Lawrence F. The Origins of Technology-Skill Complementarity. The Quarterly Journal of Economics 1998;113:693–732.

Gregory, James. The Southern Diaspora: How the Migration of Black and White Southerners Transformed America. Chapel Hill: University of North Carolina Press; 2005.

Guest, Avery M. Frontier and Urban-Industrial Explanations of US Occupational Mobility in the late 1800s. Social Science Research 2005;34:140–164.

Haines, Michael R. The Population of the United States, 1790–1920. In: Engerman, Stanley L.; Gallman, Robert E., editors. The Cambridge Economic History of the United States. Vol. 2. Cambridge: Cambridge University Press; 2000. p. 143-205.

Hall, Patricia Kelly; Ruggles, Steven. 'Restless in the Midst of Their Prosperity': New Evidence on the Internal Migration of Americans, 1850–2000. The Journal of American History 2004;91:829–846.

Hatton, Timothy J.; Williamson, Jeffrey G. The Age of Mass Migration: Causes and Economic Impact. New York: Oxford University Press; 1998.

Hawley, Amos. Population Density and the City. Demography 1972;9:521–529. [PubMed: 4595864]

Higham, John. Strangers in the Land: Patterns of American Nativism, 1860 – 1925. 2. New Brunswick: Rutgers University Press; 1988. original publication 1955

Hounshell, David A. From the American System to Mass Production, 1800–1932: The Development of Manufacturing Technology in the United States. Baltimore: The Johns Hopkins University Press; 1984.

Kahan, Arcadius. Economic Opportunities and Some Pilgrims' Progress: Jewish Immigrants from Eastern Europe in the U.S., 1890–1914. The Journal of Economic History 1978;38:235–251.

Katz, Michael; Stern, Mark J. One Nation Divisible: What America Was and What it is Becoming. New York: Russell Sage Foundation; 2006.

Kerr, Clark; Dunlop, John T.; Harbison, Frederick; Myers, Charles A. Industrialism and Industrial Man. New York: Oxford University Press; 1964.

Kirby, Jack Temple. Rural Worlds Lost: The American South, 1920–1960. Baton Rouge: Louisiana State University Press; 1987.

Kuznets, Simon. Notes on the Pattern of U.S. Economic Growth. In: Fogel, Robert William; Engerman, Stanley L., editors. The Reinterpretation of American Economic History. New York: Harper and Row; 1971a. p. 17-24.original publication 1964

Kuznets, Simon. The Contribution of Immigration to the Growth of the Labor Force. In: Robert William, Fogel; Stanley L, Engerman, editors. The Reinterpretation of American Economic History. New York: Harper and Row; 1971b. p. 396-401.original publication 1952

Lieberson, Stanley. A Piece of the Pie: Blacks and White Immigrants Since 1880. Berkeley: University of California Press; 1980.

Margo, Robert A. Index of Money Wages for Unskilled Labor. In: Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin, editors. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. New York: Cambridge University Press; 2006. p. 2-256.p. 2-257.

Massey, Douglas; Arnago, Joaquin; Hugo, Graeme; Kouaouci, Ali; Pellegrino, Adela; Taylor, J Edward. Theories of international migration: a review and appraisal. Population and Development Review 1993;19:431–466.

Mayer, David. Midwestern Industrialization and the American Manufacturing Belt in the Nineteenth Century. Journal of Economic History 1989;49:921–937.

Muller, Thomas. Immigrants and the American City. New York: New York University Press; 1993.

Neal, Larry; Uselding, Paul. Immigration, A Neglected Source of American Economic Growth: 1790–1912. Oxford Economic Papers 1972;24:68–88.

Newby, IA. Plain Folk in the New South: Social Change and Cultural Persistence, 1880–1915. Baton Rouge: Louisiana State University Press; 1989.

Olmstead, Alan L.; Rhode, Paul W. The Transformation of Northern Agriculture. In: Engerman, Stanley L.; Gallman, Robert E., editors. The Cambridge Economic History of the United States. Vol. 3. Cambridge: Cambridge University Press; 2000. p. 693-742.

Perry, Joseph McGarity. The Impact of Immigration on Three American Industries, 1865–1914. New York: Arno Press; 1978.

Raff, Daniel MG. Distribution. In: Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin, editors. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. New York: Cambridge University Press; 2006. p. 707-712.

Ransom, Roger L.; Sutch, Richard. Tontine Insurance and the Armstrong Commission: A Case of Stifled Innovation in the American Life Insurance Industry. Journal of Economic History 1987;47:379–390.

Raper, Arthur. Preface to Peasantry. Chapel Hill: University of North Carolina Press; 1936.

Raper, Arthur. Tenants of the Almighty. New York: Macmillan; 1943.

Raper, Arthur; Reid, Ira. Sharecroppers All. Chapel Hill: University of North Carolina Press; 1941.

Rees, Albert. Real Wages in Manufacturing. Princeton: Princeton University Press; 1961.

Rodgers, Donald T. Tradition, Modernity, and the American Industrial Worker: Reflections and Critique. In: Rabb, Theodore K.; Rotberg, Robert I., editors. Industrialization and Urbanization: Studies in Interdisciplinary History. Princeton: Princeton University Press; 1981. p. 217-243.

Romer, Paul M. Why, Indeed, in America? Theory, History and the Origins of Modern Economic Growth. American Economic Review 1996;86:202–206.

Rosenberg, Nathan. Technology and American Economic Growth. White Plains, NY: M. E. Sharpe; 1972.

Ruggles, Steven; Sobek, Matthew; Alexander, Trent; Fitch, Catherine A.; Goeken, Ronald; Hall, Patricia Kelly; King, Miriam; Ronnander, Chad. Integrated Public Use Microdata Series: Version 3.0. [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor]; 2004. http://www.ipums.org

Schachter, Joseph. Net Immigration of Gainful Workers into the United States, 1870–1930. Demography 1972;9:87–105. [PubMed: 4595859]

Singelmann, Joachim. From Agriculture to Services: The Transformation of Industrial Employment. Beverly Hills: Sage Publications; 1978.

Smith, James P.; Edmonston, Barry, editors. The New Americans: Economic, Demographic, and Fiscal Impacts of Immigration. Washington, DC: National Academy Press; 1997.

Sobek, Matthew. New Statistics on the U.S. Labor Force, 1850–1990. Historical Methods 2001;34:71–87.

Sobek, Matthew. Occupations. In: Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin, editors. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. Vol. 2. New York: Cambridge University Press; 2006. p. 35-39.

Sutch, Richard. Industrial Classification. In: Carter, Susan B.; Sigmund, Scott; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard; Wright, Gavin, editors. Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition. Vol. 4. New York: Cambridge University Press; 2006. p. 3-5.

Taeuber, Irene B.; Taeuber, Conrad. People of the United States in the Twentieth Century. Washington, D.C.: U.S. Government Printing Office; 1971.

Taeuber, Karl. The Residential Redistribution of Farm Born Cohorts. Rural Sociology 1967;32:20–36.

Thomas, Brinley. Migration and Economic Growth: A Study of Great Britain and the Atlantic Economy. 2. Cambridge: Cambridge University Press; 1973.

Tolnay, Stewart. The African American ‘Great Migration’ and Beyond. Annual Review of Sociology 2003;29:209–232.

Ward, David. Cities and Immigrants: A Geography of Change in Nineteenth Century America. New York: Oxford University Press; 1971.

Wright, Gavin. American Agriculture and the Labor Market; What Happened to Proletarianization? Agricultural History 1988;62:182–209.

Wright, Gavin. The Origins of American Industrial Success: 1879–1940. American Economic Review 1990;80:651–678.

Wyman, Mark. Roundtrip to America, The Immigrants Return to Europe: 1880–1930. Ithaca: Cornell University Press; 1993.

Zolberg, Aristide R. A Nation by Design: Immigration Policy in the Fashioning of America. Cambridge: Harvard University Press and the Russell Sage Foundation; 2006.

Zunz, Olivier. The Changing Face of Inequality: Urbanization, Industrial Development, and Immigrants in Detroit, 1880–1920. Chicago: University of Chicago Press; 1982.

Appendix 1. Industry classification used in this study

AGRICULTURE

MINING

206 Metal mining

216 Coal mining

226 Crude petroleum and natural gas extraction

236 Nonmettalic mining and quarrying, except fuel

246 CONSTRUCTION

MANUFACTURING

306–326 Wood and Mineral Products (incl. logging/sawmills)

Metals (Steel and Iron)

336 Blast furnaces, steel works, & rolling mills

337 Other primary iron and steel industries

338 Primary nonferrous industries

346 Fabricated steel products

347 Fabricated nonferrous metal products

348 Not specified metal industries

Machinery

356 Agricultural machinery and tractors

357 Office and store machines

358 Misc machinery

367 Electrical machinery, equipment and supplies

376 Motor vehicles and motor vehicle equipment

378 Ship and boat building and repairing

379 Railroad and misc transportation equipment

406–429 Food & Tobacco

Textiles/Footwear/Leather

436 Knitting mills

437 Dyeing and finishing textiles, except knit goods

438 Carpets, rugs, and other floor coverings

439 Yarn, thread, and fabric

446 Misc textile mill products

448 Apparel and accessories

449 Misc fabricated textile products

487 Leather: tanned, curried, and finished

488 Footwear, except rubber

489 Leather products, except footwear

457–459 Paper and Printing

466–478 Chemical/Petro/Rubber

387–399 & 499 Miscellaneous

TRANSPORTATION, COMMUNICATION AND UTILITIES

506 Railroads and railway

516 Street railways and bus lines

526 Trucking service

527 Warehousing and storage

536 Taxicab service

546 Water transportation

578 Telephone

579 Telegraph

586 Electric light and power

587 Gas and steam supply systems

WHOLESALE AND RETAIL TRADE

606–627 Wholesale

636–699 Retail

PRODUCER SERVICES

716 Banking and credit

726 Security and commodity brokerage and invest companies

736 Insurance

746 Real estate

806 Advertising

807 Accounting, auditing, and bookkeeping services

808 Misc business services

879 Legal services

898 Engineering and architectural services

PERSONAL SERVICES

816 Auto repair services and garages

817 Misc repair services

826 Private households

836 Hotels and lodging places

846 Laundering, cleaning, and dyeing

847 Dressmaking shops

848 Shoe repair shops

849 Misc personal services

857 Theaters and motion pictures

858 Bowling alleys, and billiard and pool parlors

859 Misc entertainment and recreation services

SOCIAL SERVICES

868 Medical and other health services, except hospitals

869 Hospitals

888 Educational services

896 Welfare and religious services

897 Nonprofit membership organizs.

899 Misc professional and related

906 Postal service

916 Federal public administration

926 State public administration

936 Local public administration

Acknowledgments

The authors are deeply indebted to Patty Glynn for her statistical advice and assistance and to Brian Gatton, Avery Guest, Matthew Sobek, Stewart Tolnay, and the anonymous reviewers for their detailed criticisms and comments of earlier visions of this paper. All remaining errors are the responsibility of authors.

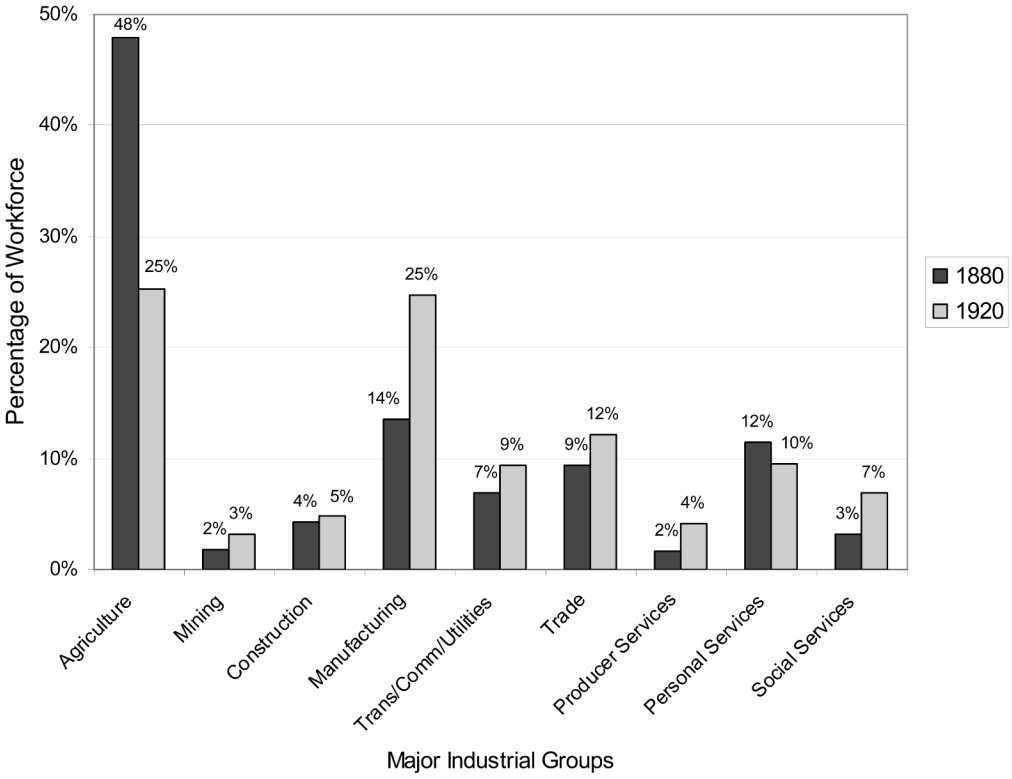

Figure 1.
Industrial Structure of Workforce: 1880 & 1920

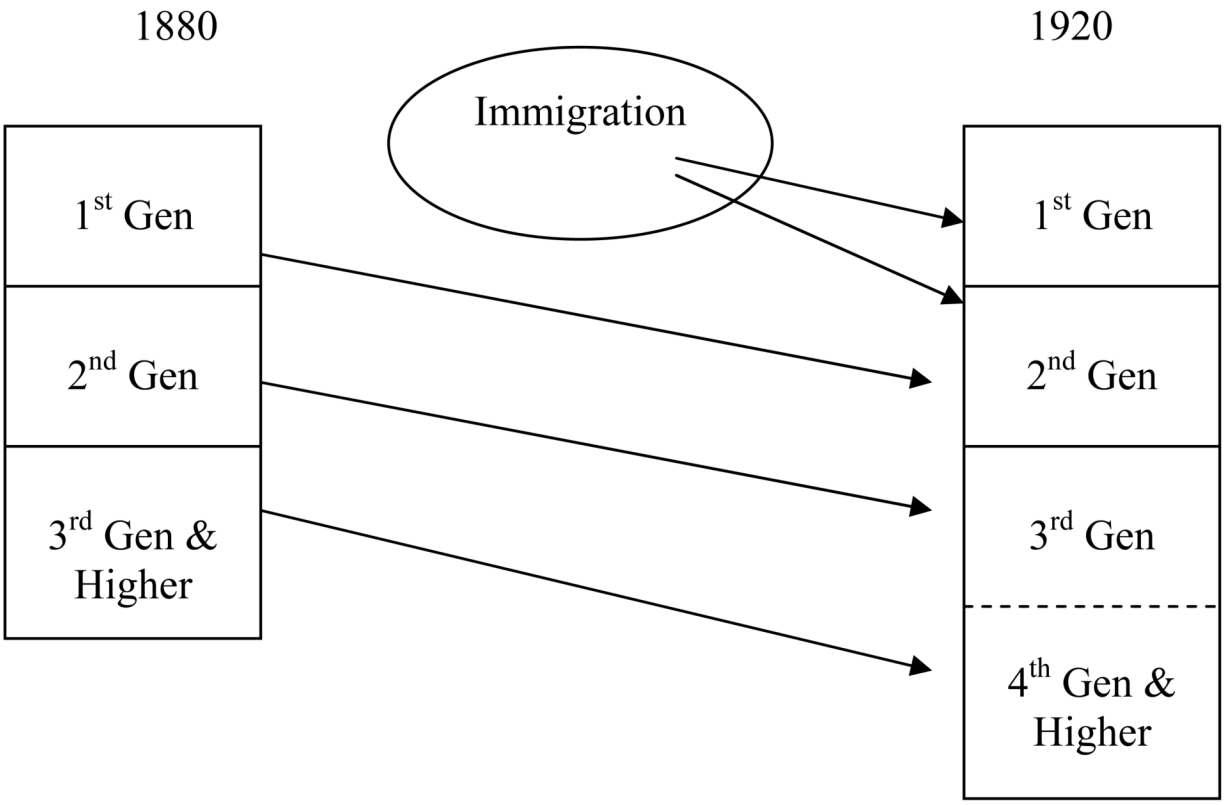

Figure 2.
The Demographic Components of the 1920 Gainful Workforce

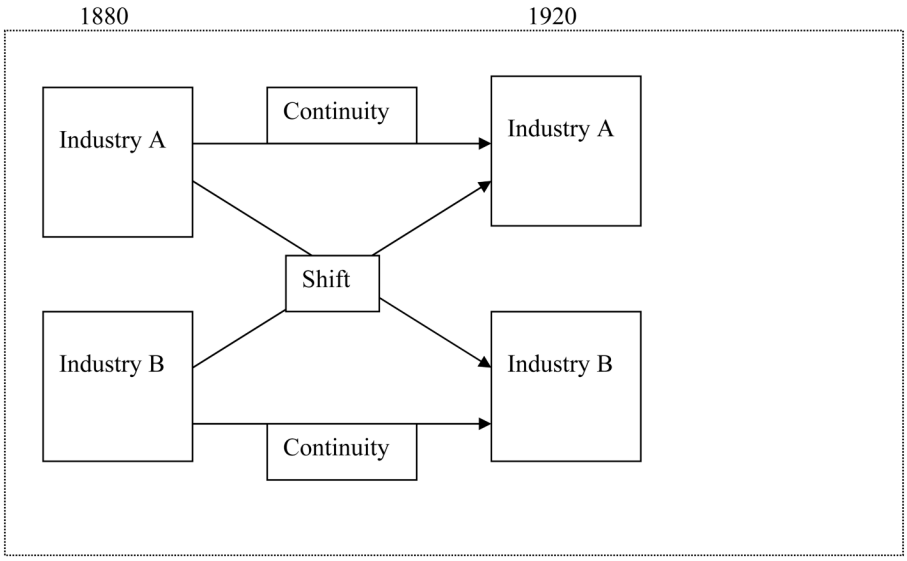

Figure 3.
Estimating the Sources of Change in the Industrial Structure of the Gainful Workforce From 1880 to1920

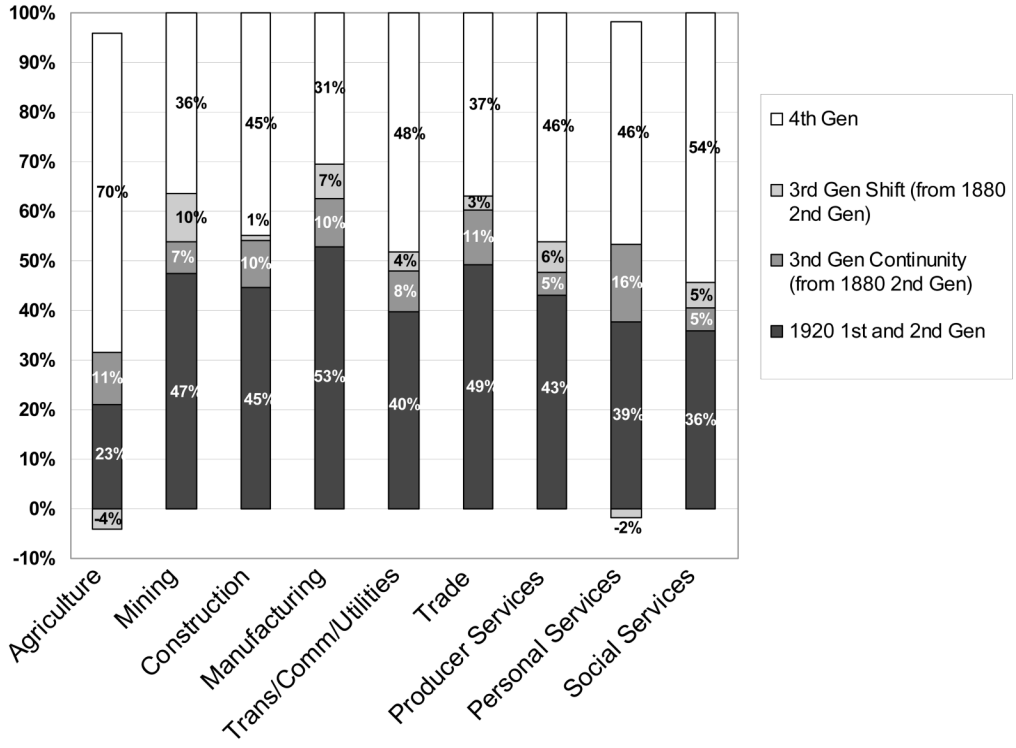

Figure 4.
Components of the 1920 Industrial Workforce

Table 1

Industrial Structure of the Work Force of Gainful Workers, by Immigrant (1st and 2nd Generation) Generation: United States, 1880 to 1920

	% in Industry of Total LF		1880 to 1920 Change		% Immigrant of Industry		Imm. Grwth as % of Total Grwth
	1880	1920	Absolute (in 000)	Relative to Total Growth	1880	1920	
INDUSTRIAL SECTOR	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
AGRICULTURE	**47.9%**	**25.3%**	**1,548**	**0.1**	**21%**	**23%**	**36%**
MINING	**1.7%**	**3.1%**	**956**	**2.5**	**64%**	**47%**	**42%**
206 Metal mining	0.1%	0.4%	156	5.2	52%	66%	68%
216 Coal mining	0.5%	2.1%	741	6.5	64%	50%	49%
226 Crude petroleum and natural gas extraction	0.0%	0.4%	138	15.2	32%	13%	12%
236 Nonmetallic mining and quarrying, except fuel	1.0%	0.3%	−80	−0.3	68%	40%	105%
246 CONSTRUCTION	**4.3%**	**4.8%**	**1,159**	**1.2**	**41%**	**45%**	**47%**
MANUFACTURING	**13.5%**	**24.8%**	**7,585**	**2.5**	**57%**	**53%**	**52%**
Wood and Mineral Products (incl. logging/sawmills)	***2.6%***	***3.2%***	***817***	***1.4***	***51%***	***37%***	***29%***
Metals (Steel and Iron)	***1.3%***	***3.7%***	***1,268***	***4.3***	***60%***	***57%***	***57%***
336 Blast furnaces, steel works, & rolling mills	0.5%	1.4%	476	4.1	61%	56%	55%
337 Other primary iron and steel industries	0.1%	0.8%	285	9.0	58%	57%	57%
338 Primary nonferrous industries	0.2%	0.3%	114	3.3	57%	62%	64%
346 Fabricated steel products	0.4%	1.0%	313	3.5	60%	56%	55%
347 Fabricated nonferrous metal products	0.0%	0.1%	39	12.7	84%	58%	57%
348 Not specified metal industries	0.1%	0.1%	41	1.9	53%	63%	68%
Machinery	**0.7%**	**5.0%**	**1,872**	**11.3**	**48%**	**54%**	**55%**
356 Agricultural machinery and tractors	0.1%	0.1%	43	2.5	55%	51%	50%
357 Office and store machines	0.0%	0.1%	39	78.8	0%	43%	44%
358 Misc machinery	0.1%	1.5%	610	29.5	57%	58%	58%

	% in Industry of Total LF		1880 to 1920 Change		% Immigrant of Industry		Imm. Grwth as % of Total Grwth
	1880	1920	Absolute (in 000)	Relative to Total Growth	1880	1920	
INDUSTRIAL SECTOR	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
367 Electrical machinery, equipment and supplies	0.0%	0.6%	243	197.4	70%	54%	54%
376 Motor vehicles and motor vehicle equipment	0.0%	1.2%	487	3952.3	0%	54%	54%
378 Ship and boat building and repairing	0.0%	1.0%	388	98.7	44%	51%	51%
379 Railroad and misc transportation equipment	0.5%	0.4%	59	0.5	45%	51%	60%
Food & Tobacco	***1.5%***	***2.5%***	***740***	***2.3***	***56%***	***50%***	***48%***
Textiles/Footwear/Leather	***3.8%***	***4.8%***	***1,242***	***1.5***	***65%***	***62%***	***60%***
436 Knitting mills	0.0%	0.3%	122	11.7	51%	49%	49%
437 Dyeing and finishing textiles, except knit goods	0.0%	0.1%	41	5.7	72%	67%	67%
438 Carpets, rugs, and other floor coverings	0.1%	0.1%	19	1.1	80%	71%	64%
439 Yarn, thread, and fabric	1.7%	2.0%	485	1.3	73%	58%	48%
446 Misc textile mill products	0.2%	0.2%	32	0.8	62%	68%	74%
448 Apparel and accessories	0.3%	1.1%	400	6.3	68%	73%	73%
449 Misc fabricated textile products	0.1%	0.1%	20	1.1	56%	71%	82%
487 Leather: tanned, curried, and finished	0.3%	0.2%	18	0.2	52%	62%	96%
488 Footwear, except rubber	1.0%	0.6%	84	0.4	56%	56%	57%
489 Leather products, except footwear	0.1%	0.1%	22	1.0	52%	62%	70%
Paper and Printing	***0.8%***	***1.6%***	***475***	***2.5***	***53%***	***49%***	***48%***
Chemical/Petro/Rubber	***0.2%***	***1.6%***	***587***	***10.6***	***61%***	***46%***	***45%***
Miscellenous	***2.5%***	***2.6%***	***583***	***1.0***	***52%***	***57%***	***60%***
TRANSPORTATION, COMMUNICATION AND UTILITIES	**6.9%**	**9.4%**	**2,572**	**1.7**	**42%**	**40%**	**39%**
506 Railroads and railway	3.9%	5.1%	1,342	1.5	41%	38%	35%

	% in Industry of Total LF		1880 to 1920 Change		% Immigrant of Industry		Imm. Grwth as % of Total Grwth
	1880	1920	Absolute (in 000)	Relative to Total Growth	1880	1920	
INDUSTRIAL SECTOR	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
516 Street railways and bus lines	0.1%	0.5%	204	9.0	49%	45%	44%
526 Trucking service	1.0%	1.1%	237	1.0	45%	39%	34%
527 Warehousing and storage	0.0%	0.1%	49	5.0	34%	41%	42%
536 Taxicab service	0.0%	0.2%	73	8.5	53%	43%	42%
546 Water transportation	0.8%	0.6%	117	0.7	42%	54%	68%
556–568 Misc transportation	0.7%	0.3%	−14	−0.1	39%	46%	−17%
578 Telephone	0.0%	0.7%	276	83.2	52%	36%	36%
579 Telegraph	0.2%	0.2%	53	1.6	38%	36%	35%
586 Electric light and power	0.0%	0.3%	104	17.2	47%	37%	37%
587 Gas and steam supply systems	0.0%	0.2%	65	6.4	47%	46%	46%
588–598 Misc. utilities	0.0%	0.2%	65	6.7	47%	49%	50%
WHOLESALE AND RETAIL TRADE	**9.4%**	**12.1%**	**3,216**	**1.5**	**49%**	**49%**	**49%**
Wholesale	***1.4%***	***2.1%***	***615***	***2.0***	***38%***	***45%***	***47%***
Retail	***8.0%***	***10.0%***	***2,601***	***1.5***	***51%***	***50%***	***50%***
PRODUCER SERVICES	**1.6%**	**4.1%**	**1,367**	**3.8**	**32%**	**43%**	**45%**
716 Banking and credit	0.1%	0.7%	261	8.1	25%	37%	38%
726 Security and commodity brokerage and invest companies	0.1%	0.2%	67	2.5	27%	42%	47%
736 Insurance	0.1%	0.6%	234	11.7	22%	40%	41%
746 Real estate	0.1%	0.6%	209	10.3	28%	43%	44%
806 Advertising	0.0%	0.1%	25	40.7	20%	50%	51%
807 Accounting, auditing, and bookkeeping services	0.3%	0.3%	39	0.5	41%	49%	61%
808 Misc business services	0.4%	1.1%	379	4.8	42%	52%	53%
808 Misc business services	0.4%	1.1%	379	4.8	42%	52%	53%
879 Legal services	0.4%	0.4%	79	1.0	21%	35%	46%

	% in Industry of Total LF		1880 to 1920 Change		% Immigrant of Industry		Imm. Grwth as % of Total Grwth
	1880	1920	Absolute (in 000)	Relative to Total Growth	1880	1920	
INDUSTRIAL SECTOR	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
898 Engineering and architectural services	0.1%	0.2%	69	3.8	34%	37%	38%
				0.0			
PERSONAL SERVICES	**11.5%**	**9.5%**	**1,763**	**0.7**	**43%**	**39%**	**34%**
816 Auto repair services and garages	0.0%	0.8%	342	- -	- -	32%	32.3%
817 Misc repair services	1.3%	0.6%	−7	0.0	47%	42%	188%
826 Private households	7.3%	4.3%	403	0.2	41%	34%	14%
836 Hotels and lodging places	0.6%	1.3%	406	3.3	41%	43%	43%
846 Laundering, cleaning, and dyeing	0.3%	0.5%	145	2.0	53%	46%	43%
847 Dressmaking shops	1.3%	0.6%	5	0.0	50%	44%	−243%
848 Shoe repair shops	0.0%	0.2%	73	17.9	45%	72%	73%
849 Misc personal services	0.4%	0.7%	225	2.4	49%	42%	40%
857 Theaters and motion pictures	0.0%	0.3%	114	928.3	100%	43%	43%
858 Bowling alleys, and billiard and pool parlors	0.0%	0.1%	34	17.1	44%	45%	45%
859 Misc entertainment and recreation services	0.3%	0.2%	24	0.4	48%	50%	54%
SOCIAL SERVICES	**3.2%**	**6.9%**	**2,205**	**3.1**	**27%**	**36%**	**38%**
868 Medical and other health services, excpt hospitals	0.6%	0.8%	212	1.6	18%	36%	45%
869 Hospitals	0.0%	0.4%	167	90.6	60%	46%	46%
888 Educational services	1.3%	2.4%	739	2.5	24%	30%	32%
896 Welfare and religious services	0.4%	0.5%	127	1.3	37%	42%	45%
897 Nonprofit membership organizs.	0.0%	0.1%	38	25.6	25%	39%	39%
899 Misc professional and related	0.1%	0.1%	23	1.7	34%	48%	55%
906 Postal service	0.1%	0.5%	192	6.1	23%	32%	33%
916 Federal public administration	0.2%	0.9%	318	5.9	44%	33%	31%
926 State public administration	0.0%	0.1%	26	4.5	35%	34%	34%

	% in Industry of Total LF		1880 to 1920 Change		% Immigrant of Industry		Imm. Grwth as % of Total Grwth
	1880	1920	Absolute (in 000)	Relative to Total Growth	1880	1920	
INDUSTRIAL SECTOR	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
936 Local public administration	0.4%	1.1%	364	4.6	34%	46%	49%
Total Work Force (Gainful Workers)	**100%**	**100%**	**22,371**	**1.0**	**34%**	**40%**	**45%**
Census Count (from PUMS)	18,147,884	40,518,636					

Sources: 1880 and 1920 PUMS from Ruggles et al. (2004)

Notes: Gainful workers in 1880 not reporting an industry (codes 997/998) are disributed prorata by the industry of their reported occupation.

(1). Percentage by Major and Selected Industrial Sectors of Employment of 1880 Total Labor Force.

(2). Percentage by Major and Selected Industrial Sectors of Employment of 1920 Total Labor Force.

(3). Change (in thousands) in Absolute Number of Workers, by Industrial Sector from 1880 to 1920.

(4). Ratio of the Pecent Change from 1880 to 1920 of Each Industrial Sector to the Percent Change of the Total Work Force from 1880 to 1920 (123%).

(5). Percent Immigrant (first and second generation) of Workers, by Industrial Sector in 1880

(6). Percent Immigrant (first and second generation) of Workers, by Industrial Sector in 1920

(7). Ratio of the Change in the Absolute Number of Immigrants (first and second generation) to the Absolute Change of Workers in Each Industry from 1880 to 1920.

Table 2

Estimation of the Composition of the 1920 Industrial Structure by Immigraton Generation Based on Assumptions of Generational Replacement from 1880 to 1920

	ACTUAL 1920 WORKFORCE (in thousands)				Expected Workforce in 1920		SHIFT (Actual -Expected)		SHARE OF 1920 LABOR FORCE FROM:			
		Immigrant Generation			Based on 1880:		Based on 1880:		From 1920	From1880 2nd Gen		Total
	Total	3rd +	2nd	1st	3+ Gen	2nd Gen	3+ Gen	2nd Gen	1st & 2nd	Expected	Shift	Imm. Share
	1	2	3	4	5	6	7	8	9	10	11	12
					(r * 1880 3rd +)	(r * 1880 2nd)			(3+4)/(1)	(6/1)	(8/1)	(9+10+11)
AGRICULTURE	10,235	7,897	**1,373**	967	11,667	1,167	−4,488	−449	23%	11%	−4%	30%
MINING	1,270	668	**192**	410	189	83	275	121	47%	7%	10%	64%
206 Metal mining	181	62	34	85	20	5	30	7	66%	3%	4%	72%
216 Coal mining	834	414	130	291	56	28	221	109	50%	3%	13%	67%
226 Crude petroleum and natural gas extraction	145	126	12	6	8	2	92	24	13%	2%	16%	31%
236 Nonmettalic mining and quarrying, except fuel	110	66	16	28	104	49	−59	−28	40%	44%	−25%	59%
	0											
246 CONSTRUCTION	1,942	1,077	**394**	471	778	185	92	22	45%	10%	1%	55%
	0											
MANUFACTURING	10,039	4,724	**2,451**	2,863	1,793	971	1,272	689	53%	10%	7%	69%
Wood and Mineral Products	1,288	809	**203**	276	390	141	205	74	37%	11%	6%	54%
Metals (Steel and Iron)	1,509	647	**326**	536	164	115	217	151	57%	8%	10%	75%
336 Blast furnaces, steel works, & rolling mills	570	252	99	219	62	43	86	60	56%	8%	11%	74%
337 Other primary iron and steel industries	310	133	61	116	18	13	60	42	57%	4%	14%	75%

	ACTUAL 1920 WORKFORCE (in thousands)				Expected Workforce in 1920		SHIFT (Actual -Expected)		SHARE OF 1920 LABOR FORCE FROM:			
		Immigrant Generation			Based on 1880:		Based on 1880:		From 1920	From1880 2nd Gen		Total
	Total	3rd +	2nd	1st	3+ Gen	2nd Gen	3+ Gen	2nd Gen	1st & 2nd	Expected	Shift	Imm. Share
	1	2	3	4	5	6	7	8	9	10	11	12
					(r * 1880 3rd +)	(r * 1880 2nd)			(3+4)/(1)	(6/1)	(8/1)	(9+10+11)
338 Primary nonferrous industries	142	53	28	60	20	12	13	8	62%	9%	6%	77%
346 Fabricated steel products	386	170	105	110	49	39	46	36	56%	10%	9%	75%
347 Fabricated nonferrous metal products	42	17	15	9	1	1	7	9	58%	2%	21%	82%
348 Not specified metal industries	59	22	17	21	14	7	1	0	63%	11%	0%	75%
Machinery	2,007	921	**554**	531	119	45	**548**	**209**	54%	2%	10%	67%
356 Agricultural machinery and tractors	57	28	13	16	11	8	5	4	51%	14%	7%	72%
357 Office and store machines	39	22	11	6	1	0	22	0	43%	0%	0%	43%
358 Misc machinery	626	260	190	176	12	8	145	95	58%	1%	15%	75%
367 Electrical machinery, equipment and supplies	244	112	81	50	1	1	56	55	54%	0%	23%	77%
376 Motor vehicles and motor vehicle equipment	487	225	125	137	0	0	225	0	54%	0%	0%	54%
378 Ship and boat building and repairing	391	193	98	100	3	1	142	47	51%	0%	12%	63%
379 Railroad and misc transportation equipment	158	78	35	45	91	28	−32	−10	51%	18%	−6%	62%
Food & Tobacco	1,007	504	**224**	278	199	93	144	68	50%	9%	7%	66%
Textiles/Footwear/Leather	1,933	738	**509**	686	407	312	10	8	62%	16%	0%	78%
436 Knitting mills	130	66	37	27	7	5	31	23	49%	4%	18%	71%

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	ACTUAL 1920 WORKFORCE (in thousands)				Expected Workforce in 1920		SHIFT (Actual -Expected)		SHARE OF 1920 LABOR FORCE FROM:			
		Immigrant Generation			Based on 1880:		Based on 1880:		From 1920	From1880 2nd Gen		Total
	Total	3rd +	2nd	1st	3+ Gen	2nd Gen	3+ Gen	2nd Gen	1st & 2nd	Expected	Shift	Imm. Share
	1	2	3	4	5	6	7	8	9	10	11	12
					(r * 1880 3rd +)	(r * 1880 2nd)			(3+4)/(1)	(6/1)	(8/1)	(9+10+11)
437 Dyeing and finishing textiles, except knit goods	47	15	13	19	3	2	5	5	67%	5%	10%	83%
438 Carpets, rugs, and other floor coverings	34	10	11	13	5	8	**−1**	**−2**	71%	25%	−6%	89%
439 Yarn, thread, and fabric	792	334	193	265	138	163	15	18	58%	21%	2%	81%
446 Misc textile mill products	63	20	18	26	20	15	−8	−6	68%	23%	−10%	82%
448 Apparel and accessories	451	123	121	207	28	31	30	34	73%	7%	8%	87%
449 Misc fabricated textile products	35	10	10	14	11	5	−4	−2	71%	15%	−6%	80%
487 Leather: tanned, curried, and finished	82	31	19	32	52	22	−30	−12	62%	27%	−15%	73%
488 Footwear, except rubber	260	113	77	70	130	52	−49	−20	56%	20%	−8%	69%
489 Leather products, except footwear	39	15	11	13	14	7	**−4**	**−2**	62%	19%	−6%	75%
Paper and Printing	628	318	**199**	111	121	84	67	47	49%	13%	7%	70%
Chemical/Petro/Rubber	632	341	**134**	157	30	17	185	108	46%	3%	17%	66%
Miscellenous	1,035	446	**302**	288	363	163	**−56**	**−25**	57%	16%	−2%	70%
TRANSPORTATION, COMMUNICATION AND UTILITIES	3,825	2,300	**833**	692	1,228	305	614	153	40%	8%	4%	52%
506 Railroads and railway	2,047	1,280	403	365	698	153	352	77	38%	7%	4%	49%
516 Street railways and bus lines	223	123	49	51	16	8	67	33	45%	3%	15%	63%

	ACTUAL 1920 WORKFORCE (in thousands)				Expected Workforce in 1920		SHIFT (Actual -Expected)		SHARE OF 1920 LABOR FORCE FROM:			
		Immigrant Generation			Based on 1880:		Based on 1880:		From 1920	From1880 2nd Gen		Total
	Total	3rd +	2nd	1st	3+ Gen	2nd Gen	3+ Gen	2nd Gen	1st & 2nd	Expected	Shift	Imm. Share
	1	2	3	4	5	6	7	8	9	10	11	12
					(r * 1880 3rd +)	(r * 1880 2nd)			(3+4)/(1)	(6/1)	(8/1)	(9+10+11)
526 Trucking service	428	261	108	59	176	62	17	6	39%	14%	1%	55%
527 Warehousing and storage	57	34	14	9	9	1	20	3	41%	2%	5%	48%
536 Taxicab service	80	46	21	13	6	2	27	11	43%	3%	13%	59%
546 Water transportation	255	118	45	92	136	33	−41	−10	54%	13%	−4%	63%
556–568 Misc transportation	120	64	26	30	138	28	−84	−17	46%	23%	−14%	55%
578 Telephone	279	178	85	16	2	2	83	90	36%	1%	32%	69%
579 Telegraph	81	51	22	7	29	11	8	3	36%	14%	4%	54%
586 Electric light and power	109	68	27	14	4	2	46	16	37%	1%	15%	54%
587 Gas and steam supply systems	74	40	17	17	7	2	24	6	46%	3%	8%	57%
588–598 Misc. utilities	73	37	16	20	7	2	22	6	49%	3%	9%	61%
	0											
WHOLESALE AND RETAIL TRADE	4,919	2,493	**1,223**	1,202	1,456	538	364	135	49%	11%	3%	63%
Wholesale	870	481	**228**	160	265	54	135	28	45%	6%	3%	54%
Retail	4,050	2,012	**995**	1,043	1,191	484	240	97	50%	12%	2%	65%
PRODUCER SERVICES	1,657	942	**494**	221	333	77	432	100	43%	5%	6%	54%
716 Banking and credit	287	181	83	23	33	6	121	21	37%	2%	7%	46%
726 Security and commodity brokerage and invest companies	89	51	29	9	27	4	18	3	42%	4%	3%	49%
736 Insurance	250	150	70	29	21	3	112	14	40%	1%	6%	47%

	ACTUAL 1920 WORKFORCE (in thousands)				Expected Workforce in 1920		SHIFT (Actual -Expected)		SHARE OF 1920 LABOR FORCE FROM:			
		Immigrant Generation			Based on 1880:		Based on 1880:		From 1920	From1880 2nd Gen		Total
	Total	3rd +	2nd	1st	3+ Gen	2nd Gen	3+ Gen	2nd Gen	1st & 2nd	Expected	Shift	Imm. Share
	1	2	3	4	5	6	7	8	9	10	11	12
					(r * 1880 3rd +)	(r * 1880 2nd)			(3+4)/(1)	(6/1)	(8/1)	(9+10+11)
746 Real estate	226	129	50	47	20	4	88	17	43%	2%	7%	52%
806 Advertising	26	13	9	4	1	0	12	0	50%	0%	0%	50%
807 Accounting, auditing, and bookkeeping services	102	52	37	13	63	24	−25	−9	49%	23%	−9%	63%
808 Misc business services	443	214	154	74	62	19	102	31	52%	4%	7%	63%
879 Legal services	145	95	40	11	88	15	−7	−1	35%	10%	−1%	44%
898 Engineering and architectural services	84	53	20	11	17	4	27	6	37%	4%	7%	48%
	0											
PERSONAL SERVICES	3,851	2,350	**678**	823	2,001	628	−213	−67	39%	16%	−2%	54%
816 Auto repair services and garages	342	232	77	33					32%	--	--	--
817 Misc repair services	224	130	46	48	208	65	−109	−34	42%	29%	−15%	56%
826 Private households	1,728	1,135	244	350	1,331	360	−438	−118	34%	21%	−7%	48%
836 Hotels and lodging places	507	291	91	125	100	20	143	28	43%	4%	6%	52%
846 Laundering, cleaning, and dyeing	204	111	43	51	47	12	41	11	46%	6%	5%	57%
847 Dressmaking shops	242	135	65	43	200	125	−117	−73	44%	52%	−30%	66%
848 Shoe repair shops	76	22	5	49	3	1	12	5	72%	2%	7%	80%
849 Misc personal services	300	173	51	76	65	26	58	23	42%	9%	8%	59%
857 Theaters and motion pictures	115	65	28	21					43%	--	--	--

	ACTUAL 1920 WORKFORCE (in thousands)				Expected Workforce in 1920		SHIFT (Actual -Expected)		SHARE OF 1920 LABOR FORCE FROM:			
		Immigrant Generation			Based on 1880:		Based on 1880:		From 1920	From1880 2nd Gen		Total
	Total	3rd +	2nd	1st	3+ Gen	2nd Gen	3+ Gen	2nd Gen	1st & 2nd	Expected	Shift	Imm. Share
	1	2	3	4	5	6	7	8	9	10	11	12
					(r * 1880 3rd +)	(r * 1880 2nd)			(3+4)/(1)	(6/1)	(8/1)	(9+10+11)
858 Bowling alleys, and billiard and pool parlors	35	20	7	8	2	1	12	5	45%	2%	15%	62%
859 Misc entertainment and recreation services	77	39	20	19	47	18	−19	−7	50%	23%	−9%	64%
	0											
SOCIAL SERVICES	2,782	1,782	**676**	324	707	128	803	145	36%	5%	5%	46%
868 Medical and other health services, except hospitals	319	204	73	42	148	13	39	3	36%	4%	1%	41%
869 Hospitals	169	90	44	34	1	0	67	22	46%	0%	13%	60%
888 Educational services	978	686	226	66	308	64	260	54	30%	7%	6%	42%
896 Welfare and religious services	206	120	41	46	84	15	18	3	42%	7%	2%	51%
897 Nonprofit membership organizs.	39	24	11	4	2	0	20	2	39%	0%	6%	45%
899 Misc professional and related	34	18	9	8	12	2	3	0	48%	7%	1%	57%
906 Postal service	217	148	55	14	33	5	96	14	32%	2%	6%	40%
916 Federal public administration	362	243	80	39	41	11	151	39	33%	3%	11%	47%
926 State public administration	30	20	8	3	5	1	11	3	34%	4%	9%	46%
936 Local public administration	429	230	131	68	73	16	116	26	46%	4%	6%	56%
	0											

	ACTUAL 1920 WORKFORCE (in thousands)				Expected Workforce in 1920		SHIFT (Actual -Expected)		SHARE OF 1920 LABOR FORCE FROM:			
		Immigrant Generation			4th + Gen	3rd Gen	4th + Gen	3rd Gen				
					Based on 1880:		Based on 1880:		From 1920	From1880 2nd Gen		Total
	Total	3rd +	2nd	1st	3+ Gen	2nd Gen	3+ Gen	2nd Gen	1st & 2nd	Expected	Shift	Imm. Share
	1	2	3	4	5	6	7	8	9	10	11	12
					(r * 1880 3rd +)	(r * 1880 2nd)			(3+4)/(1)	(6/1)	(8/1)	(9+10+11)
	0											
Total Work Force (Gainful Workers)	40,519	24,232	8,314	7,973	20,150	4,082	0	0	40%	10%	0%	50%

Sources: 1880 and 1920 PUMS from Ruggles et al. (2004)

Notes:

(1). The generational compostion of each industrial sector is estimated in two steps:
a) GROWTH: the expected 1920 workers in each industry is assumed to be proportional to the national growth rate appied to the number of 1880 workers in the industry:
-- the 1920 4th and higher generation is assumed to be the descendants of the 1880 3rd and higher generations in that industry
-- the 1920 3rd generation is assumed to be the descendants of the 1880 2nd generation in that industry
b) SHIFT: the difference between the actual 1920 3rd and higher number in each industry and the expected based on assumed GROWTH
-- the estimated SHIFT for the 1920 3rd and higher generations is allocated proportional to the relative size of the 3rd and higher and 2nd generations in 1880.

(2). Columns 1, 2, 3 and 4 are the actual number (in thousands) of gainful workers in each industry, by immigrant generation (3rd & higher, 2nd, and 1st) in 1920.

(3). Columns 5 and 6 are the expected number of gainful workers in each industry in 1920 assuming proportional change from the the 1880 2nd & higher gen in to the 1920 3rd and higher gen
a) Col 5: Expected 1920 gainful workers in each industry from 1880 3rd and higher gen workers = r * 1880 3rd and higher gen workers in the industry
b) Col 6: Expected 1920 gainful workers in each industry from 1880 2nd gen workers = r * 1880 2nd gen workers in the industry
where r = the ratio of total 3rd and higher gen wokers in 1920 to the 1880 total 2nd gen and higher workers

(4). Columns 7 and 8 are the Shift of Workers (Actual - Expected) from 1880 to 1920 in each industry, assuming that the 1920 3rd and higher gen workers “inherit” the industry composition of the 2nd & higher gen workers in 1880. The expected 1920 workers are distributed proportionally to the 1880 generations of 3rd and higher and 2nd.
a) Col 7: The proportional share of the 1920 3rd gen & higher actual workers in each industry minus the expected 1920 “descendants” of the 1880 2nd and higher generation workers
b) Col 8: The proportional share of the 1920 3rd gen and higher actual workers in each industry minus the expected 1920 “descendants” of the 1880 2nd and higher generation workers

Table 3

Net Migration (in thousands) of Native Whites, Foreign Born, and African Americans, 1870–80 to 1940–50.

	NORTHEAST/NORTH CENTRAL			SOUTH			WEST		
	Native Born			Native Born			Native Born		
	White	Black	Foreign Born	White	Black	Foreign Born	White	Black	Foreign Born
1870–1880	−348	68	1,609	91	−68	89	257	--	177
1880–1890	−283	89	3,297	−271	−88	124	554	--	337
1890–1900	−344	185	2,559	−30	−185	124	374	--	205
1900–1910	−1,306	172	4,263	−69	−194	240	1,375	22	686
1910–1920	−219	523	2,227	−663	−555	232	880	32	428
1920–1930	−641	861	1,896	−704	−903	67	1,345	42	480
1930–1940	−692	425	−74	−558	−480	−53	1,250	55	5
1940–1950	−1,955	1,225	408	−866	−1,581	206	2,822	356	361
1870 to 1920	−2,500	1,037	13,955	−942	−1,090	809	3,440	54	1,833
1920 to 1950	−3,288	2,511	2,230	−2,128	−2,964	220	5,417	453	846

Source: Eldridge and Thomas. 1964. Tables 1.21 and 1.27