Public Expenditure on Education and Economic Growth in the USA in the Nineteenth and Twentieth Centuries in Comparative Perspective

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Earlier studies of France, Germany and the UK suggest that a common framework exists to explain the relationship between public expenditure on education and economic growth in nineteenth and twentieth-centuries. This article shows that while a similar relationship exists in the United States, the US policies were particularly committed to educational expenditure required to produce citizens.

Much contemporary educational discussion is concerned with seeking to establish links between education, employment and economic growth. Such discussions may be located within a variety of contexts: for example those of human capital theory or with reference to specific political and administrative initiatives. An introduction from C. E. Núñez in a recent special issue of Paedagogica Historica offered a highly detailed account of methodological and theoretical issues in relation to the historical investigation of the relationship between literacy, schooling and economic growth.[1]

The purpose of this article is to provide an introduction to one approach to the relationship between public expenditure on education and economic growth. This approach combines conceptual and historical perspectives within a quantitative framework in order to analyse both the socio-economic impact of the public education system and the driving forces behind its development.

[1]Núñez, Clara Eugenia. E. "Literacy, Schooling and Economic Modernization: An Historian's Approach." *Paedagogica Historica - International Journal of the History of Education* 39, no. 5 (2003): 535-558.

This article is based upon recent research on the case of the USA,[2] but also includes comparisons with education and economic growth in Europe, especially in the UK.[3] The article is divided into four parts. The first is methodological and identifies theoretical and statistical backgrounds; the second examines changes in public educational expenditure. The third part, which considers the relationship between education and economic growth, is divided into three sections: the historical debates about education, the economy and the State; an explanation of the link between public expenditure on education and long economic cycles; the case of the USA. Finally some conclusions are drawn.

Methodology

The research reported in this article forms part of a broader investigation into the long-term links between public educational expenditure and socio-economic systems. The programme, initiated by L. Fontvieille at the University of Montpellier, has already produced major studies on France, Germany, Spain and the UK.[4] While this article focuses upon the USA, comparisons and contrasts will be made with all of these countries, with particular attention paid to the UK.

Since the 1960s, there has been a growing interest towards education and knowledge among economic theorists. Human capital theory sought to conceptualise the growing contribution of education to economic growth revealed by many empirical studies.[5] In an analogy with physical capital, education was incorporated into the economic sphere as a cost supported by individuals who anticipated higher wages as a reward for their increased productivity.[6] The transposition of human capital in the neo-classical model at the macroeconomic level established a direct link

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[2]This research was supported through a European Commission Marie Curie Fellowship and an Economic and Social Research Council award.

[3]Carpentier, Vincent. *Système éducatif et performances économiques au Royaume-Uni: 19ème et 20ème siècles*. Paris: L'Harmattan, 2001; Carpentier, Vincent. "Public Expenditure on Education and Economic Growth in the UK, 1833-2000." *History of Education* 32 no. 1 (2003): 1-15.

[4]Carry, Alain. "Le compte satellite rétrospectif de l'éducation en France: 1820-1996." *Economies et Sociétés, Série AF, Histoire quantitative de l'économie française* 25 (1999); Diebolt, Claude. "L'évolution de longue période du système éducatif Allemand XIXème et XXème siècles." *Economies et Sociétés, Cahiers de l'I.S.M.E.A.* 2-3 (1997); Diebolt, Claude. Dépenses d'éducation et cycles économiques en Espagne aux 19ème et 20ème siècles. Paris: L'Harmattan, 2000; Fontvieille, Louis. "Education, Growth and Long Cycles: The Case of France in the 19th and 20th Centuries." In *Education and Economic Development since the Industrial Revolution*, edited by G. Tortella. Valencia: Generalitat Valenciana, 1990; Carpentier, *Système éducatif et performances économiques au Royaume-Uni*.

[5]Denison, Edward. F. "The Sources of Economic Growth in the United States and the Alternatives Before Us." In *A Supplementary Paper of the Committee for Economic Development*. New York, 1962, 77-79; Schultz, Theodore W. "Capital Formation by Education." The Journal of Political Economy 68, no. 6 (1960): 571-583.

[6]Becker, Gary S. "Investment in Human Capital: A Theoretical Analysis." *The Journal of Political Economy* 70, no. 5 (1962): 9-49; Mincer, Jacob "On-The-Job Training: Costs, Returns and Some Implications." *The Journal of Political Economy* 70, no. 5 (1962): 61-73.

between a nation's investment in education and a rise in the economic growth rate. Since the late 1980s, the new growth theory has argued that the positive social returns from knowledge, which drives the rate of growth of the economy, justify public authority involvement in the educational system.[7]

Human capital theory's main contribution was a capacity to demonstrate that the education system not only represents a cost for the economic system, but also furnishes a main determinant of its growth.

In this article, I rely mainly on the theory of systemic regulation which, although a different theoretical framework from the human capital theory, seeks to provide an explanation of the historical expansion of public expenditure on education and its growing contribution to the economy.[8]

This theory interprets the historical transformations of the economic system in terms of developing connections among spheres (including education) that are influenced, but not wholly determined, by economic dimensions. Within this framework, the long-term interactions (sometimes positive, sometimes negative) between economic and human development provide a means of explaining the rise of educational systems. Thus according to the theory of systemic regulation the development of an educational system may be interpreted, in part, as the outcome of regulation processes between public expenditure on education and long economic cycles.

This theoretical framework is combined with an historical approach. G. McCulloch and R. Watts insisted in a recent paper on the evolution of the field on the potential gain that history of education could make by considering theoretical and methodological tools from other disciplines.[9] The economic perspective can enhance the understanding of the historical development of education which according to R. Aldrich "reflects, and at times challenges the social, economic, political and intellectual context of its age".[10] At the same time, some works from historians of education on social or political changes have already either directly or indirectly integrated economic dimensions.[11] On the other hand, economic theory's understanding of education can also benefit from the field of history of education which naturally provide a more varied fare, with administrative, biographical, gender, institutional, intellectual, pedagogical

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[7]Romer, Paul M. "Endogenous Technological Change." The Journal of Political Economy 98, no. 5 (1990): 71-102; Lucas, Robert E. "On the Mechanics of Economic Development." *Journal of Monetary Economics* 22, no. 1 (1988): 3-42.

[8]Boccara, Paul. *Etudes sur le capitalisme monopoliste d'Etat, sa crise et son issue*. Paris: Editions Sociales, 1974 ; Fontvieille, "Education, Growth and Long Cycles".

[9]McCulloch, G. and R. Watts. "Introduction: Theory, Methodology, and the History of Education." *History of Education* 32, no. 2 (2003): 129-132; McCulloch, G. and W. Richardson. *Historical Research in Educational Settings*. Buckingham, 2000.

[10]Aldrich, Richard. *A Century of Education*. London: RoutledgeFalmer, 2002, 3.

[11]For example, Simon, Brian. *Education and the Labour Movement 1870-1920*. London: Lawrence and Wishart, 1965; Aldrich, R., D. Crook and D. Watson. *Education and Employment: the DfEE and its Place in History*. London: Bedford Way Papers, Institute of Education, 2000.

and political dimensions, amongst others.[12] There is therefore a promising space for what C. K. Harley judiciously called a "dialogue between growth theory and historical literature".[13]

Theoretical and historical perspectives are here combined within a quantitative approach based on the collection of data on public educational expenditure and their confrontation with macro-economic indicators. Comparative studies of economic performance have a long history. For example, in the 1950s research units from several countries were integrated into an international research programme on long-term economic statistics inaugurated by S. Kuznets and F. Perroux. Quantitative history of this sort provides retrospective accounts that may be compared across time and space.[14] A quantitative history of education may furnish data about the nature and level of financial, and other, resources for education, and upon the extent to which education, in turn, affects the nature and level of resources. Again, some historians of education have recently underlined the interest of combining quantitative and qualitative approaches.[15]

Although statistics on the history of public educational expenditure in some countries, including the UK,[16] have only recently been collected, in the case of the USA a significant number of studies of long-term statistical data on public education already exist.[17] Data on US education were systematically gathered by the National Center for Education Statistics (NCES) and published by the US Department for Education. An important source is the *Digest of Education Statistics*, published annually since 1962.[18] These publications provide decennial data about expenditure on elementary and secondary schools from 1870 to 1890. Subsequently such data are available on an annual basis. In higher education, equivalent annual data are available from the 1930s onwards. It was therefore necessary to consult primary sources in order to reconstruct complete annual statistical series. Figures for earlier periods are available in the *Reports from the Commissioner of Education*, ordered and published each year by the House of Representatives.[19] Since 1878, the *Statistical Abstract for the United States*, originally issued by the Bureau of

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[12]See, for example, Dean, Dennis. "Race Relations and the Making of Educational Policy: The View from the Centre in the 1960s." *Cambridge Journal of Education* 32, no. 3 (2002): 385-404; Green, Andy. *Education and State Formation, The Rise of Educational Systems in England, France and USA*. London: Macmillan, 1990; Muller, D. K., F. Ringer and B. Simon. The Rise of the Modern Educational System: *Structural Change and Social Reproduction 1870-1920*. Cambridge: Cambridge University Press, 1987.

[13]Harley, C. K. "Growth Theory and Industrial Revolutions in Britain and America." *Canadian Journal of Economics* 36, no. 4 (2003): 809-831.

[14]Marczewski, Jean. "Histoire quantitative, buts et méthodes." *Cahiers de l'Institut de Sciences Economiques Appliquées*, Série A.F. 15 (1961) : 3-54.

[15]Goodman, J. and J. Martin. "Editorial: History of Education-Defining a Field." *History of Education* 33, no. 1 (2004): 1-10.

[16]Carpentier, *Système éducatif et performances économiques au Royaume-Uni*, 203-267.

[17]See, for example, Goldin, Claudia. "A Short History of Education in the United States." *NBER Historical Papers* 119, 1999; US Department of Education. *120 years of American Education: a Statistical Portrait*. Washington D. C., National Center for Education Statistics, 1993.

[18]US *Department of Education, Digest of Education Statistics*. Washington D. C.: National Center for Education Statistics, 1962-2003.

Statistics and from 1938 by the Bureau of Census, has been a major source of statistics on educational expenditure.[20]

Such sources were used to compile statistics of public expenditure on education and associated enrolment in the USA from 1870. The historical series gather all Federal, States and Local level funds that are directed towards the education system. Enrolment series are those of all educational establishments receiving public funds. These comprise all pupils in public elementary and secondary schools (88% of all schools enrolment) and students of all degree-granting institutions. Some 50% and 75% of all higher education enrolment was in public institutions in 1930 and 2001 respectively. It was also necessary to collect and process demographic and economic data over the period. These were extracted from the works of B. R. Mitchell and A. Maddison, the *Statistical Abstract for the United States* and other major historical studies.[21]

All economic and educational series are expressed in purchasing power parity in 1990 Geary-Khamis US $ (PPP). PPP can be defined as a conversion rate that quantifies the amount of a country's currency necessary to buy in the market of that country the same quantity of goods and services as a dollar in the US.[22] Such a tool is necessary in order to give a comparative estimate of the value of educational expenditure eliminating differences in price level between countries.

Public Expenditure on Education

This section explores the growth of public expenditure on education and economic development. During the nineteenth and twentieth centuries, participation in and public expenditure on formal education grew rapidly.

Figure 1. Enrolment in the Public Educational System as a Share of the 5-24 Year Old Age Group, 1850-1994.

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[19]*US House of Representatives. Report from the Commissioner of Education*. Washington D. C.: US Government Printing Office, 1870-1890.

[20]US *Department of Commerce, Statistical Abstract of the United States*. Washington D. C.: US Government Printing Office, 1878-2003.

[21]Maddison, Angus. *Monitoring the World Economy 1820-1992*. Paris: O.E.C.D., 1995; Mitchell, Brian R. *International Historical Statistics: The Americas 1750-1988*. New York: Stockton Press, 1993; US Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970*. Washington D. C.: Bureau of the Census, 1975.

[22]The PPP indices series are derived from Maddison, Monitoring the World Economy. They are updated with Maddison, Angus. *The World Economy: A Millennial Perspective*. Paris: O.E.C.D., 2000. The GDP at PPP US $ was divided by the GDP expressed in current $ to obtain the PPP index and applied to the expenditure series.

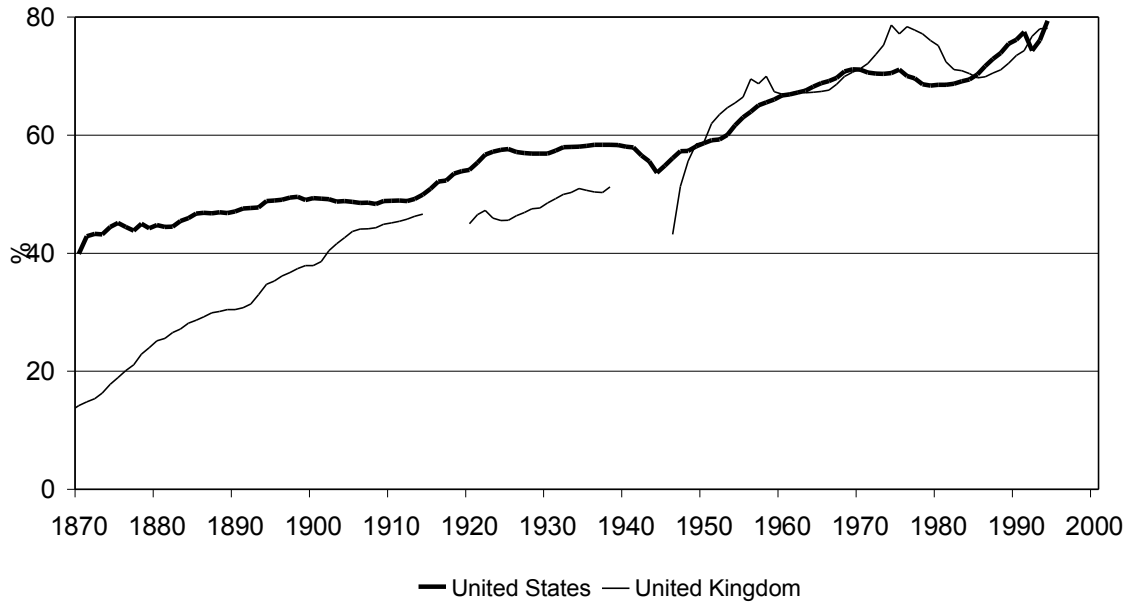


Figure 2. Public Expenditure per Pupil and Student, 1870-2001 (1990 Geary-Khamis $).

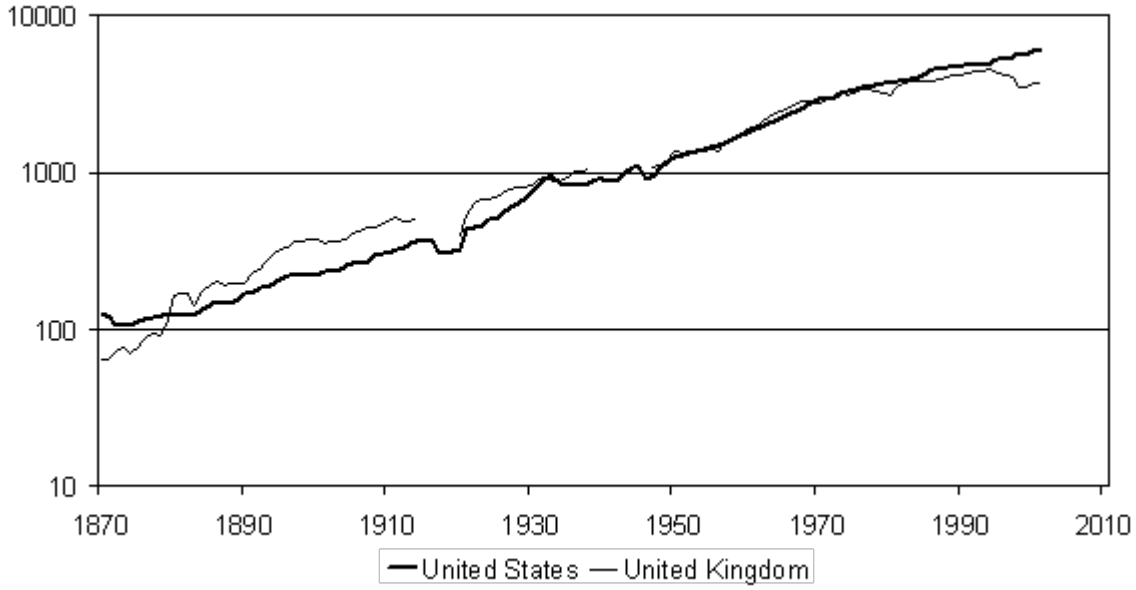


Figure 1 shows that by 1870, 40% of the 5-24 year old age group were enrolled in the US public educational system. This contrasted with a mere 15% in the UK. By 1991 some 70% of the 5-24

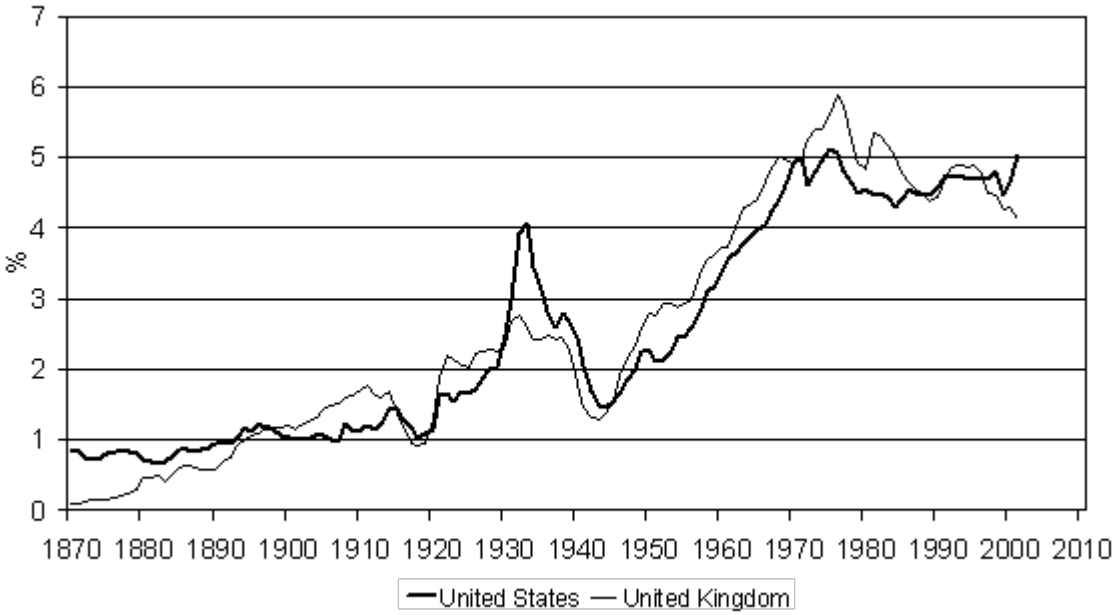
year old age group, both in the USA and in the UK, were incorporated into the educational system. By the end of the century this had grown to 75% in the USA and was approaching 80% in the UK as a consequence of the rapid expansion of higher education. It must be acknowledged, however, that the development of lifelong learning has led to a blurring of categories and that some enrolment in full time and especially part time post-secondary education of the last two decades may include people who are over 24 years old.

The definition of public expenditure adopted here refers to all public funding devolved to educational institutions. The spending relates to public money transferred to public primary and secondary schools and public or private institutions of higher education. The same definition was used for the UK.

Despite the considerable rise of levels of enrolment between 1870 and 2001 there was also a massive increase in public expenditure per pupil and student over the period – some 40 fold in the USA and 50 fold in the UK. Figure 2 shows that in 1870 public expenditure per pupil was twice as high in the USA as in the UK. In 2001 US public expenditure on education per pupil was 65% higher than in the UK.

Figure 3 demonstrates that in 1870 public educational expenditure in the USA represented 0.86% of GDP in contrast to only 0.11% in the UK. In 2001 the gap had narrowed: 4.85% of US GDP was spent on public education and 4.46% in the UK.

Figure 3. Public Expenditure on Education as a Share of GDP, 1870-2001.



Figures 1-3 indicate two main developments. The first is that both countries experienced a massive expansion in public resources devoted to education. The second is that although

investment and enrolment in public education were much greater in the USA in 1870, by 2001 the differences had been much reduced.

Economic data also show considerable expansion over the same period. In 2001, US GDP per capita was more than nine times its level in 1870. Over the same period GDP per capita in the UK had increased some fivefold. In 1870 the UK was still the wealthier country, with a GDP per capita of some 3,060$ compared to 2,450$ in the USA (Geary-Khamis 1990 US $). The situation, however, would change. In 2001, US GDP per capita was 28,095$, against 20,773$ in the UK.

Thus, when compared with the USA, a relative increase in public expenditure on education in the UK was accompanied by a relative decline in economic performance.

This crucial historical change was to play a major role in debates focusing on the relationship between education and the economy.

Education, the Economy and the State

The Debates

The integration of education into the analyses of economists was widely welcomed, both in theoretical and empirical terms. Critics, however, regretted that the purpose of education was now being construed mainly as a contribution to the economy. Economic determinism was denounced by researchers who argued that the development of education has been, and still is, driven by heterogeneous factors – for example, social, racial, religious, civic and geopolitical – which for the most part are independent of the economic system or indirectly connected to it. Similarly it is clear that education is not the sole driving force of the economy. Physical and human capital combine with other extra-economic factors as varied as natural resources, military conflict and work ethics in determining economic success or failure. In the light of these complexities it is not surprising that the precise relationship between public expenditure on education and economic growth remains highly contentious.[23]

Historical debate in the UK concentrated upon educational failures and relative economic decline at the end of the nineteenth century.[24] One interpretation adduced an inevitable economic convergence as other countries caught up.[25] Educational weaknesses were not to blame.[26] Another drew attention to the failure of the UK educational system to respond to socio-economic change.[27] Declining productivity was associated with a lack of innovation among entrepreneurs and a labour force characterized by low skills.[28] The empirical knowledge of the self-educated

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[23]For a recent example see Wolf, Alison. *Does Education Matter? Myths about Education and Economic Growth*. London: Penguin Books, 2002.

[24]Dormois, J. P. and M. Dintenfass, *The British Industrial Decline*. London: Routledge, 1998; Crafts, Nicholas. F. R., *Britain's Relative Economic Performance 1870-1999*. London: The Institute of Economic Affairs, 2002.

[25]McCloskey, Donald. N. "Did Victorian Britain Fail?" *The Economic History Review* 23 (1970): 446-459.

[26]Hartwell, Ronald M. "Education and Economic Growth in England During the Industrial Revolution." *Annales Cisalpines d'Histoire Sociale* 1 (1971): 75-93; West, Edwin. G. *Education and the Industrial Revolution*. London: B.T. Batsford Limited, 1975.

man that had proved decisive in the first industrial revolution[29] was not appropriate to the second wave of industrialization which required more theoretical, technical and formal knowledge. M. Sanderson showed that the late development of English technical schools harmed economic growth in the long-term.[30]

In sharp contrast to these interpretations, E. G. West denounced the negative effects of state intervention from the second half of the nineteenth century, arguing that the creation of a public monopoly destroyed an efficient educational market regulated by fees and harmed the economy.[31] It could be argued, on the contrary, that the development of public education was rather the consequence than the cause of economic difficulties.[32] D. Mitch showed that the public involvement in education was mainly motivated by social externalities but indirectly produced "pecuniary externalities".[33] According to P. Lindert, Britain's taxpayers' support for primary education was lower than in many comparatively poorer countries and that "holding back public mass education was costly to Britain' elite style franchise in the early and mid nineteenth century and held back Britain's relative skills and GDP per capital for a few decade".[34] Figures 1-3 seem to confirm the idea that the development of public education in the UK took place too late to prevent other countries, such as Germany and the USA, from catching up in economic terms.

In contrast to the UK, the early development of a widespread system of formal education was commonly considered to be a central factor in US economic development. S. Kuznets suggested that the impressive growth of the US economy was due not only to increases in population but also more fundamentally to rises in levels of productivity. According to him, the growth in the per capita product was the result of a close connection between the stock of knowledge and innovation.[35] Such dynamism in turning invention into innovation was essential. S. N. Broadberry argued that by the late nineteenth century, and possibly earlier, the USA had become the world's

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[27]Sanderson, Michael. *Education, Economic Changes and Society in England 1780-1870*. London: Macmillan, 1991; Hobsbawm, Eric J. *Histoire économique et sociale de la Grande-Bretagne, Tome 2. De la Révolution Industrielle à nos jours*. Paris: Edition du Seuil, 1977.

[28]Landes, David S. *The Unbound Prometheus, Technological Change and Industrial Development in Western Europe from 1750 to the Present*. London: Cambridge University Press, 1979; Aldcroft, Derek. H. "The Entrepreneur and the British Economy, 1870-1914." *The Economic History Review* 17 (1964): 113-134; Dintenfass, Michael *The Decline of Industrial Britain, 1870-1980*. London: Routledge, 1992.

[29]Mitch, David. "The Role of Human Capital in the First Industrial Revolution." In *The Economics of the Industrial Revolution*, edited by J. Mokir. Totowa: Rowman & Allanhed, 1985: 267-307.

[30]Sanderson, Michael. *The Missing Stratum, Technical School Education in England 1900-1990's*. London: The Athlone Press, 1994.

[31]West, Edwin G. "Educational Slowdown and Public Intervention in Nineteenth-Century England: a Study on the Economics of Bureaucracy." *Explorations in Economic History* 12 (1975): 61-87.

[32]Carpentier, "Public Expenditure on Education and Economic Growth in the UK, 1833-2000." 15.

[33]Mitch, David. "Underinvestment in Literacy? The Potential Contribution of Government Involvement in Elementary Education to Economic Growth in Nineteenth-Century England." *The Journal of Economic History* 44, no. 2 (1984), 566.

[34]Lindert, Peter. "Voice and Growth? Was Churchill Right? *NBER Working Paper Series* 9749 (2004), 18.

leader in technology and productivity.[36] In addition to the creation of knowledge, its transmission was also important in improving the capacity of workers to deal with technical progress.

The educational system might have played a role in producing the necessary skills as well as in promoting social discipline. S. Bowles and H. Gintis argued that "An essential structural characteristic of US education is what we have called the correspondence between the social organisation of schooling and that of work".[37] R. Higgs also identified US success as stemming from a "complementarity among skilled workers, mechanisation and advancing technology".[38]

E. G. West developed a similar interpretation of the negative impact of the involvement of the bureaucratic state in education both in the US and the UK.[39] In contrast, many US studies have pointed to the early public school system as a key factor in US economic growth. For example, L. Hughes and J. McDougall considered that free education was necessary to economic success.[40] C. Goldin emphasized the importance of the early development of a mass system of secondary education. In comparison with other countries the high school movement was more egalitarian and organized and supported from public funds.[41] A. Fishlow insisted on the local basis of the early US public investment in education.[42] R. Balfanz showed that states with higher expenditure per pupil between 1880 and 1940 were rewarded with more productive manufacturing workers.[43]

If education is considered to have been one of the decisive factors in US economic success, there are still debates about the forces that generated the growth of the educational system, and especially the identification of factors behind the early involvement of public authorities. School enrolment, moreover, especially prior to the introduction of compulsory attendance, was affected

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[35]Kuznets, Simon. "Two Centuries of Economic Growth: Reflections on US Experience." *American Economic Review* 67 (1977), 6.

[36]Broadberry, Stephen N. "Technological Leadership and Productivity Leadership in Manufacturing Since the Industrial Revolution: Implications for the Convergence Debate." *The Economic Journal* 104, no. 423 (1994), 298.

[37]Bowles, S. and H. Gintis. "The Origins of Mass Public Education." In *History of Education: Major Themes, Volume II, Education in its Social Context*, edited by R. Lowe. London: Routledge, 2000), 61.

[38]Higgs, Robert. *The Transformation of the American Economy 1865-1914: An Essay in Interpretation*. New York: John Wiley & Sons Inc, 1971.

[39]West, Edwin G. "The Political Economy of American Public School Legislation." *Journal of Law and Economics* 10, (1967): 101-128.

[40]Davis, L. E., J. R. T Hughes and D. M. McDougall. *American History: The Development of a National Economy*. Georgetown: Irwin Ltd, 1969, 139.

[41]Goldin, Claudia. "The Human Capital Century and American Leadership: Virtues of the Past." *NBER Working Paper Series* 8239 (2001), 6.

[42]Fishlow, Albert. "Levels of Nineteenth-Century American Investment in Education." *The Journal of Economic History* 26, no. 4 (1966), 418.

[43]Balfanz, Robert. "Where Money Mattered: Organizational and Economic Consequences of State Public School Expenditures in the United States: 1880-1940." *Interchange - Ontario Institute for Studies in Education* 28, no. 1 (1997), 63.

by a number of social and economic factors, for example fee levels and the need for domestic child labour. Total public expenditure on education and per pupil were also affected by such factors as the relative age distribution of the population, family income and taxation rates.[44] The question then is why and when the State began to be involved and started to exert its influence on education through legislation and its funding capacity.

There is an extensive literature dealing with the origins and consequences of the growth of the public sector. Wagner's law considered the disproportional rise in public expenditure in comparison to economic growth as a logical consequence of the needs of an expanding economy to develop social activities and to regulate the market.[45] A. Peacock and J. Wiseman and S. Kendrick and M. Wehle focused on the impact of external events upon government spending. For example, wars might lead to a greater consensus about the need to promote egalitarian social policies, and lessen resistance to taxation.[46]

By considering public spending in general, these approaches suggest that educational resources fluctuated like any other public expenditure, within or without a narrow margin of autonomy. From the 1870s until the end of the twentieth century, however, the share of US and UK public expenditure devoted to education grew from less than 6% to more than 14%. Therefore, the growth of public effort on education cannot simply be considered as a consequence of the rise in public expenditure as a whole. The expansion of the educational system seems to have been a special case beyond the growth of the State. So what could have driven this particular public involvement in education?

According to D. North, "investment in formal education, new technologies and pure science have been a derived demand resulting from the perceived payoff to such investment".[47] It is not clear, however, why and how that demand was satisfied and translated into increased public investment in education. L. Davis and D. North stressed the indirect contribution of socially orientated educational policies to economic development. They argued that the public education system was established in part to inculcate shared entrepreneurial values in a heterogeneous population.[48]

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[44]Hoxby, Caroline M. "How Much Does School Spending Depend on Family Income? The Historical Origins of the Current School Finance Dilemma." *American Economic Review* 88, no. 2 (1998): 309-314; Poterba, James. "Demographic Change, Intergenerational Linkages and Public Education." *The American Economic Review* 88, no. 2 (1998): 315-320.

[45]Wagner, Adolph. (1883) "Three extracts on Public Finance." In *Classics in the Theory of Public Finance*, edited by R. A. Musgrave and A. T. Peacock. London: Macmillan, 1958, 1-15.

[46]Kendrick, S. M. and A. Wehle. *A Century and a Half of Federal Expenditures*. Princeton: NBER, 1955; A. T. Peacock and J. Wiseman, *The Growth of Public Expenditure in the United Kingdom*. London: Oxford University Press, 1994.

[47]North, Douglas. "Institutional Change in American Economic History." In *American and Economic Development in Historical Perspective*, edited by T. Weiss and D. Schaefer. Stanford: Stanford University Press, 1994, 90.

[48]Davis, L. and D. North, *Institutional Change and American Economic Growth*. London: Cambridge University Press, 1971, 238.

Public intervention in education was justified but the economic modalities behind the development of public funding remain obscure. D. Hogan, in emphasizing links between markets, politics and the state, proposes a stimulating analysis of the growth of the public education system in the US as the result of the changes brought from the interactions between market pressure, professionalisation and the needs of social mobility.[49] This raises questions about the combination of economic and extra-economic reasons that could explain the early growth of the public educational system.

One interesting interpretation of the growing share of education in public expenditure which may explain differences between US and UK historical trajectories is based upon a concern for citizenship. A. Green has argued that US education was an "important cultivation for the national identity, maintenance of social cohesion, promotion of republican values".[50] In the context of a transition period marked by industrialization and immigration, public expenditure on education served to convey common values to immigrants with different languages and cultures and constituted an important force in the creation of a republican hegemony.[51] According to C. Kaestler, "education for assimilation became one of the central preoccupations of nineteenth century school officials" in the USA.[52]

Another study noted that the "Protestant-Republican millennial view of the polity, coupled with a particular view of the nature of capitalism" produced the common school movement before the development of bureaucratic public education in Massachusetts.[53] However, the common school movement expanded central control and gradually attracted more public funds. In addition to increasing enrolment, which was already high, this movement aimed at developing a nation-wide system and reducing regional inequalities.[54] Such tasks were directly connected to growing public funds and the acceptance of taxation for educational purposes.[55]

Extra-economic interpretations such as these are essential to an understanding of the development of educational systems and are particularly relevant for any comparison between the USA and the UK. Green, indeed, has stated that such a public educational development could not have taken place at that time in the UK, a country that was already unified and felt less need than the USA to

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[49]Hogan, David. "To Better Our Condition: Educational Credentialing and the "Silent Compulsion of Economic Relations" in the United States." *History of Education Quarterly* 36, no. 3 (1996), 264.

[50]Green, Education and State Formation, 171.

[51]Ibid., 198.

[52]Kaestler, Carl. F., *Pillars of the Republic: Common Schools and American Society, 1780-1860*. New York: Hill and Wang, 1983, 72.

[53]Meyer, J. W, D. Tyack, J. Nagel and A. Gordon. "Public Education as Nation-Building in America: Enrolments and Bureaucratization in the American States 1870-1930." *American Journal of Sociology* 85 (1979), 599.

[54]Urban, W. and J. Wagoner, *American Education: A History*. New York: The McGraw-Hill Companies Inc., 1996, 97.

[55]Pulliam, J. D. and J. Van Patten, *History of Education in America*. New Jersey: Prentice-Hall Inc., 1995), 63.

promote the ideal of citizenship.[56] L. Cremin argued that the "Americanizing function" of the school was particularly important during the latter years of the nineteenth century.[57] Indeed in the USA from 1870 to 1910, between 6 to 8% of the 5-24 year old age group were born in a foreign country.[58] The language is also an issue as shown by the rising share of immigrant from non-English speaking countries.[59]

Table 1.Foreign-Born Population as a Share of 5-24 Year Old Age Group, USA.

1870	7.69	**1910**	7.43	**1950**	0.97	**1990**	5.8
1880	5.69	**1920**	4.77	**1960**	1.52		
1890	7.61	**1930**	3.07	**1970**	1.77		
1900	6.14	**1940**	0.97	**1980**	4		

The systemic regulation theory may add to these factors an economic interpretation for the development of the public educational system. The following argues that besides these levels of interpretation, long economic cycles also played an important part in the pace of growth of the public system of education. Long economic cycles had an impact on expenditure per pupil and student through their links with demography and immigration and their influence on the level of public funding available for education.

Public Educational Resources and Long-Term Economic Movements: an Interpretation

Previous studies of the relationship between public educational expenditure and economic growth in France, Germany and UK concluded that in all three countries the rise of the educational system was punctuated by fluctuations of public expenditure in education. These fluctuations corresponded to long economic waves and were counter-cyclical in respect of economic cycles before 1945 and then synchronized.[60] A similar pattern may be observed in the USA. The rise in US public educational expenditure from 1870 was not linear and may be related to long-term economic fluctuations. Figure 4 shows that fluctuations of US public expenditure on education were in opposition to those in GDP before 1945. This was not only true in overall terms but also with reference to public expenditure per pupil. Thus it can be argued that after 1870 US public

[56]Green, Education and State Formation, 110.

[57]Cremin, Lawrence A. *The Transformation of the School: Progressivism in American Education 1876-1957*. New York: Vintage Books, 1961, 66.

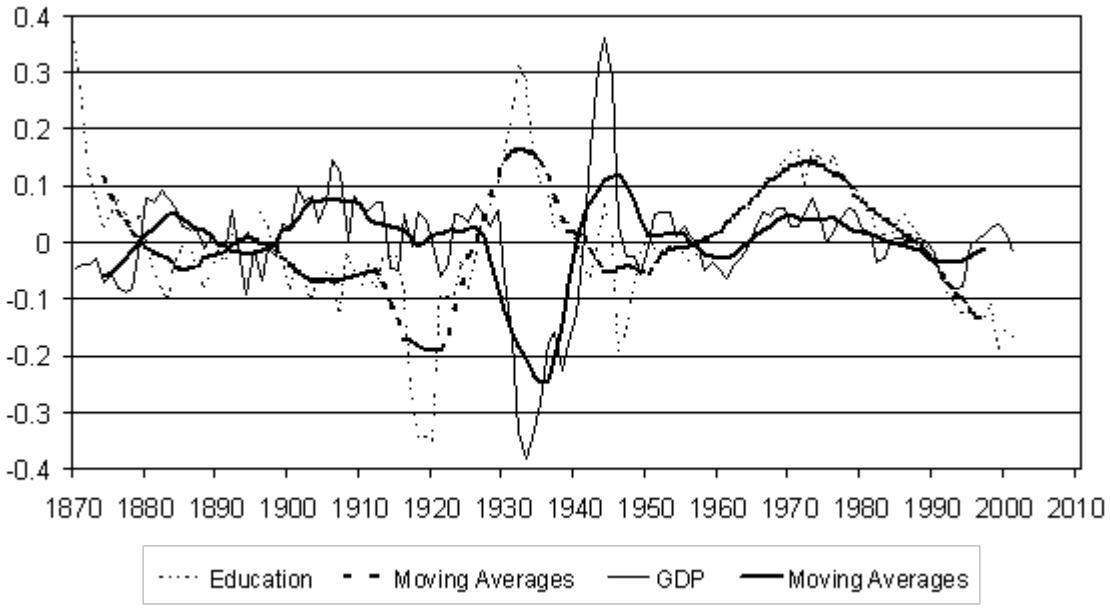
[58]U.S. Bureau of the Census, Age and Sex of the Foreign-Born Population, 1870-1990. Washington D.C., 1999.

[59]Calculations based on Austin, Erik W. *Political Facts of the United States Since 1789*. New York: Columbia University Press, 1986, 472-474.

[60]Fontvieille, "Education, Growth and Long Cycles"; Carry, "Le compte satellite rétrospectif de l'éducation en France"; Carpentier, Système éducatif et performances économiques au Royaume-Uni; Diebolt, "L'évolution de longue période du système éducatif Allemand".

expenditure on education developed as the consequence of economic crisis. After 1945, the growth of public educational resources accelerated during the period of post-war prosperity, only to go into relative decline following the economic crisis of 1973.

Figure 4. GDP per Head and Public Expenditure on Education per Pupil and Student (1990 Geary-Khamis $), USA, 1870-2001 (Second Order Deviation from the Regression Curve and 9-Year Moving Averages).



These findings for France, Germany, UK and now USA, however, are unsurprisingly not universally applicable. For example, C. Diebolt showed that Spanish educational fluctuations remained counter-cyclical after 1945.[61] A. Nunes found similar results for Portugal and suggested the potential existence of an "Iberian pattern as far as the evolution of government expenditure on education is concerned and its relationship with cyclical economic growth in the long-run".[62] One possible explanation for this difference is that both Portugal and Spain were ruled by dictators in this period. Another link might be made with levels of economic development. For example, A. Bouslimani has recently identified differences between the economic cycles of industrializing and industrialized countries and their relationship with education.[63] Nevertheless, although not universally applicable, systemic regulation theory provides an explanation of the historical

[61]Diebolt, Dépenses d'éducation et cycles économiques en Espagne.

[62]Nunes, Ana Bela. "Government Expenditure on Education, Economic Growth and Long Waves: The Case of Portugal." *Paedagogica Historica - International Journal of the History of Education* 39, no. 5 (2003): 559-581.

[63]Bouslimani, Azzedine. "La régulation systémique à l'épreuve de la problématique éducation-développement: vers l'élaboration de la notion de système social d'accumulation." *Economies et Sociétés, Série F, Développement, Croissance et Progrès* 40, (2002): 475-500.

development of public educational systems of old industrialised countries in connection with long economic movements since the first industrial revolution.[64]

Previous studies have shown that the fluctuations of public educational expenditure in France and the UK were connected to the Kondratiev cycle or the long wave.[65] This cycle is considered by L. Fontvieille to be an expression of the regulation process of the economic system and its transformations.[66] Educational development played a key role in this process. The passage from reversed to synchronized fluctuations of public educational expenditure and economic growth after 1945 showed a radical change in the link between educational and economic systems. Two distinct periods must be established in order to describe the historical process that led to the shift of education from a correcting to a driving force of economic growth after the 2nd World War.

Pre-1945 counter-cyclical fluctuations in public expenditure on education are interpreted in the context of the type of regulation produced by the first industrial revolution. Until 1945, each upward phase was based on a short-term prospect of profit. This led to the accumulation of more and more capital and a reduction in labour costs. Consequently, the tendency to neglect human development led periodically to uneven economic development. By neglecting skill and innovation, the limited public investment in education during periods of economic boom contributed to a decline in productivity and a fall in the rate of profit that characterized a downward economic phase. For example, the slowing down of funding and its impact on schooling rates and reduction in teacher per pupil ratio have repercussions on economic efficiency. On the other hand, increased public investment in education during periods of decline was central to the overcoming of the crisis. Prior to 1945, economic revival depended on more selective investments and the qualitative development of labour.[67] This explanation may be linked to the argument advanced by C. Freeman and F. Louçã that the economic cycle reflects the degree of harmony between technological and social innovations.[68] Thus public educational expenditure can be interpreted as a factor in the emergence of a new technology and in the qualifications of people who will use it.[69]

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[64]Fontvieille, Louis. "Long Cycle Theory: Dialectical and Historical Analysis." In *The Foundations of Long Wave Theory, vol. 1*, edited by F. Loucã and J. Reijnders. Cheltenham: Edward Elgar Publishing, 1999, 314-342; Fontvieille, "Education, Growth and Long Cycles".

[65]The duration of Kondratiev cycles differs according to authors and to countries. In general, four long waves of approximately 50 years have been identified, each showing expansion and depression phases: (1790-1820/1820-1848); (1848-1870/1870-1897); (1897-1913/1913-1945); (1945-1973/1973-?).

[66]Fontvieille, "Long Cycle Theory." 326.

[67]Besides education, wages are also reversed with long waves contributing to the reduction of imbalances. See De Faria, Vivien. "L'évolution de long terme de la hiérarchie des rémunérations." *Economies et Sociétés, Série AF, Histoire quantitative de l'économie française* 27 (2000): 205-234.

[68]Freeman C. and F. Louçã. *As Time Goes By, From the Industrial Revolutions to the Information Revolution*. Oxford: Oxford University Press, 2001.

[69]Conus, Marie-France. "L'héritage de la pensée économique de Schumpeter sur les mouvements économiques de longue période: avancées ou recul des néo-schumpéteriens." *Les cahiers de l'association Charles Gide pour l'étude de la pensée économique* 5 (1993), 157.

The synchronization between fluctuations in public educational expenditure and economic cycles observed after 1945 signalled the emergence of a radically different type of educational growth. Before 1945 economic recovery acted as a brake upon educational development. The growth of resources slowed, but there was no overall reversal. One possible explanation is that the changes that have taken place after the Second World War reflected the fact that accumulation of knowledge was becoming more autonomous from the economic system while, at the same time, becoming a decisive contributor to its growth.[70] Before 1945, counter-cyclical public expenditure on education sought to transfer capital that could not be invested efficiently from the economic to the educational system in order to re-launch future investment prospects. These successive transformations gradually made the economy more and more dependent on knowledge. After 1945, increases in public expenditure on education were no longer considered to be a means of correcting economic downturn, but rather as the foundation of its growth. From 1945 to 1973, increased public educational expenditure and a massive development of the educational system were seen as essential to economic prosperity.

The slowdown in the growth of public educational expenditure that accompanied the economic downturn of 1973 confirmed the new relationship between education and economy while revealing its complexity. The expansion of education and knowledge, which developed initially as a response to economic downturn, acquired increasing autonomy after 1945 and became oriented towards additional activities that were not directly linked to economic needs. A new distribution of time between learning and working developed. There was extra time to learn for work but also for other activities, unrelated to productive functions.[71] While more and more autonomous, the educational sphere was still dependent on public funding generated by the economic system. The post 1973 oil crisis led to attempts to reframe educational activities and to limit public spending. In the following section the particular dimensions of the US case will be examined.

Public Expenditure on Education and the Economy: the Case of the USA

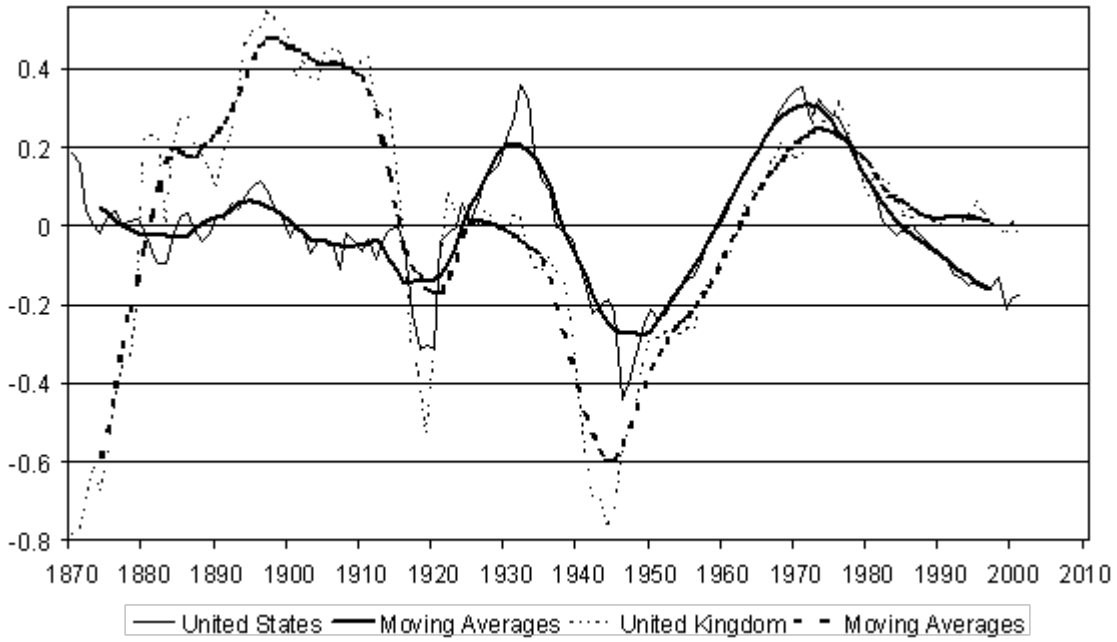
While evidence from the USA confirms the importance of 1945 as a turning point in the relationship between public educational expenditure and economic development already observed in France and the UK, some contrasts may be noted in the period before 1945. For example Figure 5 shows that the economic fluctuations and the counter-cyclical movements of public expenditure on education reacting to them in the USA were shorter and of less amplitude than in the UK. Indeed, the countries studied within the research programme in Montpellier can be divided into two groups in this respect. Prior to 1945, fluctuations of public expenditure in education in France and the UK were of the same duration as the Kondratiev cycles. The situation in the USA, however, mirrored the results observed by C. Diebolt in Germany where fluctuations

[70]Michel, S. *Education et croissance économique en longue période*. Paris: L'Harmattan, 1999.

[71]Vallade, Delphine. "Transformation historique du temps hors travail: une caractérisation économique des activités de formation loisir." PhD. Diss., University of Montpellier 1, 2002.

were related to the shorter Kuznets swings.[72] After 1945 fluctuations in all of these countries were positively connected to the Kondratiev cycle.

Figure 5. Public Expenditure on Education (1990 Geary-Khamis $) USA & UK, 1870-2001 (Second Order Deviation from the Regression Curve and 9- year Moving Averages).



As noted by J. Goldstein, unlike physical science, in the cycles of social sciences "the length of a phase can vary, and the appropriate emphasis is on a regularly recurring sequence rather than a fixed periodicity".[73] Social sciences, as investigations of human activity, do not conform to natural laws and are influenced by historical and geographical contexts. Debates about economic cycles continue, both in Europe and the USA.[74] J. L. Escudier showed that the variety of terminologies employed, for example 'cycles' and 'swings', reflects the lack of consensus about

[72]Diebolt, L'évolution de longue période du système éducatif Allemand; Carpentier; Diebolt, C. and L. Fontvieille. "Dynamic Forces in Educational Development: A Long-Run Comparative View of France and Germany in the 19th and 20th Centuries." *Compare* 31, no. 3 (2001): 295-309.

[73]Goldstein, Joshua. S. *Long Cycles, Prosperity and War in the Modern Age*. London: Yale University Press, 1988, 6.

[74]Loucã, F. and J. Reijnders. *The Foundations of Long Wave Theory*. Cheltenham: Edward Elgar Publishing, 1999; Kondratieff, N. D. (1924) "Sur les concepts de statique, de dynamique et de conjoncture en économie." In *Les grands cycles de la conjoncture*, edited by L. Fontvieille. Paris: Economica, 1992, 1-46; Lewis, William. A. *Growth and Fluctuations, 1870-1913*. London, 1978; Solomou, Solomos. *Phases of Economic Growth, 1850-1973, Kondratieff Waves and Kuznets Swings*. Cambridge: Cambridge University Press, 1987; Rosenberg, N. and C. R. Frischtack, "Long Waves and Economic Growth: A Critical Appraisal." *The American Economic Review* 73, no. 2 (1983): 146-151; Thompson, William R. "Long Waves, Technological Innovation and Relative Decline." *International Organisation* 44, no. 2 (1990): 201-233.

reality, duration and meanings.[75] Such debates are mirrored by the alternative views that were expressed in order to characterise and interpret the fluctuations that shaped the US long-term economic development.

R. J. Gordon uses historical perspectives to identify the 1870-1972 period in the USA as a single big wave nourished by permanent innovations.[76] He claims that great inventions in the last century were as important as the information revolution symbolized today by computers.[77] The year 1972 was a major, but not the only, economic turning point. Figure 4 may be adduced in support of this interpretation, for since 1870 neither economic nor educational development in the USA has followed a consistent pattern.

The Social Structure of Accumulation (SSA) School supports an historical analysis of US economic development in which long waves portray fluctuations in social and institutional innovations around long-term technological innovation. Upward and downward swings represent respectively the harmony and disconnection between the economic system and the SSA, defined as an institutional framework that conditions capital accumulation and production processes. This approach considers the origin of the downturn as the result of internal contradiction in the economic process.[78] In contrast, the return to upturn is regarded as the outcome of an undetermined political process that would adapt the SSA to new economic conditions.[79] Education, as a part of this framework, would then interact with economic cycles. The SSA historical explanation of US economic development identifies fluctuations of indicators relative to capital accumulation and prices that are connected to Kondratiev cycles.[80]

Many studies, however, show that fluctuations in US GNP followed the Kuznets cycle: (1870-1881/1881-1895); (1895-1905/1905-1914); (1914-1929/1929-1945). Many economic historians consider that this cycle, especially because of its connections with demographic movements, is a pertinent frame to characterize the pace of US long-term economic development.

C. W. Calomiris and C. Hanes concluded that "the phenomenon of long-duration Kuznets cycle is central to American macroeconomic history", as this cycle of 15-25 years duration is commonly

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[75]Escudier, Jean-Louis. "Long-Term Movement of the Economy: Terminology and theoretical Options." In *The Foundations of Long Wave Theory, vol. 1*, edited by F. Loucã and J. Reijnders. Cheltenham: Edward Elgar Publishing 1999, 249.

[76]Gordon, R. J. "Interpreting the "One Big Wave" in US Long-Term Productivity Growth." *NBER Working Paper Series* 7752 (2001).

[77]Gordon, Robert. J. "Does the New Economy Measure Up to the Great Inventions of the Past?, *NBER Working Paper Series* 7833 (2000).

[78]The systemic regulation approach posits the idea of internal contradiction to generate the crisis but does not consider the return to growth as external but rather as being imposed by the mechanisms of regulation of the economic system. Failures in economic perspectives and profitability are seen as strong determinants of these transformations. Education is central to economic revival.

[79]Gordon, D. M., T. W. Weisskopf and S. Bowles, "Long Swings and Nonreproductive Cycle." The *American Economic Review* 73, no. 2 (1982), 153.

[80]Kotz, D., M. McDonough and M. Reich, *Social Structures of Accumulation*. Cambridge: Cambridge University Press, 1994, 68.

seen as the result of immigration, territorial conquests and communication factors. They added that, "during the 19th and early 20th centuries especially, as America pushed back the physical frontiers westward, building cycles were central to the processes of territorial expansion and industrialisation."[81]

The shorter lengths of US economic cycles have not only been linked to quantitative aspects such as demography but have also been related to qualitative transformations of the socio-economic system. For instance, W. C. Mitchell introduced Burns' work on the Kuznets cycle by arguing that "by secular trends Dr Burns means economic movements of longer duration than business cycles. He believes that such trends express the relatively long-run effects of forces making for change."[82] M. Abramovitz characterized Kuznets fluctuations as general cycles driven by population change and productivity.[83] R. Easterlin assumed that during the inter-war years Kuznets cycles were generated not by quantitative and demographic issues but rather by qualitative aspects of population.[84] Thus it may be possible to argue that the Kuznets cycles described the periodic transformations of the US socio-economic system as the Kondratiev cycles did for France and the UK. Both cycles include the alternation between the effort devoted to human and physical capital.

Such connections between qualitative changes of population and productivity may be related to the link between public educational fluctuations and economic cycles suggested by the systemic regulation theory. Figure 4 shows, moreover, that these qualitative changes took place not only during the inter-war years as noted by Easterlin, but also during previous downward phases.

Figure 6 shows that until 1945 fluctuations in the schooling rate of the 5-24 year age group in the USA were consistent with fluctuations in public expenditure on education and thus opposed to economic cycles. The importance of the differences between states, and between urban and rural areas shown by J. Rury must be kept in mind.[85]

Figure 6. Schooling Rate of the 5-24 Year Old Age Group and Associated Indicators, USA, 1870-2001 (Second Order Deviation from the Regression Curve).

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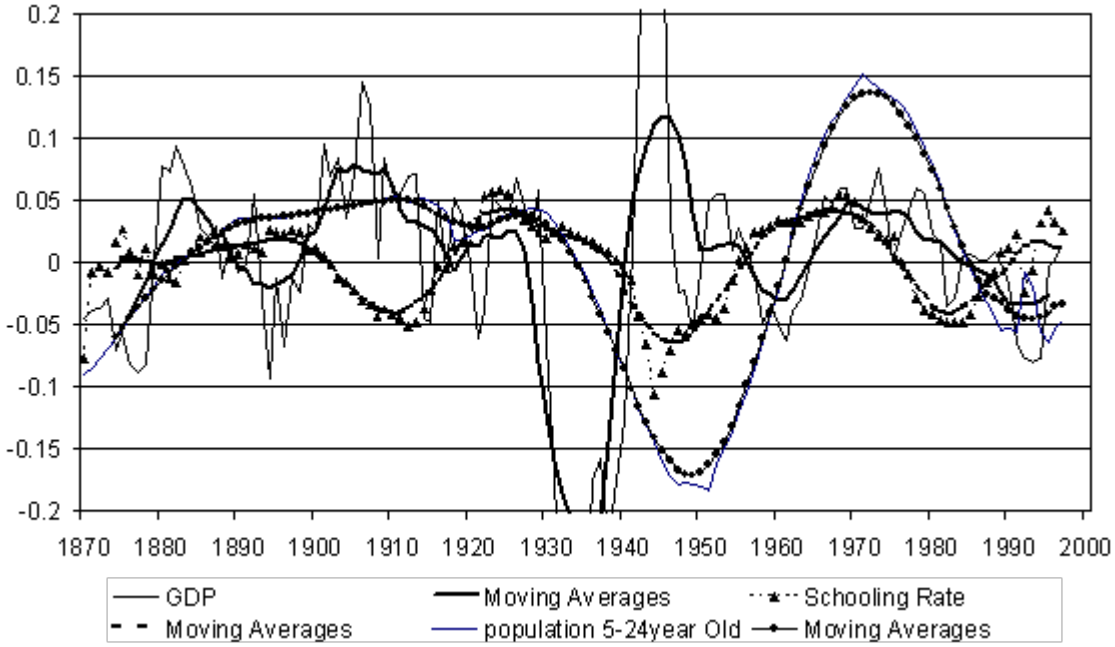
[81]Calomiris, C. W. and C. Hanes. "Historical Macroeconomics and American Macroeconomic History." *NBER Working Papers* 4935 (1994), 45.

[82]Burns, Arthur F. *Production Trends in the United States since 1870*. Princeton: NBER, 1934, xiii.

[83]Abramovitz, Moses. "Resource and Output Trends in the United States Since 1870." *The American Economic Review* 46, no. 2 (1956): 5-23.

[84]Easterlin, Richard A. "Economic-Demographic Interactions and Long Swings in Economic Growth." *American Economic Review* 56, no. 5 (1966): 1083.

[85]Rury, John. "American School Enrolment in the Progressive Era: An Interpretive Inquiry." *History of Education* 14, no. 1 (1985): 49-67.



Rises in the rate of schooling during periods of economic downturn prior to 1945 can be explained by two main factors. First, the demographic consequences of downturn progressively provoked a reduction in population (due to a slowing down of both birth rate and immigration) that limited potential enrolment. However, the acceleration of enrolment was more dynamic than the reduction of the potentially enrolled population. Secondly, and predominantly, school population was increased by enlarged public expenditure on education, principally as a qualitative improvement of the population for the purposes of improving economic performance. Growing public funds replaced fees and eased entry to the educational system. New laws requiring compulsory attendance were often preceded by transfers of resources that facilitated participation in schooling, especially for the poorest children.[86] Mobilization of public resources would be a crucial driving force of educational democratization. This may explain why W. Landes and L. Solmon have not found an obvious causal connection between compulsory schooling legislation and increased enrolment.[87] It is possible that greater public resources to promote enrolment frequently preceded legislation to make schooling compulsory. The influence of public spending on cutting fees was more effective in increasing enrolment than attendance laws, especially during periods of economic crisis. Moreover, increases in public expenditure were sufficient to sustain both a growth in attendance and qualitative improvements such as reductions in pupil-teacher ratios.

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[86]Caner, Karine. "Législation scolaire et croissance économique, le cas de la France aux XIXème et XXème siècles." *Savoir* 9 (1997).

[87]Landes, W. M. and L. C. Solmon. "Compulsory Schooling Legislation: an Economic Analysis of Law and Social Change in the Nineteenth Century." *The Journal of Economic History* 32, no. 1 (1972), 86.

In contrast, economic upswings led on the one hand to a rise in population linked both to increased birth rate and immigration and a slower growth in public funding for education which was seen as being less essential while rates of profit were rising. The combination of these forces provoked a stagnating or a declining schooling rate and a qualitative stagnation that in turn contributed to the long-term exhaustion of productivity and falling profitability. This downswing led to a rise in public educational funds which in a context of a slower growth of population stimulated the schooling rate and the investment per pupil and reactivated the recovery of productivity towards another upswing. The observation by S. Bowles and H. Gintis that "significantly it was in the depression years of the early 1840s that Horace Mann, too, became convinced of the economic value of education"[88] and of its impact on productivity [89] should not only be applied to the 1840s but to all depression phases before 1945, including that of the 1890s.[90]

Many reasons have been adduced to account for the post-1945 increase in US public expenditure on education. Resources were mobilized in support of GIs returning from the Second World War and the Korean War. The Cold War sparked a new concern about the spread and levels of knowledge, a concern increased with the launch of the first Russian Sputnik.[91] The Civil Rights movement led to a greater concentration upon the needs of those groups who had traditionally been educationally dispossessed. These developments were clearly important but they can be complemented by explanations from an economic perspective. The 1945 transition from a counter-cyclical to a pro-cyclical growth of public educational resources heralded a new type of regulation which linked return from investment to a productivity based on improvements in the quality of the labour force and not, as before 1945, on the minimization of its cost. Before 1945, spurts in public expenditure on education occurred in order to restore profit rates in times of crisis, and ceased as soon as this goal was fulfilled. Public expenditure on education was not part of a strategy of economic growth but an element in its recovery. The post-1945 boom in public educational expenditure was in part the result of increases in population. At the same time, growing expenditure per pupil also ensured the qualitative development of that population in order to promote economic growth. For the first time, economic upturn was contemporaneous with the integration of more pupils in school and the lengthening of their school careers.

One of the major themes of the post-war period, as G. Bereday and L. Valpolicelli foretold in 1958, was a major increase in public finance for higher education.[92] Indeed, during this period the share of US GDP devoted to higher education rose from 0.5% to more than 2%. Public funding of higher education, whose share of US GDP increased from 0.2% to 1%, experienced a 12-fold increase from 1946 to 1973. Its share of all public educational expenditure rose from 13% to

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[88]Bowles and Gintis, "The Origins of Mass Public Education," 72.

[89]Vinovskis, Maris A. *Education, Society and Economic Opportunity*. New Haven: Yale University Press, 1995.

[90]Calomiris and Hanes, "Historical Macroeconomics and American Macroeconomic History," 23.

[91]Pulliam and Van Patten, History of Education in America, 198.

[92]Bereday, G. Z. F. and L. Volpicelli, *Public Education in America : A New Interpretation of Purpose and Practice*. New York: Greenwood Press 1958, 75.

20%. This rise was occasioned not only by increased enrolment but also by a doubling of expenditure per student. It also permitted a reduction in the percentage of money raised by student fees, especially in state universities.[93] Educational participation among the 5-24 year age group rose from 54% to 68% between 1951 and 1973.

The post-war years until 1973 can be considered in the USA (as in the UK) as the golden age of educational development. Pro-cyclical public expenditure on education reflected a simultaneous development of educational and economic systems. A virtuous circle was apparent. Education was seen as contributing to greater productivity; which in turn led to increased funds for education.

Conversely, the post-1973 slowdown in economic activity led to a relative reduction in public expenditure on education. J. Spring noted that the term 'educational inflation' was coined during this period to describe the declining economic value of education.[94] Spring described an opposition between the aim of education to develop the individual in society and its function in improving the economy. From an economic point of view, education was both a consumers' good and a producers' good.[95] The post-1973 era reintroduced the conflict between these two fundamental dimensions of education but, unlike previous cycles, this struggle took place during an economic downturn. Public expenditure on education as a share of GDP fell from 5% in 1973 to 4.8% in 2001. Over the same period public expenditure as a share of GNP remained stable around 30%,[96] while the share of all public expenditure devoted to education dropped from 19% to 15%. The decline in spending per head indicated in Figure 4, therefore, was the combined result of a general cut in public expenditure and of a specific reduction targeted at education. Since 1973, higher education's share of total public educational expenditure has remained constant at about 20%. Universities have been forced to turn to fees and other sources of private finance. In 2001 only 37% of universities' income came from public funds, as opposed to 50% in 1974. These ratios were respectively 50% and 85% in the UK. Reductions in funding per student led to a decline in the percentages of full-time students.

Conclusions

As shown in Figure 3, from 1870 public expenditure on education in the USA grew more rapidly than the rise in GDP. This growth was not only the result of increases in the numbers of participants but also of the amount spent per pupil and student (Figure 2) Examination of the historical patterns of growth reveals a trajectory similar to that already found in France, Germany and the UK. (Figures 4-6) These trajectories have been interpreted within the framework of systemic regulation, which locates the rise of a public education system within the transformation

[93]Goldin, C. and L. F. Katz, "The Origins of State-Level Differences in the Public Provision of Higher Education: 1890-1940." *The American Economic Review* 88, no. 2 (1998): 303-308.

[94]Spring, Joel H. Educating the Worker-Citizen, *The Social, Economic and Political Foundations of Education*. New York: Longman, 1980, 55.

[95]Wynn, T., C. A. DeYoung and J. Lindsay Wynn, *American Education*. New York: McGraw-Hill Book Company, 1977, 296.

[96]Tanzi, V. and L. Schuknecht, *Public Spending in the Twentieth Century: A Global Perspective*. Cambridge: Cambridge University Press, 2000.

of the socio-economic system. This rise was the outcome of a counter-cyclical relationship before 1945 and a pro-cyclical one thereafter.

Prior to 1945, public education developed in part as a reaction to crises in the socio-economic system. After 1945, growth in public expenditure on education and economic growth went hand in hand. The educational system sought to acquire a greater independence from other priorities while at the same time being seen as the new driving force of the knowledge economy.

The relative contributions of education in promoting individual growth, social and national unity and economic prosperity continue to be matters of widespread debate. For example, R. Rothstein has argued that too much might be demanded of schools in socio-economic terms. Impressions of failure in the public education system produce pressure for reductions in costs.[97] Failure, however, may be attributable to general poverty and inequality, rather than to faults in the schools themselves.[98] Indeed, as this article indicates, problems can be traced back to the economic crisis of 1973, which initiated financial constraints in education. Education should not be seen as the cause of the 1973 crisis, but rather as a key factor in economic growth since 1945.

The economic explanations advanced in this article about relative growth and decline in education are presented as complementary to other arguments derived from social, political and other factors. Indeed, in the case of the USA it may well be that emphasis upon the ideal of citizenship explains the pattern of more stable and regular expenditure on education in contrast to some European states, and thus the shorter amplitude of the fluctuations of public spendings on education cycles in the USA compared to the UK.

Acknowledgments
I am most grateful to Richard Aldrich for his assistance in the preparation of this article for publication and to William J. Reese for his comments upon an earlier version.

[97]Rothstein, R. Out of Balance: *Our Understanding of How Schools Affect Society and How Society Affects Schools*, The Spencer Foundation, 30th Anniversary Conference (2002), 1.

[98]Campbell; C., V. Carpentier and G. Whitty. "Educational Financing and Improvement: Conceptual Issues and Policy Debates in the UK." Revue Suisse des Sciences de l'Education 3 (2004), 472.