

---

## *The Human-Capital Century and American Leadership: Virtues of the Past*

CLAUDIA GOLDIN

The modern concept of the wealth of nations emerged by the early twentieth century. Capital embodied in people—*human capital*—mattered. The United States led all nations in mass postelementary education during the “human-capital century.” The American system of education was shaped by New World endowments and Republican ideology and was characterized by virtues including publicly funded mass education that was open and forgiving, academic yet practical, secular, gender neutral, and funded and controlled by small districts. The American educational template was a remarkable success, but recent educational concerns and policy have redefined some of its “virtues” as “vices.”

At the dawn of the twentieth century the industrial giants watched each other cautiously. The British sent high-ranking commissions to the United States and the United States sent similar groups to Britain and Germany. All were looking over their shoulders to see what made for economic greatness and what would ensure supremacy in the future. The two leading economic nations had grown closer in per capita income since 1850 and were fierce competitors in product markets. It was a moment of angst for Britain and one of enormous possibility for the followers.<sup>1</sup>

The great industrial nations had scrutinized each other before and had in prior decades sent commissions to uncover the source of economic great-

*The Journal of Economic History*, Vol. 61, No. 2 (June 2001). © The Economic History Association. All rights reserved. ISSN 0022-0507.

Claudia Goldin is Professor, Department of Economics, 217 Littauer, Harvard University, Cambridge, MA 02138, and Research Associate, National Bureau of Economic Research. E-mail: cgoldin@harvard.edu.

I thank Daron Acemoglu, Joseph Ferrie, Peter Lindert, Robert A. Margo, Elyce Rotella, and especially Lawrence F. Katz for helpful comments. Florencio Lopez de Silanes generously provided data on religious groups by country.

<sup>1</sup> For evidence on “economic angst” in Britain around 1900 see, for example, McKenzie, *American Invaders*; and Williams, *Made in Germany*. The commissions and delegations of the early twentieth century were many. On the American side, for example, Massachusetts Governor William Douglas appointed a commission in 1905 headed by Carroll D. Wright that was empowered to investigate how industry in the Commonwealth was helped or hindered by existing educational institutions. See Massachusetts, *Report of the Commission*. On the British side a private commission financed by the South African diamond mine owner Alfred Mosely that included, among others, various secretaries of the British trade unions came to the United States in 1902 to investigate labor, education, and training issues. The commission was so well received that ex-President Cleveland met with the group, as did Harvard’s President Eliot and U.S. Senator Mark Hanna. See Mosely, *Mosely Industrial Commission*.

ness. Earlier delegations focused on technology and physical capital. Those of the turn-of-the-century turned their attention to something different. People and training, not capital and technology, had become the new concerns.<sup>2</sup> For the first time in history the postliteracy schooling of the masses—at the secondary and higher levels—was perceived to greatly enhance economic production. Education might uplift, build moral fiber, enhance art, literature, and culture, and produce public officials, as even the ancients knew. The novel concern at the dawn of the twentieth century was that postliteracy training could make the ordinary office worker, bookkeeper, stenographer, retail clerk, machinist, mechanic, shop-floor worker, and farmer more productive, and that it could make the difference between an economic leader and a laggard.

The modern concept of the wealth of nations had emerged by the early twentieth century. It was that capital embodied in the people—*human capital*—mattered. The odd thing, however, is that even though most industrial nations acknowledged the change, only one did much about it until well into the twentieth century.<sup>3</sup>

In 1900 no nation apart from the United States had more than a trivial fraction of its youth enrolled in full-time upper secondary schooling.<sup>4</sup> The industrial world had already recognized the importance of universal literacy, but postelementary schooling for the masses was a new frontier. By the *end* of the twentieth century, however, all but the very poorest countries of the world had secondary-school enrollment rates that would have made the masses of the rich nations in the early twentieth century green with envy. And college and university enrollment rates among most current OECD nations are now substantial.<sup>5</sup> Many have not just caught up to the levels achieved in the United States, but have surpassed them. The twentieth century was, indeed, the *human-capital century*.

<sup>2</sup> Previous delegations visited technology shows, such as the 1851 Crystal Palace Exhibition in London and its U.S. counterpart in 1853, attended by the British team of George Wallis and engineer-manufacturer Joseph Whitworth. Alexis De Tocqueville, Harriet Martineau, and others with interests in the New World experiment in democracy were celebrated visitors earlier. See Sawyer, "Social Basis," on the British delegations to the United States after 1853; and Curti, "America at the World Fairs," for a discussion of the return visits. Curti's treatment reveals the shift in the late nineteenth century from technology demonstrations to displays that included America's role in education and training.

<sup>3</sup> The Report of the Massachusetts Commission on Industrial Education noted in 1907, "We know that the only assets of Massachusetts are its climate and its skilled labor." Cited in Roman, *Industrial and Commercial Schools*.

<sup>4</sup> Secondary schooling in the United States means grades nine through twelve, independent of whether the school is a junior or senior high school, and students between fourteen to about eighteen years. In parts of Europe these grades are mainly in upper secondary schools, whereas lower secondary schools often include grades five or six to eight. See also the Appendix.

<sup>5</sup> OECD is the Organization of Economic Cooperation and Development and today includes Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxemburg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

For the twentieth century to become the human-capital century required vast changes in educational institutions, a commitment by governments to fund education, a readiness by taxpayers to pay for the education of other people's children, a belief by business and industry that formal schooling mattered to them, and a willingness on the part of parents to send their children to school (and by youths to go). The transition occurred first in the United States and was accompanied by a set of "virtues" or principles, many of which can be summarized by the word "egalitarianism." The virtues figure prominently in this essay.

By virtues I mean a set of characteristics that stemmed from basic democratic and egalitarian principles and that influenced the educational system. They include public funding, openness, gender neutrality, local (and also state) control, separation of church and state, and an academic curriculum.<sup>6</sup> These principles, in turn, gave rise to corollary virtues such as the use of property taxes, competition among school districts, and permitting students to repeat grades. The virtues were not always intentionally so nor were they virtuous in all locations and situations, as in the case of local control and the use of property taxes. Others lost their virtuous distinction over time, as in the case of the almost infinite forgiveness of students. But for the moment, and probably for at least the first half of the twentieth century, these were virtues and were, as a group, unique to the United States and some other New World nations.

The main questions addressed here are why the twentieth century was the human-capital century, how and why America led in education, and what impact this had on the U.S. economy. The virtues of the past need not be those of the present, and I end by placing current U.S. educational policy in historical perspective. Even though advances in higher education are an important part of the human-capital century, this essay concerns mass secondary education because it came first and set the stage for the transition to mass higher education.

#### SCHOOLING ADVANCES IN THE HUMAN-CAPITAL CENTURY

At the start of what would become the human-capital century, even the rich nations of the world had but a small fraction of their youth enrolled in formal secondary schools. These rich nations, however, had already converged in terms of elementary-school enrollments, and even many of the poorer nations of Europe had begun to greatly expand mass primary schooling.

But around 1910 the United States pulled ahead of all other nations in terms of enrollment rates in postelementary education. The divergence was

<sup>6</sup> By "gender neutral" I mean in terms of enrollment and graduation rates, not in terms of actual treatment in the classroom or in courses taken.

also noticeable in what I will call the “templates” each of the nations formulated for the training of youth. The United States, Britain, France, and Germany, to mention the leading nations, took divergent educational paths. By the end of the human-capital century, however, these paths have again converged, to some degree. And even the poorest nations of the world have flows into formal education, measured by enrollment rates, that are extremely high by historical standards.

*Postelementary Education before World War II: Divergence*

Mass elementary education, by the early twentieth century, had swept through Britain, France, parts of current Germany, and Sweden, and was just beginning to advance across other sections of Europe.<sup>7</sup> By 1910, using a somewhat different measure, enrollment rates for 5- to 19- year olds were fairly similar among the world’s economic leaders.<sup>8</sup> The ratio of this enrollment rate in France to that in the United States was 0.93, that with respect to Germany was 0.96, and even relative to Great Britain the ratio was 0.82.<sup>9</sup> Cross-country differences in the formal schooling of labor-market entrants were, for the moment, quite small. The important point is that these differences would soon become quite large. The sole reason concerns changes within the United States.

At the turn of the twentieth century the American high school underwent a series of fundamental changes. It became less classical, more practical, although still primarily academic. It embraced the sciences, modern languages, and commercial subjects, but was not industrial nor was it primarily vocational.<sup>10</sup> Although some of its graduates were college bound, it would no longer be, for a substantial fraction of its graduates, a preparatory school for universities and colleges. Its diploma was, more and more, a terminal degree for youths whose first jobs would be in a host of white-collar positions and certain blue-collar ones as well.<sup>11</sup>

Americans invented the publicly funded, academic secondary school for the masses. The “high school movement” in America radically changed the education of its youth and set the United States apart from other nations for

<sup>7</sup> See Easterlin, “Why Isn’t the Whole World”; and Lindert, “Comparative Political Economy.” According to Lindert, Britain and France had elementary-school enrollment rates per 1,000 children 5- to 14-years old exceeding 800 in 1910. Sweden had universal elementary education but school began late (at age 7) in the Nordic countries and thus their enrollment rates appear low.

<sup>8</sup> Although there was some convergence to 1900 in educational levels among the industrial nations of the world, there was probably divergence in educational levels among all nations in the world.

<sup>9</sup> These data are from Mitchell, *International Historical Statistics*; see Goldin and Katz, “Why the United States,” p. 11.

<sup>10</sup> Industrial courses of study taught skills for a particular job. Often the school had a direct relationship to a firm or labor union. Vocational courses (such as bookkeeping and typing) were more general.

<sup>11</sup> On the evolution of the modern high school in America see Krug, *Shaping*. For a more critical view of the changing secondary-school curriculum see Ravitch, *Left Back*.

much of the twentieth century.<sup>12</sup> Compared with Britain and France, for example, the United States by the 1930s was three to four decades ahead in postelementary education and educational gaps remained large at least to the 1950s. Furthermore, that for college and university enrollment widened substantially.<sup>13</sup>

As the United States entered World War II, the median American 18-year old was a high school graduate, and outside the South more than 60 percent had recently graduated from high school.<sup>14</sup> When Franklin Roosevelt signed the GI Bill of Rights into law in 1944, the average GI was able to attend college for he had already graduated from high school. Nothing more clearly demonstrates the difference in schooling between the United States and Britain than the simultaneous passage by the Labour Government of the 1944 Education Act. The American GI Bill paid tuition and a stipend for attending college, while the British Education Act of 1944 did no more than guarantee to all youth a publicly funded grammar or secondary-school education. School districts in the United States ever since 1874 were able to use public funds to support secondary schools, and secondary-school education became a child's right in state after state in the early twentieth century.<sup>15</sup>

Formal schooling is only one type of training and most countries of continental Europe took a path divergent from that of the United States for much of the twentieth century, as the data in Figure 1A, for 18 countries in

<sup>12</sup> As I have shown elsewhere, about 70 percent of the increase, from 1930 to 1970, in the educational attainment of U.S. males 40- to 44-years old was due solely to the increase in secondary-school attendance (Goldin, "America's Graduation").

<sup>13</sup> The statements just made, and substantiated later in this essay, will appear at variance with Maddison, "Growth and Slowdown," table A-12. Maddison, whose data come from a 1975 OECD publication, claims that in 1950, for example, the U.K. population 15- to 64-years old had 3.27 years of secondary school, on average, the German population had 4.37 years, and the United States population had 3.4. These numbers are graphed in Nelson and Wright, "Rise and Fall," figure 6, as "average years of secondary education." But these data are *not* comparable across countries. They do not refer to a fixed type of school nor fixed age of pupils. They assume, for example, that "secondary school" began after grade four in Germany but after grade six in the United Kingdom and also implicitly assume that everyone in the United Kingdom in 1950 completed eight years of school and that all schooling beyond grade six was in a secondary school or a college. In fact, when schooling by age of student is computed, that in the United Kingdom was vastly below that in the United States for almost all of the twentieth century. The U.S. advantage in education extended for decades. See also Dewhurst, et al., *Europe's Needs*; and the data in Figures 1A and 1B in this article. The OECD now publishes data that are more comparable by country.

<sup>14</sup> "South" is defined as the three census divisions—South Atlantic, East South Central, and West South Central.

<sup>15</sup> See Stanley, "Higher Education," on the GI Bill. Both the World War II and the Korean War GI Bills generally paid full tuition and a stipend for college or other training, including that given by proprietary technical schools. The Kalamazoo Case in 1874 established the legitimate right of local school districts to use common school funds for public secondary schools. The right of youth to receive a public secondary-school education came with the "free tuition" laws passed in most states beginning in the early twentieth century. These laws made the home school district financially responsible for paying tuition to a neighboring district if the home district did not contain a secondary school. African-American children in the South and those elsewhere who could not travel to neighboring districts were denied these rights or could not take advantage of them.

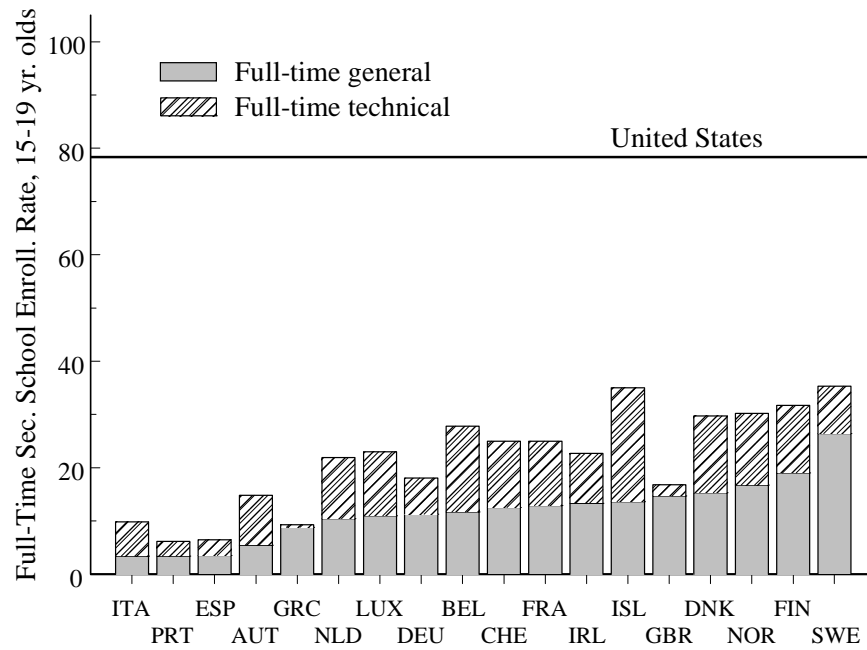


FIGURE 1A  
FULL-TIME SECONDARY-SCHOOL ENROLLMENT RATES, EUROPE AND THE UNITED STATES, c.1955.

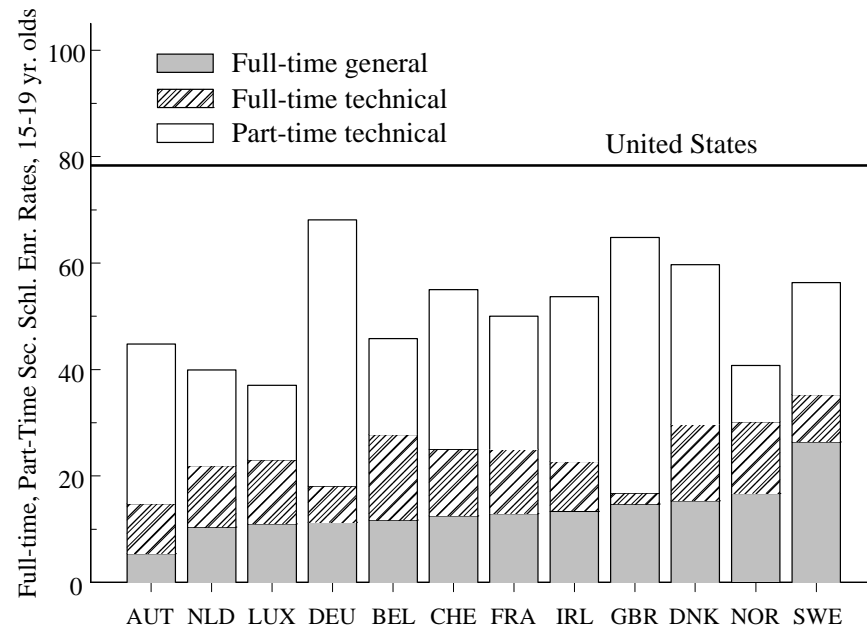


FIGURE 1B  
FULL- AND PART-TIME SECONDARY-SCHOOL ENROLLMENT RATES, EUROPE AND THE UNITED STATES, c.1955

FIGURE 1 — continued

*Notes:* The data refer to the number of youths in public and private upper and lower secondary schools (of the types listed) ranging from those who turned 15-years old during the school year to those who turned 19-years old during that year. Thus, the age group under consideration is approximately all 15- to 18-year olds, plus one-half of 14- and 19-year olds. No youths in elementary schools or colleges and universities are included even if they were in the included ages. The procedure ensures consistency but implicitly favors countries, such as the Nordic nations, that have late starting ages and penalizes those, such as France and the United States, that have earlier starting ages. The computation for the United States assumes 100 percent enrollment for the 14-year olds and then adds all enrolled in ninth through twelfth grades and divides by the age group given above. The five European nations that did not give data on part-time vocational schools are excluded from part 1B. All data are for c.1955.

Abbreviations are: Italy (ITA), Portugal (PRT), Spain (ESP), Austria (AUT), Greece (GRC), Netherlands (NLD), Luxemburg (LUX), Germany (DEU), Belgium (BEL), Switzerland (CHE), France (FRA), Ireland (IRL), Iceland (ISL), Great Britain (GBR), Denmark (DNK), Norway (NOR), Finland (FIN), and Sweden (SWE).

*Sources:* European nations: Dewhurst, et al., *Europe's Needs*, tables 10-2 and A. The data for England and Wales, France, Germany (including the Saar and West Berlin), and Sweden, have been checked against the original administrative records and small errors have been corrected. United States: U.S. Department of Education, *120 Years*, tables 1 and 9.

the mid-1950s, show. All 18 countries had enrollment rates in regular secondary schools (for youths 15- to 19-years old) that were low by U.S. standards.<sup>16</sup> Some countries, such as Belgium, Denmark, Iceland, and Norway, had extensive full-time technical training programs. But even adding these students to those in regular secondary schools produces figures that are far below that achieved by the United States in the mid-1950s. Only when part-time students in technical schools are included, as in Figure 1B for 12 countries, does the total come close to that for formal full-time secondary schooling in the United States. Part-time technical students attended school for anywhere from a few hours to several days a week. In Germany and the United Kingdom there were almost twice as many 15- to 19-year old students in part-time technical schools as in full-time (general plus technical) secondary schools. Rather than providing formal, general schooling to all, much of Europe tracked youth into technical training programs that were often work-study arrangements for older teenagers.<sup>17</sup>

### *Postelementary School Education after World War II: Convergence*

Even by the mid-1950s upper secondary-school enrollment rates remained low throughout much of Europe, but convergence to the leader nation was rapid later in the century. As the youth of Europe made the transition

<sup>16</sup> The data are from Dewhurst et al., *Europe's Needs*, and include all youths in schools above the elementary school grades and below the college level between the ages of about 14.5- and 18.5-years old. See the Appendix for more details.

<sup>17</sup> Tracking took off in the United States in the 1920s but was generally of a more forgiving kind than in Europe. For a history of tracking see Chapman, *Schools as Sorters*; for a severe criticism of the system see Ravitch, *Left Back*.

through secondary school they were poised to enter college and by the late 1990s college and university enrollment rates were substantial in much of continental Europe and parts of Asia.<sup>18</sup> Among cohorts turning 20-years old around 1955 only two of the 26 reporting OECD countries, including the United States, had a college completion rate exceeding 15 percent. But nine nations did for cohorts turning 20 in 1985.<sup>19</sup>

What about schooling levels among all countries at the close of the human-capital century? Except for the very poorest nations of the world, upper secondary-school enrollment rates, measured by the gross enrollment rate (GER), for today's currently poor nations are substantial using mid-twentieth century high-income country standards.<sup>20</sup> The solid vertical line in Figure 2 gives U.S. real per capita income in 1900 just before the "high school movement" began and human capital investments between the United States and other industrialized countries substantially diverged. I will use the level of per capita income in the United States a century ago as a loose definition of "currently poor."<sup>21</sup>

The "dots" with dates in Figure 2 give the U.S. GER and income level for the year given.<sup>22</sup> Any country that is situated in the South-East quadrant delineated by lines through a given dot had a 1990 income greater than the United States in the given year but a 1990 GER that was lower. One can think of this as the "bad" quadrant. There are almost no countries in this quadrant until GERs are quite high (greater than 80 percent) or until the reference point is the United States in 1960.<sup>23</sup> In 1990 almost all countries with incomes greater than the United States in a particular year had GERs that exceed that attained in the United States for that year.

<sup>18</sup> Net enrollment of 18- to 21-year olds in public and private universities in 1996 was 21.7 percent in the United States and was exceeded by Greece (29.3 percent), the Netherlands (24 percent), Spain (26.3 percent), and the United Kingdom (22.2 percent) in Europe, Japan (25.6 percent) and Korea (25.6 percent) in Asia, and the New World countries of Australia (22.9 percent), Canada (23.1 percent), and New Zealand (23.3 percent). Adding nonuniversity tertiary education (for example, community colleges) raises the U.S. figure to 34.6 percent, equal to or slightly exceeded by Belgium, Canada, France, Greece, and Korea. Because these are by age, rates for countries with later ages of entry or continuing education are understated. For 17- to 34-year olds, the United States at 10.2 percent is exceeded by Finland, the Netherlands, and Spain for university education. See OECD, *Education at a Glance 1998* (table C3.3).

<sup>19</sup> The other country was the Netherlands. There are 29 OECD nations; the three nations without these data are Iceland, Japan, and Mexico. See OECD, *Education at a Glance 1998*, table A1.2a.

<sup>20</sup> See the Appendix for a definition of the gross enrollment rate and why it can exceed 100 percent for certain countries.

<sup>21</sup> Because income inequality of currently poor countries is generally greater than it was in the United States in 1900, this measure probably overstates median incomes in currently poor countries relative to the United States in 1900.

<sup>22</sup> The GERs in the UNESCO data for the United States are almost identical to the official U.S. enrollment rates since 1950 (see the enrollment data in, for example, Goldin, "America's Graduation"). Comparisons among countries, however, may be misleading for various reasons. See the Appendix.

<sup>23</sup> The GERs, particularly at high levels, may not be reliable because they are sensitive to the age groups used in the deflator.



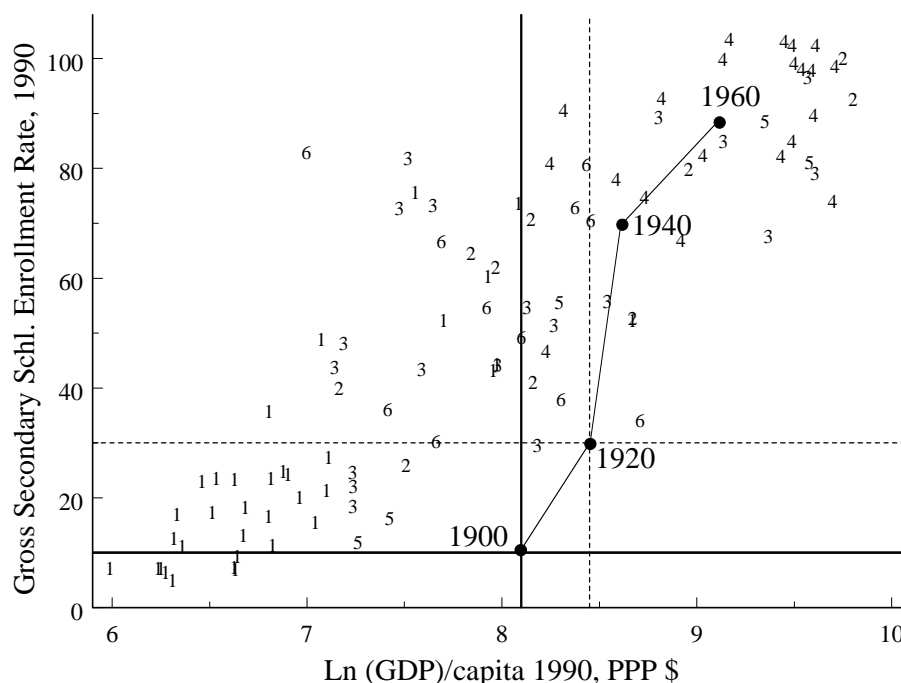


FIGURE 2  
GROSS ENROLLMENT RATES IN SECONDARY SCHOOLS AND GDP/CAPITA ACROSS  
105 COUNTRIES, 1990

*Notes:* The markers refer to geographic groupings in the UNESCO data: 1 = Africa, 2 = Central and North America and the Caribbean, 3 = Asia, including the non-African Middle East, 4 = Europe, 5 = Oceania, and 6 = South America. For the meaning of gross (secondary) enrollment rates, see the Appendix.

*Sources:* Gross secondary enrollment rates: United Nations Organization for Education, Science and Culture (UNESCO). Website <http://unesco.org/en/stats/stats0.htm>. GDP/capita: Penn World Tables, <http://pwt.econ.upenn.edu/>, due to the efforts of Alan Heston and Robert Summers.

But there is more that can be said because there are also countries in the North-West quadrant for each year, that is the “good” quadrant. These countries had 1990 incomes that were lower than the United States for the year given but GERs that were higher. In fact, many of the currently poor nations have gross enrollment rates at or above 0.3, the level achieved in the United States around 1920. Some of the currently poor nations have enrollment rates that exceed 0.5, the U.S. secondary-school enrollment rate in about 1930.<sup>24</sup> Many have secondary-school enrollment rates that exceed those attained by most European nations in the mid-1950s.

<sup>24</sup> There are 14 countries in this category and they are, in descending order of GER: Guyana, Mongolia, Egypt, South Africa, Sri Lanka, Philippines, Peru, Jamaica, Panama, Algeria, Ecuador, Congo, Zimbabwe, and China. Some of these nations have not yet had sustained high enrollment rates and thus the human-capital stock of their labor force is still quite low. But that answer does not hold for many other nations and there are more complicated reasons for persistent poverty.

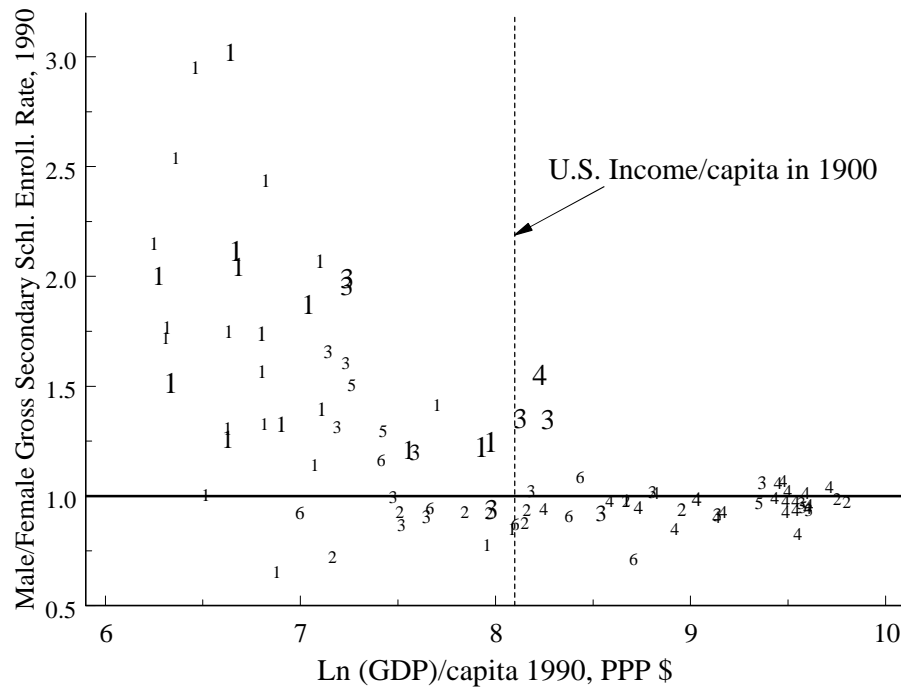


FIGURE 3  
GENDER DIFFERENCES IN GROSS ENROLLMENT RATES IN SECONDARY SCHOOLS  
AND GDP/CAPITA ACROSS 96 COUNTRIES, 1990

*Notes:* See Figure 2. The size of the marker indicates the fraction Muslim. Large markers are for those countries (about 15 percent of the sample) with more than 85 percent Muslim among the population. About 65 percent of the countries listed have less than 10 percent Muslim among their populations.

*Sources:* See Figure 2.

The point is clear. Even today's currently poor nations and their people invest in secondary schooling to a far greater degree, in terms of enrollment rates, than did the currently rich countries in the past.<sup>25</sup>

The poorer the country, not surprisingly, the lower is the secondary-school enrollment rate for all youth. Of more interest here is that the enrollment rate for girls, in many nations, is far below the average rate for all. As seen in Figure 3, when income per capita is below that achieved by the United States in about 1900, gender distinctions in enrollment are large. But when per capita income is above the 1900 U.S. level, gender distinctions all but evaporate. The few exceptions to this rule are all predominantly Muslim countries. Similarly, when the ratio of male to female enrollment rates is graphed against the male enrollment rate (graph is not given), gender neu-

<sup>25</sup> Among all poor countries in the data set 60 percent had GERs below 0.3, 20 percent were between 0.3 and 0.5, and 20 percent exceeded 0.5. If only male youths are considered, 54 percent had GERs below 0.3, 20 percent were between 0.3 and 0.5, and 26 percent exceeded 0.5.

trality in enrollment is apparent when the male enrollment rate exceeds about 0.4. The same exceptions of predominantly Muslim countries appear here as well. Gender neutrality is a virtue purchased at higher incomes, a fact that holds in the educational histories of many of the currently rich countries as well.

#### WHY THE TWENTIETH CENTURY?

Fundamental changes around the turn of the twentieth century made formal, general, school-based learning of importance to the emerging economic leader of the world. These changes accelerated over time so that even the world's poor countries today have secondary-school enrollment rates that greatly exceed those of mid-twentieth-century industrialized Europe.<sup>26</sup>

A host of demand-side factors arising from advances in science, changes in the structure of knowledge, and the emergence of big business, bigger government, and large-scale retailing increased the relative demand for educated labor generally, raised the returns to education, and led to the expansion of formal schooling for the masses.

A primary reason for the emergence of the human-capital century concerns the appearance of a “new” economy in the early twentieth century, as some referred to it. The changes that created the “new” economy were pervasive. Some emanated from basic findings as diverse as the germ theory of disease and the development of high-grade steel. They led to an increased specialization of academic disciplines and a greater use of science by industry. Certain industries became infused with science, including petroleum refining, wood distillation, sugar refining, rubber, canning, paper and pulp, photography, fertilizers, and later steel, ceramics and glass, paints and varnishes, soap, and vegetable oils. The internal combustion engine, electrification, and the use of small motors were also major contributors to the “new” economy. These changes did more than increase the demand for a small cadre of scientists and engineers. They changed the demand for skills among the mass of workers.<sup>27</sup>

The rise of big business and the growth of large-scale retailing increased the demand for secretaries, bookkeepers, typists, stenographers, and retail sales clerks, positions that generally required a high school degree or some years of secondary school. The growth of office machinery (such as the

<sup>26</sup> See Acemoglu and Zilibotti, “Productivity Differences,” for an intriguing reason why the spread of modern technologies forces the less-developed parts of the world to educate their people when technologies are not easily refitted for less-skilled, low-educated workers.

<sup>27</sup> The list of industries is from Noble, *America by Design*, p. 18. See also Nelson, *Managers and Workers*; and Nye, *Electrifying America*, on technological changes in manufacturing generally. The papers in Oleson and Voss, *Organization of Knowledge*, establish the fundamental changes in the structure of knowledge.

comptometer, typewriter, dictating machine, Addressograph, and mimeograph) around 1910 produced the first “information revolution” in the office and further shifted out the demand for clerical workers.<sup>28</sup>

Starting, perhaps, in the 1910s even farmers recognized that a formal secondary-school education was of value to them in learning about new crops, animal health, fertilizers, machinery, and accounting techniques that were essential in managing the modern farm. More educated farmers adopted technological advances at a faster rate than did others, as the diffusion of hybrid corn has demonstrated.<sup>29</sup>

The technological changes just mentioned served, by and large, to increase the relative demand for educated labor.<sup>30</sup> Beginning in the 1910s firms, particularly in newer industries and those that had more scientific content, such as those just mentioned, stated that they preferred to hire production workers with various types of general skills.

They mentioned the ability to read and decipher manuals, knowledge of algebra to solve simple formulas, the mastery of mechanical drawing to read and create blueprints, and an understanding of the elements of chemistry and the fundamentals of electricity. Blue-collar positions, for which some years of high school or a diploma were required, demanded individuals with “good judgment,” who were “skilled in free-hand drawing,” with “special ability to interpret drawings,” “[familiarity] with the chemical formulas,” “general knowledge of chemicals used,” and “[ability] to mix the chemicals.” Technical know-how and skills were also valued including “knowledge of electricity,” “the properties of glass,” and “general knowledge of photography.” Printing establishments stated that beginners should be “well versed in grammar, spelling, punctuation,” and that “an elementary knowledge of Latin and Greek is helpful.”<sup>31</sup> The head of the employment department of one technologically advanced and forward-looking company stated, in 1903, that: “in the factory we like the boys to have a high school education if possible.” Of those in the office, he noted that “office boys must give good references, must have good character ... [and] should have high school education.”<sup>32</sup> That beginners in the office should

<sup>28</sup> See, for example, Goldin, *Gender Gap*; and Rotella, *From Home to Office*.

<sup>29</sup> The 1905 Iowa school report quoted *The Twentieth Century Farmer* as stating: “it takes a better trained mind to be a successful farmer or business man today than it did even ten years ago. . . . The new conditions of life on the farm demand improvement in general education for the farm boy or girl” (Iowa, *Report 1905*, p. 143). On the diffusion of hybrid corn, see Ryan and Gross, *Acceptance and Diffusion*. On the role of education in agriculture more generally, see Schultz, *Transforming Traditional Agriculture*.

<sup>30</sup> On skill-biased technological change over the long run, see Goldin and Katz, “Origins of Technology-Skill Complementarity.”

<sup>31</sup> See, for example, the descriptions of positions c.1920 in electrical machinery, glass, medicinal manufacturing, paint and varnish, and the printing trades in U.S. Department of Labor, *Descriptions of Occupations*.

<sup>32</sup> Thomas, *National Cash Register Factory*, p. 34.

have a high school education is not surprising for the 1910s, certainly not for the 1920s. What is surprising is that this statement was made at the very start of the twentieth century.

The increased demand for young people with these enumerated skills, given their initial small supply at the start of the twentieth century, produced high wage differentials between occupations that required more education and those that required less. Put slightly differently, the return to high school (and college) education around the turn of the twentieth century was substantial. I later present evidence on how substantial the return to formal schooling was and how it changed over the twentieth century.

The nation that led the world in mass education chose formal, general schooling and not specific, apprenticeship or on-the-job training as the premier method of investing in human capital. Why did the United States take this route, why have most nations eventually adopted it, and why did many nations in Europe initially do otherwise?

America chose a type of postelementary schooling that was consistent with the particular features of the New World and with an ideology embraced by the time of the early Republic. Flexible, general, and widely applicable skills that were not tied to particular occupations and geographic places had enormous option value. Skills had to survive transport across firms, industries, occupations, and geography in the dynamic American economy. These New World features together with republican ideology gave rise to the virtues introduced earlier and produced a unique educational system, termed here the “American template.”<sup>33</sup>

#### THE EDUCATIONAL TEMPLATES OF EUROPE AND AMERICA

During the first two decades of the twentieth century, the United States provided only one of several templates for secondary and higher education. Germany, Britain, and France provided the other main contenders, which were characterized by severe tracking at an early age and by the preservation of higher educational levels for an elite corps. There were differences, however.

The British emphasized classical training for those who were allowed to go beyond the compulsory grades. The French system produced a small group of civil servants and a cadre of those well trained in technical and scientific fields. The German system contained a number of tracks, some for manual work, others for commercial pursuits, and an elite course for students who would attend universities. If the American system is characterized as open, infinitely forgiving, lacking universal standards, and academic yet practical, the European system was closed, unforgiving, with uniform stan-

<sup>33</sup> The term “American” refers as well to Canada whose educational institutions generally mirrored those of the United States and whose high school movement occurred just a decade or two later.

dards, and academic for some and industrial for others. One was egalitarian; one was elite.

Why did the United States pioneer a novel and distinctively American form of secondary and higher education and break from the educational templates of Europe? Why did Americans engage in investments in human capital that Europeans viewed as wasteful of resources?

A partial answer can be found in a simple model of choice between general training, such as formal schooling, and specific training, such as an apprenticeship or on-the-job training. Investment in general schooling is more costly than is an apprenticeship, but it produces skills that are more flexible and transferable across place, occupations, and industries. Thus formal education is more highly valued when geographic mobility is anticipated to be higher, when there is a greater likelihood of technical change at the occupational or industrial level, and when the gain from flexibility is greater after a technical shock or a geographic move. It is also more valuable when the costs of formal schooling are lower, possibly because of public funding, and when the costs of specific training are higher, possibly because family ties are weaker.<sup>34</sup>

General schooling for the masses fit American circumstances more than it did those of early-twentieth-century Europe. Extensive evidence exists on the considerably greater geographic mobility of Americans than Europeans for the post-1960s.<sup>35</sup> Comparable data for the late nineteenth and early twentieth centuries are scarcer. But evidence on intercounty migration for the mid-nineteenth century suggests that rates in the United States were six times as great as those in England and Wales. Many insightful historians and demographers, in addition, have commented on the accepted wisdom that within the United States, Americans were highly mobile but that Europeans were not, within their nations.<sup>36</sup>

<sup>34</sup> Consider a two-period model in which all agents invest in general (formal schooling) or specific (apprenticeship) training in period zero and then work in period one. Technology is given by  $f_i$  initially but has probability  $p$  of changing to  $f_j$  by period one. The agent who invests in an apprenticeship for the initial technology ( $a_i$ ) in period zero earns  $f_i(a_i)^0$  in period zero and  $f_i(a_i)^1$  in period one if technology does not change, where  $f_i(a_i)^0 < f_i(a_i)^1$ . The agent who invests in formal schooling ( $s$ ) earns  $-C$  in period zero, where  $C$  = the direct cost of school, and  $f_i(s)^1 = f_i(a_i)^1$  in period one, if technology does not change. The formally schooled person, however, would earn  $f_j(s)^1 > f_i(a_i)^1$  if technology did change. The agent, therefore, should invest in formal schooling if  $p > [f_i(a_i)^0 + C] / [f_j(s)^1 - f_i(s)^1]$ . That is, invest in schooling if the probability of technical change exceeds the ratio of the costs to the benefits of the training. General training is more valuable the higher the probability of technical change (or a geographic move), the lower the cost of formal schooling, and the larger the gain from general education conditional on the technical change.

<sup>35</sup> Much has been written about the greater U.S. than European migration rates since the 1960s. See, for example, Eichengreen, "Can the Maastricht Treaty," who shows that mobility within the United States was two to three times the rate within European nations from the 1960s to the early 1980s. Hughes and McCormick, "Housing Markets," using longitudinal data for the 1970s and 1980s, show that the U.S. migration rate for manual workers was about four times the U.K. rate and job-related migration for that group in the United States was more than ten times the U.K. rate.

<sup>36</sup> The data in Baines, *Migration* (appendix 1) have been used to show that, of those who could be matched from 1861 to 1870, about 8 percent of the population of England and Wales did not persist

Formal, school-based education enabled American youths to change occupations over their lifetimes, to garner skills different from those of their parents, and to respond rapidly to technological change.<sup>37</sup> Apprenticeships and highly specific training were more cost effective for individuals who expected to spend their lives in the same place and in the same industry and occupation, but were not as valuable for others and clearly not for their employers.<sup>38</sup> Europeans may have been correct in their assessment that the American educational system was wasteful of resources. But it was not wasteful in the technologically dynamic, socially open, and geographically mobile New World setting. It may have even enhanced this dynamism.<sup>39</sup>

The factors just summarized provide only part of the reason for the different templates. Others include the extent of the franchise, the role of the central government in educational funding, the relative strength of pre-existing guilds and labor unions, and the level of wealth and income per capita.

On these fronts, as well, the United States differed from Europe. The franchise in the United States was extended to virtually all (white) males early in the nineteenth century, whereas almost all European countries achieved universal male suffrage much later.<sup>40</sup> Educational taxing and fund-

---

in the same county (personal communication from Joseph P. Ferrie). Ferrie, "New Sample," on the other hand, calculates that 47 percent of the population of the United States did not persist in the same county from 1850 to 1860. Emigration from England and Wales does not in any way make up for this large difference. Adding gross emigration increases migration rates to about 11 percent. Demographer Everett Lee, "Turner Thesis," emphasized that migration "was and is a major force in the development of American civilization and in the shaping of American character" (p. 78) and noted that he and Henry Shyrock made independent calculations showing that the high migration rates in the 1960s extend back to at least 1850 (p. 79).

<sup>37</sup> See, for example, Schultz, *Transforming Traditional Agriculture*, on the role of education in how individuals respond to economic change. Galor and Moav, "Ability Bias," formalize Schultz and show the conditions under which the rate of technological change, and not skill bias, increases the relative demand for skill.

<sup>38</sup> Lebergott, *Americans*, commented that the "incessant mobility [of Americans] made it thoroughly unwise for any employer to invest much in training his employees" (p. 372). Elbaum, "Why Apprenticeship," argues that the growth of formal education in the United States led to the breakdown of apprenticeships. It may have, but formal education was more consistent with the greater geographic mobility of a country with great land availability.

<sup>39</sup> An economist trained in Germany noted in 1915: "It is often remarked in the United States that the German skilled workman does well and thoroughly what he has been taught to do, but seems to be rather slow in originating new designs for new circumstances." See Roman, *Industrial and Commercial Schools*, p. 30.

<sup>40</sup> France, in 1848/49, was the first European nation to extend the franchise almost universally. Even in 1890 Belgium, Italy, the Netherlands, Norway, and Sweden had electorates of less than 35 percent of the male population above legal age. Ireland and Great Britain had about 60 percent, Switzerland 80 percent, France and Denmark 85 percent, and Germany more than 90 percent. By 1900 Italy, the Netherlands, Sweden, and the United Kingdom remained below 60 percent (Flora, et al., *State, Economy, and Society*, pp. 91). See Acemoglu and Robinson, "Why Did the West Extend the Franchise?" for an ingenious model of endogenous franchise; Engerman and Sokoloff, "Evolution," for the timing of franchise extension in the United States; and Lindert, "Comparative Political Economy," on the role of the franchise in the earlier transition to mass elementary-school education. For a less benign view of the U.S. franchise and a later dating of universal franchise, see Keyssar, *Right to Vote*.

ing for K-12 education in the United States was almost always controlled at the local level, whereas in most European countries central authorities made most of the taxing and funding decisions, even though curriculum decisions may have been locally made.

The United States had, by 1890, the highest income per capita and could most afford mass secondary-school education. Differences in income per capita alone, however, do not entirely explain differences in education between the American states and the nations of Europe. Many of the poorer U.S. states had secondary-school enrollment and graduation rates in the early twentieth century that far exceeded those of European nations with approximately equal per capita incomes.<sup>41</sup>

#### THE VIRTUES OF THE AMERICAN SYSTEM

A host of changes beginning in the late nineteenth century increased the value of certain types of skills and knowledge, and by the early twentieth century the United States was endowing a large fraction of its youth with skills in formal, school-based, academic settings, using an educational system termed here the American template. With the gift of hindsight, we can see that by the end of the twentieth century many aspects of the American template have swept the world's educational systems. But how did the United States pioneer a new type of education and how did it diffuse across the vast land?

#### *The "High School Movement"*

Clear across America in the early twentieth century, citizens at the local-community level discussed and debated the necessity for a modern form of secondary education. The new schools would train American youth for "life" rather than for "college" and they would enable a child in Nebraska to enter the same office job as a child in New York State. These discussions were part of a widespread grass-roots movement sparked by individuals and by local associations. That is not to say that this was a completely uncoordinated movement. Communities were, to be certain, guided by state commissions and by various Progressive leaders, and states paid attention to what other states were doing. But it is essential to an understanding of what happened in the United States to recognize that there were tens of thousands of

<sup>41</sup> Income per capita in Great Britain in 1929 was about equal to that in the states of the Midwest, whereas that in Germany, France, and Sweden was approximately equal that in Kentucky, North Carolina, Tennessee, and Virginia, the higher-income states of the South. The enrollment rate in secondary schools in the Midwest was about 60 percent in 1930; in the South Atlantic it was about 38 percent. Enrollment rates in full-time general and technical schools for 15- to 18-year olds in these European nations nowhere exceeded 20 percent in 1930 and were probably less than 15 percent.



independent school districts in America—about 130,000 in the 1920s. Although many were common school districts of the open country, that still leaves thousands of town and city districts to compete with each other and make separate decisions on the expansion of secondary schools.

Secondary-school enrollment increased rapidly in the United States after 1910. Much of the increase was due to the building of high schools where none previously existed. Other margins shifted out as well. Existing schools became larger, more schools were built in large cities, and the high school curriculum was made more meaningful to youth who had previously dropped out to work.

The high school movement began in New England, but spread rapidly to the rich agricultural areas in the central part of the country and to the western states. By 1928 states in the New England, West North Central, and Pacific regions had enrollment rates of about 60 percent of the relevant age group and high school graduation rates of around 40 percent. These rates in 1910 had been less than 30 percent for enrollment and between 10 and 15 percent for graduation.<sup>42</sup> (See Figure 4 for a map giving contemporaneous graduation rates by state in 1928.) The laggards (less than 20 percent graduating), not surprisingly, included the entire South. But many of the industrial states also lagged. Enrollment rates in New York State and New Jersey, for example, were half those in Iowa and Nebraska in 1928. Part of the difference can be accounted for by the greater ability of youth to find employment in the “old” industries of the northeast, such as textiles. Another part is due to the greater fraction of foreign-born in the northeastern population.

In 1938 the leading regions had graduation rates around or exceeding 60 percent and enrollment rates greater than 80 percent, levels achieved by the entire United States in the mid-1950s. The industrial Northeast and Midwest closed much of the gap during the Great Depression when jobs for youths were scarce. Others, such as states in the South, did not close the gap until the 1950s.

Parents in the early-twentieth-century United States clamored to have their children go to high school. In a nation with an abundance of small school districts, each competed with the next to maintain population, particularly among small towns and rural areas.<sup>43</sup> The existence of numerous

<sup>42</sup> The enrollment and graduation rate data have been constructed from administrative records of all public and private secondary schools (including the preparatory divisions of universities). To construct the rates the enrollment numbers are divided by all 14- to 17-year olds and the graduate numbers are divided by all 17-year olds in the state. See Goldin, “America’s Graduation.”

<sup>43</sup> Many in rural farm areas saw the local high school as their only hope to maintain the current population and local youth. The 1911/12 *Iowa School Report* remarked that a high school will “stop the drift of the population to the cities” (p. 12). *Wallace’s Farmer* similarly noted that: “farmers of the district have been watching their boys and girls going to town schools and acquiring ideas that take them ultimately away from the farm. The farmers declare that a school is needed where regular high school studies are taught and other work closely allied with the farm and its problems” (21 March 1913, p. 519).

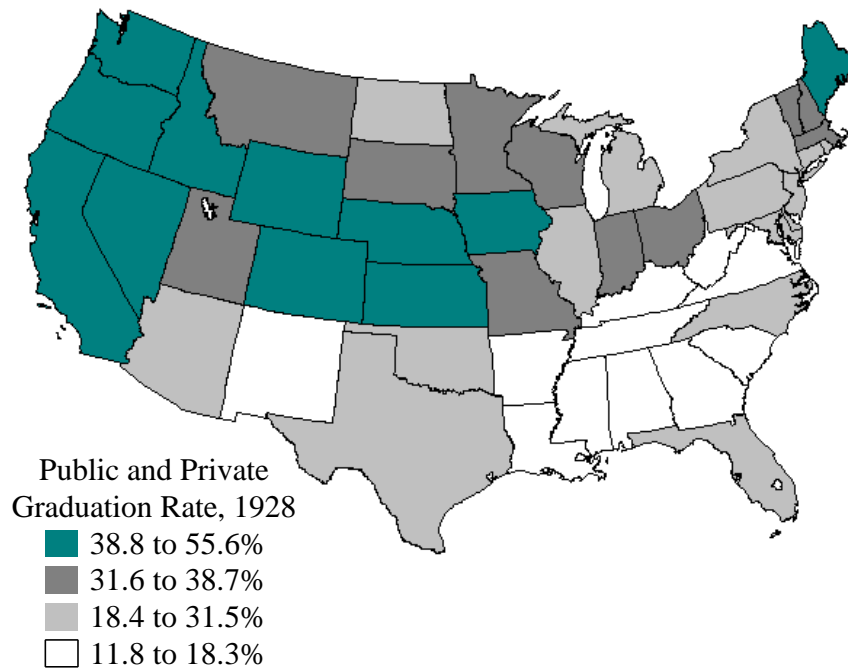


FIGURE 4  
PUBLIC AND PRIVATE HIGH SCHOOL GRADUATION RATES BY STATE, 1928

*Notes:* The public and private graduation rate is the number of graduates from all public and private secondary schools divided by the number of 17-year olds in the state.

*Source:* Goldin, "America's Graduation from High School."

small and medium-sized school districts in America may have served to increase secondary-school education in the first half of the twentieth century in comparison with the nationwide fiscal districts of much of Europe. When less than 50 percent of the electorate desires a public good, a decentralized system will agree to fund far more than a centralized system.<sup>44</sup>

Smaller districts are, on average, more homogeneous with respect to income, ethnicity, religion, and cultural values than are states, for example, and greater homogeneity of tastes produces more optimal public-goods outcomes. Education at the secondary and higher level in the early twentieth century was often viewed as providing "private," not public, goods. Unlike the elementary schools, which taught basic skills thought to be essential to a democracy and needed to coordinate commercial activity, high schools were often depicted as producing skills accruing entirely to

<sup>44</sup> When more than 50 percent of the electorate want the public good, the centralized system should agree to fund more than the decentralized system but because of hysteresis, this will not always be the case. The issue is taken up later in this essay.

the individual. The key was getting the community to fund the schools as an intergenerational loan. To accomplish that feat, the community had to be cohesive.<sup>45</sup>

But was a high school education different from spending more years at the local elementary school? A unique individual-level database from the Iowa State Census of 1915 allows the estimation of the impact of an additional year in high school versus in an elementary school or a common school. A year in a high school in the early twentieth century added more than 11 percent to the income of the individual, but a year beyond the usual grades in a common school added just 3 percent and one in a graded elementary school contributed 5 percent.<sup>46</sup> High schools, even with few students in small Iowa towns, apparently mattered. But why did they?

High schools in the 1910s, even small ones, endowed youths with skills and knowledge for the “new” economy. Algebra, geometry, and bookkeeping were offered in most high schools in Iowa in 1914. Larger schools had a more expanded curriculum that included various laboratory sciences and a range of practical courses such as mechanical drawing.<sup>47</sup> High school teachers had far better training than did those at the elementary-school level and many had college degrees.

I reiterate that the high school movement occurred at the grass-roots level. The federal government had virtually no involvement until much later in the twentieth century, and state compulsory education and child labor laws played only a minor role in the expansion of secondary-school education.<sup>48</sup> States provided financial incentives for the building of high schools and the creation of larger districts through consolidation, and they set up various standards for graduation. One important and much neglected factor at the state level was the passage of “free tuition” laws, which made a local school district responsible to pay tuition to a neighboring district if the home district lacked a high school. But these state involvements were minor compared

<sup>45</sup> See the discussion in Goldin and Katz, “Human Capital and Social Capital.” Alesina, Baqir, and Easterly, “Public Goods” demonstrate a negative relationship between “productive” public-goods spending and ethnic fractionalization. The United States was considerably more ethnically and culturally diverse than were most European nations, thus smaller districts enabled more homogeneity. But Europe had more subtle class and income distinctions that may have been reinforced by decision making at the national level.

<sup>46</sup> Goldin and Katz, “Education and Income,” table 4.

<sup>47</sup> Accredited high schools in Iowa in 1903 had to offer various language courses, have a laboratory facility, and at least two teachers, among other requirements set down to regulate whether the graduate of a particular high school could enter the state university. By 1914 accredited high schools also had to have an adequate library. Almost 70 percent of all Iowa high schools in 1914 listed a course in bookkeeping.

<sup>48</sup> Lleras-Muney, “Compulsory Attendance and Child Labor Laws,” uses the 1960 U.S. population census to estimate the impact of these laws on the educational attainment of individuals who were 14-years old from 1915 to 1939. Compulsory attendance laws by themselves, she finds, were ineffective in increasing years of schooling but combined with child labor laws they had a positive but small effect. See also Acemoglu and Angrist, “Social Returns to Education.”

TABLE 1  
RETURNS TO EDUCATION BY TYPE OF SCHOOLING AND OCCUPATION, 1914:  
MALES, BY AGE

Type of School, in Years	Type of Occupation				
	All	Nonfarm	Farm	Nonfarm	
				White-Collar	Blue-Collar
Males, 18 to 65 years					
Common school	0.0427	0.0400	0.0375	0.0275	0.0239
Grammar school	0.0533	0.0647	0.0232	0.0470	0.0585
High school	0.103	0.102	0.114	0.0609	0.0740
College	0.103	0.106	0.132	0.0783	0.0533
Males, 18 to 34 years					
Common school	0.0483	0.0375	0.0637	0.0438	0.0229
Grammar school	0.0693	0.0671	0.0568	0.0679	0.0634
High school	0.120	0.114	0.132	0.0826	0.0908
College	0.146	0.143	0.166	0.131	0.0575

*Notes:* Income data in the 1915 Iowa State Census is for 1914. All coefficients are significant at standard levels. The dependent variable is log (annual earnings). The coefficients come from ten regressions that include covariates, such as a quartic in potential experience, race and ethnicity dummies, and years in the United States for the foreign born. Blue-collar occupations include those in craft, operative, service, and laborer occupations (codes 300 to 988 using the 1940 census occupational classification). White-collar occupations include those in professional, semiprofessional, managerial (excluding farming), clerical, and sales occupations (codes 1 to 45, and 100 to 299 using the 1940 census occupational classification).

*Source:* Sample of the 1915 Iowa State Census, see Goldin and Katz, "Education and Income," tables 4, 5, and 6.

with the power of the central governments of Europe to control funding and curriculum.

I have already alluded to why the high school movement spread in the early twentieth century and to the role of the "new" economy. The Iowa data, mentioned previously, yield the earliest estimates of the returns to education for a large and diverse population.<sup>49</sup> The returns to a year of secondary school and college in Iowa were substantial in 1914 (see Table 1) and were almost double the return for similar individuals in Iowa in 1960.<sup>50</sup> Furthermore, the returns were high even *within* various occupations. For males 18- to 34-years old employed in white-collar trades, a year of high school increased earnings by 8 percent, and for those employed in blue-collar trades the return was 9 percent. Most important in an agricultural state such as Iowa is that fact that the educational return to farmers was as high as it was for others in the labor force. And as high as these estimated returns are, they must have been higher still. The data from the Iowa State Census can reveal the returns to education only among those who remained in Iowa. Those who left Iowa in the years to

<sup>49</sup> On the properties of the sample, see Goldin and Katz, "Education and Income."

<sup>50</sup> See Goldin and Katz, "Education and Income," figure 2.

come were among the best educated and earned more because of their migration.<sup>51</sup>

*Why Did the United States Take the Lead in the “Human-Capital Century”?*

Secondary schooling was of enormous value to young people in Iowa, and evidence from earnings differences by occupation suggests that it was also of great value in other states.<sup>52</sup> Why, then, did it diffuse at different rates throughout the United States? More important to the central questions of this essay, why did it not diffuse throughout Europe until much later in the twentieth century? The answer is that supply-side institutions in the United States were better able to respond to the demand-side shift, and they were better able to respond in certain parts of the United States than in others.

The states that led in the U.S. high school movement had higher taxable wealth per capita, less mobile older populations imparting community cohesiveness, a lower fraction of their labor forces in manufacturing, a greater fraction of youth in public colleges, lower fraction Catholic, and higher wages in manufacturing. The educational leaders also had more automobile registrations per capita. Although this variable does not give the distribution of income or wealth, it is an indicator of the fraction of the population above some cut-off level of income or wealth. In that way it is related to the fraction of the population in some middle- to upper-income group. Thus, the states that were better able to respond were richer, with a broader middle-income group, cohesiveness of population, and youth not enticed to quit school early. The results just mentioned hold, by and large, in levels for 1928 and in differences from 1910 to 1928.<sup>53</sup>

Can the factors that explain which U.S. states led in secondary school also help explain why European nations lagged? The answer is that only a small part of the differential diffusion between the United States and Europe in educational institutions can be explained by these factors.<sup>54</sup>

<sup>51</sup> The returns to a year of education, from a standard log annual earnings regression, for Iowa-born males in 1940 was 0.088, but was 0.066 for Iowa-born males currently residing in Iowa. Mean years of schooling for adult male workers born in Iowa was 10.9 years, but was 10.4 for those born in Iowa and still residing there in 1940. Thus a substantial fraction of the returns to schooling came through migration. Estimates use the IPUMS of the 1940 federal population census; see Goldin and Katz, “Education and Income,” fn. 63.

<sup>52</sup> On earnings differences by occupation, see Goldin and Katz, “Decreasing (and Then Increasing) Inequality.”

<sup>53</sup> Goldin and Katz, “Why the United States Led,” table 3; and Goldin, “America’s Graduation,” table 3. The South provides an interesting test case of egalitarian institutions. Even for white youth, the South was an educational laggard. It had lower income and wealth per capita and also wider distributions of both than the rest of the United States. But it also had a more restrictive franchise, extensive private schools, and greater state and county funding of education. See, for example, Margo, *Race*.

<sup>54</sup> In contrast, differences in enrollments between the United States and Canada can be more readily explained by income differences. The ratio of secondary-school enrollment rates in Canada, excluding the Maritimes and Quebec, to those in the United States was about 0.70 in c.1930 and the ratio of incomes

Cross-national differences were largely due to the factors that gave rise to the different templates. Some, such as geographic mobility and technological dynamism, were due to New World conditions such as greater land availability. Others, such as the earlier and more extensive franchise and fiscally independent local districts, may have arisen from ideological differences but may also have been rooted in different factor endowments and greater equality of condition in nineteenth-century America.

But these are not simple differences. Take, for example, decentralized versus centralized public-goods provision in the United States. If there were universal adult franchise but just less than one-half of the population favored expanding education, a centralized system would result in no expansion. A decentralized system, however, could result in school expansions in about half of all school districts, depending on the geographic concentration of the population with respect to the school decision. Thus, the United States may have led in educational advances in the early twentieth century because of its highly decentralized system. Other nations, however, should have caught up rapidly when the fraction favoring public education rose to more than one-half. But they often did not for a variety of reasons, some having to do with the persistence of “class” differences.

### *Impact of Expanding Secondary School Education*

The story thus far is that the “new” economy that emerged around the early twentieth century increased the demand for educated workers. The returns to education rose and became substantial even by the standards of the late twentieth century. The response in the United States was to create modern secondary schools that were general, practical, and flexible and enabled youths to continue with college or exit for work. More important, such schools sprouted across the country and diffused rapidly. In the short run they enabled youths, almost without regard to social background, to attend and graduate high school and to garner skills that were geographically mobile.<sup>55</sup> In the long run, they enabled a large fraction of Americans to attend college.

But what impact did the American template have on the economy and individual welfare? As more individuals gained greater years of education, the structure of wages narrowed, wage ratios for higher-skilled relative to lesser-skilled positions fell, and the returns to education decreased markedly. These changes occurred in two critical moments in the first half of the twentieth century. One was around the late 1910s to the early 1920s, and the

---

was 0.73 in 1913 and 0.70 in 1950. Secondary school enrollment divided by the number of 14- to 17-year olds was 0.37 in Ontario, 0.27 in Manitoba, 0.34 in Saskatchewan, 0.40 in Alberta, and 0.37 in British Columbia; in the entire United States it was about 0.50 and was about 0.60 in the states outside the South.

<sup>55</sup> There were, of course, many types of exclusions, some based on race and some based on income.

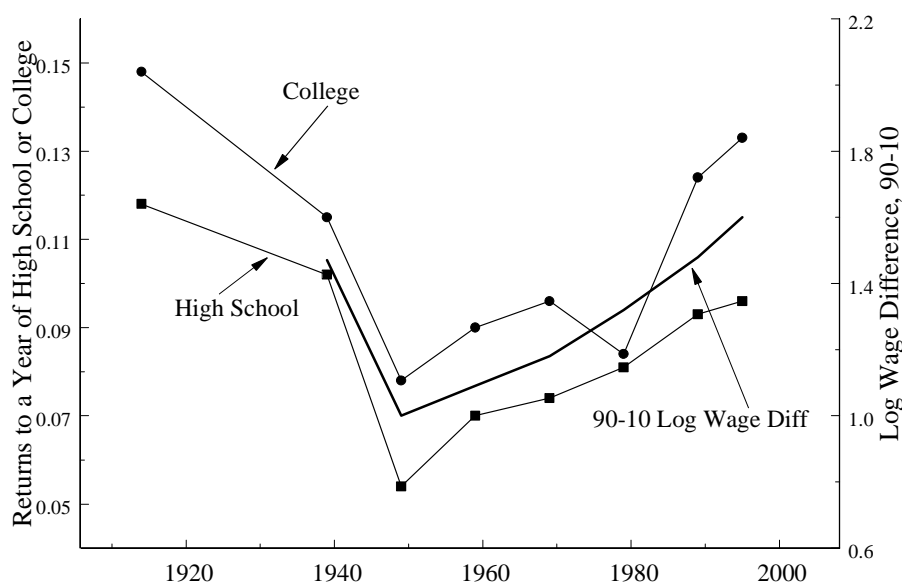


FIGURE 5  
RETURNS TO A YEAR OF SCHOOLING FOR MEN, 18- TO 34-YEARS OLD AND  
THE 90-10 LOG WAGE DIFFERENCE

*Notes:* The 90-10 log wage difference is from the 1940 to 1990 IPUMS and the 1990 and 1996 March CPS, and uses weekly wages for full-time, full-year, nonagricultural male wage and salary workers, 19- to 65-years old. Full-time, full-year workers are those working 35 hours or more per week and working at least 40 weeks in the previous calendar year.

*Source:* Goldin and Katz, "Decreasing (and Then Increasing) Inequality," table 4, figures 1 and 6.

other was during the 1940s. Both, therefore, occurred during periods of war. Although some of the compression was reversed after the wars, most of the narrowing remained.

The evidence for these compressions comes from various data sources. Some give the "between" variations in wages, such as those for various white-collar and professional occupations relative to blue-collar ones, as well as those for skilled manual relative to unskilled manual occupations. Others reflect the "within" variation in wages and give the wage structure of manufacturing industries at various points in time. Data also exist, as I noted before, on the returns to education at several points since 1914. These are given in Figure 5.<sup>56</sup> All of the data sets, including that in Figure 5, show declining inequality for the period before the 1950s and rapidly rising inequality after the mid-1970s. Of most importance here is that there was a narrowing in the wage structure and a reduction in the premium to education

<sup>56</sup> On the various data sets and the evidence on changing inequality across the twentieth century, see Goldin and Katz, "Decreasing (and Then Increasing) Inequality" and "Education and Income."

in the immediate post–World War I period that was reinforced and sustained into the 1950s.

The same is not true of Britain. The World War I compression in the British wage structure was markedly reversed after the cessation of hostilities. In the immediate post–World War II period, however, when secondary-school educational advances began in earnest, the compression remained in place.<sup>57</sup>

#### VIRTUES OF THE PAST, VICES OF THE PRESENT?

The U.S. system of education was characterized for much of the twentieth century by a set of virtues that included publicly funded mass secondary education that was open and forgiving, academic yet practical, secular, gender neutral, and funded by small, fiscally independent districts. These virtues were reinforced at the higher-education level by its competing private and public systems and layers of publicly supported institutions that are part of the forgiving educational system. During the first half of the twentieth century, and for some time after, the American template succeeded far better than did the competing templates of Britain, France, and Germany. The U.S. system produced a considerably larger group of educated citizens and workers. It did not, by and large, reinforce “class” distinctions, but rather, enabled social and geographic mobility and produced a large decrease in inequality in economic outcomes. It may also have increased technological change and economic growth, but that is a more difficult connection to establish.

But some of the characteristics that were deservedly deemed the virtues of the past now appear to contain vices. For example, a forgiving system without severe tracking at early ages may be egalitarian and nonelitist, but it is also one without strict standards. It may be considered virtuous when enrollment rates are low for young teenagers but it may spawn a system without standards and will discourage effort when enrollment rates are higher.

The system of small, fiscally independent districts dependent on property taxes and competing for residents may foster educational investments if there are wide differences in tastes and when enrollments are low. But it may also produce large differences in funding. Laws to equalize amounts spent per school child have been passed in almost all states since the 1970s but have had unintended and occasionally dire consequences.<sup>58</sup> States had historically responded to income differences by providing grants to poorer districts for schools and teacher salaries. But in more recent decades the response has been to impose on districts marginal taxes that are high, even greater than one.

<sup>57</sup> See Phelps Brown, *Inequality of Pay*.

<sup>58</sup> Hoxby, “All School Finance Equalizations.”



Rather than equalizing dollars per pupil holding mean expenditures constant, some rules appear to have actually lowered the mean amount spent per pupil and even that spent by districts at the lower end of the income distribution.

A general, academic education for most may enhance flexibility *ex ante*, but may, *ex post*, leave behind many in the lower part of the educational distribution. The United States, a century ago, looked to the German system of apprenticeship training and rejected it. When rising inequality in the 1980s and 1990s led to concerns over the lower part of the distribution, the German system was reconsidered and rejected again.

A secular educational system was crucial to maintaining fairness and support for public funding in a religiously pluralistic nation. But more recently the possible use of vouchers to create more competition for public school districts has been stymied in poor neighborhoods by the absence of all but parochial private schools.

Each of the characteristics just mentioned—open, forgiving, small fiscally independent districts relying on local property taxes, academic, secular—was once a virtue. Most still are. But changing circumstances have made some considerably less virtuous and others now appear to be vices.

Despite the cracks in the system, there is considerable persistence in the virtues. The states that provided more education in the past continue to do so even though their economic fortunes have changed. The high education states in 1928 (see Figure 6) were also, by and large, those with better educational performance records in 1993, measured by a wide-ranging index. The correlation is 0.60; in the absence of three outliers (CA, ND, and NV), the correlation is 0.77, a surprisingly high level of persistence over 65 years. One large and important state is obvious among the outliers—California. Its younger and older populations now differ in their demands for educational spending, and its per pupil expenditure, relative to that of the rest of the nation, has plummeted as an unintended consequences of state equalization.

The twentieth century was the human-capital century. America led other nations by a wide margin in the provision of general, formal education to the masses and did so because of characteristics—what I have called the virtues—that were shaped by New World endowments and Republican ideology. The characteristics remain, but all may no longer be virtues.

### *Appendix: Measuring Cross-Country Educational Attainment and Enrollment Rates*

There is no simple or easy way to make comparisons with regard to educational attainment and school enrollment rates across countries. Children in Sweden and other Nordic countries, for example, begin school at age seven; they do so today and have done so for

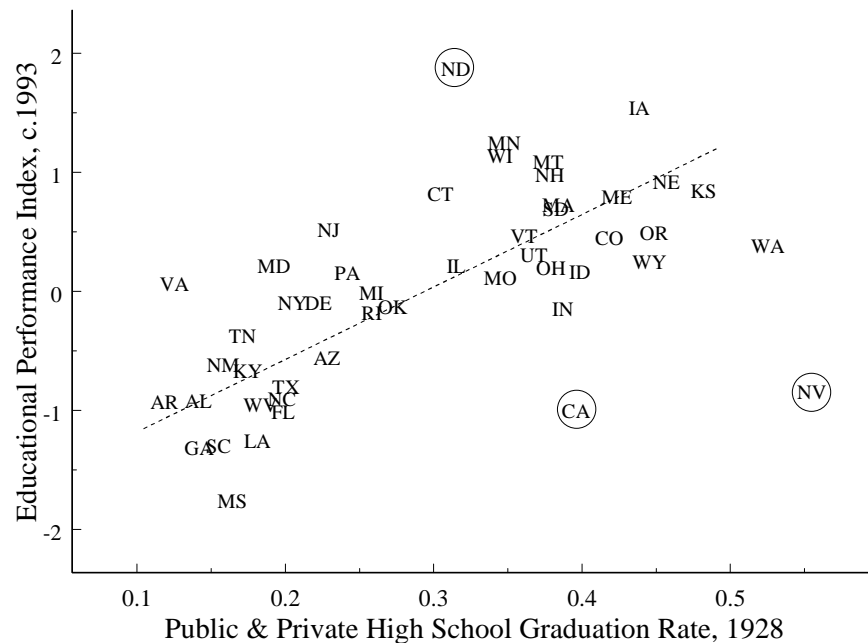


FIGURE 6  
PERSISTENCE OF EDUCATIONAL DIFFERENCES: 1928 AND c.1993

*Notes:* The educational performance index for c.1993 is an average of three components: (1) a combination of seven National Assessment of Educational Progress scores for 1990, 1992, and 1996; (2) the average Scholastic Aptitude Test score in 1993, adjusted for participation-rate differences among states; and (3) a measure of the high school dropout rate for 1990 to 1995 that combines four factors. The 1928 high school graduation rate includes all graduates of public and private secondary schools divided by the number of 17-year olds in the state.

*Source:* Goldin and Katz, "Human Capital and Social Capital."

much of the past. Children in France, however, begin school at age five. If the measure of schooling is the fraction in upper secondary school among those 15-to 19-years old, then Sweden will have a higher enrollment rate than France even if they both have the same fraction of youth who ever attended these schools. Some measures, therefore, try to take into consideration the age group in the type of school considered (for example, UNESCO data). But the number of countries that report the age of students is limited even today. It is unwise and often highly misleading to use the type or name of school as a guide for classification since "secondary school" once began for certain children at age 11 in Britain, but has almost always begun at age 15 (with ninth grade) in the United States. (See Maddison, "Growth and Slowdown," for an example of the confusion that can result from using type or name of school.) Further complications arise because some countries have full-time technical training and some have part-time work-study arrangements. All of these examples show the need for various measures of enrollment rates. Some will be useful in comparing the total number of youths being educated or trained. Some will be useful to show the fraction who are prepared to continue with college or university.

*Fraction of 15- to 19-year olds enrolled full-time in secondary schools:* gives the number

of students in full-time secondary schools who are between 15- and 19-years old, (that is, individuals turning 15-years old during one of the included grades but not turning 20-years old), divided by the number of youths in the population in these age ranges. In computing the denominator one-half the number of 14-year olds and one-half the number of 19-year olds was added to those 15- to 18-years old. No individuals in colleges and universities were included, but those in full-time lower secondary schools were, if they met the conditions just stated. The students were primarily those in upper secondary schools (high schools in the United States that included ninth to twelfth grades) but also included some in lower secondary schools (ninth graders in the United States in junior high schools). The definition is due to Dewhurst, et al., *Europe's Needs and Resources*, who produced the data for 18 countries in 1955/56. The computations for c.1938 and c.1975 were done for consistency with the procedure devised by Dewhurst et al.

*Gross Enrollment Rate (GER)*: gives the fraction of individuals in an age group who are currently enrolled in a particular level of school (for example, upper secondary). The age group in the UNESCO data is supposed to be tailored to that included in the school level for the particular nation. The GER can exceed 100 percent if some youth outside the usual age group, for various reasons, are enrolled in that level of schooling. See UNESCO, <http://unesco.stat.unesco.org/en/stats/stats0.htm>.

#### REFERENCES

- Acemoglu, Daron, and Joshua Angrist. "How Large are the Social Returns to Education? Evidence from Compulsory Schooling Laws." NBER Working Paper no. 7444, December 1999.
- Acemoglu, Daron, and James A. Robinson. "Why Did the West Extend the Franchise? Democracy, Inequality and Growth in Historical Perspective." *Quarterly Journal of Economics* CXV (November 2000): 1167–99.
- Acemoglu, Daron, and Fabrizio Zilibotti. "Productivity Differences." *Quarterly Journal of Economics* CXVI (May 2001): forthcoming.
- Alesina, Alberto, Reza Baqir, and William Easterly. "Public Goods and Ethnic Divisions." *Quarterly Journal of Economics* 114 (November 1999): 1243–84.
- Baines, Dudley. *Migration in a Mature Economy: Emigration and Internal Migration in England and Wales, 1861–1900*. Cambridge: Cambridge University Press, 1985.
- Chapman, Paul David. *Schools as Sorters: Lewis Terman, Applied Psychology, and the Intelligence Testing Movement, 1890–1930*. New York: New York University Press, 1988.
- Curti, Merle. "America at the World Fairs, 1851–1893." *American Historical Review* 55 (July 1950): 833–56.
- Dewhurst, J. Frederic, John O. Coppock, P. Lamartine Yates, and Associates. *Europe's Needs and Resources: Trends and Prospects in Eighteen Countries*. New York: Twentieth Century Fund, 1961.
- Easterlin, Richard. "Why Isn't the Whole World Developed?" *This JOURNAL* 51 (March 1981): 1–19.
- Eichengreen, Barry. "Can the Maastricht Treaty Be Saved?" *Princeton Studies in International Finance*. Princeton, NJ: Princeton University, International Economics Section, December 1992.
- Elbaum, Bernard. "Why Apprenticeship Persisted in Britain but Not in the United States." *This JOURNAL* 49 (June 1989): 337–49.
- Engerman, Stanley L., and Kenneth L. Sokoloff. "The Evolution of Suffrage Institutions

- in the New World: A Preliminary Look." Unpublished manuscript, UCLA, June 2000.
- Ferrie, Joseph P. "A New Sample of Males Linked from the Public Use Micro Sample of the 1850 U.S. Federal Population Census to the 1860 U.S. Federal Census Manuscript Schedules." *Historical Methods* 29 (Fall 1996): 141–56.
- Flora, Peter, Jens Alber, Richard Eichenberg, et al. *State, Economy, and Society in Western Europe, 1815–1975*. Vol. I. *The Growth of Mass Democracies and Welfare States*. Frankfurt: Campus Verlag, 1983.
- Galor, Oded, and Omer Moav. "Ability-Biased Technological Transition, Wage Inequality, and Economic Growth." *Quarterly Journal of Economics* 115 (May 2000): 469–97.
- Goldin, Claudia. *Understanding the Gender Gap: An Economic History of American Women*. New York: Oxford University Press, 1990.
- . "America's Graduation from High School: The Evolution and Spread of Secondary Schooling in the Twentieth Century." *This JOURNAL* 58 (June 1998): 345–74.
- Goldin, Claudia, and Lawrence F. Katz. "The Origins of Technology-Skill Complementarity." *Quarterly Journal of Economics* 113 (June 1998): 693–732.
- . "The Shaping of Higher Education: The Formative Years in the United States, 1890 to 1940." *Journal of Economic Perspectives* 13 (Winter 1999): 37–62.
- . "Human Capital and Social Capital: The Rise of Secondary Schooling in America, 1910 to 1940." *Journal of Interdisciplinary History* XXIX (Spring 1999): 683–723.
- . "Education and Income in the Early Twentieth Century: Evidence from the Prairies." *This JOURNAL* 60 (September 2000): 782–818.
- . "Decreasing (and Then Increasing) Inequality in America: A Tale of Two Half Centuries." In *The Causes and Consequences of Increasing Income Inequality*, edited by F. Welch, pp. 37–82. Chicago, IL: University of Chicago Press, 2001.
- Hansen, Hal Eugene. "Caps and Gowns: Historical Reflections on the Institutions that Shaped Learning for and at Work in Germany and the United States, 1800–1945." Ph.D. dissertation. Department of History, University of Wisconsin-Madison, 1997.
- Hoxby, Caroline M. "All School Finance Equalizations Are Not Created Equal." *Quarterly Journal of Economics* 116 (November 2001): forthcoming.
- Hughes, Gordon, and Barry McCormick. "Housing Markets, Unemployment and Labour Market Flexibility in the U.K." *European Economic Review* 31 (April 1987): 615–41.
- Iowa. *Report of the Department of Public Instruction for [year]*. *Iowa School Report*. Des Moines, IA: State Printer, [year]
- Keysser, Alexander. *The Right to Vote: The Contested History of Democracy in the United States*. New York: Basic Books, 2000.
- Krug, Edward A. *The Shaping of the American High School: 1880–1920*. Madison: University of Wisconsin Press, 1964.
- Lebergott, Stanley. *The Americans: An Economic Record*. New York: W.W. Norton, 1984.
- Lee, Everett. S. "The Turner Thesis Reexamined." *American Quarterly* 13 (Spring 1961): 77–83.
- Lindert, Peter H. "The Comparative Political Economy of Mass Schooling before 1914." University of California at Davis Working Paper, 2000.
- Lleras-Muney, Adriana. "Were Compulsory Attendance and Child Labor Laws Effective? An Analysis from 1915 to 1939." Unpublished manuscript, Columbia University, 2000.
- Maddison, Angus. "Growth and Slowdown in Advanced Capitalist Economies: Techniques of Quantitative Assessment." 25 *Journal of Economic Literature* (June 1987): 649–98.
- Margo, Robert A. *Race and Schooling in the South, 1880–1950: An Economic History*. Chicago: University of Chicago Press, 1990.
- Massachusetts. Commission on Industrial and Technical Education. *Report of the Commission on Industrial and Technical Education*. Boston: Wright & Potter Printing Co.,

- State Printers, 1906.
- Massachusetts. Commission on Industrial Education. *Report of the Commission on Industrial Education*. Public document no. 76. Boston: Wright & Potter Printing Co., State Printers, 1907.
- McKenzie, Fred A. *The American Invaders: Their Plans, Tactics, and Progress*. New York: Street & Smith, Publishers, 1902.
- Mosely, Alfred. *Mosely Industrial Commission: Reports of the Delegates*. Manchester: Co-operative Printing Society, 1903.
- Nelson, Daniel. *Managers and Workers: Origins of the New Factory System in the United States, 1880–1920*. Madison: University of Wisconsin Press, 1975.
- Nelson, Richard, and Gavin Wright. “The Rise and Fall of American Technological Leadership.” *Journal of Economic Literature* 30 (December 1992): 1931–64.
- Noble, David F. *America by Design: Science, Technology, and the Rise of Corporate Capitalism*. New York: Alfred A. Knopf, 1979.
- Nye, David E. *Electrifying America: Social Meanings of a New Technology*. Cambridge, MA: MIT Press, 1990.
- Oleson, Alexandra, and John Voss, eds. *The Organization of Knowledge in Modern America, 1860–1920*. Baltimore, MD: Johns Hopkins University Press, 1979.
- Organisation for Economic Co-operation and Development (OECD). *Education at a Glance, OECD Indicators: 1998*. Paris: OECD, 1998.
- Phelps Brown, Henry. *The Inequality of Pay*. Oxford: Oxford University Press, 1977.
- Ravitch, Diane. *Left Back: A Century of Failed School Reforms*. New York: Simon & Schuster, 2000.
- Ringer, Fritz K. *Education and Society in Modern Europe*. Bloomington: Indiana University Press, 1979.
- Roman, Frederick William. *The Industrial and Commercial Schools of the United States and Germany: A Comparative Study*. New York: G. P. Putnam’s Sons, 1915.
- Rotella, Elyce. *From Home to Office: U.S. Women at Work, 1870–1930*. Ann Arbor, MI: UMI Research Press, 1981.
- Ryan, Bryce, and Neal Gross. *Acceptance and Diffusion of Hybrid Corn Seed in Two Iowa Communities*. Research Bulletin no. 372. Agricultural Experiment Station, Sociology Subsection. Ames: Iowa State College of Agriculture and Mechanic Arts.
- Sandberg, Lars G. “The Case of the Impoverished Sophisticate: Human Capital and Swedish Economic Growth before World War I.” *This JOURNAL* 29 (March 1979): 225–41.
- Sawyer, John E. “The Social Basis of the American System of Manufacturing.” *This JOURNAL* 14 (Autumn 1954): 361–79.
- Schultz, Theodore W. *Transforming Traditional Agriculture*. New Haven, CT: Yale University Press, 1964.
- Stanley, Marcus. “Higher Education and the Mid-Century GI Bills.” Kennedy School of Government, Harvard University, February 2000.
- Thomas, Alfred A. *National Cash Register Factory, as Seen by English Experts of the Mosely Industrial and Educational Commission*. Dayton, OH, 1904.
- U.S. Department of Education. *120 Years of American Education: A Statistical Portrait*. Washington, DC: GPO, 1993.
- U.S. Department of Labor. Bureau of Labor Statistics. *Descriptions of Occupations: Coal and Water Gas, Paint and Varnish, Paper, Printing Trades, Rubber Goods; Electrical Manufacturing Distribution and Maintenance; Glass; Medicinal Manufacturing*. Prepared for the U.S. Employment Service. Washington, DC: GPO, various years 1918–21.
- United Nations. Organization for Education, Science and Culture (UNESCO). Website. <http://unesco.stat.unesco.org/en/stats/stats0.htm>.

*Wallace's Farmer*. Des Moines, IA, 1913.

Williams, Ernest Edwin. *Made in Germany*. London: W. Heinemann, 1896.