

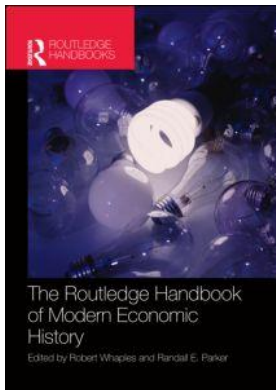
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THE ECONOMIC HISTORY OF EDUCATION

David Mitch¹

That humans would make provision for the development of their offspring is to be expected, given the length of time between birth and maturity we experience as a species. And there is evidence from early in recorded human history of provision for apprenticeship and markets in training and instruction. Nevertheless, it is only in the last few centuries that provision of formal instruction and schooling has become widespread and indeed has become a gauge of potential for economic development. Economists since Adam Smith, if not earlier, have argued that the performance of an economy has been influenced by the education of its work force (Johnson 1937). These developments call for consideration of both the causes and consequences of the rise of education in historical perspective.

Students and their parents have purchased instructional services from ancient times onwards and there is evidence that in some ancient Greek city states the society and state were involved as well (Cubberley 1920). One can distinguish two types of instructional markets. One is characterized by direct outlays in payment and by the transmission of knowledge and skills from teacher to student. In contrast, a second type of market, apprenticeship, which can be documented from the Code of Hammurabi circa 1700 BC (Westermann 1914: 304) onwards, can be characterized by access to experiential learning opportunities financed by making the labor services of the learner available to sponsors of apprenticeship. By the high Middle Ages, apprenticeship came to be associated with guilds. Some historians have argued that the time required for completing an apprenticeship considerably exceeded that required to master a given craft and that guild-sponsored apprenticeship largely constituted a barrier to entry into skilled occupations rather than a means of conveying skill (Ogilvie 2008). However, other scholars have argued that apprenticeship constituted an efficient means of facilitating and financing access to experiential training opportunities (Epstein 1998, 2008; Humphries 2003). Institutional procedures, such as the Statute of Artificers established in England in 1563, developed to foster and regulate apprenticeship (Minchinton 1972).

There is little indication of systematic, centralized provision of schools and instructional services prior to the Protestant Reformation. Botticini and Eckstein (2005, 2007) argue that Judaism as a “religion of the Book” cultivated far higher rates of adult literacy than other populations in ancient and medieval times. Instructional services in the medieval period were available through local and itinerant teachers and schools run by the clergy themselves, with affiliated religious sponsorship, by lay philanthropic foundations or for profit (Graff 1987; Moran Cruz 1985).

While the medieval university has been associated with arid, academic scholasticism, it was in fact often centered around the professional faculties of Law, Medicine, and Theology (Cubberley 1920). Joan Simon's summary description of education resources in the English county of Leicestershire in the early seventeenth century, admittedly from the early modern period, can be deemed to apply to the medieval period as well: "a nucleus of organized schools in the main centres, then parish schools interspersed with lesser foundations in the countryside and, on a more casual basis, curates and schoolmasters engaged in teaching whose qualifications gradually rose" (Simon 1966: 376).

Trends in educational participation and attainment

Although available estimates are quite fragmentary, the extent of schooling and corresponding literacy attainment in the later Middle Ages and early Renaissance appears to have varied considerably according to social class and gender and also according to locality and between town and country (Houston 2002). While major gaps remain, available evidence suggests considerable improvement in schooling and literacy activity following the onset of the Protestant Revolution in the early sixteenth century. Cressy's (1980: 176–7) rough estimates of literacy for England, based on signature ability, show an increase from only around 10 per cent for men and 2 or 3 per cent for women in 1500 to around 60 per cent for men and 40 per cent for women in 1750. Johansson's estimates for Swedish parishes show increases from under 50 per cent prior to 1620 to over 80 per cent by 1690 (Johansson 1987: 87). Allen (2003: 415) develops estimates of adult signature ability based on urbanization shares. He finds that in 1500 the proportion of adults who could sign their names across Europe varied from a low of 6 per cent for England, Germany, Austria-Hungary, and Poland to a high of 10 per cent in Belgium and the Netherlands; he puts the percentage for France at 7 per cent and for Italy and Spain at 9 per cent. He then reports based on firmer evidence that in 1800 the adult signature rate varied from low values of 20 per cent for Spain, 21 per cent for Austria-Hungary and Poland, and 22 per cent for Italy to intermediate levels of 35 per cent for Germany, 37 per cent for France, 49 per cent for Belgium, and 53 per cent for England to a high of 68 per cent for the Netherlands.

By the eighteenth century, a distinct minority of adult populations throughout most regions of the world possessed even minimal literacy and numeracy skills. In 1800, the only areas of the world in which a clear majority of adults had basic literacy skills were North America, Germany, and Scandinavia. In 1900, these areas had been joined by much of the rest of Western Europe, most notably Britain and France. Throughout the rest of the world, literacy and exposure to primary education were still relatively uncommon at this time (Graff 1987).

Benavot and Riddle's (1988) compilation of primary school enrollment rates indicates that in 1890 the majority of children in the world aged 5–14 were not enrolled in primary schooling at any particular point in time, though a substantial proportion probably saw the inside of a schoolroom at some point during childhood. For a collection of 66 countries for which there are consistent data, they report (see Figure 22.1) that the primary school enrollment rate for children aged 5–14 was 32.9 per cent in 1890 and had risen to 51.7 per cent by 1935–40. For a broad group of 120 countries for which data are available in the latter time period, primary school enrollment rate was 40.9 per cent. Across regions, this ranged from 79.1 per cent for North America and Oceania, 72.1 per cent for Northern Europe, 48.2 per cent for Eastern Europe, 30.6 per cent for Asia, and 19.6 per cent for sub-Saharan Africa.

Economic historians have recently used age-heaping as an alternative way to measure trends in human capital development. The logic behind this measure is that populations with little exposure to numeracy tend to report numerical ages disproportionately ending in either 0 or 5.

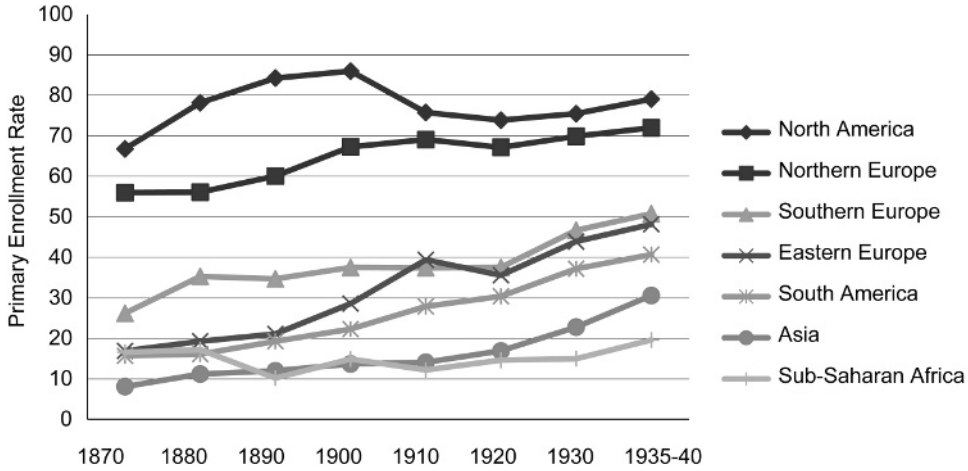


Figure 22.1 Trends in percentage of children aged 5–14 enrolled in school, by region of the world, 1870–1940

Source: Benavot and Riddle (1988).

As populations become more accustomed to working with numbers, the tendency for ages to heap at numbers ending in either 0 or 5 tends to decline. Employing indexes based on this measure, one recent study found that in Western Europe the percentage of adults correctly reporting their numerical age had already reached 70 per cent by 1600 and rose to 90 per cent by 1700. For Northern Italy, where longer-run estimates are available, this percentage rose from 31 per cent in 1350 to 89 per cent in 1750. The authors employ data from a study of grave inscriptions to infer that in Rome between 0 and 200 AD, the rate was 55 per cent (A’Hearn *et al.* 2009: 803). They suggest that, by this measure, numeracy became widely diffused in these populations prior to literacy as measured by signature ability. While they find that in the Eastern European areas of Bohemia, Hungary, and Russia numeracy rates in the mid-1600s were in the range of 30 to 45 per cent, considerably lower than what they report for Western Europe, by 1800 considerable convergence had occurred towards Western European levels. In a separate study of global age-heaping trends, Crayen and Baten (2010) find that in 1850 numeracy levels in South Asia, the Middle East, North Africa, and Southeast Asia were considerably lower than in industrialized areas of Western Europe, Japan, and North America, but that considerable convergence had occurred between these regions by 1940.

As Table 22.1 and Figure 22.2 indicate, by the end of the twentieth century, the rest of the world was clearly catching up with developed countries at the primary schooling level. For the world as a whole, male gross primary enrollment rates were 102 per cent in 1999 rising to 109 per cent in 2010. Since gross enrollment rates are measured relative to the primary school-aged population, countries enrolling students out of age range in primary schools can have gross enrollment rates exceeding 100 per cent.

World literacy rates have been estimated at 80 per cent in the year 2000 with literacy rates for countries classified as least developed at 50 per cent. By 2005–9, adult literacy had increased to 84 per cent and for Africa had reached 63 per cent, with female literacy rates at 79 per cent for the world and in Africa at 54.6 per cent. Enrollment rates of primary school-aged children indicate rapid catch-up across regions of the world over the last decade (1999–2010), with rates approaching 100 per cent even for sub-Saharan Africa. Differences by gender have

Table 22.1 Primary school enrollments around 2000

	Males		Females	
	1999	2010	1999	2010
World	102	109	94	105
South and West Asia	97	113 (2007)	81	107 (2007)
Arab States	93	102	81	94
Sub-Saharan Africa	86	105	73	97

Source: UNESCO Institute for Statistics (2001), Reports, Table 20D.

Note: Primary gross enrollment rate is defined as number of students enrolled in primary school as a percentage of the primary school-age population. This percentage can exceed 100 due to enrollment of students older than primary age.

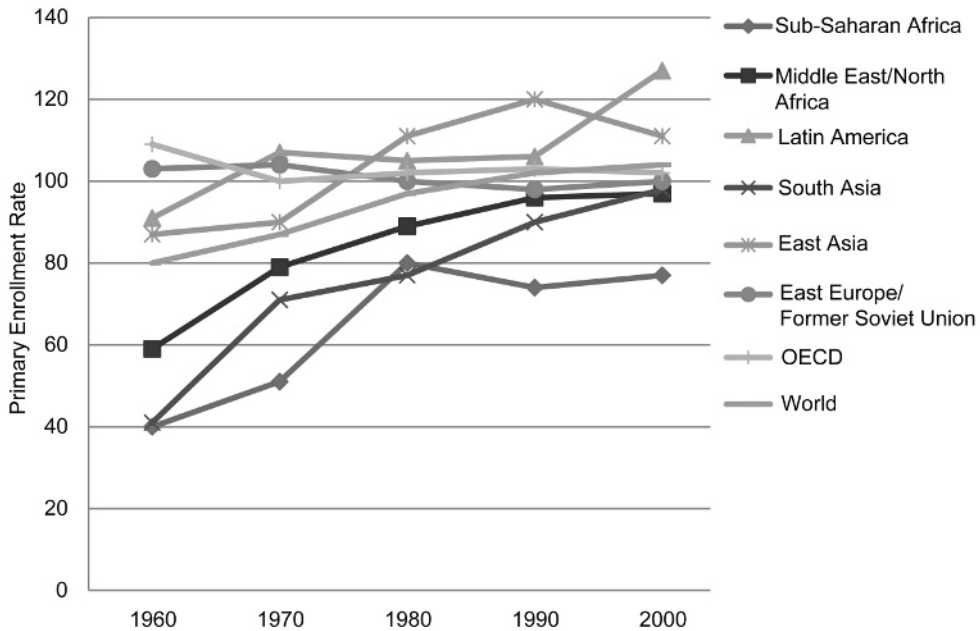


Figure 22.2 Primary gross enrollment rates by regions of the world, 1960–2000

Source: Glewwe and Kremer (2006).

Note: Primary gross enrollment rate is defined as number of students enrolled in primary school as a percentage of the primary school-age population. This percentage can exceed 100 due to enrollment of students older than primary age.

persisted. Nevertheless, for the world as a whole, the ratio of female to male literacy rates rose from 0.77 in 1970 to 0.86 in 2000 and for countries classified as least developed from 0.41 in 1970 to 0.67 in 2000 (UNESCO Institute for Statistics 2011).

Although enrollments in primary schooling have grown remarkably in the last half-century, especially in developing countries, the impact of these gains on educational attainment has been impeded by erratic patterns of school attendance and the frequently very low quality of schooling in developing countries (Glewwe and Kremer 2006).

The evidence of convergence for secondary and tertiary education over the last century is less pronounced (see Figure 22.3). Prior to 1900, only a small minority of adults completed

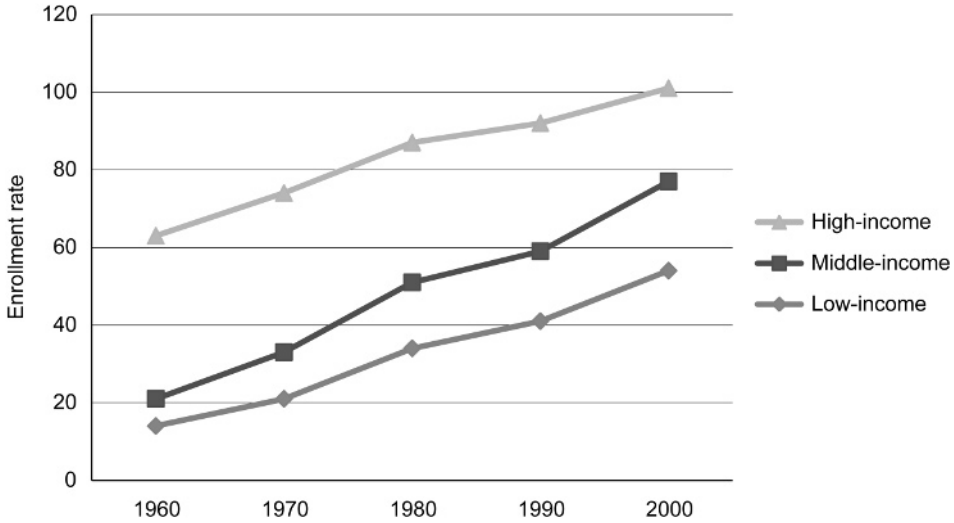


Figure 22.3 Trends in secondary gross enrollment rates for countries grouped by income per capita, 1960–2000

Source: Glewwe and Kremer (2006).

Note: Secondary gross enrollment rate is defined as the number of students enrolled in secondary schools as a percentage of the total population of secondary age. This percentage can exceed 100 if students of non-secondary age enroll in secondary school.

secondary or higher education even in the most developed countries of the world. Between 1970 and 2000, enrollments for those of secondary age in developed countries rose from 76 to 100 per cent and for least developed countries from 10 to 19.3 per cent. For higher education, the percentage rose from 26 to 52 per cent for developed countries and from 1 to 3.2 per cent for least developed countries. And similar trends have continued since 2000 (UNESCO Institute for Statistics 2011). In 1990, the mean years of schooling completed in the developed world was 10 years, but only 3.7 years for the developing world.

While the catch-up in enrollment rates in higher education has been modest for developing countries, their absolute population size has implied that they have started to overtake the United States as global suppliers of highly educated workers. From the 1970s onwards, enrollment rates have grown faster in developing countries, such as India and China, in higher education. In 1970, 29 per cent of the world’s college students regardless of nationality were studying in the United States; by 2006, this share had fallen to 12 per cent while in the same year the share of developing countries was almost 75 per cent. By 2004, China produced 57 per cent as many PhDs in science and engineering as the United States and it is projected to soon overtake the U.S. (Freeman 2009). (It should be noted, however, that this makes no allowance for quality differences in higher and doctoral education between developed and developing countries.)

Also striking has been the overtaking of men by women in enrollment in higher education in most developed countries in recent decades. Beginning in the 1970s, enrollment of women in higher education grew at a faster rate than men and, by 2004, the majority of university students in 21 of 25 advanced countries were women (Freeman 2009; Goldin *et al.* 2006).

Expenditure shares of national income devoted to schooling appear to have risen during the first half of the twentieth century. Edding estimates for a group of five developed countries that

expenditure on public education rose from about 1–2 per cent of national income around 1900 to 4–5 per cent by 1960 (Edding 1966: 26; Blaug 1970: 127–36). However, by 1999, the OECD average expenditure on non-tertiary schooling relative to gross domestic product (GDP) had leveled at 3.6 per cent (OECD 2002). Glewwe and Kremer (2006) note that, while expenditure on education relative to GDP in 2000 was larger in higher-income than lower income countries, the differences were not pronounced. And while expenditure per student relative to GDP per capita was higher in higher-income than lower-income countries, the gaps narrow considerably once allowance is made for price differences in non-traded goods and services across countries.

The rise of mass schooling: factors influencing public provision of schooling

Instruction of any sort can be privately supplied in the marketplace. Why, then, have societies increasingly turned toward the public provision of schooling?

The primary reason may be that people have increasingly come to see education as having significant benefits to society at large. Over time and cross-sectionally, the public share in total educational expenditure and enrollment in publicly managed schools relative to privately managed schools generally rises with the level of economic development (James 1993; Lott 1990; Fernandez and Rogerson 2001). Thus, in explaining the rise of schooling in recent centuries, a central focus has been the rise of public support for schooling.

Although there has not been a uniform path to the diffusion of mass schooling, scholars have distinguished some basic factors at work. Regarding motives, one useful distinction is between the public provision of education due to neighborhood effects – effects that fall beyond those obtaining the education – and the public provision of education as a means of redistribution from segments that pay a disproportionate share of the cost of education to those who realize a disproportionate share of the benefits. Both motives appear to have been present historically. Regarding the means of providing and funding public education, some accounts have emphasized the role of centralized institutions such as national governments or church hierarchies. This perspective argues that centralized governments and religious institutions can fund and set high standards for mass schooling as well as pursue universal involvement much more effectively than localized entities. However, other accounts have emphasized the importance of local community interests. And the counterargument for this position is that, without local support and enthusiasm for the spread of education, individual schools would have been unlikely to attract students or be effectively supervised. Beadie (2010a) provides a useful overview of the historical literature on these contrasting perspectives. John Stuart Mill (1861) set forth the classic argument for federalism in the provision of schooling with both centralized setting of standards and local monitoring suggesting the contrasting virtues of both centralized and decentralized provision. Beadie's (2010b) careful case study of a New York State antebellum community delineates the effective interaction between local community-level and regional-level actors in the rise of public schooling in the first half of the nineteenth century.

Even free-market advocates have noted that mass schooling has distinctive features from other commodities and services that can generate market failures. Both Adam Smith and Milton Friedman exhibited a clear preference for private provision and the role of profit incentives in instructional markets. Nevertheless, both also acknowledged a significant role for government in the market for schooling. Smith (1776) acknowledged the value in his native Scotland of the schools that localities had funded in each parish. As Friedman (1962) notes, the schooling of children raises both neighborhood effects – the schooling of other people's children affects me

and my own children – and paternalism effects – poor or good decisions by parents can affect their children’s schooling and life outcomes.

An important historical influence on the rise of mass education has come from religious groups. They have been important not only as sources of financial support for schooling but also for establishing doctrines and ideology either supportive of or impeding the spread of popular schooling. They have frequently been active in the establishment and funding of schools not only as a way of cultivating literacy and other cognitive skills but also as ways of propagating their own religious beliefs and related non-cognitive behaviors. For some religious groups such as the Jews and early modern Scandinavian Lutherans, the cultivation of religion seems to have been complementary with that of literacy and related cognitive skills (Botticini and Eckstein 2005, 2007; Johansson 1987). However, there is also evidence of opposition by religious elites (among others) to working-class schooling in early nineteenth-century England (Kaestle 1976) and evidence that Muslim emphasis on religious schooling displaced secular schooling in early twentieth-century India, even though the secular schooling was likely to have been more effective in propagating literacy (Chaudhary and Rubin 2011).

Historians of education often associate the Protestant Reformation with the perception of neighborhood and paternalism effects for popular schooling. The simplest and most commonly articulated version of this association is that Martin Luther and other Protestant leaders of his era emphasized the importance of the ability of the individual believer to read the Bible, and this in turn led church and lay leaders to paternalistically diffuse instruction in reading among the general populace. As a *post hoc propter hoc* explanation, this seems to work well in broad-brush cross-country terms. Scandinavia and Germany became early leaders in the spread of popular instruction following the Reformation in those countries (see Becker and Woessmann 2009 for detailed statistical and econometric analysis). However, deeper examination by historians has revealed considerable ambiguity in the causal mechanisms and channels of influence at work, and in the timing of the spread of reading ability and literacy following the Reformation in the sixteenth and seventeenth centuries (Craig 1981). Gawthrop and Strauss (1984) have challenged the direct connection between Lutheran or other Protestant doctrine and the promotion of popular Bible reading.

Another related line of analysis has emphasized the value to national religious and political leaders of using schooling to promote doctrinal and cultural uniformity whether in religious practice, patriotism, or loyalty to political ideology. Gawthrop and Strauss (1984), in their analysis of the relationship between Protestantism and the development of schooling networks, argue for the importance of local rulers, Catholic as well as Protestant, in using control over schooling to promote homogeneity of religious belief. Melton (1988) as well as Gawthrop and Strauss (1984) argue that an important follow-up impetus to Luther’s Reformation was the late seventeenth- and eighteenth-century Pietist movement, which viewed popular education as a means of social control in eighteenth-century Austria and Prussia. Vaughan and Archer (1971) and Green (1990) consider the role of centralized control over schools as a way of promoting social uniformity in their comparative studies of Britain, France, and the U.S. Beadie (2010a) contrasts the decentralized provision in the U.S. with these European comparative studies.

For the twentieth century, Lott (1990) argues that totalitarian regimes have been disproportionately likely to promote schooling as a way of promoting ideology supportive of their regimes.

It should be noted that the motives for educational provision and funding in all these cases often focuses on the impact of schooling on the non-cognitive behaviors of students, what could loosely be labeled social control, because it aimed to instill order in populations and reduce tendencies to crime, disorder, and improvident behavior, rather than schooling as a way of enhancing labor market productivity.

Much recent work by economic historians has emphasized the importance of redistributive coalitions in motivating the development of public education. The general claim is that public schooling has emerged and developed when it has been feasible for political coalitions to arise that favor redistribution of resources via taxes to support schools. A number of analyses of the uneven development and access to schooling and literacy by race in the postbellum U.S. South reflect the distributional dimensions of schooling (see, for example, Margo 1990). In contrast, Goldin and Katz (2008), in their assessment of what they term the “virtues” of U.S. schooling, argue that homogeneity of local communities implied that agreement could be reached on acknowledging the neighborhood and paternalistic externalities of schooling and hence for support of schooling, thus avoiding gridlock over distributional conflicts. Consistent with this view, Alesina *et al.* (1999) argue that diversity and fragmentation among interest groups has impeded support for funding public goods such as schooling in the late twentieth-century U.S. Lindert’s (2004) international comparative analysis of the rise of mass schooling gives prominent place to the timing of the franchise, which he argues reflects the use of popular voting power to support public schooling as a way of redistributing resources to the masses, as does Stasavage’s (2005) study of Africa. Engerman *et al.* (2009) suggest that differences in inequality in access to political power explain the stark differences between North and South America in the timing and extent of support for mass education. In the United States and Canada, egalitarian ideology and increasing access to the franchise implied the use of public funding to redistribute resources to lower- and middle-income groups in the funding of schooling. However, in South America, the much greater inequality of wealth and political power implied much greater reluctance of elites to fund popular education or of lower classes to demand it. Recent studies of developing areas have also pointed to the presence of distributional coalitions hostile to support of mass education (see, for example, Chaudhary 2009 on India). However, research on India has also suggested that the colonial British establishment of secondary education contributed to higher levels of secondary enrollment in the early twentieth century than in France or Japan, and contributed to the development of India’s service sector (Chaudhary 2009; Broadberry and Gupta 2010).

A number of scholars, including Engerman and Sokoloff (2000), Galor *et al.* (2009), Galor (2011), and Cinnirella and Hornung (2011), have argued that inequality in land ownership has been a key impediment to the development of mass schooling with its associated inequality of control over economic resources, and that ameliorating this inequality has been key to the spread of popular schooling.

Stoddard (2009) tests the relative importance of distributive versus external benefits in explaining the timing of support for public schooling for the United States in the mid-nineteenth century. She finds that an increase in wealth dispersion tended to lower the share of public spending in the U.S. at this time and interprets this as consistent with the perception of external benefits to public schooling as dominant over redistributive motives. Her argument is that, in a model with external benefits dominant, an increase in wealth dispersion will increase the percentage of the population with a tax price of schooling exceeding perceived external benefits, while in a model emphasizing redistributive motives an increase in dispersion should increase the benefit to the median voter of supporting public schooling. However, Gallego’s (2010) analysis of variation in primary school enrollment for a global sample of countries in both 1900 and 1985–95 finds that the degree of democratization has tended to have a positive influence on primary school enrollments, which could be interpreted as supporting the presence of redistributive elements in the support for primary schooling. James’s (1993) analysis of cross-country variation in public share in secondary enrollments finds that allowing for religious diversity weakens the impact of income level, which she interprets as showing the presence of

redistributive motives. Stoddard (2011), based on analysis of increasing support for fee subsidization and ultimately free schooling in nineteenth-century New York State, finds that the relative importance of the distributive motive increased over time, as the distribution of wealth and voting power changed. She argues that initially successful political coalitions were dominated by middle-income groups over both elites and the poor, neither of which would patronize public schools. However, as the century progressed, lower-income groups dominated the coalition but also experienced rising demands for schooling for their children that shifted support towards completely free schooling. Thus, as suggested earlier, the relative importance of external benefit versus redistributive motives for the funding of public schooling would appear to have varied by time and place.

Centralization of the provision of education can be seen as having made a number of contributions to the rise of mass schooling. It insured the diffusion of school buildings and teachers and thus growing access throughout a given population to instructional services. It also set in place and presumably improved standards for curriculum and for teacher training. And it insured that even more backward areas, reluctant to support education, received compensating funding from centralized sources. Furthermore, compulsory schooling legislation and enforcement could insure that even reluctant parents ended up sending their children to school. Skeptics have argued that compulsory schooling legislation was effectively enforced only after widespread popular support for schooling was present. But recent estimates suggest a substantive impact on enrollments for the U.S. Clay *et al.* (2010) estimate that compulsory schooling laws in the late nineteenth-century U.S. raised enrollment rates (which for the relevant age groups were initially in the 60 to 80 per cent range) by a further 2 to 7 percentage points. Moreover, centralized mandates could override more localized discrimination against certain racial and ethnic groups as with the case of civil rights legislation in the twentieth-century U.S. (Donohue *et al.* 2002; Margo 1990).

One important stage in this increased public funding concerns the decision to eliminate school fees. In the U.S., this occurred relatively early with the elimination of rate bills in the mid-nineteenth century throughout the United States (Go and Lindert 2010; Stoddard 2011). In the case of England, it did not occur until the 1890s. In developing countries, fees are still often present for primary schooling (James 1993). Other scholars have emphasized the role of local support for schooling. The U.S. in particular is a case noteworthy for the very limited role of the national government in the provision of schooling but with very early and active provision of schooling at the local and state level. Some of the factors seen as contributing to the success of local initiative in the U.S. are the homogeneity of communities supporting education and the egalitarian ethic (Goldin and Katz 2008). Go and Lindert (2010) have argued that decentralization and local autonomy in school provision and funding in the antebellum Northern United States allowed public support for schooling to emerge in high-demand localities without being blocked by low-demand groups elsewhere. They argue that the more centralized arrangements in the U.S. South impeded the emergence of local coalitions supportive of public schooling. Similar arguments have been made about regional diversity in support of education in late nineteenth- and early twentieth-century Brazil (Martinez-Fritscher *et al.* 2010). But even in areas where education expansion has been characterized by top-down initiative, local community support has been identified as important, as in Prussia and Austria in the eighteenth century (Melton 1988). Going back to at least early modern times, some regions and communities in Europe had traditions of providing communal resources to support teachers, often providing additional sources of livelihood for those agreeing to engage in teaching duties (see Maynes 1979 and Melton 1988).

Gallego's (2010) international analysis for the later twentieth century finds decentralization of political power had a positive effect on secondary school enrollments. He suggests that

decentralization implies more local autonomy in the provision and management of schools, which can lead to more responsiveness and tailoring of instruction more closely to local demands. He also notes that more decentralized systems may be able to more effectively mobilize local funding for schools. However, Glewwe and Kremer (2006) offer a more mixed assessment of the advantages of decentralized compared with centralized provision of schooling in current developing countries. On the one hand, they acknowledge that centralized funding arrangements can result in substantial wastage due to corruption of funds actually reaching local schools. On the other hand, they note studies of Kenya indicating that communities with substantial ethnic diversity had difficulty in coping with collective action problems and ruling elites established decentralized control of schools in ways that tended to allocate resources to regions most favored by these elites. In addition, Chaudhary (2009) finds that for late nineteenth- and early twentieth-century India caste and religious diversity reduced the level and effectiveness of local private provision of schooling.

In sum, this survey suggests the variety of historical experience with provision of mass schooling and the various roles in specific historical circumstances that can be played by addressing the neighborhood effects of schooling, the redistributive aspects of public funding for schools, and the contribution of both centralized and decentralized aspects to the provision of schooling.

The private demand for education

While historians have emphasized the role of public efforts in promoting the expansion of schooling, it has also been recognized that any such expansion will be greatly amplified insofar as it is reinforced by the eagerness of parents and their children to attend school. These private motives can vary ranging from perceived labor market advantages of education to a desire for self-improvement for its own sake. However, as already noted, economists such as Smith and Friedman have recognized that the markets for education may fail due to factors such as capital market imperfections, imperfect information by parents and children on the labor market advantages of schooling, and barriers to entering occupations making use of education, including societal attitudes toward gender roles. The discussion here will proceed by first considering labor market trends in the demand for education based on the arguable premise that labor markets have functioned reasonably efficiently. Then consideration will turn to one major influence that can shift demand for schooling even in the presence of market failures (i.e. rising income levels). Finally, very brief consideration will be given to non-labor market uses of schooling.

The pecuniary return to schooling provides the most obvious economic explanation for private investment in schooling and other forms of training such as apprenticeship.

It can be argued that in the long run, with constant supply costs of providing skill and schooling, the premiums to skill and education should be constrained to provide a normal rate of return to the investments involved. Any excess in returns above that should encourage additional entry, which lowers returns accordingly. While subject to considerable margins of error, some attempts at estimating skill premia over several centuries based on differences between skilled and unskilled building workers have found constant premia consistent with this perspective (Clark 2005; van Zanden 2009). However, there is abundant evidence of strong swings in skill premia over shorter time periods (Goldin and Margo 1992; Goldin and Katz 2008; Hornstein *et al.* 2005; Williamson 1985).

An increasing premium placed on education is often associated with rising demands for education due to the scientific and technological revolutions and industrialization from the seventeenth century onwards (Easterlin 1981; Kuznets 1966). Other longer-term developments

may have generated demands for educated workers as well. Johnson (1964) suggested that the centrality of art and practice in contrast to science in pre-industrial societies pointed to on-the-job experiences as the most effective approach to learning. However, there were pre-industrial developments contributing to the rise of more formal instruction. The earliest systems of writing seem to have emerged in ancient Babylonia and Egypt as ways to monitor government tax collections (Goody 1986). And this would lead to some sort of provision for instruction in writing and deciphering these writing systems, albeit most likely for a quite small proportion (under 10 per cent) of the adult population. In the early Middle Ages, there was increased use of writing as a substitute for memory (Clanchy 1993; de Roover 1965: 59) and in particular the development of double entry bookkeeping that could be attributed to the rise of commercial activity at this time.

The expansion of education in the United States and elsewhere in the twentieth century has been depicted, as originally suggested by Tinbergen (1975), as a race between schooling and technology (see, for example, Berman *et al.* 1998; Machin and Van Reenen 1998). This suggests that technological advance is skill-biased, or, in other words, skill- or education-using. One way to explain the presence of skill- or education-using technological advance is to argue that technological advance has been increasingly knowledge-based and hence has increased the demand for educated workers who can use advances in knowledge (Easterlin 1981; Kuznets 1966; Abramovitz and David 1996) and can adapt to the disequilibria associated with changes in knowledge (Schultz 1975). However, this does not account for how widespread the use of knowledge or education is in the labor force. Thus, other accounts have argued that skill-biased technical change has arisen due to specific historical circumstances and to particular types of technological advance (Goldin and Katz 1998). Some have argued that any education-using bias of technology is itself endogenous, and in particular has been affected by the premia paid for education. Economies facing relatively low premia for education would have greater incentives to demand and hence to generate more education-using technologies (Acemoglu 2002).

Unified growth theorists, in attempting to explain the apparently changing role of education over the last few centuries, have argued that the economic system itself has longer-term triggers, which set off interactions between education and technology, and which have led to the onset of modern economic growth (Galor 2011). The nature of these triggers remains sketchy. However, one scenario by which they would work is that an initial surge in education levels – for example, fueled in early modern Europe by the Reformation – has in turn generated new technologies that in their turn lead employers to increasingly value education of their workers, setting in motion ongoing positive interactions between education and technology. In the case of manufacturing, Goldin and Katz (1998) have mapped out changing relationships in the case of the United States.

Given the complexity of possible interactions and limitations on evidence regarding educational attainment, especially in conjunction with earnings or measures of economic activity, much remains obscure about how the demand for education has changed in the course of economic change and growth. The three following sectoral examples illustrate the issues and possibilities.

Agriculture is often regarded as a tradition-bound economic activity, and as such one that would have relatively little call for education. However, Adam Smith among others noted the diversity and irregularity of activity in agriculture compared with factory work. And much of the early work on education as a factor of production in the 1960s and 1970s recognized the value of education in agriculture in enhancing decision-making ability in response to technological and economic change (Griliches 1964; Welch 1970; Schultz 1975; Huffman 2001).

In the case of manufacturing, Sanderson (1972) pointed to evidence that early English textile factories made extensive use of illiterate labor. It was also noted by investigators for the

Newcastle commission in mid-Victorian England that in relatively affluent industrial districts, where little labor market advantage was perceived to schooling, enrollment rates were relatively low, while in port cities, with a higher perceived advantage, enrollment rates tended to be higher (Mitch 1992). Goldin and Katz (1998) mapped out for the United States from the late nineteenth century onwards how complementarity between capital and skill evolved as manufacturing shifted from a more artisanal orientation towards factory and then to batch, assembly line, and other continuous process methods of production. They suggest that the shift from artisanal workshops to the factory may on net have lowered the relative demand for skilled labor, but that the subsequent shift to batch and continuous process methods of production increased it. The skilled labor was embodied in the machine-building and maintenance segment rather than in the machine-operation and product-assembly segment of manufacturing operations.

The service sector has become notorious for relatively slow productivity growth due to the difficulty of substituting capital for human judgment and skill in this sector, thus leading to Baumol's so-called "cost-disease problem" (Baumol and Bowen 1966; Baumol, 1993). Recent work on the impact of computers has suggested that computers can substitute for humans in tasks involving clear procedural logic, while leaving untouched tasks where procedures are much more problematic to specify in a formal or systematic manner. This can lead to declining demand for less skilled labor with increasing demand for educated labor more capable of exercising judgment (Baumol 1993; Autor *et al.* 2002).

This work points to the importance of considering skill and task content of jobs and how these can change over time in an endogenous manner as sketched by Autor *et al.* (2002, 2003) and Acemoglu and Autor (2011). This factor would seem especially critical for determining the extent of demand for educated labor throughout the work force as a whole.

Although females had achieved parity in college completion in the United States earlier in the twentieth century, changing social attitudes and labor market opportunities contributed to women overtaking men in college completion in the later twentieth century. Comparable recent trends in female advantage over males in college completion in other OECD countries would suggest similar influences at work (Goldin *et al.* 2006).

One obvious explanatory factor on the demand side that transcends pecuniary motives and market imperfections is rising living standards throughout the world over the last few centuries. Simple cross-section scatter plots of educational expenditure on income per capita as well as pooled time-series cross-country regressions support some role for rising income (Blaug 1970: 127–36; Edding 1966). However, the issue of direction of causation arises – whether rising educational attainment has also contributed substantially to rising income per capita. The issue of mutual causation between schooling and income has featured centrally in discussions of education and economic development going back as far as Bowman and Anderson's classic study (1963). The more general issue arises of why people value education regardless of their income levels. One can argue that with perfect capital markets and only a pecuniary return to education – that is, with schooling only as an investment – an optimizing model of schooling choice would not predict any impact of wealth changes on educational attainment (Behrman and Knowles [1997] and Glewwe and Jacoby [2004] following Becker [1967]). Findings of a positive effect of wealth on educational attainment can be interpreted as reflecting the presence of some combination of capital market imperfections and consumption value (i.e. non-pecuniary) to schooling. A number of studies of late twentieth-century developing countries do indicate causation from income to schooling but also point to the importance of care in measurement and to differences in how children's school careers can differ by level of poverty (Behrman and Knowles 1997; Filmer and Pritchett 1999; Glewwe and Jacoby 2004; Thomas *et al.* 2004).

Filmer and Pritchett (1999) also note distinctive patterns across the world in whether the very poor are unlikely to send their children to primary school at all or whether the wealth gaps in schooling occur because of higher attrition rates by age according to poverty. They identify a Latin American pattern in which there is universal enrollment in the first year of schooling or lower primary education that then drops off to zero for the poor for subsequent schooling, and they distinguish this pattern from an East African one where many poor do not send their children for any schooling.

Historical studies looking at variation over time and across countries have found a positive effect of per capita income on school enrollment rates; however, this evidence has been confined to examining macro-level country variation in income and enrollment measures. It doesn't provide direct estimates of income elasticities (Engerman *et al.* 2009: 134; Lindert 2004).

The development of the printing press and associated rise of book production enhanced the value of literacy (Dittmar 2011; Eisenstein 1979). One non-labor market factor increasing the private demand for basic education has been the falling price of print media and increased value to writing through the service sector (Altick 1957; Mitch 1992; St. Clair 2004; Vincent 1989, 2000).

Consequences of mass schooling

The expansion of schooling would seem to be an obvious factor contributing to modern economic growth. However, the actual impact of schooling expansion depends on the channels through which it influences output per capita and on historical circumstances that influence those channels. The most direct channel is through enhancing the productivity of individual workers. With this channel, the contribution to growth over some period would depend on both how much the productivity of the individual worker is enhanced by any given increment of education and the percentage of the labor force increasing its levels of educational attainment. Insofar as the return to education is high and the proportion of the labor force affected is large, then the contribution of education to economic growth is likely to be high. And in some situations such as for the United States in the twentieth century this appears to have happened. Denison (1962) estimated that, for the period 1929 to 1957, as much as 42 per cent of the growth in real GDP per capita in the United States could be attributed to improvements in work force educational attainment. However, more recently, Goldin and Katz (2008: 40) obtain a more modest estimate of 15 per cent for this contribution over the period 1915 to 2005. In other situations, either or both returns to education and expansion of schooling have been limited, while other factors such as capital accumulation or technological advance unrelated to rising educational attainment appear to have contributed more substantially to economic growth; England during the industrial revolution is one conspicuous example.

However, another channel that has been emphasized is that the level of education affects the generation and adoption of technological advance and adaptability more generally. Here causal effects are more difficult to pin down. Benhabib and Spiegel (1994) find evidence for this in the late twentieth century supporting the original conceptual foundation proposed by Nelson and Phelps (1966). That is, through cross-country analysis, they find that levels of educational attainment rather than changes in educational attainment affect growth rates. Their argument is that the overall level of schooling contributes to adaptability and the possibility of technological advance rather than changes in schooling changing the quality of individual workers. Becker *et al.* (2011) find support for this framework in their examination of cross-country differences in the rate of industrialization relative to schooling levels in nineteenth-century Prussia.

Empirical attempts to estimate the impact of education on economic growth from cross-country studies have varied considerably in their findings and much depends on model

specification (Mitch 2005; Pritchett 2001; Bills and Klenow 2000). One conclusion would seem to be that the impact of education on growth varies with particular context and not in obvious ways. Thus education can have as large an impact in agriculture as in manufacturing because possibilities for technological advance and adaptation can be at least as large in that traditional sector.

Going beyond economic impacts to the impact on human welfare more generally and attempting to incorporate likely positive externalities of schooling, analysts and investigators are increasingly emphasizing the importance of women's education. Schultz's (2002: 211–21) assessment of a large interdisciplinary and international literature of micro-studies concludes that the external benefits of women's schooling are considerably larger than men's schooling. These studies indicate that enhancements in women's schooling are more likely to raise educational attainment of their children, lower their mortality rates, and improve their nutrition and health outcomes than equivalent enhancements in men's schooling. A presumption of greater female involvement with childrearing and household production in past times would suggest that these findings would generalize to previous periods in history as well, but this is a matter requiring further investigation.

Conclusion

The rise of mass education is one of the most striking developments of recent centuries. It clearly should be viewed as a historical phenomenon rather than some universal tendency of human nature. The protean nature of education implies that it can serve different purposes for different groups in different places and times. This chapter suggests diverse paths to the spread of education – and the consequences for economic development and economic well-being have also been diverse. Resource commitments to public education have been no more than a few percentage points of national income. Yet the consequences for economic performance and human welfare suggest that this sector warrants continued monitoring.

Notes

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References

- Abramovitz, M. and David, P. (1996) 'Technological change and the rise of intangible investments: the U.S. economy's growth-path in the twentieth century', in OECD Documents, *Employment and Growth in the Knowledge-based Economy*, Paris: OECD.
- Acemoglu, D. (2002) 'Technology and the labor market', *Journal of Economic Literature*, 40: 7–72.
- Acemoglu, D. and Autor, D. (2011) 'Skills, tasks, and technologies: implications for employment and earnings', in O. Ashenfelter and D. Card (eds) *Handbook of Labor Economics*, vol. 4B, Amsterdam: Elsevier.
- A'Hearn, B., Baten, J. and Crayen, D. (2009) 'Quantifying quantitative literacy: age heaping and the history of human capital', *Journal of Economic History*, 69: 783–808.
- Alesina, A., Baqir, R. and Easterly, W. (1999) 'Public goods and ethnic divisions', *Quarterly Journal of Economics*, 114: 1243–84.
- Allen, R. (2003) 'Poverty and progress in early modern Europe', *Economic History Review*, 56: 403–43.
- Altick, R. (1957) *The English Common Reader*, Chicago, IL: University of Chicago Press.
- Autor, D.H., Levy, F. and Murnane, R.J. (2002) 'Upstairs, downstairs: computers and skills on two floors of a large bank', *Industrial and Labor Relations Review*, 55: 432–47.
- (2003) 'The skill content of recent technological change: an empirical exploration', *Quarterly Journal of Economics*, 118: 1279–333.

- Baumol, W.J. (1993) 'Health care, education, and the cost disease: a looming crisis for public choice', *Public Choice*, 77: 17–28.
- Baumol, W.J. and Bowen, W.G. (1966) *Performing Arts: The Economic Dilemma*, New York: Twentieth Century Fund.
- Beadie, N. (2010a) 'Education, social capital and state formation in comparative historical perspective: preliminary investigations', *Paedagogica Historica*, 46: 15–32.
- (2010b) *Education and the Creation of Capital in the Early American Republic*, New York: Cambridge University Press.
- Becker, G.S. (1967) 'Human capital and the personal distribution of income: an analytical approach', Woytinsky Lecture No. 1, Ann Arbor, MI: Institute of Public Administration.
- Becker, S. and Woessmann, L. (2009) 'Was Weber wrong? A human capital theory of Protestant economic history', *Quarterly Journal of Economics*, 124: 531–96.
- Becker, S., Hornung, E. and Woessmann, L. (2011) 'Education and catchup in the industrial revolution', *American Economic Journal: Macroeconomics*, 3: 92–126.
- Behrman, J. and Knowles, J.C. (1997) 'How strongly is child schooling associated with household income', University of Pennsylvania CARESS Working Paper No. 97–022.
- Benavot, A. and Riddle, P. (1988) 'The expansion of primary education, 1870–1940: trends and issues', *Sociology of Education*, 61: 191–210.
- Benhabib, J. and Spiegel, M. (1994) 'The role of human capital in economic development: evidence from aggregate cross-country data', *Journal of Monetary Economics*, 34: 143–73.
- Berman, E., Bound, J. and Machin, S. (1998) 'Implications of skill-biased technological change: international evidence', *Quarterly Journal of Economics*, 113: 1245–69.
- Bils, M. and Klenow, P.J. (2000) 'Does schooling cause growth?' *American Economic Review*, 90: 1160–83.
- Blaug, M. (1970) *An Introduction to the Economics of Education*, Harmondsworth: Penguin.
- (1975) 'The economics of education in English classical political economy: a re-examination', in A.S. Skinner and T. Wilson (eds) *Essays on Adam Smith*, Oxford: Oxford University Press.
- Botticini, M. and Eckstein, Z. (2005) 'Jewish occupational selection: education, restrictions, or minorities?' *Journal of Economic History*, 65: 922–48.
- (2007) 'From farmers to merchants, conversions and diaspora: human capital and Jewish history', *Journal of the European Economic Association*, 5: 885–926.
- Bowman, M.J. and Anderson, C.A. (1963) 'On the role of education in economic development', in C. Geertz (ed.) *Old Societies and New States*, New York: Free Press.
- Broadberry, S. and Gupta, B. (2010) 'The historical roots of India's service-led development: a sectoral analysis of Anglo-Indian productivity differences, 1870–2000', *Explorations in Economic History*, 47: 264–78.
- Chaudhary, L. (2009) 'Determinants of primary schooling in British India', *Journal of Economic History*, 69: 269–302.
- Chaudhary, L. and Rubin, J. (2011) 'Reading, writing, and religion: institutions and human capital formation', *Journal of Comparative Economics*, 39: 17–33.
- Chin, A., Juhn, C. and Thompson, P. (2006) 'Technical change and the demand for skills in the second industrial revolution: evidence from the merchant marine, 1891–1912', *Review of Economics and Statistics*, 88: 572–8.
- Cinnirella, F. and Hornung, E. (2011) 'Landownership concentration and the expansion of education', University of Munich working paper.
- Clanchy, M.T. (1993) *From Memory to Written Record: England, 1066–1307*, 2nd edition, Oxford: Blackwell.
- Clark, G. (2005) 'The condition of the working class in England, 1209–2004', *Journal of Political Economy*, 113, 6: 1307–40.
- Clay, K., Lingwall, J. and Stephens, M. (2010) 'Compulsory attendance laws and nineteenth-century schooling', SITE conference paper.
- Craig, J. (1981) 'The expansion of education' in D.C. Berliner (ed.) *Review of Research in Education*, 9: 151–213.
- Crayen, D. and Baten, J. (2010) 'Global trends in numeracy 1820–1949 and its implications for long-term growth', *Explorations in Economic History*, 47: 82–99.
- Cressy, D. (1980) *Literacy and the Social Order: Reading and Writing in Tudor and Stuart England*, Cambridge: Cambridge University Press.
- Cubberley, E. (1920) *The History of Education: Educational Practice and Progress Considered as a Phase of the Development and Spread of Western Civilization*, Boston, MA: Houghton Mifflin.
- Denison, E. (1962) 'Education, economic growth, and gaps in information', *Journal of Political Economy*, 70: 124–8.

- de Roover, R. (1965) 'The organization of trade' in M.M. Postan, E.E. Rich, and E. Miller (eds) *The Cambridge Economic History of Europe, Vol. III*, Cambridge: Cambridge University Press.
- Dittmar, J. (2011) 'Information technology and economic change: the impact of the printing press', *Quarterly Journal of Economics*, 126: 1133–72.
- Donohue, J.J., Heckman, J.J. and Todd, P.E. (2002) 'The schooling of southern blacks: the roles of legal activism and private philanthropy, 1910–60', *Quarterly Journal of Economics*, 117: 225–68.
- Easterlin, R. (1981) 'Why isn't the whole world developed?' *Journal of Economic History*, 41: 1–19.
- Edding, F. (1966) 'Expenditure on education: statistics and comments', in E.A.G. Robinson and J.E. Vaizey (eds) *The Economics of Education: Proceedings of a Conference Held by the International Economic Association*, London: Macmillan.
- Eisenstein, E. (1979) *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early Modern Europe*, Cambridge: Cambridge University Press.
- Engerman, S. and Sokoloff, K. (2000) 'Institutions, factor endowments, and paths of development in the new world', *Journal of Economic Perspectives*, 14: 217–32.
- Engerman, S., Mariscal, E. and Sokoloff, K. (2009) 'The evolution of schooling in the Americas, 1800–1925', in D. Eltis, F.D. Lewis, and K.L. Sokoloff (eds) *Human Capital and Institutions: A Long-Run View*, New York: Cambridge University Press.
- Epstein, S.R. (1998) 'Craft guilds, apprenticeship, and technological change in pre-industrial Europe', *Journal of Economic History*, 53: 684–713.
- (2008) 'Craft guilds in the pre-modern economy: a discussion', *Economic History Review*, 61: 155–74.
- Fernandez, R. and Rogerson, R. (2001) 'The determinants of public education expenditure: longer-run evidence from the states', *Journal of Education Finance*, 27: 567–83.
- Filmer, D. and Pritchett, L. (1999) 'The effect of household wealth on educational attainment: evidence from 35 countries', *Population and Development Review*, 25: 85–120.
- Freeman, R.B. (2009) 'What does global expansion of higher education mean for the U.S.?' NBER Working Paper No. 14962, Cambridge: MA: NBER.
- Friedman, M. (1962) 'The role of government in education', in *Capitalism and Freedom*, Chicago, IL: University of Chicago Press.
- Gallego, F. (2010) 'Historical origins of schooling: the role of democracy and political decentralization', *Review of Economics and Statistics*, 92: 228–43.
- Galor, O. (2011) *Unified Growth Theory*, Princeton, NJ: Princeton University Press.
- Galor, O., Moav, O. and Vollrath, D. (2009) 'Inequality in landownership, the emergence of human-capital promoting institutions, and the great divergence', *Review of Economic Studies*, 76, 1: 143–79.
- Gawthrop, R. and Strauss, G. (1984) 'Protestantism and literacy in early modern Germany', *Past & Present*, 104: 31–55.
- Glewwe, P. and Jacoby, H. (2004) 'Economic growth and the demand for education: is there a wealth effect?' *Journal of Development Economics*, 74: 33–51.
- Glewwe, P. and Kremer, M. (2006) 'Schools, teachers, and education outcomes in developing countries', in E. Hanushek and F. Welch (eds) *Handbook of the Economics of Education*, vol. 2, Amsterdam: Elsevier.
- Go, S. and Lindert, P. (2010) 'The uneven rise of American public schools to 1850', *Journal of Economic History*, 70: 1–26.
- Goldin, C. and Katz, L. (1998) 'The origins of technology-skill complementarity', *Quarterly Journal of Economics*, 113: 693–732.
- (2008) *The Race Between Education and Technology*, Cambridge, MA: Harvard University Press.
- Goldin, C., Katz, L. and Kuziemko, I. (2006) 'The homecoming of American college women: the reversal of the college gender gap', NBER Working Paper No. 12139, Cambridge, MA: NBER.
- Goldin, C. and Margo, R. (1992) 'The great compression: the wage structure in the United States at mid-century', *Quarterly Journal of Economics*, 107: 1–34.
- Goody, J. (1986) *The Logic of Writing and the Organization of Society*, Cambridge: Cambridge University Press.
- Graff, H. (1987) *The Legacies of Literacy: Continuities and Contradictions in Western Culture and Society*, Bloomington, IN: Indiana University Press.
- Green, A. (1990) *Education and State Formation: The Rise of Education Systems in England, France, and the USA*, New York: St. Martin's.
- Griliches, Z. (1964) 'Research expenditures, education, and the aggregate production function', *American Economic Review*, 54: 961–74.

- Hornstein, A., Krusell, P. and Violante, G. (2005) 'The effects of technical change on labor market inequalities', in P. Aghion and S. Durlauf (eds) *Handbook of Economic Growth*, vol. 1B, Amsterdam: Elsevier.
- Houston, R.A. (2002) *Literacy in Early Modern Europe: Its Growth, Uses, and Impact*, 2nd edition, London: Longman.
- Huffman, W. (2001) 'Human capital: education and agriculture', in B. Gardner and G.C. Rausser (eds) *Handbook of Agricultural Economics*, vol. 1, Amsterdam: Elsevier.
- Humphries, J. (2003) 'English apprenticeship: a neglected factor in the first industrial revolution', in P.A. David and M. Thomas (eds) *The Economic Future in Historical Perspective: Essays in Honour of Charles Feinstein*, Oxford: Oxford University Press.
- James, E. (1993) 'Why do different countries choose a different public-private mix of educational services?' *Journal of Human Resources*, 28: 571–92.
- Johansson, E. (1987) 'Literacy Campaigns in Sweden', in R.F. Arnove and H.J. Graff (eds) *National Literacy Campaigns: Historical and Comparative Perspectives*, New York: Plenum.
- Johnson, E.A.J. (1937) *Predecessors of Adam Smith: The Growth of British Economic Thought*, New York: Prentice-Hall.
- (1964) 'The place of learning, science, vocational training and "art" in pre-Smithian economic thought', *Journal of Economic History*, 24: 129–44.
- Kaestle, C.F. (1976) "'Between the Scylla of brutal ignorance and the Charybdis of a literary education": elite attitudes toward mass schooling in early industrial England and America', in L. Stone (ed.) *School and Society: Studies in the History of Education*, Baltimore, Md: Johns Hopkins University Press.
- Kuznets, S. (1966) *Modern Economic Growth: Rate, Structure, and Spread*, New Haven, CT: Yale University Press.
- Lindert, P. (2004) *Growing Public. Social Spending and Economic Growth since the Eighteenth Century*, Vols 1 and 2, Cambridge: Cambridge University Press.
- Lott, J. (1990) 'An explanation for public provision of schooling: the importance of indoctrination', *Journal of Law and Economics*, 33: 199–232.
- Machin, S. and Van Reenen, J. (1998) 'Technology and changes in skill structure: evidence from seven OECD countries', *Quarterly Journal of Economics*, 113: 1215–44.
- Margo, R.A. (1990) *Race and Schooling in the South, 1880–1950: An Economic History*, Chicago, IL: University of Chicago Press.
- Martinez-Fritscher, A., Musacchio, A. and Viarengo, M. (2010) 'The great leap forward: the political economy of education in Brazil, 1889–1930', Harvard Business School Working Paper No. 10–075.
- Maynes, M.J. (1979) 'The virtues of archaism: the political economy of schooling in Europe, 1750–1850', *Comparative Studies in Society and History*, 21: 611–25.
- Melton, J. (1988) *Absolutism and the Eighteenth-century Origins of Compulsory Schooling in Prussia and Austria*, Cambridge: Cambridge University Press.
- Mill, J.S. (1861) 'Of local representative bodies', Chapter XV of *Considerations on Representative Government* in Vol. XIX of J.M. Robson (ed.) (1977) *The Collected Works of John Stuart Mill*, Toronto: University of Toronto Press.
- Minchinton, W. (ed.) (1972) *Wage Regulation in Pre-Industrial England*, Newton Abbott: David & Charles.
- Mitch, D. (1992) *The Rise of Popular Literacy in Victorian England: The Influence of Private Choice and Public Policy*, Philadelphia, PA: University of Pennsylvania Press.
- (2005) 'Education and economic growth in historical perspective', R. Whaples (ed.) *EH.Net Encyclopedia of Economic and Business History*, eh.net/encyclopedia/article/mitch.education
- Moran Cruz, J. (1985) *The Growth of Schooling, 1340–1548: Learning, Literacy and Laicization in Pre-reformation York Diocese*, Princeton, NJ: Princeton University Press.
- Nelson, R. and Phelps, E. (1966) 'Investment in humans, technological diffusion, and economic growth', *American Economic Review*, 56: 69–75.
- OECD (2002) *Financing Education – Investments and Returns: Analysis of the World Education Indicators 2002 Edition*, Paris: OECD Publications.
- Ogilvie, S. (2008) 'Rehabilitating the guilds: a reply', *Economic History Review*, 61: 175–82.
- Pritchett, L. (2001) 'Where has all the education gone?' *World Bank Economic Review*, 15: 367–91.
- St. Clair, W. (2004) *The Reading Nation in the Romantic Period*, Cambridge: Cambridge University Press.
- Sanderson, M. (1972) 'Literacy and social mobility in the industrial revolution in England', *Past & Present*, 56: 75–104.
- Schultz, T.P. (2002) 'Why governments should invest more to educate girls', *World Development*, 30: 207–25.

- Schultz, T.W. (1975) 'The value of the ability to deal with disequilibria', *Journal of Economic Literature*, 13: 827–46.
- Simon, J. (1966) *Education and Society in Tudor England*, Cambridge: Cambridge University Press.
- Smith, A. (1776, reprinted 1976) *The Wealth of Nations*, Chicago, IL: University of Chicago Press.
- Stasavage, D. (2005) 'Democracy and education spending in Africa', *American Journal of Political Science*, 49: 343–58.
- Stoddard, C. (2009) 'Why did education become publicly funded? Evidence from the nineteenth-century growth of public primary schooling in the United States', *Journal of Economic History*, 69: 172–201.
- (2011) 'Voting for free public schools', Montana State University working paper, Department of Agricultural Economics and Economics.
- Thomas, D., Beegle, K., Frankenberg, E., Sikoki, B., Strauss, J. and Teruel, G. (2004) 'Education in a crisis', *Journal of Development Economics*, 74: 53–85.
- Tinbergen, J. (1975) *Income Distribution. Analysis and Policies*, Amsterdam: North-Holland.
- UNESCO Institute for Statistics (2011), UNESCO Global Education Digest, www.uis.unesco.org
- Van Zanden, J.L. (2009) 'The skill premium and the "great divergence"', *European Review of Economic History*, 13: 121–53.
- Vaughan, M. and Archer, M. (1971) *Social Conflict and Educational Change in England and France, 1789–1848*, Cambridge: Cambridge University Press.
- Vincent, D. (1989) *Literacy and Popular Culture: England, 1750–1914*, Cambridge: Cambridge University Press.
- (2000) *The Rise of Mass Literacy: Reading and Writing in Modern Europe*, Cambridge: Polity Press.
- Welch, F. (1970) 'Education in production', *Journal of Political Economy*, 78: 35–59.
- Westermann, W.L. (1914) 'Apprenticeship contracts and the apprenticeship system in Roman Egypt', *Classical Philology*, 9: 295–315.
- Williamson, J.G. (1985) *Did British Capitalism Breed Inequality?* Boston, MA: Allen & Unwin.