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Cycles of expansion in higher education 1870 – 1985: an international comparison

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Abstract. This article analyses the expansion of higher education between 1870 and 1985 in five countries (Germany, Italy, France, US, Japan). Two hypotheses are tested to explain the expansion: human capital theories and the theory of individual 'status competition' (Collins). The analysis concentrates on the interaction between the educational and the economic system, particularly during times of an economic crisis. Spectral analysis is used to explore the cyclical character of the expansion and the relationship between economic growth and the increasing enrollment rates in higher education. For most countries the data confirm the theory of 'status competition' (perverse effects): universities expand particularly fast during times of an economic recession (e.g., Great Depression, 1890–1900; World Economic Crisis, 1929–1935). The human capital theory is not confirmed by this longitudinal analysis. The article demonstrates that spectral analysis is a powerful instrument to analyse the causal relationship between two or more social systems over a long period of time.

Introduction

The growth of universities over the past century has proceeded along a fairly simple course: virtually each year has seen more university students than the previous year. Even when enrollment levels declined for a few years, they very soon recoverd their earlier level and then continued their long-term rise. The following analysis traces briefly the course of educational expansion and considers the question as to what causative factors may have led to the continual expansion. Finally, spectral analysis is employed to examine more closely the relationship between economic growth and the expansion of the universities (colleges).

Trend, cycle and chance

Enrollment rates in Germany and in the United States (US) are presented in Figure 1 for the period between 1870 and 1985.[1] Certain differences are evident in the curves for the respective countries, particularly in specific periods during this century. Prior to World War I the rate of growth in enrollment levels was relatively moderate and roughly similar in the two countries. During the interwar period, while universities in the US continued their steady, rapid expansion, the enrollment curve for Germany showed dramatic reversals reflecting the economic and political developments in the Weimar Republic and falling eventually to the 1913 level. Only in the 1960s did (West)Germany reach the levels attained by the US between the wars, and with the slowing of expansion in the US during the 1970s the German rate of

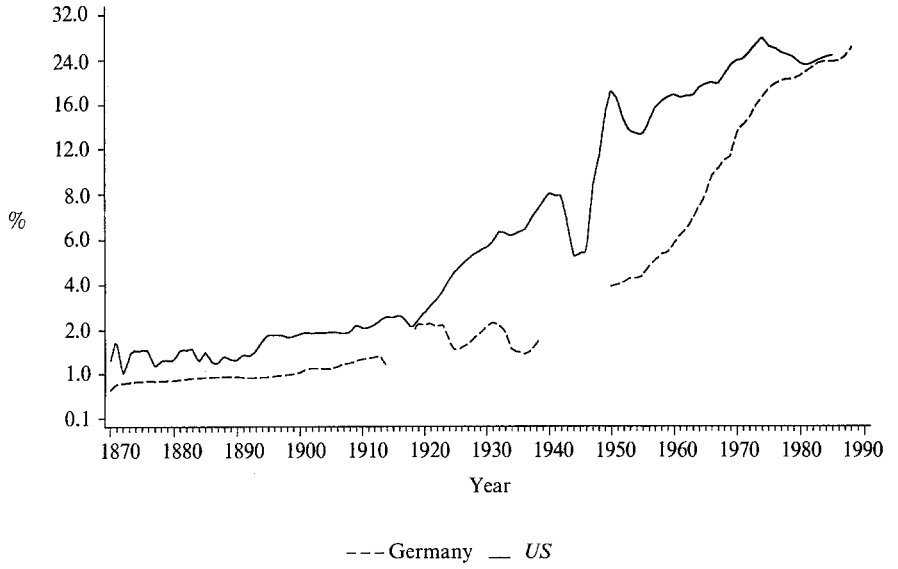


Fig. 1. Enrollment rates 1870–1988: Germany – USA.

university enrollment finally came to equal that in the US.

A time series such as that represented in Figure 1 can be divided into three components: a trend, a cycle, and a (random) chance or 'disturbance' (Borchardt 1977). The *trend* refers to a long-term, often secular tendency underlying the observed variations over time. In the present case, those factors make up the trend which over the past century have led to the virtually uninterrupted growth in the university enrollment despite substantial 'disturbances' and periods of short-term stagnation. In Germany, the two World Wars and the upheavals of the interwar years delayed this expansion which manifested itself thereafter at an accelerated rate.

The simplest explanation that can be adduced for this continuous growth is rooted in the characteristic dynamic of educational behavior itself. It is an 'iron law' of educational research that university enrollment is higher among children of educated parents than among those of working class parents. Thus, when an expansion of the universities has once been set in motion, this expansion becomes perpetuated through succeeding generations, for working class children who enjoyed the opportunity to obtain a college education will themselves have children whose backgrounds are not in the working class but in the educated class. Thus the overall societal level of university attendance increases further in the second generation after the initiation of such an expansion. This increase then continues from generation to generation, albeit with a decreasing rate of increase.

This sort of growth can be referred to as *endogenous* since it stems from dynamic forces unleashed by the educational expansion itself. Such endogenous growth alone, however, cannot adequately explain either the overall trend or the cyclical

variations that are evident in Figure 1. As regards Germany, one can identify at least three separate periods, each characterized by a specific trend: the first before World War I (one of low growth), the second in the interwar years (zero growth with substantial cyclical variations), and the third following World War II (high growth). The educational expansion has thus not grown out of purely endogenous factors but has been influenced as well by *exogenous* economic and political forces which are dealt with in detail below.

The second component, that of the *cycle*, represents a regular, wavelike variation along the trend. Introduction of this component into the analysis takes into account the fact that expansion of educational institutions has not followed a smooth, continuous course but one resembling waves, with times of expansion giving way to those of stagnation, which in turn are followed by times of renewed expansion. To speak of cycles in this context is to perceive a *regularity* in the variations around the trend which show a roughly constant and measurable duration. Figure 1 demonstrates that the curve of educational expansion over time has indeed not been smoothly upward but has included phases characterized by stagnation or short-term decline; the question is whether these variations describe a regular repetitive structure, or whether they represent mere random chance and 'disturbance'.

The relationship between cycle and *disturbance* can be illustrated in the course of the time series during the Weimar Republic. The waves in university enrollment rates here reflect the political and economic crises of this period. The principal cause of the sudden decline after 1921 lies in the hyperinflation that decimated the wealth of many in the middle class; the decline after 1933 resulted from the conditions imposed by the Nazi regime upon university attendance.[2] Hyperinflation which brought economic plight to the middle class and a totalitarian government which sought consciously to reverse the educational expansion are factors which, in this context, are assigned to 'chance'. This does not mean that these events elude all explanation, but rather that as singular events they can be explained only by a reconstruction of their specific historical causes, not by general 'laws' or repetitive, cyclical phenomena.

In contrast, the periods before World War I and after World War II show variations of a different nature. Here by drawing a straight line through the curve (Figure 1), one can see the cyclical variations more clearly as deviations from a (linear) trend. These variations repeat themselves with some regularity, and they are probably influenced by the business cycle in the economy (we return to this relationship below).

An important difference between trend and cycle, on the one hand, and chance (or disturbance), on the other, becomes evident in the attempt to extrapolate the time series as hitherto observed into the future. Trend and cycle are long-term or regularly repeating components which, it can be presumed, will continue to hold for some time still and therefore serve as the basis (whether accurately or not) for predictions. From 'accidental' singular events or 'disturbances' no predictions can be made.

From the perspective of 1913, an observer could have noted a fairly steady rise in enrollment at German universities since 1870 of some 1.7% per year, and this

average growth rate (trend) would have permitted predictions for years to come. These predictions may in fact have been rather accurate, had not singular events intervened as massive 'disturbances' and made nonsense of them: the devastation of World War I, the hyperinflation in the years thereafter, and the restrictions imposed by the Nazis in 1933. As a result of these 'chance' factors university enrollment in Germany declined – while that in the US continued to grow at an accelerated pace.

These conceptual distinctions can be used to 'explain' the time series presented in Figure 1. This entails explaining the trend and those dynamic forces that influence the secular growth in unversity enrollment. Furthermore, it involves determining what deviations from this trend are of a regular, cyclical nature and therefore permit the formulation of a general 'law' to cover them. What then remains as unexplained residual variation is regarded as 'chance disturbance', explicable only by recourse to concrete historical reconstruction.

Theories of educational expansion

Three theories have been advanced in education research that deal with educational expansion. Each of these has been developed almost exclusively on the basis of short-term growth processes in the educational system.[3] However, they permit the formulation of hypotheses regarding the long-term trend and cyclical variations in educational expansion. This is particularly the case as regards two of the three theories, that of 'human capital' and that of 'status competition'. The third, referred to here as the 'political' theory of educational expansion, foregoes largely the attempt at quantitative analysis and concentrates instead on the historical representation of the successive phases of liberal 'opening' and conservative 'closing' of the universities. This theory considers the question, for example, of whether educational expansion has been a necessary condition for the emancipation of certain social groups.

The theory of *human capital* was developed in the context of modernization theories and maintains that universities expand apace with economic growth and technical progress, meeting the societal need for qualified personnel.[4] This view perceives a straightforward, market-related relationship between the need for trained personnel and the expansion of universities. University enrollment expands in times of economic growth and contracts in times of economic recession. This model regards the job market and the university as mutually regulating systems, and university expansion is therefore seen as limited by the actual demand for technical qualifications in the economy. Although conditions of over- or undersupply may occur in the short term, balance will eventually be restored between educational system and job market. This model thus pursues an exogenous explanation, seeing educational expansion as resulting not from forces within the educational system itself but from those outside of it, in the economic system: the educational system reacts to demand in the job market.

As early as the turn of the century, the Prussian statistician Eulenburg cast doubt upon the putative explanation of university expansion by the business cycle – the

view still adhered to in the 1960s by proponents of the human capital theory. Eulenburg's skepticism was founded on his observation that, 'even favorable economic conditions may tend to impede university attendance and unfavorable conditions to encourage it' (Eulenburg 1904, p. 256).[5] This observation did not accord easily with modernization theories that trace university expansion to increased demand for qualification on the part of industry.

If Eulenburg's claim is correct, a plausible explanation must be found for the encouragement which educational expansion may find, not in economic growth, but in economic recession. This seeming paradox, in terms of modernization theory, received renewed attention in the early 1970s, as the result of the chronic overproduction of university graduates. It was argued that the educational decisions of individual actors could lead to undesirable side effects for the overall society. Educational expansion was then hypothesized to stem not from demand in the job market but from *individuals' competition over social status*, which in contrast to demand-limited factors develops a dynamic that is difficult to control.[6] Since in meritocratic societies the level of educational achievement that one attains constitutes an important precondition for social advancement and pursuit of occupational career, individuals behave in terms of the maxim: 'the more, the better.' While this behavior appears rational from the standpoint of the individual, it becomes increasingly irrational from the standpoint of society as a whole. Uncontrolled educational aspriations lead to a chronic oversupply of university graduates in the job market, and the educational system distances itself ever further from a condition of equilibrium with the needs of the economy.

The theory of human capital and that of status competition are not necessarily mutually exclusive. An individual who accumulates as many credentials as possible in order to improve his/her competitive situation is also helping to meet the societal need for trained personnel. However, the respective theories make differing predictions in periods of economic depression and high unemployment. While the human capital theory would predict here a decline in the number of students, the theory of status competition would predict continued, even accelerated, expansion as youthful competitors for dwindling employment opportunities seek all the more to improve their comparative advantage in obtaining employment.

The past century has seen three periods of economic depression; each of these shows the following characteristics: (a) it lasted a relatively long time; (b) it not only halted economic growth but led to a real decline in living standards; and (c) it affected almost all Western capitalist nations. These were the long depression of 1876–1893, the worldwide crisis of the 1930s following the stock market crash, and the present economic recession which since 1979 has substantially increased unemployment in all Western European countries (Rosenberg 1943).[7] What happened to the universities in these countries during these periods? Did their expansion continue despite the economic downturn?

Both theories of educational expansion provide an explanation for the trend and for the regularly repeating cycles in this expansion. Furthermore, both posit a relationship between educational expansion and economic expansion, albeit of differing nature. The theory of human capital maintains a direct relationship, that is,

that educational expansion accompanies pari passu that in the economy. The theory of status competition, on the other hand, maintains an inverse relationship: economic recession and unemployment bring increased university enrollment while economic boom and high employment lead to stagnating enrollment figures (not necessarily to declining levels, since status competition remains a problem for the individual actors).

In contrast to both these theories, the third *'political' theory* of educational expansion maintains that this expansion has little if anything to do with the business cycle. This theory also begins with the fact of competition – not individual competition, however, but the collective competition among social groups for political and cultural advancement and for participation in political decision making. Before individuals can compete for educational qualifications, an infrastructure must be developed, consisting of schools, universities, and libraries. Teachers and researchers must be trained, hired, and financed. Whether and to what extent universities are supported and enabled to expand is determined by the state (or a collective actor). The state and political parties decide what proportion of collective resources to invest in the educational system and what entrance requirements to impose upon those seeking to participate in the competition for higher education.

University education imparts not only technical and cultural capabilities. In many countries it also bestows the credentials necessary for filling a higher level position in the state bureaucracy. As the role of bureaucratic control in modern democracy becomes more important and more central, class conflict expresses itself increasingly on the issue of guaranteeing the access of specific social groups to the bureaucracy. The university serves as the gate-keeper to the state bureaucracy, and only those aspirants possessing a university degree can gain access to bureaucratic power. Whether universities are open to working class children and to women is not a purely academic decision but a reflection of the *relative power* of various groups in society. And the conflict over such access concerns less individual cases of advancement than the cultural and political emancipation of social groups (Bowles and Gintis, 1976; Goldthorpe 1980; Windolf 1990).

During the period between the World Wars it was decided – at least in the US – that the universities should also be opened to women, and their attendance became a chief factor in the growth of university enrollments. Following World War II this decision was also made in European countries, which in addition decided to admit a proportion (varying by country) of the working class. These groups have contributed substantially to the increasing proportions of those attending university.

Variations in the business cycle can provide only little if any explanation for these phases of accelerated expansion in university enrollment. Such phases of liberal 'opening' and conservative 'closing' of the university are reflections more of 'political cycles' than of economic cycles.[8] There have been a number of periods during which German universites have undergone increased expansion. Between 1873 and the end of the century the number of students doubled, despite the long period of economic depression besetting most of this period; during the Weimar

Republic universities enjoyed a particularly rapid expansion between 1925 and 1931; and after World War II the years 1965–1975 were an era of enormous educational expansion. These were not periods of particularly increased economic growth but of 'liberal' educational policies. The outcome of class conflicts and the altered distribution of power among competing social groups (which may cause a liberal openness to the university) represent singular events which cannot be explained by general 'laws' but only by a posterior historical reconstruction.

Results of spectral analysis

The study of (long-term) cyclical variations is of central concern in research on the business cycle. Econometric analyses concentrate, for instance, on the question of whether variations show a regular, cyclical structure, and, if so, what duration these cycles have. Regarding the duration of cycles one distinguishes between those of the long term (40–60 years, 'Kondratieffs'), medium term (15–30 years; 'Kuznets cycles'), and short term (7–11 years; 'Juglar cycles').[9] Here we ask the following: Do the phases of educational expansion show a cyclical nature, and, if so, what is the duration of a cycle, and what is the relationship between these cycles and those in the economy? This analysis considers the following nations: Germany, Italy, France, United States, and Japan.

The question as to whether long-term waves do in fact exist, and if they do, what their duration is, has led to considerable controversy in economic literature. Many researchers maintain that their existence cannot be proven (Eklund 1980). As a result, research in recent decades has concentrated predominantly on those of medium- and short-term duration. In the present analysis we also exclude consideration of long-term waves and focus on those having a duration of 5–40 years. In particular we seek to ascertain whether the phases of educational expansion stand in direct relationship (human capital theory), inverse relationship (status competition theory), or no relationship (political theory) to the business cycle.

To answer this question we compare time series data on university enrollment and those on gross national product (GNP). We first control for the overall trend and long-term cycles by means of a filter consisting of a polynomial of the seventh degree. This method of filtering was used because it leaves the number of observations unchanged. (If a moving average is used, one may lose a substantial number of observations.) The degree of the polynomial chosen determines the duration of the cycles to be removed; one of seventh degree eliminates substantially those cycles of more than 40 years (see Figures 7–11).

Figures 2–6 plot the residuals of both variables (enrollment rates, GNP) over time and thus represent the respective time series adjusted after removal of the trend and long-term cycles. In Germany, Italy, and Japan, the cyclical variation in university enrollment frequently runs counter to that in GNP. Thus, phases of economic expansion are times of slow growth in university enrollment (latter curve below zero) while phases of economic downturn see rapid expansion in university

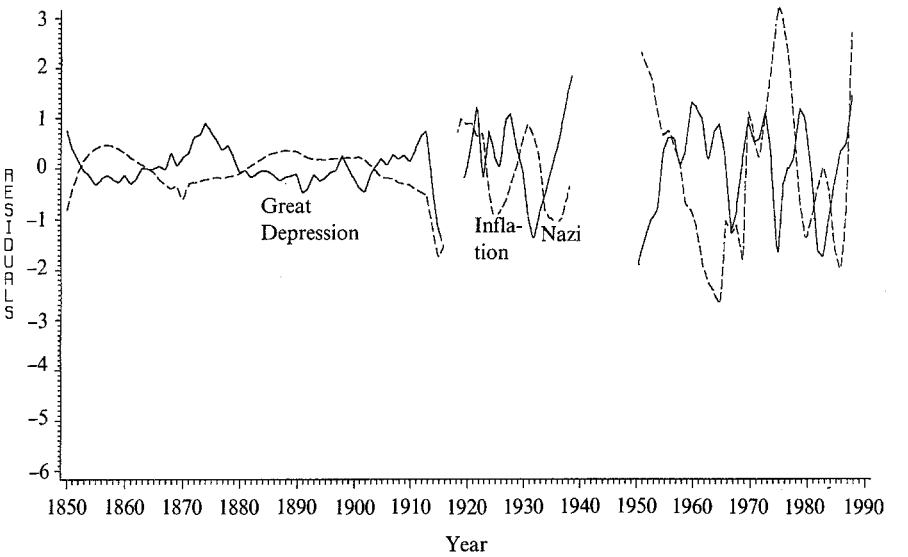


Fig. 2. Germany (residuals 1850–1988).

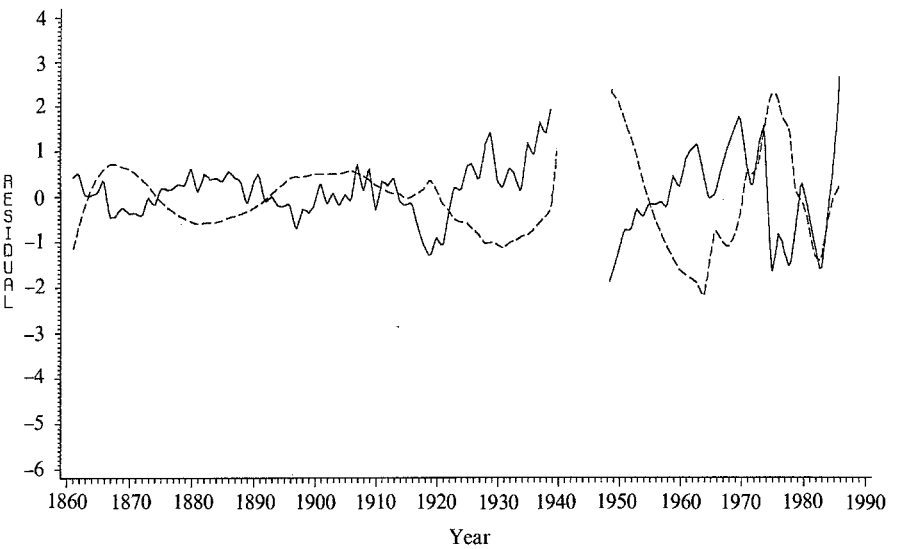


Fig. 3. Italy (residuals 1861–1986). The following legend applies to Figures 2–6 (residuals) and Figures 7–11 (spectral density function): University enrollment: - - - - - - - - - - - -; GNP: ————————.

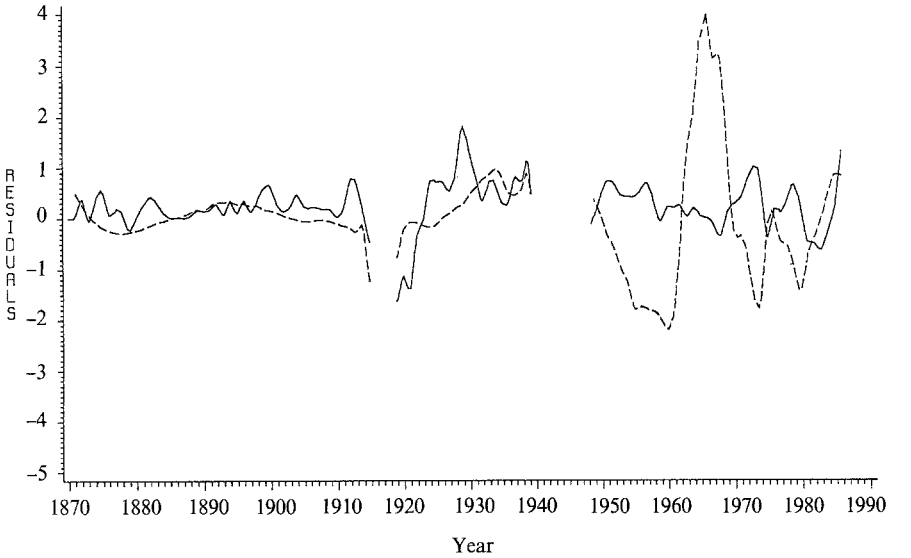


Fig. 4. France (residuals 1871–1986).

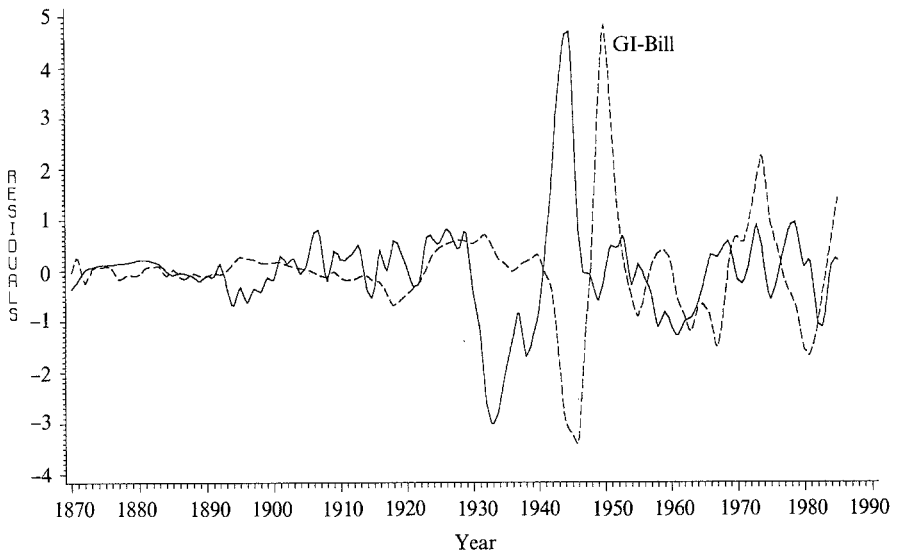


Fig. 5. US (residuals 1870–1985).

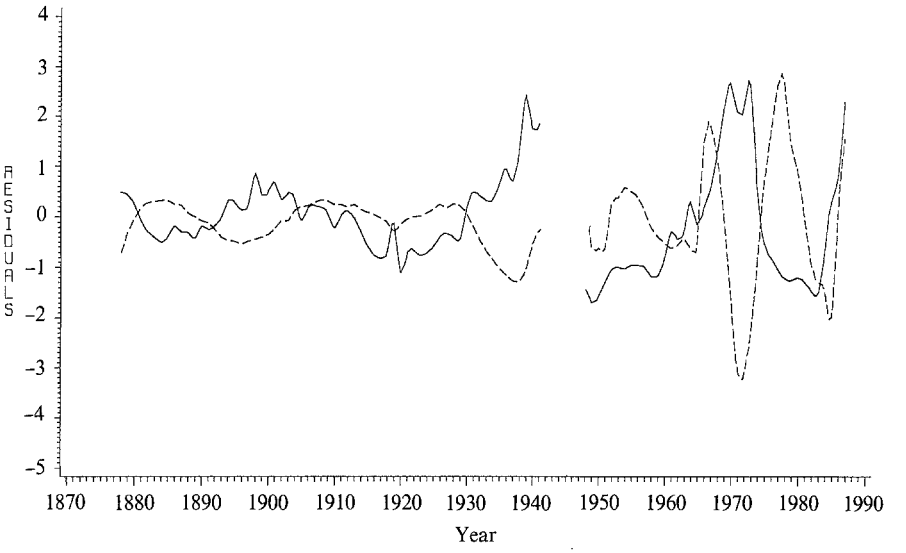


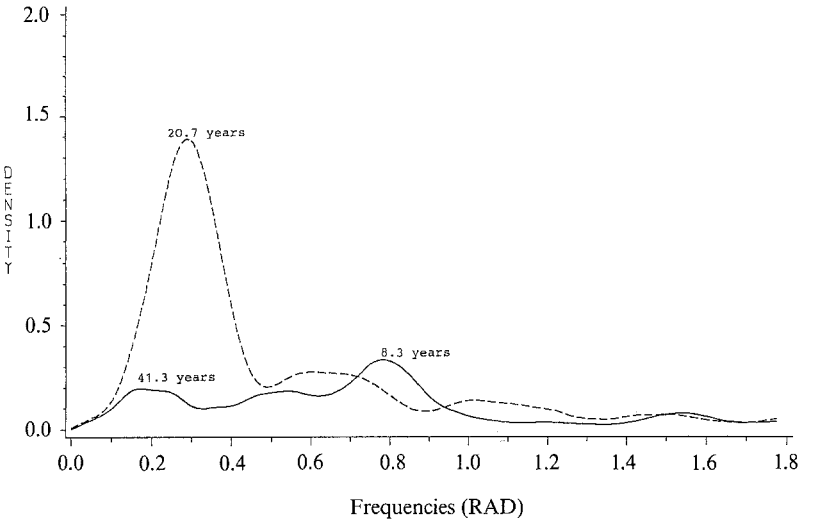
Fig. 6. Japan (residuals 1878–1987).

enrollment (latter curve above zero). In the data on France and the US this inverse relationship emerges less clearly.

Spectral analysis can be used to decompose any time series into a set of harmonic waves (Gottman 1981). In other words, the method seeks to approximate a cyclical process – as shown in Figures 2–7 (residuals) – by a set of harmonic functions (sine waves) which might have generated the cyclical process. In particular, the method permits to estimate the duration (period) of these cycles The results of the analysis are presented in Figures 7-11. The peak in the spectral density function indicates the period that explains a relatively high proportion of the variance of the time series. The higher the peak, the greater is the proportion of variance that is explained by a set of harmonic waves with this particular period.

The spectral density function in the case of Germany, for example, shows that harmonic waves of a period of about 20 years (20.7) fit the time series of university enrollment (residuals) relatively well. The corresponding peak for GNP data lies at 8.3 years (see Figure 7). In other words, German universities have expanded over the past century in cyclical waves of some 20 years – which have cut across the business of boom and bust. The cyclical ups and downs in GNP can be described by a combination of 41 and 8-year cycles. The respective cycles for expansion in the educational and the economic systems have therefore been independent of one another. This result supports neither the theory of human capital nor that of status competition and seems to indicate that educational institutions are dependent upon political cycles (or processes) rather than business cycles.[10]

In the case of Italy, on the other hand, the spectral density function shows peaks for both university enrollment and GNP at about 24 years (24.2). This means that



Results of spectral analysis (most significant cycles):

	Enrollment rate	Gross-National-Product
Kondratieff cycle:	*	41.3 (0.19)
Kuznets cycle:	20.7 (1.41)	*
Juglar cycle:	*	8.3 (0.33)

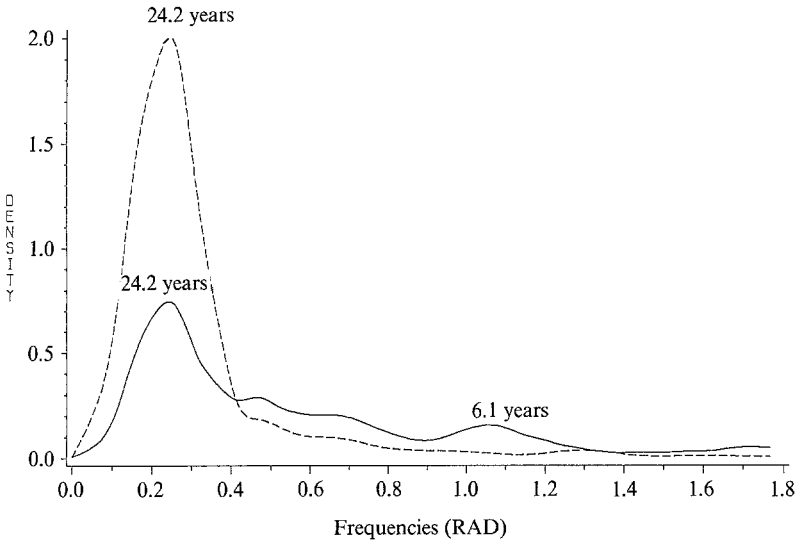
Figures give duration of most significant cycles in years. Spectral density estimates in parentheses.
* Cycles in this frequency band not significant.

Spectral density estimates were computed for the frequencies from 0 to 3.14 (pi), but in Figures 7–11 only frequencies from 0 to 1.89 are shown. The period can be calculated by the following formula: period (duration in years) = 6.28/frequency.

Fig. 7. Germany (spectral density function).

the cycle of educational expansion as well as that of economic expansion has had a duration of some 24 years, albeit not synchronously with one another. Examination of the phase spectrum indicates that the cycle of educational expansion follows that of economic expansion with a phase lag of some 10 years. Since the length of this lag is approximately half of one full cycle, the appearance is that of inversely related variables. Expansion of the economy is accompanied by stagnation in university enrollment figures, and vice versa. This result supports the theory of status competition.

The most important peaks in spectral density function are included in Figures 7–11. In cases in which university enrollment and GNP expand in cycles of similar duration, the phase lag between the two time series is indicated (bottom). The measure of 'coherence' evaluates the strength of relationship between the two cycles with similar duration and can be interpreted generally in the manner of a correlation coefficient.



Results of spectral analysis (most significant cycles):

	Enrollment rate	Gross-National-Product
Kondratieff cycle:	*	*
Kuznets cycle:	24.2 (1.97)	24.2 (0.73) phase lag of enrollment: 9.9 years; coherence: 0.80
Juglar cycle:	*	6.1 (0.15)

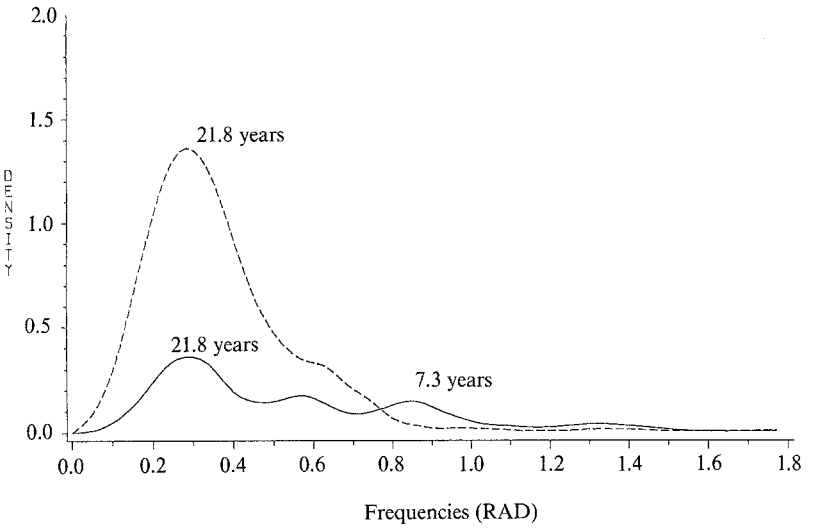
Figures give duration of most significant cycles in years. Spectral density estimates in parantheses.
* Cycles in this frequency band not significant.

Fig. 8. Italy (spectral density function).

Conclusions

In summary, we can observe that the theory of human capital is not confirmed in any of the countries examined. In Japan and Germany, the cycles of educational and economic expansion show varying duration, and simultaneous expansion in the two systems occurs only by chance overlapping of the respective time series. In Italy, France and the United States, on the other hand, the duration of the respective cycles is very similar. However, the phase lag in each case (7–12 years) is so great that one cannot speak of a delayed adjustment of the educational system to expansion in the economic system. These empirical findings therefore seem to support either the theory of status competition or the 'political' theory of educational expansion rather than the theory of human capital.

In four out of five countries analysed here the expansion of higher education fluctuates around cycles of 20 years (Germany 20.7 years, Italy 24.2 years, France 21.8 years, US 19.3 years). How is this pattern of recurrent cycles to be explained?



Results of spectral analysis (most significant cycles):

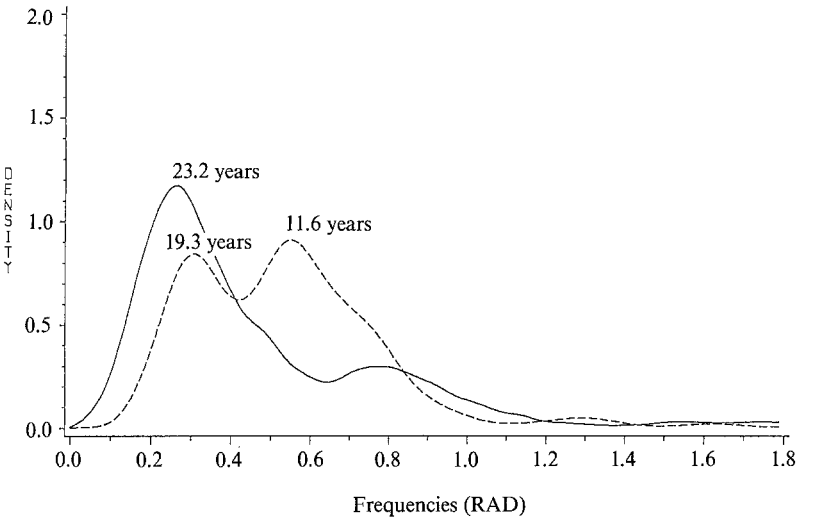
	Enrollment rate	Gross-National-Product
Kondratieff cycle:	*	*
Kuznets cycle:	21.8 (1.18)	21.8 (0.31) phase lag of enrollment: 12.0 years; coherence: 0.07
Juglar cycle:	*	7.3 (0.15)

Figures give duration of most significant cycles in years. Spectral density estimates in parantheses.
* Cycles in this frequency band not significant.

Fig. 9. France (spectral density function).

Are there any forces in the educational system or in the economy which produce such a pattern of regularity? Critics have argued that prominent scholars of the 'long waves' (Kondratieff, Schumpeter, and Mandel) failed to provide a *theoretical* explanation why booms and busts follow each other every fifty to sixty years (Eklund 1980, p. 395). Neither the cyclical character of technical innovation nor the life-expectancy of capital goods are convincing arguments for the regularity of 'long waves' which are supposed to repeat themselves twice during a century. For similar reasons, it would also be difficult to give a theoretical explanation for the empirical finding that higher education expanded around cycles of about twenty years.[11]

The present analysis does not try to give such an explanation, but concentrates on *patterns of interaction between different social systems over a long period of time.* The duration of cycles is taken as an empirical 'fact'. Attention is directed toward such questions as whether the business cycle and cycles of expansion in higher education are of similar duration and how they influence each other. Spectral analysis is a powerful tool to isolate the most important waves which underlie the cyclical movement of the economic and the educational system. Spectral analysis also shows



Results of spectral analysis (most significant cycles):

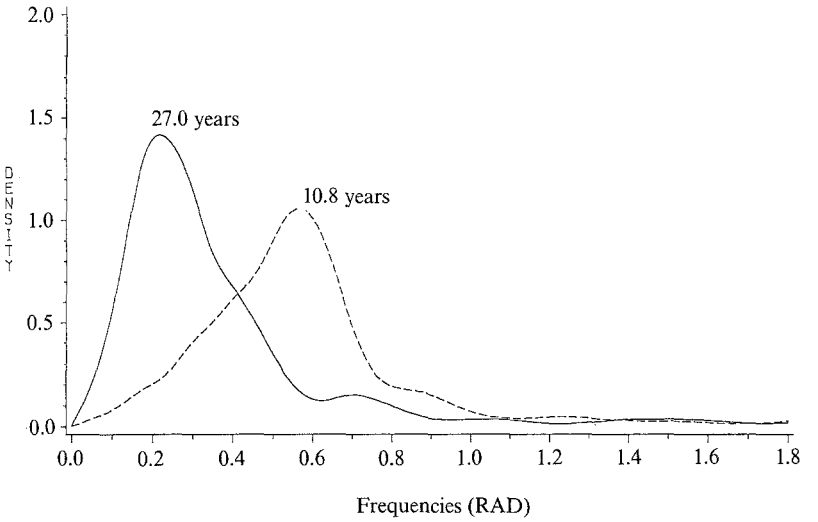
	Enrollment rate	Gross-National-Product
Kondratieff cycle:	*	*
Kuznets cycle:	19.3 (0.83)	23.2 (1.17) phase lag of enrollment: 7.0 years; coherence: 0.48
Juglar cycle:	11.6 (0.91)	*

Figures give duration of most significant cycles in years. Spectral density estimates in parentheses.
* Cycles in this frequency band not significant.

Fig. 10. US (spectral density function).

the relationship over time between these cycles, i.e., the structure of leads and lags. If the duration of cycles in the educational system differs considerably from the duration in the economic system, one may assume that the two systems do not interact with each other (see Germany, Figure 7). If, however, both systems expand around cycles of similar duration *and* the educational system lags consistently behind the economic system, then, one may assume that this lag-structure indicates a *causal* relationship between both systems. In the case of Italy, Figure 8 (bottom) shows that the educational system lags about 10 years behind the business cycle. Since this lag is approximately half of one full cycle, it points to a reverse relationship between economic growth and the expansion of higher education: students go to universities in times of the recession and join the labour force in time of the economic boom.

Concluding then, spectral analysis provides an accurate picture of the structure of interaction between two or more social systems over time. The analysis did not intended to 'prove' the existence of 'long waves'. Instead, it has been shown how



Results of spectral analysis (most significant cycles):

	Enrollment rate	Gross-National-Product
Kondratieff cycle:	*	*
Kuznets cycle:	*	27.0 (1.41)
Juglar cycle:	10.8 (1.06)	*

Figures give duration of most significant cycles in years. Spectral density estimates in parentheses.
* Cycles in this frequency band not significant.

Fig. 11. Japan (spectral density function).

cyclical movements in one social system are related to similar movements in other systems, and whether this relationship is stable over time.

Notes

1. Enrollment rates were defined as follows: Germany, proportion of *all* students as a percentage of those aged 20–24 years (=5 cohorts); US, proportion of university graduates (bachelor's degree) as a percentage of 1 cohort (calculated as an average of those aged 20–24 years).
2. In 1933 the Nazi-government enacted a law to end the 'overcrowding' of the German universities (numerus clausus). Only 15,000 students (freshmen) were allowed to enroll at universities. In the same year, about 40,000 students graduated from the 'Gymnasium', i.e., only 38% of those legally entitled to enroll at a German university were allowed to do so. The number of women was limited to 10%. (In 1931 about 19% of all students were women.) The state bureaucracy used the following selection criteria: academic excellence, membership in a Nazi-youth-organization and political attitudes (Windolf 1990, p. 94; Giles 1985).
3. An exception is, for example, the cross-national comparison of educational expansion between

1950 and 1970 by Meyer and Hannan (1979).

4. The basic assumptions of human capital theory are summarized in Blaug (1970) and Freeman (1976). On the more comprehensive approach of modernization, see Zapf and Flora (1973).
5. For a similar conclusion for the Italian universities before World War I, see M. Barbagli (1974, pp. 134–136).
6. Boudon (1977) terms non-intended side effects of the educational expansion as 'perverse effects'. On the concept of status competition see Collins (1971).
7. Milward (1981) denies that conditions during this period were those of a depression.
8. Cyclical changes in political values have been analysed by Namewirth and Bibee (1976) for the US, by Weber (1981) for Great Britain, and by Mohler (1987) for West Germany.
9. Goldstein (1988) provides a comprehensive overview of empirical research on 'long cycles' in economic and political history.
10. For simplification here, details are not presented in terms of frequencies. However, it should be noted that the 'peaks' of spectral density function are to be interpreted in the sense of frequency *bands*.
11. The period of 20 years might be explained by the effect of succeeding generations. It has already been argued that working class children who went to university will themselves have children with higher enrollment rates. This increase continues from generation to generation, albeit on a lower level. For example, Figure 5 shows the effect of the GI-bill allowing veterans of the Second World War to become college students (Jencks and Riesman 1977, p. 94). Between 1950 and 1952 there is a sharp increase in the proportion of a cohort graduating from college. This effect is repeated twenty years later (around 1972) although at a lower level.

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Summary in German

Zusammenfassung. In diesem Aufsatz wird die Bildungsexpansion an den Universitäten zwischen 1870 und 1985 in fünf Ländern analysiert (Deutschland, Italien, Frankreich, USA und Japan). Zwei Hypothesen, die das Wachstum erklären, werden getestet: die Humankapital-Theorie und die Theorie der individuellen Statuskonkurrenz (Collins). Die Analyse konzentriert sich auf die Interaktion zwischen dem Bildungssystem und dem Wirtschaftssystem, insbesondere während einer ökonomischen Krise. Die Spektralanalyse wird als statistisches Verfahren benutzt, um den zyklischen Charakter der Expansion und die Beziehung zwischen Wirtschaftswachstum und Bildungsexpansion zu untersuchen. Für die meisten Länder wird die Theorie der Statuskonkurrenz bestätigt: die Universitäten wachsen besonders schnell während einer ökonomischen Krise (z.B. Große Depression, 1890–1900; Weltwirtschaftskrise, 1929–1935). Die Humankapital-Theorie wird durch die Längsschnitt-Untersuchung nicht bestätigt. Der Aufsatz zeigt, daß die Spektralanalyse ein nützliches Instrument ist, um die kausale Beziehung zwischen zwei oder mehreren sozialen Systemen im Zeitablauf zu untersuchen.