Relative cohort size, labor flows, and economic opportunity in the United States, 1910-2040

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Abstract

This analysis revisits the relative cohort size hypothesis proposed by demographer Richard Easterlin in the 1960s. Easterlin argued that the economic and social prospects of a generation are influenced by the size of the cohort relative to adjacent cohorts, affecting wages, employment, marriage, and fertility decisions. The theory fits the data well for the period from 1940 to 1980 but fails in later decades. I present a more nuanced view of the impact of demographic factors on worker competition through the lens of a new measure of decennial labor force flows. This approach allows consideration of the effects of retirement, female labor force participation, and immigration on labor market competition. I calculate these flows for the period from 1910 to 2040 and propose an index of employment competition. The results show that trends in labor market competition are consistent with wage trends of young workers since 1940. Projections to 2040 show that we are on the verge of a radical reshaping of labor markets in which new workers will be in extremely short supply.

Introduction

The large size of the baby boom cohort depressed economic opportunities as it flooded the labor force in the 1970s. Contrary to the predictions of Richard Easterlin's relative cohort size hypothesis, however, there was no rebound of opportunities with the advent of smaller cohorts in the mid-1980s; indeed, incomes of young adults remained depressed until the 2010s. Focusing on decennial labor flows makes it simple to assess the relative impact of retirement, female labor force participation, and immigration in concert with the size of birth cohorts entering the labor force. The results suggest that the departure of baby boomers from the labor force will have profound implications for economic opportunities of new workers.

Background

"New Census Trend: the Bulging Generation" announced the headline in the New York Times on November 5, 1971. The article explained that there was a bulge in the U.S. population that resembled "what happens when a pig is eaten by a python." The newspaper illustrated the bulge with a graph of the age distribution in the shape of a python and noted that the baby boom age group "sticks out like the python's dinner" (Fig. 1A). All things being equal, "the bulge moves gradually along the length of the snake until it is fully digested" which "could cause continuing and considerable changes in American society for the next half century" (4). Three years later, the humorist Russell Baker again characterized the baby boom generation as a pig in a python, and imagined a country dominated by the cohort as it passed through the stages of life, until eventually "the diminished young population … would be increasingly hard-taxed to pay retirement benefits for the aging majority" (5).

Richard Easterlin (1-3) proposed that the baby boom resulted from an exceptionally favorable labor market for young adults in the post-war period. He attributed that strong labor market to a shortage of workers in a period of rapid growth. The shortage of workers in turn resulted mainly from small birth cohorts during the Depression. According to Easterlin's relative cohort size hypothesis, economic opportunity is inversely associated with the relative size of birth cohorts. The "lucky few" Depression era babies were in high demand after the war, so they received high wages, married early, and had lots of babies (6). Easterlin predicted that when the baby boom bulge reached working age in the 1970s, their economic prospects would diminish with the gusher of young workers entering the labor market.

By 1978, it appeared as if Easterlin's predictions were coming to pass. Incomes of young people rose spectacularly after World War II as the small Depression-era birth cohorts entered the job market, and the trend abruptly reversed in the early 1970s as the large baby boom cohort came of age. In his 1978 presidential address to the Population Association of America, Easterlin predicted that the recent decline in the wages of young men would reverse by 1984 as a smaller birth cohort entered the job market (2). Rising wages, Easterlin predicted, would bring a surge in marriages, a new baby boom, and a host of other salutary changes, including a drop in crime, a rise in college enrollment, and an increase in SAT scores.

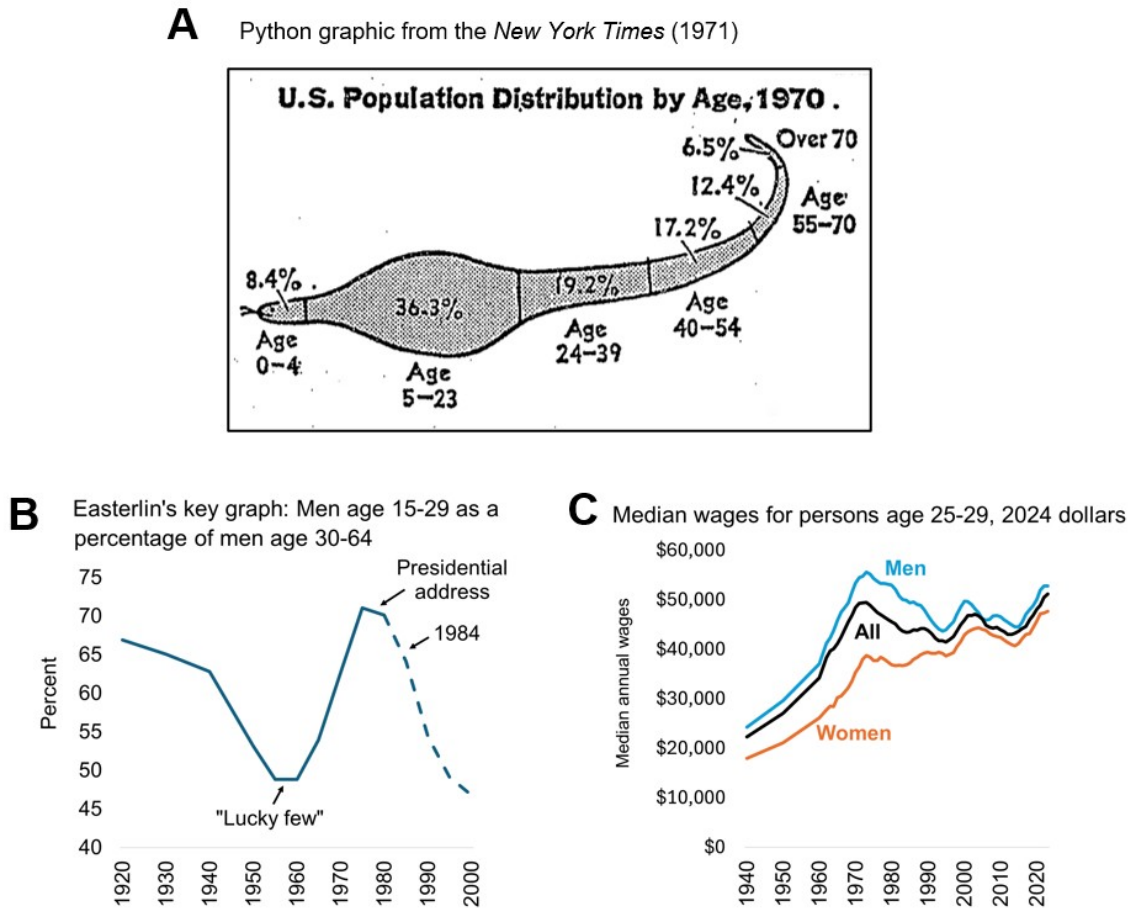

Figure 1. The pig in the python. (**A**) Age distribution in the shape of a python, *New York Times* 1971. (**C**) Easterlin's key graph, showing men age 15-29 as a percentage of men aged 30-64. Easterlin (1978) predicted that the incomes of young men would start going up by 1984 when the supply of young men started shrinking. (**C**) Median annual wage and salary income of full-time workers aged 25-29, 1940-2023, by sex, in 1999 dollars. Real incomes for young men declined until 2015. Data on real wages calculated from IPUMS (7,8). Prices adjusted using CPI-U from 1939 to 1977 and R-CPI-U-RS from 1978 to the present.

Easterlin's key graph from that presentation (Fig. 1B) showed that relative cohort size of young men declined sharply from 1940 until the 1950s and then increased rapidly until about 1975. Easterlin measured relative cohort size as the number of males age 15-29 as a percentage of the number of males age 30-64. This represents the relative size of the age group entering the workforce compared to the rest of the working-age population. The analysis focuses entirely on men. Easterlin argued that because of gender segregation of occupations, women did not significantly compete with men, and male economic opportunity was the primary determinant of household economic welfare.

Easterlin's predictions for 1984 were wrong. Not only did the real wages of young men fail to rise by 1984, but real wages continued to decline, reaching a nadir in 2015 when real male wages were 25% lower than in 1973 (Fig 1C). Young women fared better as sex discrimination diminished, but their real wages still stagnated; in 2014 real median wages for young women were virtually the same as they had been in 1973. The four-decade decline in the real wages of workers age 25-29 coincided with a dramatic rise of inequality both within and between generations (9). In addition, contrary to Easterlin's prediction, the marriage rate plummeted and there was no new baby boom. SAT scores stagnated, and crime rates continued to rise until the early 1990s.

Easterlin's relative cohort size hypothesis has generated a large literature (10, 11). There is a broad consensus that cohort size provides a convincing explanation for the relative prosperity of the lucky few and for the size and duration of the postwar baby boom, but that cohort size fails to predict the economic fortunes of young adults after the early 1970s (10, 12, 13).

Measuring decennial labor force flows

Relative cohort size focuses on age distribution at a particular moment. One may gain a more nuanced view of labor market competition faced by new workers by looking at net decennial flows of workers into and out of the labor force. The competitiveness of labor markets is determined not only by the influx of new workers, but also by the departure of old ones.

Easterlin (3) argued that retirement is relatively unimportant because older and younger workers are at opposite ends of the career ladder and therefore do not directly compete. Although inexperienced entry-level workers may not compete directly for the jobs of retiring experienced workers, retirement creates opportunities for the next rung of skilled workers, and those opportunities eventually will percolate down to the entry level. Among unskilled workers, retirements may create immediate openings for younger workers. In other cases—such as senior university faculty positions occupied by aging baby boomers—a single retirement may free up sufficient resources to hire two or three junior replacements.

The decennial flows approach can account for the effects of retirement on economic opportunity. It also can accommodate two major structural changes in the job market of the second half of the twentieth century. First, from 1950 to 2000 there was a dramatic increase in female labor force participation, especially among married women. Second, there was a large increase in the

number of immigrant workers following the 1965 Immigration and Nationality Act, which greatly reduced immigration restrictions that had been in place since the Immigration Act of 1924. We can measure net entry into the labor force over the course of a decade by U.S. born persons aged 16-29 at the end of the decade as

$$Enter_{y..y+10} = \sum_{a=16}^{29} \left(l_{y+10,a} - l_{y,a-10} \right) \qquad (1)$$

where $Enter_{y..y+10}$ is the net number of U.S. born persons entering employment in the 16-29 age range during the decade following year *y* and l_{ya} is the number of persons in the labor force in year y at age a. We assume zero persons under 16 are in the labor force, because in most census years labor force participation was not measured for persons under 16.

For example, net inflow into the labor force between 1970 and 1980 for persons age 29 in 1980 is the number of 29-year-olds in the labor force in 1980 minus the number of 19-year-olds in the labor force in 1970. If we sum this calculation over all persons aged 16 to 29 in 1980 that yields the total net entries into the labor force for that age group during that decade.

We can flip this around to measure net exits from the labor force of persons age 50-89 during the next decade as

$$Exit_{y..y+10} = \sum_{a=50}^{89} \left(l_{y,a} - l_{y+10,a+10} \right) \qquad (2)$$

where $Exit_{y..y+10}$ is the net number of U.S. born persons leaving the labor force in the 50-89 age range during the decade following year *y*. These exits reflect both retirements and deaths. We assume that there are zero persons in the labor force after age 89, because some censuses do not identify exact ages beyond 89.

Among men, the group of workers age 30-49 has little impact on net labor force flows, since most men remain in the labor force during those prime working years. The cumulative total net entries of men into the labor for in this age group was just 250,000 for the entire period from 1910 to 2040. For women, however, it is important to take this age group into account because of the growing numbers of married women in the labor force. We can measure these net entries using Eq. 1 modified to cover ages 30-49.

We have no way of knowing when immigrant workers entered the country, so the cohort approach is not feasible for that group. We therefore combine all age groups and measure net change in the number of immigrants in the labor force simply as

$$I_{y..y+10} = i_{y+10} - i_y \qquad (3)$$

where $I_{y..y+10}$ is net number of immigrants entering the labor force during the decade from year *y* to year *y+10* and i_y is the number of immigrants in the labor force at year *y.*

As noted, Easterlin (3) argued that because of occupational segregation women did not compete for jobs with men and therefore had minimal impact on cohort competition. That was never completely true, since there were always some job sectors where women could substitute for men. By the late twentieth century, women competed with men in virtually every part of the economy, and so women must be included in any long-run analysis of labor market competition. I construct labor force flows separately for men and women to distinguish the effect of the rise of female labor force participation.

To project labor market flows through 2040 I forward survived the 2023 U.S. born population using the 2022 national life table (15). The projection, available in supplemental file S2, assumes constant mortality patterns over the 2022-2040 period. The labor force estimates for 2030 and 2040 assume constant age- and sex-specific labor force participation rates as observed in 2023. I also assume zero net change in the immigrant labor force.

Figure 2 describes net decennial flows into and out of the labor force from 1910 through 2040 as calculated from decennial census and American Community Survey data (7). The calculation of flows appears in supplemental file S1.

- The number of U.S. born entrants into the labor force at ages 16-29 (Fig. 2A) more than doubled between 1950s and the 1970s, both because of the entry of the baby boomers into the labor force and because of the rapidly rising labor force participation of young women. After a dip between 1980 and 2010, the number of young labor market entrants recovered, reaching a peak in the 2020s.
- Exits from the labor force among the U.S. born age 50-89 (Fig. 2B) have increased every decade since 1910, with the sole exception of the 1940s. The pace of retirements accelerated after 2000, and I project that by the 2030s women will account for half of exits.
- Before 1950, U.S. born women age 30-49 (Fig. 2C) were more likely to leave the labor force than enter it. From the 1950s to the 2010s there was a substantial net inflow of such women into the labor force, reflecting the rise of married women's labor force participation16.
- Immigrants exited the labor force more than they entered during the 1930s through the 1950s when immigration was sharply constrained. With the liberalization of the immigration law in 1965 there was a large influx of foreign-born workers (Fig. 2D).

Figure 2E adds all these components together to describe net decennial entries into the labor force. The labor force expanded rapidly after 1960, reaching a net increase of almost 25 million workers in the 1970s. About half of this change can be ascribed to the large cohorts of the baby boom, and about half to the increasing participation of women. There was a smaller peak in entries into the labor force in the decade after 2000, owing mainly to a spike in immigrant workers. Since 2000, net entry into the labor force has shrunk dramatically. I project that by the decade of the 2030s, net entry into the labor force will fall nearly to zero.

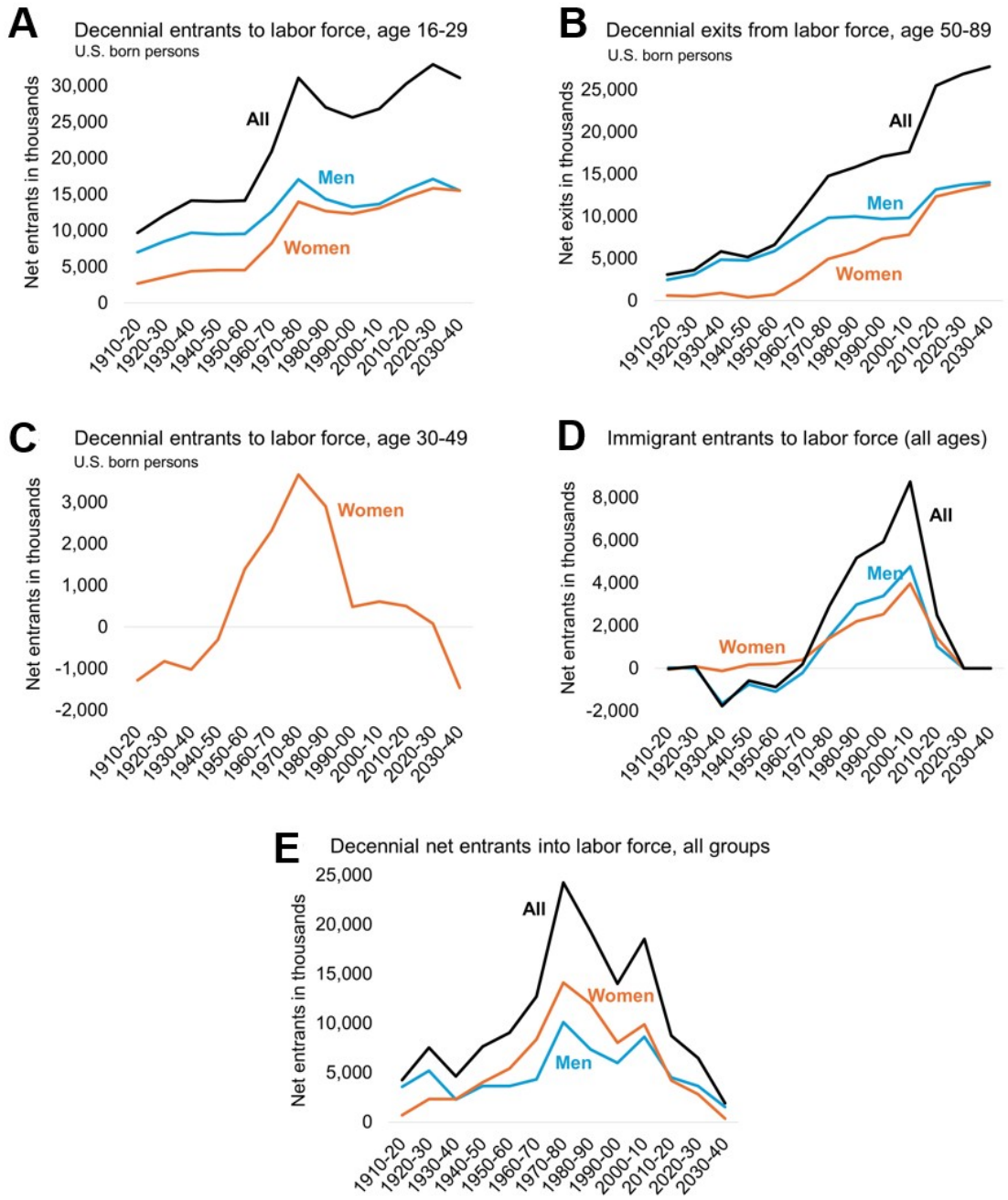

Figure 2. Net decennial labor force flows. (A) Net number of U.S. born persons age 16 to 29 entering the labor force in the next decade, by sex (**B**) Net number of U.S. born persons age 50 to 89 exiting the labor force in the next decade (**C**) Number of U.S. born women age 30-49 entering the labor force in the next decade (**D**) Net number of immigrants entering the labor force in the next decade (**E**) Combined labor force entries and exits of all age groups, including U.S. born and immigrants.

Unlike Easterlin's measure of relative cohort size, labor force flows are affected by the demand for labor. When labor is in short supply wages rise, attracting additional people into the labor force. Conversely, when there is a glut of workers some people are unable to find a job and drop out of the labor force. The responsiveness of labor force participation to demand for labor attenuates the fluctuations shown in Fig. 2. Accordingly, the dramatic rise and fall in labor flows shown in Fig. 2E would be even greater if labor force participation had been constant.

Estimating employment competition

The labor force flows in Fig. 2 are measured as the absolute number of workers, and there was substantial population growth over the period covered. In 1910 the usual working-age population, defined as ages 18 to 64, had 53 million people; by 2040 I project that population to number 204 million. To control for population change, we can measure the ratio of labor force entries to the working-age population. Figure 3a shows the combined net entries in Fig. 2e as a percentage of the average population of usual working age in each period. Using the working-age population in the denominator provides a strictly demographic benchmark unaffected by labor force participation.

Figure 3A highlights the influx of workers that occurred between 1960 and 1980, as the large baby-boom cohort entered the labor force, female labor force participation expanded, and immigration rose. It was difficult for the economy to absorb all the new workers, and after 1970 wages for young people declined sharply.

Figure 3A does not, however, provide a valid measure of labor market competition. Economic opportunities immediately before the 1970s spike in the labor force were vastly better than immediately afterwards. This is because the baby boomers and newly employed women and immigrants did not suddenly vanish after they entered the labor force; they kept working and occupying jobs until they eventually retired decades later. Like the pig in the python, the bulge of workers suppressed the appetite for new employment. The glut of workers entering the labor force in the 1970s would continue to stifle the demand for workers until their eventually exit from the labor force, a process that is still in progress.

The index of employment competition shown in Fig. 3B represents the net labor market entries over the previous five decades—a period long enough to encompass most working careers—as a percentage of the working-age population in the current decade. When cumulative net labor force entries are low relative to the size of the working age population, then the demand for workers will be strong. The pattern differs substantially from the relative cohort size measures that dominate the literature. By this measure, instead of a reduction in job competition after 1980, competition continued to rise.

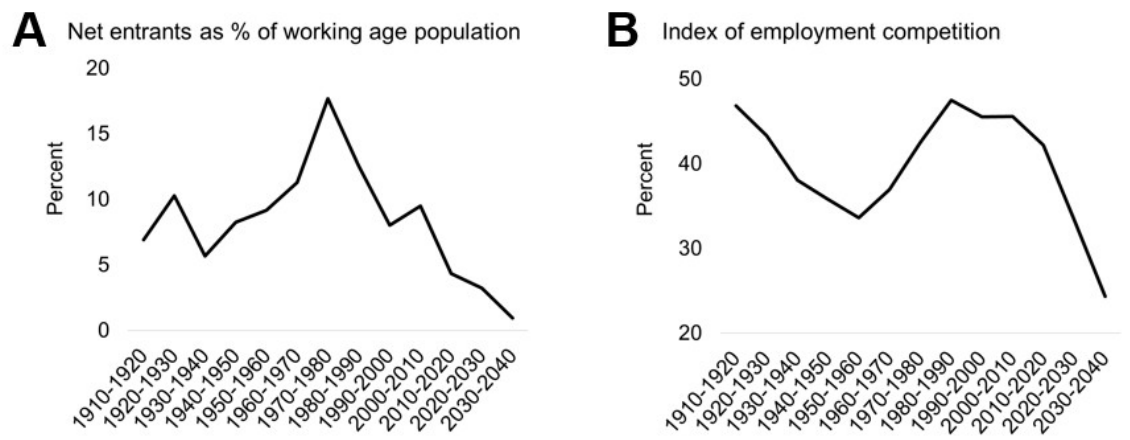

Figure 3. Labor force flows as a percentage of working-age population. (**A**) Combined labor force entries and exits of all age groups, including U.S. born and immigrants, as a percentage of the population age 18-64 in each interval (**B**) Index of employment competition, measured as net entries into the labor force over the previous five decades as a percentage of the working age population in the current period.

This index is entirely consistent with the wage trends in Fig. 1C: workers were scarce during the upsurge in young adult wages that took place between 1940 and 1970, and competition for jobs was consistently high during the long stagnation of wages between 1970 and 2010. The index of employment competition remained high until 2015, the year that wages for young adults reached their low point. Given the pattern of employment competition, it should be no surprise that wages for young adults declined for four decades after their 1973 peak.

Economic changes compounded the demographic challenges facing young workers between the 1970s and the 2010s. From the stagflation of the late 1970s to the great recession of 2007-2009, there was continuing erosion of union representation, globalization, and mechanization of production. If the demand for workers had exploded as Easterlin's hypothesis predicted, those events might not have mattered. But the pig in the python—the vast cohort of baby boomers—stood in the way of another golden age for young workers.

The coming transformation of the labor market

We are on the verge of a fundamental transformation of the labor market. Baby boomers began retiring in large numbers during the 2010s, and immigration began a steep decline in the same period. The number of births declined 17% between 2007 and 2023, which will contribute to a decline in the number of new entrants to the labor force in the 2030s.

In the current moment of political turmoil, economic predictions spanning the next 15 years are uncertain. We can predict, however, the demographic configuration of the 2040 working-age population: the births have already occurred, mortality change is generally gradual, and a massive surge of immigration seems unlikely. Other factors may affect the prospects of new workers, including recessions, sudden shifts in federal policies, and long-running economic trends like globalization and mechanization. It is possible that artificial intelligence will

dramatically reduce the demand for workers. It is also possible—or even probable—that the magnitude of the coming demographic shift may be great enough to swamp such economic changes.

Barring a revolutionary transformation of the economy, the drop in labor market competition over the coming two decades will have profound consequences. There is likely to be an unprecedented shortfall of new workers. The shortfall will create strong upward pressure on wages. As shown in Fig 2C, we are already seeing signs of an uptick in the wages of young workers, and as the demographic shortage accelerates we may finally see real wages exceed the levels of the early 1970s. Americans born in the 2020s might be the first cohort in a half century that earns significantly more than their parents did. Labor force participation will increase as more workers are pulled into the market by higher wages, and some workers will postpone retirement. The decline in labor competition should be a boon for labor organizing. There will be increased incentives for automation of both manufacturing and services. We can expect reduced inequality, especially generational inequality. High demand for labor will create pressure to expand immigration.

The unprecedented drop in employment competition may also have adverse consequences. Labor shortages may constrain economic growth, although there is some evidence to the contrary (16, 17). More critically, as Russell Baker foresaw in 1974 (5), the small working population relative to the number of retirees will place enormous strains on Social Security and health care. That burden, however, will diminish as baby boomers fade from the scene; the retirement-age population will drop by about 5% between the late 2030s and the early 2050s.

Easterlin's relative cohort size hypothesis was oversimplified because it ignored the effects of retirement, female labor force participation, and immigration. Nevertheless, it did identify a key mechanism: the relative number of people entering the labor force can have powerful implications for economic opportunity. Fluctuations in the number of workers entering the labor force were probably the most important drivers of the dramatic swings in wages from the 1940s to the 1970s (Fig 1c) and had important consequences for marriage rates and fertility. But as the pig in the python is finally fully digested over the next several decades, the coming transformations may be even greater than the demographic and economic boom and bust of the mid- the mid-twentieth century.

Materials and methods

All data and materials are contained in the paper except the IPUMS USA database, which is freely available (https://doi.org/10.18128/D010.V16.0), and the 2022 U.S. life table, also freely available from the Centers for Disease Control (https://dx.doi.org/10.15620/cdc/174575). The unweighted number of cases for each population subgroup is given in Table 1. Sample densities vary from 1% to 10%. I used the largest high-quality samples available in each year, except in 1970 I combined four 1% samples (samples 197001 to 197004).

Table 1. Unweighted number of observations for population subgroups used in the analysis

		U.S. born						Foreign born		
	Sample	Age 16-29		Age 30-49		Age 50-89		Age 16-89		
	Density (%)	Male	Female	Male	Female	Male	Female	Male	Female	Total
1870	1	40,165	43,322	29,167	30,059	16,410	15,343	26,881	22,840	224,187
1880	10	688,022	695,760	471,849	480,560	260,372	246,613	362,023	290,481	3,495,680
1900	5	438,088	444,092	364,600	345,613	182,018	176,025	271,459	226,341	2,448,236
1910	1	103,832	105,223	90,539	87,055	48,691	46,009	73,270	54,799	609,418
1920	1	112,897	116,096	109,070	106,350	61,217	57,138	74,194	59,454	696,416
1930	5	676,316	696,882	666,349	666,015	401,905	384,968	377,197	319,811	4,189,443
1940	1	160,047	163,542	160,156	162,702	102,107	103,024	64,646	58,025	974,249
1950	1	190,944	200,536	232,752	238,724	122,151	122,756	58,293	55,571	1,221,727
1960	5	764,447	784,658	1,084,514	1,137,033	816,113	929,329	240,790	252,774	6,009,658
1970	4	833,543	862,000	843,042	889,839	801,108	964,989	185,389	220,065	5,599,975
1980	5	1,336,011	1,346,636	1,216,396	1,258,222	1,177,223	1,469,793	326,594	376,377	8,507,252
1990	5	1,163,851	1,169,335	1,600,071	1,665,181	1,328,761	1,657,391	457,255	488,125	9,529,970
2000	5	1,110,630	1,106,378	1,763,109	1,827,085	1,600,480	1,904,515	717,893	731,878	10,761,968
2010	1	231,061	226,502	313,972	324,970	454,063	521,055	171,868	187,155	2,430,646
2020	1	212,022	197,007	259,592	245,818	447,022	491,286	152,809	166,569	2,172,125
2023	1	256,167	242,177	330,756	321,536	574,814	641,122	212,903	234,592	2,814,067
Total		8,318,043	8,400,146	9,535,934	9,786,762	8,394,455	9,731,356	3,773,464	3,744,857	61,685,017

Figure 1B replicates Easterlin's graph using data from IPUMS USA (7). Figure 1C is tabulated from the optimal source for each period, preferring annual data where available. I used decennial census data for 1940-1960 (7), Current Population Surveys for 1962-2005 (8), and American Community Surveys for 2006-2023 (7). The analysis is limited to wage earners working at least 35 hours a week for at least 40 weeks in the prior year. Prices are deflated using the Consumer Price Index for urban consumers (CPI-U) for 1939 through 1977 and the Consumer Price Index retroactive series using current methods (R-CPI-U-RS) for 1978 to the present (18). I used a three-year moving average to smooth annual fluctuations from 1962 to 2023.

Figures 2 and 3 are based on a tabulation of the weighted number of persons in the labor force by age and sex. The tabulation was created in SPSS version 28.0, and labor force flows were calculated in Excel based on Eq. 1-3. The calculation of labor force flows is in supplemental file S1_Decennial_flows_calculation.xlsx, and the population projection to 2040 is in supplemental file S2_Population_projection.xlsx. Because of a well-known enumeration anomaly in the 1910 female labor force participation rates (19), I used linear interpolation between 1900 and 1920 to estimate the age-specific labor force size for women in 1910.

Figure 3B requires data on net entries into the labor force for five sequential decades. The earliest national data on labor force participation for the whole population dates from 1870, and the earliest data point in Fig. 3B uses data from 1870 to 1920. The 1890 census manuscripts were destroyed in a fire (20) so I estimated the age and sex-specific labor-force for 1890 using linear interpolation between 1880 and 1900.

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