



# Economic Letter

## Middle-Skill Jobs Lost in U.S. Labor Market Polarization

by Anton Chermukhin

► *The number of people performing low-skill, low-pay, manual labor tasks has grown along with the number undertaking high-skill, high-pay, nonroutine, principally problem-solving jobs.*

**E**mployment in the United States is becoming increasingly polarized, growing ever more concentrated in the highest- and lowest-paying occupations and creating growing income inequality. The causes and consequences of this trend are often considered in the context of what has been a relatively “jobless” recovery from the Great Recession.

Market changes involving middle-skill jobs in the U.S. are hastening labor market polarization. The distribution of jobs by skill level has shifted dramatically since 1980 (*Chart 1*). The number of jobs requiring medium levels of skill has shrunk, while the number at both ends of the distribution—those requiring high and low skill levels—has expanded.

This declining prominence of middle-skill jobs is not driven by changes in labor market institutions, such as declining unionization. Rather, an increase in automation of routine tasks, a relative scarcity of skilled workers and to a lesser extent, relocation of jobs outside the country have led to the relative expansion of two kinds of jobs in the U.S. The number of people performing low-skill, low-pay, manual labor tasks has grown along with the number undertaking high-skill, high-pay, nonroutine, principally problem-solving jobs.

These changes have been relatively abrupt, with losses in routine employment concentrated in the recessions of 1990–91, 2001 and especially 2008–09. Unlike with earlier downturns, middle-skill jobs were not recovered in the expansions that followed these contractions.

### Start of Polarization

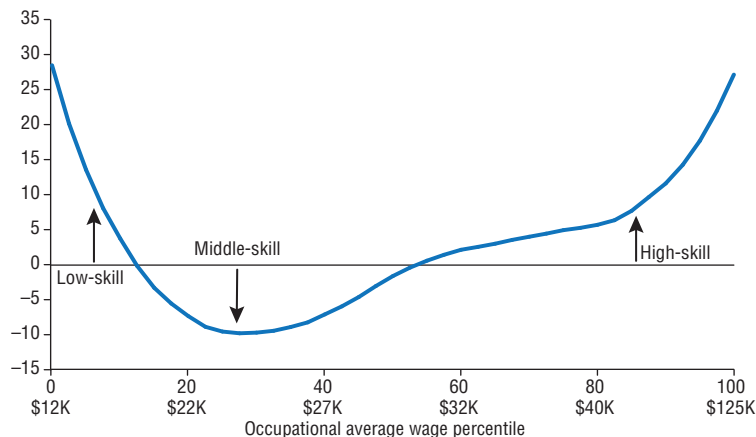
The rise in the shares of high-skill and low-skill jobs became evident about two decades ago (*Chart 2*). The U.S. labor market did not experience much polarization in the 1980s: Low-skill jobs were replaced by high-skill jobs, while the number of middle-skill jobs remained largely unchanged. Instead, polarization began about 25 years ago, in the early 1990s, and intensified in the last decade.

### Disappearing Jobs

Occupations are classified by skill level in the Employment Classification Grid (*see page 2*). Manual jobs are distinguished from cognitive jobs (the rows) and routine from nonroutine jobs (the columns). Cognitive nonroutine jobs are usually high-skill jobs (in green) that require performing abstract tasks such as problem solving, intuition and persuasion. These typically require a college degree. Manual nonroutine jobs are mostly low-skill jobs (in pink) that involve manual tasks and require per-

## Chart 1 | The Share of Middle-Skill Jobs Has Fallen Since 1980

Percentage change in employment share, 1980–2005

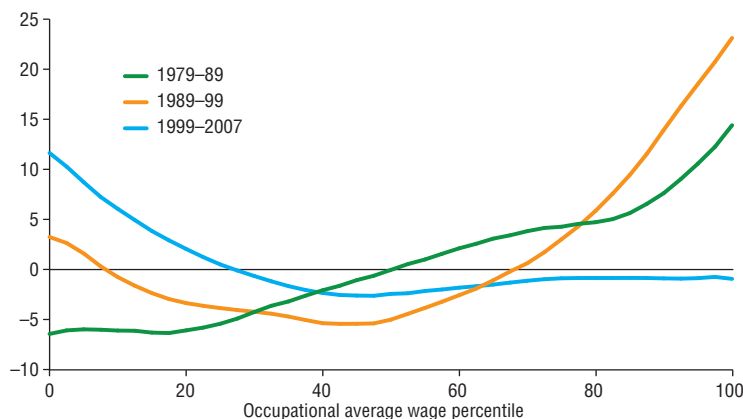


NOTE: Dollar amounts are annual income in 2004 dollars.

SOURCE: Adapted with permission from "The Growth of Low-Skill Service Jobs and the Polarization of the U.S. Labor Market," by David H. Autor and David Dorn, *American Economic Review*, vol. 103, no. 5, 2013, pp. 1553–97.

## Chart 2 | Polarization Started in Early 1990s and Intensified in 2000s

Percentage change in employment share



SOURCE: Adapted with permission from "The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings," by David H. Autor, Center for American Progress and the Hamilton Project, April 2010.

Employment Classification Grid		
	Routine	Nonroutine
Manual (blue collar)	Production Crafts Operative Repair	Food service Personal care Protective service
Cognitive (white collar)	Clerical Administrative Sales	Professional Technical Managerial
	Low-skill	Middle-skill

sonal traits such as situational adaptability, visual/language recognition and in-person interaction. These usually do not require a high school diploma.

Both cognitive routine and manual routine jobs tend to be middle-skill jobs (in blue) that require the ability to follow precise, well-understood procedures, which can, in principle, be carried out by a computer. Often, middle-skill jobs require a high school diploma or even a higher level of education.

Routine jobs have declined from 58 percent of employment in 1981 to 44 percent in 2011, while both types of non-routine jobs have expanded (Chart 3A). Out of the overall routine-job decline of 14 percentage points, 10 percentage points were replaced by higher-paying high-skill (nonroutine cognitive) jobs. The remaining 4 percentage points were downgraded to lower-paying low-skill (nonroutine manual) jobs (Chart 3B).

The biggest declines in cognitive routine jobs were concentrated in such occupations as administrative support and sales. Examples of rapidly declining jobs are brokers, clerks, tellers, cashiers, telemarketers, title examiners, bookkeepers, insurance underwriters, travel agents and technicians. Among the manual routine jobs on the decline are mail carriers, drivers, cooks and engravers.

### Labor Market Change

Unions' declining share of the workforce and the falling, inflation-adjusted minimum wage are often mentioned among potential drivers of labor market polarization. However, they likely don't play an important role. While polarization is an economywide phenomenon, labor unions' greatest presence is in the manufacturing and public sectors that represent a small and shrinking share of employment.

Meanwhile, the real (inflation-adjusted) minimum wage declined sharply in the 1980s, but then stabilized and even increased. This timing is at odds with the rising tide of polarization, which started in the 1990s and has intensified ever since.

Moreover, patterns of polarization similar to those in the U.S. have been found in 16 developed European countries whose labor market institutions markedly differ.<sup>1</sup> Thus, changes in labor market institutions

are unlikely to play a big role in polarization's growth.

## Labor Supply Changes

The effects of changes in the composition of the labor force, especially by gender and education, are a notable factor. While women were hit much harder than men by the disappearance of middle-skill jobs, the majority of women managed to upgrade their skills and find better-paying jobs (Chart 4). By comparison, more than half of men who lost middle-skill jobs had to settle for lower-paying occupations. Women's higher rates of education attainment are a potential reason for this difference.

The rate of increase in the ratio of workers with a college degree relative to those with a high school diploma flattened in the early 1980s, contributing to a steep rise in college earnings premium from 10 percent in 1982 to 100 percent in 2008 (Chart 5). One reason why so many more men were unable to find higher-paying jobs and settled for lower-paying occupations is their relatively lower level of education.

## Driving Labor Demand

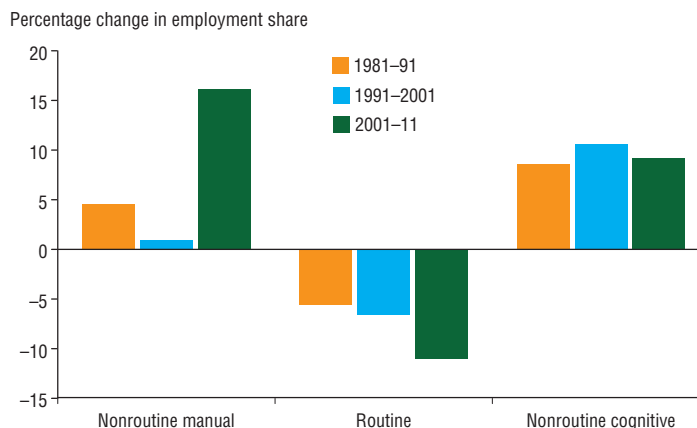
Nevertheless, changes in the composition of the labor force cannot explain why middle-skill jobs are disappearing in the first place. The leading explanation is automation of routine tasks. The increased availability of computing power and a rapid reduction in its cost over the past three decades has led to computers replacing a large number of workers performing routine tasks.

Another, quantitatively less-important but qualitatively similar factor has been the offshoring of jobs enabled by globalization. While some routine jobs, such as metal workers, machine operators and telemarketers, are easily offshored, many others, such as cashiers and bank tellers, are on-site jobs. Overall, whenever a worker in a developed country is replaced either by a computer or by a worker in a less-developed country, the number of middle-skill jobs declines. Laid-off workers must retire or switch to a job in one of the nonroutine sectors of the economy.

The pace of decline in routine, middle-skill jobs as a share of the population since 1970 has been very uneven (Chart 6). The

## Chart 3 | The Hollowing Out of Middle-Skill Jobs Since 1981

### A. Routine Jobs Experience Greatest Declines

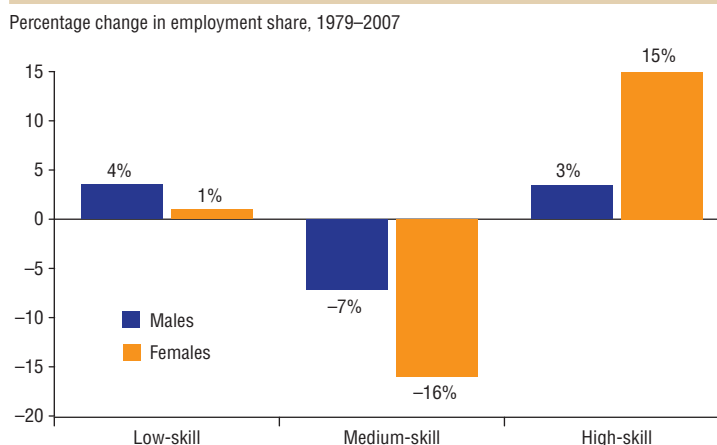


### B. Overall Employment Share by Job Classification

	Nonroutine manual	Routine	Nonroutine cognitive
1981	13%	58%	29%
2011	17%	44%	39%

SOURCE: Adapted with permission from "The Trend Is the Cycle: Job Polarization and Jobless Recoveries," by Nir Jaimovich and Henry E. Siu, National Bureau of Economic Research, NBER Working Paper no. 18334, August 2012.

## Chart 4 | Males Move into Low-Skill Jobs, Females Increase High-Skill Presence

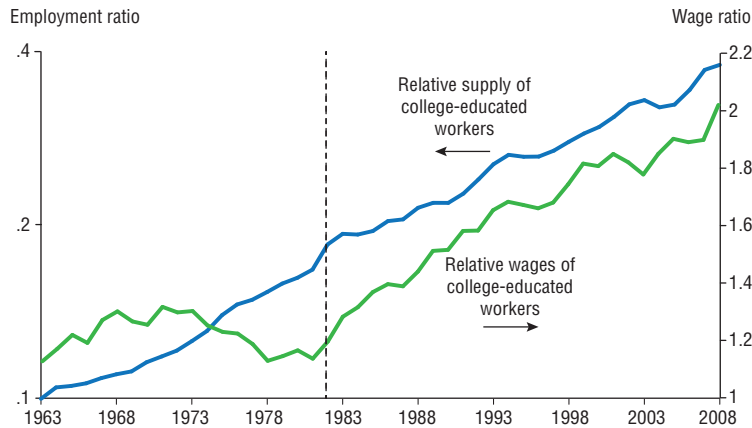


SOURCE: Adapted with permission from "The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings," by David H. Autor, Center for American Progress and the Hamilton Project, April 2010.

number of routine jobs declined in every recession since 1970, as did most other types of jobs. However, routine jobs always rebounded during the economic expansions that followed the recessions of the 1970s and 1980s.

This pattern changed dramatically in the three recessions since 1990. None of the routine jobs lost in these downturns came back in the following expansions. This fact fully accounts for the overall loss in routine jobs since 1990 and also explains

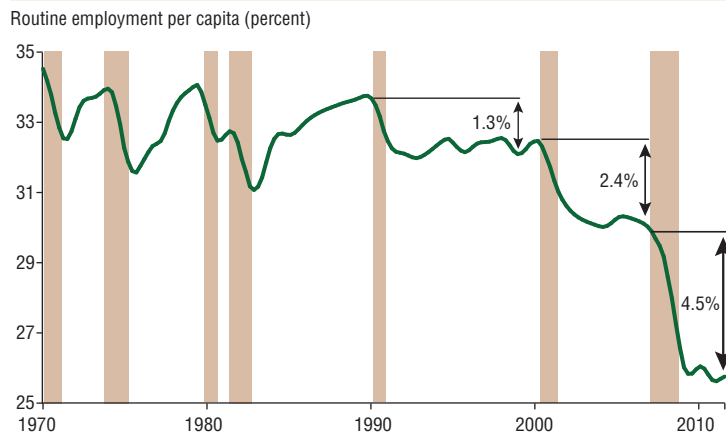
## Chart 5 | Earnings Premium for College Degree Versus High School Diploma Has Shot Up



NOTE: Dotted line shows date of a trend break in the relative supply and earnings of college-educated workers.

SOURCE: Adapted with permission from "The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings," by David H. Autor, Center for American Progress and the Hamilton Project, April 2010.

## Chart 6 | Routine Jobs Declined Considerably in Past Three Recessions



NOTE: Shaded bars indicate National Bureau of Economic Research dated recessions.

SOURCE: Adapted with permission from "The Trend Is the Cycle: Job Polarization and Jobless Recoveries," by Nir Jaimovich and Henry E. Siu, National Bureau of Economic Research, NBER Working Paper no. 18334, August 2012.

the so-called jobless recoveries from the 1991, 2001 and 2008 recessions.

Middle-skill, routine jobs still account for almost half of all existing jobs. Unfortunately, as computing power spreads, and with more nonroutine tasks becoming routine (driverless cars, drones, online education, robotic surgery), the pace of labor market polarization is unlikely to slow down anytime soon.

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### Note

<sup>1</sup> See "Job Polarization in Europe," by Maarten Goos, Alan Manning and Anna Salomons, *American Economic Review: Papers and Proceedings*, vol. 99, no. 2, 2009, pp. 58–63.

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