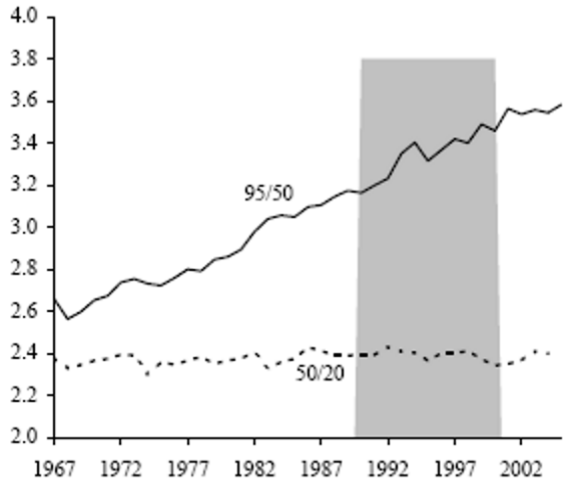
Skill-Biased Technological Change and Inequality

For the past two decades, skill-biased technological change (SBTC) has been economists' primary scapegoat for rising wage inequality. The concept that recent technological change, especially in the IT sector, favors those with more skills (that would ostensibly be complemented by this new technology) entails that there will be increased demand and higher wages for those workers with more skills, while lower-skilled/unskilled labor falls behind.

Evidence and characteristics of growing inequality

There was a sharp increase in wage dispersion in the lower half of the wage distribution during the 1980s, after which point wage dispersion grew at a much slower rate. In contrast, the upper half of the wage distribution has shown steady growth of wage dispersion over the past 25 years (Autor et al. 2008). Autor et al. argue that the bulk of inequality growth has occurred above the median of the wage distribution and can be attributed to non-compensation income (2008). The 95/50 wage gap, marking the percent wage differential between the worker at the 95th percentile of income distribution and the worker at the 50th percentile, saw a striking increase from 1967-2002. In comparison, the 50/20 wage gap remained steady, meaning that the increase in inequality was not the poorest fifth getting left behind, but rather the richest 5% leaving everyone else behind.

Figure 1
Income interpercentile ratios, 1967-2005



Source: U.S. Census Bureau. Gray bar indicates the decade for which we have county-level data.

Has technological change occurred and is it different from such change in the past?

The most common argument for skill-biased technical change as opposed to just technical change relates to the rise of the microcomputer in 1975 and the ensuing innovations in information technology (Card and DiNardo). The three-pronged argument asserts that computers complement higher-level skills, that new information technologies require skilled people to implement them, and that these information technologies galvanized the restructuring of whole production processes and even industries (Brynjolfsson and Hitt). Autor et al. show that from the 1970s onwards, there was a series of technological innovations along with a large fall in the price of machines (1998). They argue that these factors led to increased relative demand for skilled labor.

What differentiates a skilled from an unskilled worker?

Autor et al. outline three types of task-skill-pairings salient to "the age of computerization:"

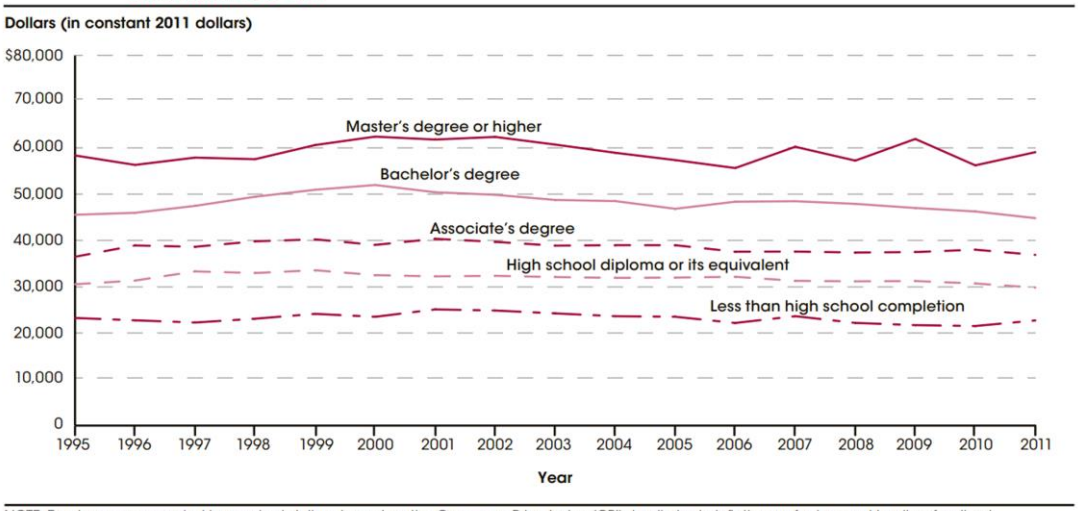
- abstract tasks, which involve cognitive and interpersonal skills
- routine tasks, which involve clerical and routine analytical and mechanical skills that comprised many middle-educated white collar and manufacturing production jobs
- manual tasks, which involve nonroutine manual skills used in many "low-skilled" service jobs

Technologies like "robotics, numerically controlled machines, computerized inventory control, and automatic transcription" have been substituting for routine tasks, displacing those workers. Meanwhile other technologies like data analytics and high-speed communications have augmented more abstract tasks, increasing the value of those jobs. (McAfee). These technologies have had little impact on manual tasks and the related service jobs.

Have the wages of "skilled" workers risen, taking into account relative supply?

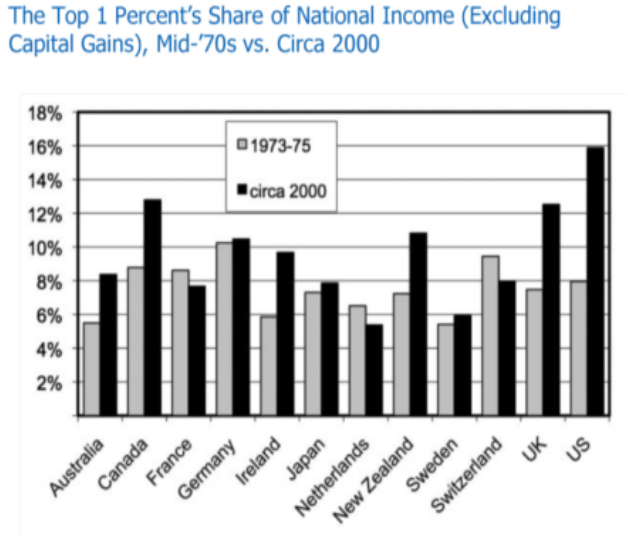
In their book *Winner Takes All Politics,* Hacker and Pierson assert that middle-class income growth is mostly attributed to increased household work hours, not increased individual earnings. And while they concede that those with college degrees have seen higher wages than those without, they point out the large amount of "within-group" inequality in regard to those with college degrees. Autor et al. label this phenomenon “residual wage inequality;” their work shows that wage dispersion within demographic and skill groups increased simultaneously with overall inequality from the 1970s-2000s (2008). Furthermore, the SBTC implies a rising college wage premium, as those with college degrees are, in the economic landscape, labelled “more skilled” and should thus be capturing the higher wages enabled by technological innovations. The evidence for a rising college wage is ambivalent at best. The figure below from the National Center for Education Statistics shows ambiguous change in median annual earnings of young adults, differentiated by educational attainment:

Figure 2. Median annual earnings of full-time, full-year wage and salary workers ages 25–34, by educational attainment: 1995–2011



NOTE: Earnings are presented in constant dollars, based on the Consumer Price Index (CPI), to eliminate inflationary factors and to allow for direct comparison across years. *Full-year workers* refers to those who were employed 50 or more weeks during the previous year; *full-time workers* refers to those who were usually employed 35 or more hours per week.
SOURCE: U.S. Department of Commerce, Census Bureau, Current Population Survey (CPS), "Annual Social and Economic Supplement," 1996–2012. See *Digest of Education Statistics 2012*, table 439.

The counterfactual - Europe



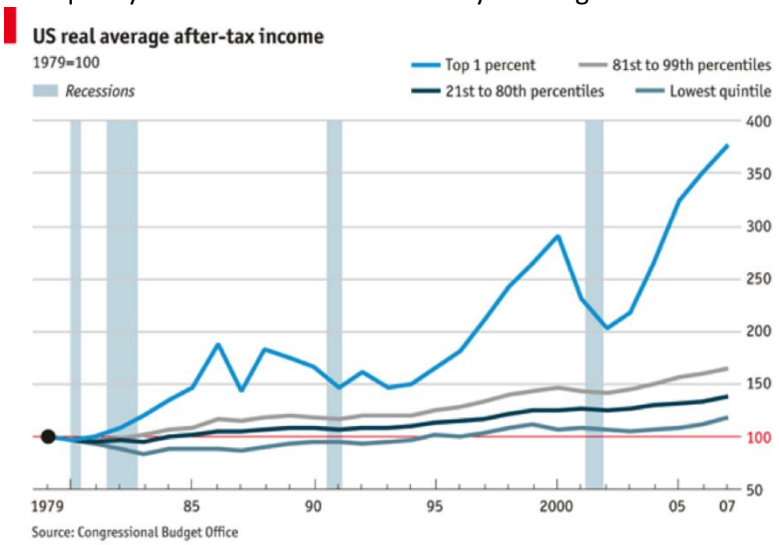
Although Europe has witnessed the same technological change as the US, wage inequality has seen considerably less growth in Europe than in the US.

Ozakawa found that the relatively small increases in inequality in Europe could be attributed to policy and institutional factors. In particular, he found that the impact of the observed difference in tax rates across countries was substantial. Blau and Kahn argue that labor market institutions, particularly the centralization of wage bargaining, can have a large impact on wage structures. Using panel data on institutions in OECD countries between 1973 and 1998, Koeniger et al. found that employment protection, unemployment

benefits, and minimum wage have a significant impact on wage inequality and argue that changes in institutions can explain a substantial part of transitions in wage inequality in OECD countries (Ozakawa). Given evidence of labor institutions keeping wages high for less-skilled labor in Europe and the fact that skill-biased technological change tends to allocate higher wages to skilled labor, some scholars theorize that SBTC leads to rising unemployment in Continental Europe, as opposed to the rising wage inequality in the US and the UK (Weiss and Garloff).

The egregious shortcoming of the SBTC theory

The evidence for SBTC as the explanation of increasing wage differentials in the US over the past 30 years is not solid, as demonstrated by the ambiguous data on the college premium differential and by the Europe counterfactual. However, it is certain that there were many technological innovations in the past few decades, and these innovations *have* affected the demand for skilled labor. The larger question is: how much of the inequality in the US is accounted for by the wage increases of skilled workers?



The SBTC analysis does not even begin to explain one of the most glaring features of inequality in the US: the dramatic rise of the earnings of the top one percent. Instead, other factors may have played a key role in creating this stark picture. It would be prudent to consider the erosion of labor market institutions (labor unions and the minimum wage), macroeconomic policy and unemployment, corporate pay, the increasing magnitude of the US financial sector, and globalization as other perpetrators of America's huge economic disparity.

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