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The Race between Education and Technology

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The Race between Education and Technology. By Claudia Goldin and Lawrence F. Katz. Cambridge: Harvard University Press, 2008. 488 pp. ISBN 978-0-674-02867-8, \$39.95 (cloth); 978-0-674-03530-0, \$19.95 (paper).

Conventional wisdom among labor economists regarding the cause of increasing earnings inequality has long been that technical changes in the economy are “skill-biased.” The movement from farm to factory and the subsequent electrification of the factories tended to benefit workers of all skill levels. In contrast, recent technical changes (think computers) have been rapid in their diffusion but not amenable to the employment of lesser-skilled workers—leading to a growing earnings disparity between those at the top and those at the bottom.

In their impressive work of historical research and analysis, *The Race between Education and Technology*, Claudia Goldin and Lawrence Katz (GK) investigate two ideas that are conspicuously absent from this simple narrative. First, they examine the precise nature of the technical change that has occurred in the United States since the turn of the twentieth century in order to better understand how the demand for different types of labor has changed over time. Second, they look at the supply side of the market before drawing any inferences about the dramatic changes in the wage structure.

Combining a remarkable array of current and historical data with a scouring of the literature on the nature of work, the types of skills required for various jobs, and the extent and timing of various technological innovations, GK determine that the demand for skill (“skill-biased technical change”) was not the driver of differences in outcomes for high-skilled workers and low-skilled workers across the twentieth century. They argue both that the pace of technical change was steady throughout the period and that the changes earlier in the period were no more or less biased toward the skilled labor force than are the technical changes occurring today. Rather, a relative increase in the supply of skilled workers mitigated the tendency for technical change to exacerbate inequality in the first part of the century, and a subsequent slowdown in the expansion of the supply of skilled workers since the 1970s allowed earnings inequality to expand.

Of particular value in this book is the historical analysis of the expansion of elementary, secondary, and post-secondary education in America—it is a must-have for students in any economics of education or history of education course. The authors’ decomposition of the skilled-unskilled

wage premium into relative supply and relative demand factors is an indispensable tool for any student in labor economics. And their diligence in obtaining original data from multiple sources is an example of how high-quality scholarly work ought to be conducted.

Some concerns are due to factors beyond the authors’ control. For example, GK equate educational attainment with the level of worker skill. Though it is clear that these two variables are highly correlated, the latter is not observable. It is unlikely that the relationship between educational attainment and worker skills remained stable throughout the course of the century, and treating it as such may lead to an under- or over-statement of the authors’ main thesis—that changes in inequality are due to changes in the supply of skill.

I would have welcomed an argument that individual *earnings* inequality is the relevant metric of interest (as opposed to, say, household consumption or political power) and that there is a threshold beyond which this kind of inequality should concern us. I also would have liked to see explicit recognition by the authors that the income distribution is not chosen by individuals, businesses, or political leaders, but is the unintended result of the millions of economic transactions that happen each day, wedded with the institutional environment that these operate in. Talking about the income distribution is therefore much easier than doing something about it. Some amount of inequality is not only desirable, but necessary to preserve incentives. In physics, equality of temperatures means the heat death of the universe. Gradients are important in all realms of life, and this is no less true in the social sciences than in the hard sciences.

The authors take great pains to (successfully) rule out immigration changes since 1980 as a major driver of earnings inequality (they ascribe about 10% of inequality to this factor), but they virtually ignore many major factors that might also be influential. Suspects include changes in mobility, changes in household structure, and the emergence of winner-take-all markets. Further, it is not clear that GK’s findings generalize across countries. Economists have shown that in the OECD countries, there has simply been no relationship between changes in earnings inequality and changes in educational attainment since 1979—particularly when the United States is removed from the data.

Several institutional factors GK do cite include a decline in the real power of the minimum wage, the decline of unions, the decreased progressivity of the tax code, and the decline of other institu-

tions to protect workers. But the absence from the discussion of some other institutional factors is puzzling. The decline in educational attainment and the increase in inequality came on the heels of President Johnson's "Great Society" programs, and also during the Nixon era price controls (Second World War wage compression occurred under a regime of wage controls). Most striking is the absence of any mention of occupational licensing. The share of the work force required to hold an occupational license issued by a government agency has increased virtually one-for-one with the decline in unionization. These special privileges serve to protect a class of workers over 2.5 times larger than the current unionized work force and the pool of minimum-wage workers combined. It should at least be a matter of interest to ask how these workers' skill levels compare with those of the previously covered union work force—and how this relationship might affect the level of equality of opportunity for the lesser-skilled. Finally, to the extent that institutions have arisen to limit the ability of employers to screen the skills of prospective workers, colleges could be serving merely as expensive signals. One such institution worthy of examination is the Supreme Court decision in the 1971 *Griggs v. Duke Power* case, which severely limited employer screening and thereby made it harder for high-skilled but credit-constrained, information-constrained, non-college students to secure higher-paying jobs.

To "solve" the slowing skills-attainment problem, GK first wish to increase early childhood interventions—particularly access to "quality" pre-school. Early intervention is preferred because economic evidence suggests that late-intervention attempts at educational rehabilitation are impotent to reduce differences in cognitive skills, whatever the origin of those differences. But even early interventions will be successful only if skill differences stem from environmental factors and if the existing public school system can deliver the goods—particularly in areas where such systems are coming under heavy scrutiny today.

Second, GK recommend that we rekindle the virtues of American education (such as decentralization) and improve the operation of K12 systems so that students graduate from high school better prepared for college. This will be increasingly difficult in an era when, for the first time in history, federal tax collections are exceeding the state and local take and federal accountability programs are firmly in place. The existing K12 system cannot be improved until the political class recognizes the success of various school choice programs and honestly assesses the shocking lack of productivity and entrepreneurship within the sector. (Books

can be and have been written on these subjects. Relevant statistics are not hard to come by. Table 181 in the U.S. Department of Education's *Digest of Education Statistics*, for example, shows that the efficiency [conventionally measured] of our education system is less than half what it was in 1971—that is, we spend more than twice as much to get the same results. Since total U.S. K12 expenditures were roughly \$630 billion two years ago [Table 25], the implication is that we are paying over \$300 billion more, annually, than we would be if educational productivity remained constant.)

Finally, the authors recommend that financial aid be made sufficiently generous and transparent so that students who are college-ready can complete a four-year degree or gain skills at a community college. This oft-repeated recommendation raises two major concerns. First, it assumes that attending college is worthwhile for all students. Second, though high-ability, low-income students appear to be under-represented in *elite* colleges and universities, it is simply no longer credible to argue with such urgency that students are not aware of financial aid opportunities, that colleges are generally out of reach, or that credit constraints pose a significant problem in educational markets.

Consider that the average net-price of attending community colleges is only *one hundred dollars* per year (*Trends in College Pricing*, 2008; see http://www.collegeboard.com/html/costs/pricing/3_1_net_prices.html). Consider also that in real terms student aid increased by 101% from 1998 to 2008, from \$80 billion to \$162 billion (with similar increases among all classes of aid, including need-based grant aid; see <http://www.collegeboard.com/html/costs/aid/>). The average student getting aid at a public four-year college graduates with only \$18,800 in debt—a pittance when one considers that the returns to receiving a college degree over a high school degree exceed 10% per year. Couple this evidence with the fact that the portion of family budgets dedicated to the necessities of food, shelter, and clothing is lower now than at any time in U.S. history (Bureau of Labor Statistics, "100 Years of U.S. Consumer Spending"; see <http://www.bls.gov/opub/usc/home.htm>), and it is simply not credible to argue that college is out of reach for many people—particularly when well less than half the population does not graduate from college.

This superbly written and deeply researched book boldly tackles an extremely important and difficult (if not unanswerable) question. Despite my quarrels with the authors' policy recommendations and their neglect of some institutional factors affecting inequality and educational attainment, the book is a must-read for anyone interested in

understanding the relationship between human capital accumulation, economic growth, and inequality.

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Historical Studies

Gender, Work, and Wages in Industrial Revolution Britain. By Joyce Burnette. Cambridge: Cambridge University Press, 2008. 377 pp. ISBN 978-0-521-88063-3, \$99.00 (cloth).

Discrimination or the rational outcome of an efficient market—which explains the concentration of women in a limited range of low-paying jobs? This is the central question behind Joyce Burnette’s examination of one of the most important topics in economic history: the impact of Britain’s Industrial Revolution on the work and wages of men and women. Much ink has been spilt, and many keyboards exhausted, in writing about this topic. Burnette enters the field with an argument that—although not new—is controversial: “occupational sorting” and lower wages for women were a rational, efficient, and optimal response to biological differences. It was not discrimination, but biology—in particular, gender differences in physical strength—that led to women’s inferior productivity and hence pay. Allocating men to strength-intensive jobs, and women to less physically demanding ones, served to maximize female (and male) income, minimize the gender gap, and promote economic efficiency. Competition was the key to this happy outcome. Only in dark anti-competitive recesses of the labor market could distributional coalitions impose discriminatory practices at a cost to the economy, employers, and women.

Is this biological or economic determinism? Burnette “take[s] biology seriously” (p. 13) but does not wish to be seen as arguing that gender gaps were good or inevitable. That said, she does argue that reproductive roles and—principally—physical strength “are sufficient to explain much of the occupational segregation and gender wage gap that we observe in Industrial Revolution Britain” (p. 12). Simultaneously, Burnette asserts the primacy of economic motivation as the driving force. It is the reason why capitalists seek profits, and why organizations that can exclude a competing labor supply do so. Greed is not always good, but it is always there. It is the engine driving the

train, while ideology is the caboose (p. 6). Past scholars, according to Burnette, have concentrated too much on the ideological rhetoric of gender roles in explaining customary wages and employment patterns. For Burnette, causation runs the other way. It is not ideology shaping the material world, but that world—influenced by biological difference—that gives rise to custom, with individuals using “ideology as a cover for their naked self-interest” (p. 7).

Words can be at odds with reality, so it is to that material actuality that Burnette turns. Chapters 1 and 2 are strong and helpful contributions to our knowledge about the work done by women and men, and the wages they were paid. In particular, Burnette augments flawed census data (reworked by Higgs) with fragmentary but copious primary-source indications of the employment ratio, as well as with information taken from parliamentary papers and commercial directories. The rich information she thus painstakingly assembles enables her to look beyond the usual issues to such matters as the gendered nature of business ownership. Included on the broad canvas Burnette paints are the changing and regionally varied experience of work, the nature of cottage industry and its decline, the impact of technological change, and the fluidity of gender roles. There are lace makers and straw plaiters, charwomen and nurses, single women and family units, widows becoming free-women in their late husbands’ trades, and many worlds thrown upside-down by industrialization. Chapter 1 concludes that women’s labor market participation was widespread and not entirely restricted to “women’s work,” but that gender was important and pronounced in determining individual working outcomes.

The book proceeds with an examination of wages, and this is where arguments about discrimination versus market rationality, based on labor productivity, are drawn into focus. Of particular interest is the author’s discussion of physical strength and the interactions between the strength needs of new technologies. Subsequent chapters examine occupational sorting and barriers to women’s employment. The foreshadowed conclusion is amplified: competitive markets were good for the economy and good for women, because they minimized the penalty of biological differences through occupational sorting. Exploiting comparative advantage minimized the gender gap. In competitive sectors, then, the gender gap was an artifact of productivity differences between the sexes. Only in the absence of competition could discrimination flourish at the hand of unions and other combinations.

Productivity differences are thus central to