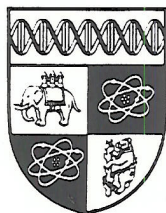THE GOLDEN AGE OF ECONOMIC GROWTH IN WESTERN EUROPE,
1950-73

N.F.R. Crafts

No.427

WARWICK ECONOMIC RESEARCH PAPERS

THE GOLDEN AGE OF ECONOMIC GROWTH IN WESTERN EUROPE,
1950-73

N.F.R. Crafts

Department of Economics
University of Warwick
Coventry CV4 7AL
UK

No.427

August 1994

The Golden Age of Economic Growth

in Western Europe, 1950-73

By

N.F.R. Crafts

(University of Warwick)

Since the mid-1980s there has been a major resurgence in the economics profession both of theoretical and empirical research on economic growth. In this paper I shall explore the implications of these new ideas for our understanding of the extraordinarily rapid European growth of the early post World War II period and, more briefly, of Britain's relatively slow growth rate. At the same time I wish to suggest that economists may have something to learn from the economic history of these years and that more serious study of this episode might modify some of their research findings.

<p style="text-align:center">I</p>

This section seeks to bring out the essence of some key aspects of the New Growth Economics. Inevitably the treatment will be both highly selective and non-technical.[1] For present purposes I focus on five central features of recent research.

i)   The Role of Investment

Traditional Solow style neoclassical growth economics, which underlies the growth accounting familiar to economic historians from the work of Denison, Maddison and Matthews et al., is based on the assumption that capital accumulation is subject to diminishing returns such that in the long run the rate of growth is independent of the rate of investment and thus of policies which influence investment.[2] In such models, long run growth of income per person requires that exogenous improvements in technology generate productivity growth - reflected in the growth accountant's residual. The production function underlying this view of growth is usually written as

$$Y = TK^a L^b \quad \text{where } 0 < a < 1 \tag{1}$$

where T, a scaling factor, reflects the level of technology.

By contrast, a simple model of endogenous growth could be organized around a production function modified to the form

$$Y = K^{a+x}L \quad \text{where} \quad a + x = 1 \tag{2}$$

In this case the term x represents externalities, there is no exogenous productivity growth (T has disappeared) and there are constant rather than diminishing returns to investment. Here an increase in the growth of the capital stock coming from higher investment permanently raises the growth rate and can therefore deliver rising incomes per person. Such a model was originally famously advocated by Romer but the empirical evidence indicates that it is completely unpersuasive, as Romer himself now accepts.[3]

Nevertheless, the basic idea of endogenous growth is quite appealing and can be developed in more fruitful ways. The key to it is not, as might be thought, increasing returns to scale but constant returns to the accumulation of reproducible factors of production. This tends be more plausible if the notion of capital is broadened to include investments in acquisition of knowledge, skills etc. Thus the well-known Rebelo model can be written as

$$Y = A\tilde{K} \tag{3}$$

where $\tilde{K}$ represents 'broad capital' and A, the incremental output to broad capital ratio is constant.[4] Thus there are constant returns to the accumulation of broad capital. Models of this kind put investment centre stage and see growth as an investment-driven process. Again, there is no role for Solow's residual.

ii)   Human Capital

It is now generally accepted among growth economists that, at the very least, the traditional Solow model needs to be modified explicitly to include human capital (H) as a

form of accumulation. This is a central message of which economic historians should take note. In a Rebelo framework the equation (3) would be re-written as

$$Y = AK^{\phi}H^{\Theta} \quad \text{where} \quad \phi + \Theta = 1 \tag{4}$$

Given this production function, we would expect that in equilibrium K/H would be constant and thus (4) is equivalent to (3) and exhibits endogenous growth.

An alternative formulation which commands a strong following is to think in terms of an Augmented-Solow model in which

$$Y = TK^{\phi}L^{\eta}H^{\Theta} \quad \text{where} \quad (\phi + \Theta) < 1 \tag{5}$$

This approach has been used by Barro and Sala-i-Martin and Mankiw et al. in well-known empirical papers.[5] Here growth is not endogenous because the exponents on the two reproducible factors (K and H) sum to less than 1. Even so, diminishing returns will in general be much less severe than in the traditional neoclassical model as the marginal product of broad capital will be much closer to average product than would be true of physical capital alone.[6]

Whether models of the type represented by equation (4) are better than those like (5) is controversial and may well depend on the circumstances under investigation. In either case, however, an important implication is that increases in investment in broad capital have much more long lasting effects on the growth rate than the Solow model supposed. Moreover, recognition of the importance of human capital to growth makes better measurement of the stock of human capital highly desirable.

iii)   Policy Effects on Growth

Once it is accepted that investment in broad capital has a strong (even if not permanent) effect on the rate of economic growth, then economic policy matters much more. In general, anything which enhances the attractiveness of investment is potentially growth promoting. Of course, this has close links to arguments long espoused by economic historians - for example, the idea that well-defined property rights and political stability are conducive to growth.

Nevertheless, the explicit formalization provided by recent models can provide sharper insights. In this respect, once again Rebelo's approach has proved particularly influential among economists and fortunately can be conveniently summarized in the diagram of figure 1.

The equilibrium shown is where the return to consumption is equal to the return to investment and is based on intertemporal optimization decisions. The return to investment is shown for the Rebelo endogenous growth case and allows for the return to be reduced by direct taxation (t_d) and depreciation (λ). This will equal the interest rate (r) which in turn must also equal the return to consumption which depends on the rate of time preference (ρ) and the rate at which marginal utility declines with respect to consumption (μ).

The central message to take away from figure 1 is that either a reduction in the rate of time preference (less impatience) or a reduction in the marginal rate of direct taxation leads to an equilibrium characterized by higher steady state growth. An interesting question is how helpful these insights are in the context of postwar European growth.

Figure 1 : Equalization of the Return to Consumption and the Return to Investment

Figure 1 : Equalization of the Return to Consumption and the Return to Investment
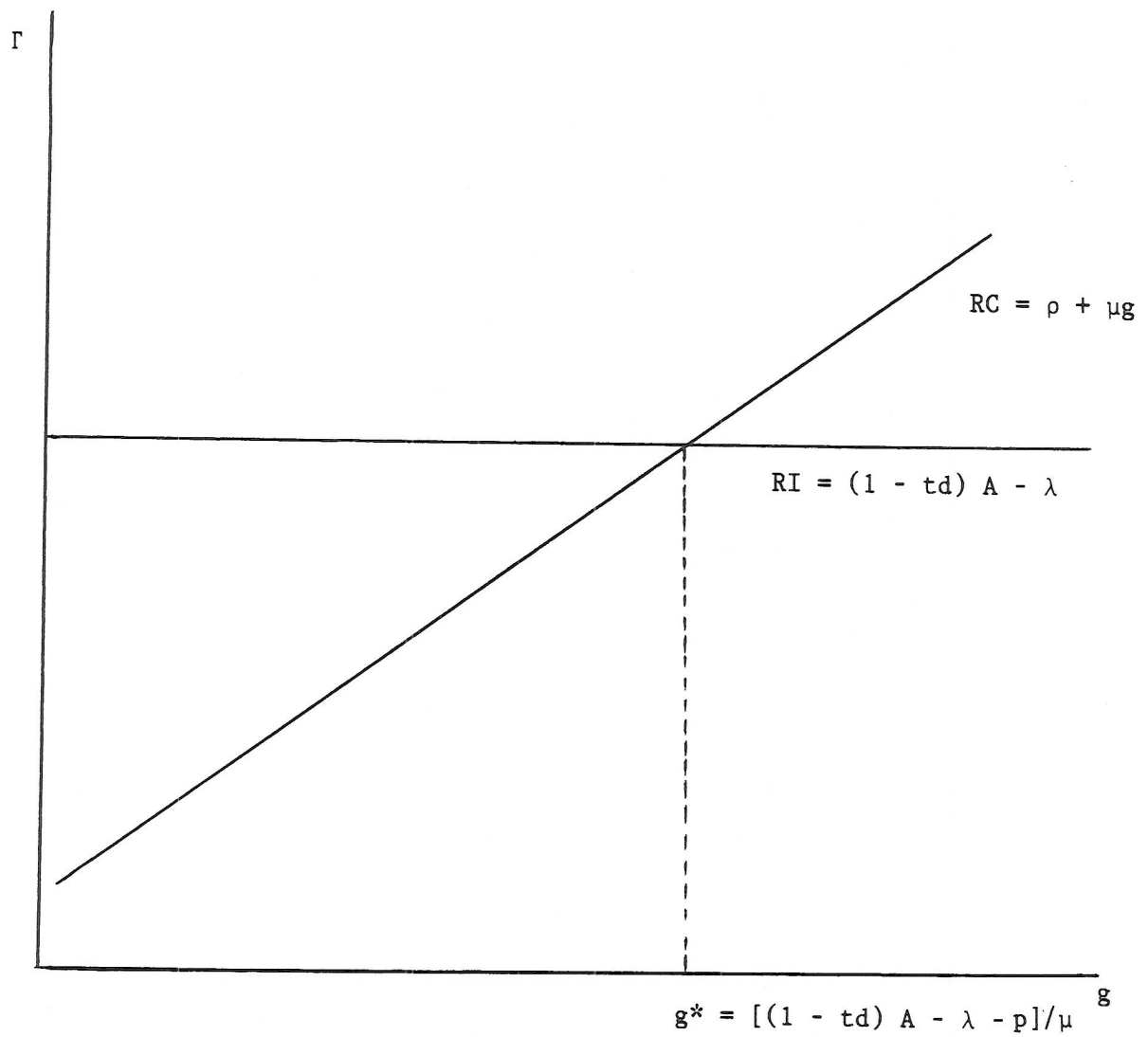
iv)   Catch-Up and Convergence

An important concept which has come into fairly general use among economists recently is that of 'conditional convergence'. Whereas unconditional convergence is the straightforward idea that countries actually move towards the same level of productivity, conditional convergence is more subtle and allows for the possibility that there are forces pushing an economy towards the steady state level of productivity and steady state growth rate but that this equilibrium is not the same in all cases. In other words there are catch-up forces at work but they may be offset by other effects.

Unconditional convergence is a result of a special case of the traditional neoclassical model but would not normally be predicted by most models. Thus, in general, both the traditional and the Augmented-Solow models predict conditional convergence where the steady state level of income depends on population growth and rates of capital accumulation. With conditional convergence we anticipate that observed growth rates of output per person will depend inversely on the initial level of output per person to reflect the scope for catching-up but that other factors will also affect the growth rate:

$$g_{y/l} = \alpha - \beta(Y/L_o) + \gamma Z \tag{6}$$

where Z represents a variable or group of variables that could affect the steady state. This notion of convergence features prominently in the work of Barro and Sala-i-Martin whose particular terminology of β-convergence has become widely used.[7]

By contrast, in endogenous growth models of the Rebelo type the growth rate depends only on the rate of investment in broad capital and not on the initial productivity gap. Indeed, the Rebelo model offers the prospect of permanent growth rate differences with divergence rather than convergence as the predicted outcome.

In periods where these catching-up effects operate strongly, at least for some countries, then evaluations of growth performance need to take this into account rather than rely simply on comparisons of the raw data of growth rates. Undoubtedly, this is an important aspect of the Golden Age of European growth even though the hypothesis of conditional convergence may not have general applicability.[8]

v)   Social Capability

Abramovitz has been a pivotal figure in the economics literature on catch-up factors in growth. A central feature of his work has always been to stress that catch-up is not automatic but depends on 'social capability'. Thus, for example, there may be obstacles to the assimilation of foreign technology stemming from inadequate education, capital markets or from political economy considerations which sustain barriers to entry.[9] Clearly, average levels of social capability may have changed over time and might very well vary even among relatively advanced countries at any particular moment.[10] Thus, social capability could also be reflected in different steady state outcomes.

Differences in social capability are at bottom sustained by market failures and/or failures of government intervention. This implies a link between Abramovitz's concerns and the approach taken by Chicago type economics and much of the early new economic history. In such approaches lack of social capability would merely be a symptom and emphasis would be placed on understanding the forces which could sustain this as an equilibrium. Social capability needs to be explored in the context of incentive structures.

In sum, recent research in growth economics tends to admit more possibilities of divergence between economies over the long run, more scope for policy and institutions to affect growth, and stresses much more the role of human capital in growth than did the mainstream growth economists of the 1960s. The implications of this for economic history

include the desirability of re-examining results based on growth accounting and a need to think hard about explanations for international differences in accumulation strategies.

II

This section seeks first to justify use of the phrase 'Golden Age' to describe the growth experienced in 1950-73 and then considers alternative ways of accounting for this episode in the sense of uncovering the proximate sources of growth.

Table 1 : European growth, 1890-1993

(Average annual rates of growth)

Period	Real GDP	Population	Real GDP per capita	Real GDP per hour
1890-1993	2.5	0.6	1.9	2.6[a]
1890-1913	2.6	0.8	1.7	1.6
1913-1950	1.4	0.5	1.0	1.9
1950-1973	4.6	0.7	3.8	4.7
1973-1993	2.0	0.3	1.7	2.7[b]

Notes: [a]1890-1987

[b]1973-1987

GDP and population are aggregates for 12 countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, United Kingdom, all adjusted for boundary changes).

Sources: 1870-1989, Maddison, *Dynamic Forces.*
1989-93, OECD, *Economic Outlook.*

Table 1 highlights the point that 1950-73 saw much the highest growth rate in Western Europe of the last century. Maddison is a strong advocate of this periodization and sees the 1950-73 era as a time when technological possibilities combined with the policy environment to promote a fast growth experience which came to an abrupt end when faced with the undermining effects of wage explosions and the 1970s oil crisis as catch-up effects waned.[11] A similar view is held by Abramovitz.[12] Taking Maddison's position to be that

Table 2 : GDP per person in 1990 International Dollars

		1950	1973	1992	1950-73 growth % (rank)	1950-92 growth % (rank)
1.	Switzerland	8939	17953	21036	3.1 (12)	2.1 (15)
2.	UK	6847	11932	15738	2.4 (16)	2.0 (16)
3.	Sweden	6738	13494	16927	3.1 (12)	2.2 (14)
4.	Denmark	6683	13416	18293	3.1 (12)	2.4 (13)
5.	Netherlands	5850	12763	16898	3.4 (10)	2.6 (12)
6.	Belgium	5346	11905	17165	3.5 (9)	2.8 (10)
7.	France	5221	12940	17959	4.0 (8)	3.0 (8)
8.	Norway	4969	10229	17543	3.2 (11)	3.0 (8)
9.	W. Germany	4281	13152	19351	5.0 (4)	3.6 (6)
10.	Finland	4131	10768	14646	4.2 (7)	3.1 (7)
11.	Austria	3731	11308	17160	4.9 (5)	3.7 (5)
12.	Ireland	3518	7023	10711	3.1 (12)	2.7 (11)
13.	Italy	3425	10409	16229	4.9 (5)	3.8 (4)
14.	Spain	2397	8739	12500	5.8 (2)	4.0 (1)
15.	Portugal	2132	7568	11130	5.6 (3)	4.0 (1)
16.	Greece	1558	6229	8238	6.2 (1)	4.0 (1)

Source: Data kindly supplied by Angus Maddison.

this epoch was created and terminated by exogenous shocks, econometric testing confirms the special status of 1951-73 when in all countries except Switzerland and Italy productivity growth was at an all-time high.[13]

Table 2 demonstrates that the experience of growth during 1950-73 was a widely shared one although within Western Europe the annual growth rate of real GDP per person had a range of 2.4% to 6.2%. Table 2 also suggests that 1950-73 was a period of conditional convergence, a hypothesis which is again borne out by econometric work.[14] Equally, however, the data seem to support Abramovitz's insistence that catch-up is not automatic. Prima facie, column 4 indicates that the UK, Norway and, especially, Ireland grew more slowly than might have been expected while West Germany did much better.

Table 3 : Maddison on the sources of growth

		France	Germany	UK
1913-50	GDP Growth	1.15	1.28	1.29
	Education	0.36	0.24	0.33
	TFP	0.67	0.28	0.35
	(Residual)	(0.57)	(0.17)	(0.34)
1950-73	GDP Growth	5.04	5.92	3.03
	Education	0.39	0.19	0.20
	TFP	3.02	3.50	1.27
	(Residual)	(1.88)	(2.26)	(0.75)
1973-87	GDP Growth	2.16	1.80	1.75
	Education	0.56	0.05	0.41
	TFP	0.92	1.01	0.82
	(Residual)	(0.62)	(0.51)	(0.74)

Source: Derived from Maddison, *Dynamic Forces*.

The growth accounting methodology has been widely used to examine differences in the sources of economic growth between periods and across countries. The best recent study is that of Maddison and a summary of some of his results obtained using the traditional neoclassical model is shown in Table 3. This summary is designed to emphasize three key points in Maddison's work, as follows.

i)   Accumulation of human capital, proxied by education, is attributed a very small part of growth during the Golden Age and accounts for little of the differences between countries or periods.

ii)   By contrast, total factor productivity growth, taken to be exogenous in the traditional model, plays a very large part in accounting for variations in growth rates and is estimated to have been exceptionally high in both France and West Germany, though not the UK, during the Golden Age.

iii)   Despite Maddison's ad hoc efforts to assign specific reasons for total factor productivity growth, he ends up with the unusually high TFP growth in Golden Age France and Germany as very largely unexplained - denoted by 'residual' in Table 3.

In fact, results like these undoubtedly provide a strong stimulus for economic theorists to develop new growth models which endogenize productivity growth. Also, of course, the new growth economics potentially undermines the assumptions on which Maddison's estimates are constructed. These comprise a reliance on a production function like (1) rather than, say, (2), (4) or (5). It should also be remembered that Maddison's results are imposed on the data rather than econometrically estimated.

The new growth economics has produced a good deal of empirical work and can supply new ways to account for postwar growth based on econometric estimates of the likely impact of investment and catch-up on growth. This literature is well reviewed by Levine and Renelt whose approach based on robust regressions is the basis for the new growth alternative accounting reported in Table 4.[15]

Table 4 : Accounting for changes in european output/head growth using a Levine-
Renelt approach (% per year)

	1923-38	1950-73	1973-89
Constant	2.01	2.01	2.01
Initial GDP/Head	-2.43	-2.49	-3.55
Investment/GDP	1.42	2.22	2.06
Secondary Enrolment	0.16	0.68	0.79
Primary Enrolment	1.90	1.99	1.79
Government/GDP	-0.62	-0.87	-1.27
Forecast	2.44	3.54	1.83
Actual	2.08	3.86	2.18

Notes: Estimates are for the unweighted average of European countries in
Maddison's 1991 database excluding Belgium and Switzerland.

Sources: The estimates are derived using equation (ii) in Levine and Renelt,
"Sensitivity analysis" with population growth and irrelevant dummies
ignored. The initial income variable was expressed as a percentage of the
US level in each year and was then multiplied by 1960 US income per
person. Basic sources of national accounts data were Maddison, *Dynamic
forces* and OECD, *Economic outlook* supplemented for interwar
investment by Maddison, "Long run perspective" and for interwar
government consumption expenditure by den Bakker et al., "Dutch
economy", Feinstein, *National income*, Hansen, *Okonomisk voekst*, Hjerrpe,
Finnish economy, Krantz and Nilsson, *Swedish national product*, Rossi
et al., "Italian historical statistics", Sommariva and Tullio, *German
macroeconomic history* and Villa, *Analyse macroeconomique*.

The estimates in Table 4 use Levine and Renelt's estimated coefficients. Growth is
related to investment and to school enrolment variables which proxy human capital
formation. The initial GDP level represents catch-up potential and the equation predicts
conditional convergence. Higher GDP/head levels will tend to reduce the scope for catch-up
growth. The inclusion of the share of government consumption in GDP as a variable picks
up negative effects from the lack of productivity growth potential in this sector and the
possibility that a large government budget dulls the pursuit of cost reductions.

This methodology leads to somewhat different conclusions about growth in the
Golden Age from those stemming from Maddison's analysis. Taken at face value, Table 4
suggests that investment in broad capital was basically responsible for the acceleration in
growth during the Golden Age compared with the interwar period while the post-1973

slowdown comes from the erosion of catch-up possibilities and the swelling of government spending on consumption goods. It is noticeable that the equation predicts the slowdown of European growth after 1973 pretty well but is less successful in accounting for the difference between the interwar period and the Golden Age, a point to which I wish to return later.

Table 5 : Comparisons of 'sources of growth' estimates, 1950-73

West German advantage over UK
(% per year)

	Growth Accounting	New Growth
Backwardness	0.53	1.18
Investment	0.52	0.73
Human Capital	-0.01	0.51
Other TFP	1.70	-0.02

Note: "Backwardness" is an assumed amount and part of TFP in Maddison's work in col (1) but is based on income levels and an estimated coefficient in col (2).

Sources: Derived from Crafts and Toniolo, "Overview", based on original estimates of Maddison, *Dynamic forces* and Levine and Renelt, "Sensitivity analysis".

Table 5 reveals clearly the central differences between the view of the world embodied in the new growth equations of Levine and Renelt and in the growth accounting assumptions of Maddison. The general tendency of new growth economics is to explain productivity growth more within the models as a result of accumulation and (in the postwar OECD) conditional convergence; this shows up here. Compared with growth accounting, the new growth approach in Table 5 sees more of the German growth advantages over Britain in the Golden Age resulting from investment in broad capital while at the same time attributing more of the faster growth to a greater scope for catch-up growth given Germany's lower 1950 productivity level.

Although these new growth results have a certain appeal, they also give rise to some serious doubts which reflect important limitations of this style of work. Three points in particular should be mentioned.

i)   Despite the strong theoretical emphasis on human capital formation in new growth economics, its measurement and thus the estimates of its impact on growth are based, here as elsewhere, on very crude proxy variables.

ii)   Given the literature on British relative decline and the German overtaking of British productivity levels during the Golden Age, it is quite astonishing to find no role for differences in efficiency of factor usage and everything seen as accumulation or catch-up.[16]

iii)   Developing the previous point further, it might be said that, when applied to the OECD countries, new growth economics is not geared up to taking 'social capability' seriously and this is reflected in the rather restrictive formulation of equations which might be used to account for growth.

III

In this section I wish further to explore two closely linked aspects of growth in the Golden Age highlighted by the new growth results of Table 4, namely why catch-up growth was much more evident in Europe than in the interwar years and why the rate of investment rose so much. This requires some thought as to the roles institutions and policy played in the contrasting experience of economic growth before and after World War II.

Table 4 showed that a new growth model which generally accounts well for growth underpredicts European growth during the Golden Age and over-predicts growth in the interwar period. Econometric investigation of a similar model over different time-periods finds that conditional convergence is present in the Golden Age but the null hypothesis

cannot be rejected in periods between 1870 and 1939, a result which Abramovitz anticipated.[17] Partly, as Dumke has stressed, this may be because the effects are strongly reinforced by the re-building of war-damaged economies.[18] More generally, a key lesson of economic history may be that, even for OECD countries, catch-up is highly contingent on circumstances rather than a general phenomenon.

If so, an important task for historians is to identify the reasons for the changed outcome in the postwar world. The literature offers several (not mutually exclusive) hypotheses without, as yet, any convincing way of judging their relative importance. Three noteworthy possibilities all of which would enhance 'social capability' for catch-up and which deserve more research are the following.

i)   Nelson and Wright have argued that post World War II technology transfer became much easier and more rapid than earlier.[19] This would imply in the long term some erosion of the American productivity lead built up during the first half of the twentieth century. The reasons for this included reduced differences between Europe and America in terms of effective market sizes and factor costs, less reliance on technological knowledge that was based on localized specific experience, a greater role for multinational enterprise and more exposure to international trade.

ii)   A particularly well-known interpretation was put forward by Olson who argued that stable democracies accumulate sectional interest groups as time goes on whose actions as vested interests slow down catch-up.[20] War and postwar trade liberalization temporarily reduced the strength of these sclerotic tendencies particularly in occupied countries hence an explanation both for a Golden Age and differential success during this period. Olson's hypotheses have been heavily criticized both by those who deny the destruction of interest groups during the war and by those who have shown that a 'sclerosis variable' adds no explanatory power to a conventional conditional convergence growth regression.[21]

iii)   Recent research in international economics has tended greatly to increase estimates of the gains from trade liberalization and the losses from protectionism as a result of paying more attention to economies of scale, competition, rationalization and X-inefficiency implications of trade regimes.[22] These aspects, for example, play a large part in the European Commission's estimates of the likely impact of the 1992 Single Market programme.[23] No similar research exists for the trade wars of the 1930s or the liberalization of the 1950s and 1960s but, if the effects were similar to those claimed for the Single Market, it appears that they could easily account for the growth model's differential success in accounting for pre and postwar growth.[24]

Table 6 : Central government outlays (% of GDP)

	1938	1955
Austria	14.3	27.0
Belgium	11.0	20.9
Denmark	7.0	13.8
Finland	14.1	21.9
France	19.9	22.8
Ireland	11.6	35.0
Netherlands	19.4	27.3
Norway	8.1	19.0
Sweden	11.7	21.1
Switzerland	6.8	7.2
UK	20.2	28.0

Source: Derived from Mitchell, *European historical statistics*; in some cases output is represented in both years by NNP.

Table 4 also points to a much enhanced role for capital accumulation in the postwar period and, regardless of its precise contribution to faster growth, it is a commonplace that the Golden Age was characterized by a great investment boom. This is paradoxical given the emphasis placed by the new growth economics on direct taxation as a deterrent to investment and that the postwar years saw much enlarged government budgets in Europe, as Table 6 reports. During the Golden Age non-consumption taxes in European countries averaged 19 per cent of GDP.[25]

Obviously, there are a number of possible offsets to the new tax regimes which would act to raise gross returns to investment or perhaps to lower the rate of time preference. Again, more research seems to be indicated. One might be, as Boltho suggests, that the policy environment made the macroeconomy seem less unpredictable.[26] Another could be simply the effects of the enhanced social capability for catch-up based notably on easier technology transfer and liberalized international trade, as discussed above.

The most intriguing is perhaps the wage moderation hypothesis suggested recently by Eichengreen.[27] He argues that postwar European countries succeeded through arriving at institutional arrangements that promoted high investment by firms in return for wage restraint by workers leading to high growth to both sides' long-term advantage. Such institutions, which needed to preclude default and opportunistic behaviour by either side, promoted a social contract through monitoring, bonding and coordinating functions and their effectiveness depended on the relatively limited international capital mobility of the time.

Eichengreen's social contract for growth thesis will, no doubt, be the subject of detailed empirical testing in the near future. If confirmed, it carries with it an interesting implication, namely that, in the context of the postwar settlement, high rates of progressive income taxation and welfare spending may have been good rather than bad for investment and growth. In any event, commitment mechanisms which promote wage moderation in return for high investment are seen to be able to perform a role analogous to that of low direct taxes in Figure 1.

This section has suggested that, by taking account of economic historians' research on the Golden Age of growth to develop the basic insights of the new growth economics, it may be possible to arrive at rather more subtle models and richer empirical analyses of economic growth than those currently on offer in the economics literature.

IV

In this section I wish briefly to examine the UK's relative decline during the Golden Age both to consider further the plausibility of new growth economics and also to draw out some implications of the last two sections for interpretations of the British experience.

The relative economic decline of the UK during the Golden Age was clearly shown in Table 2 which established a prima facie case that growth was disappointingly slow despite, of course, being higher than at any time previously.[28] The results in Table 5 go some way to indicating what new growth economics would say about this performance.

First, the explicit adoption of a conditional convergence framework would increase the weight placed on lower scope for catch-up given a relatively high initial income level and a low share of employment in agriculture. Normalizing for this is clearly important in assessing British performance. Second, new growth economics would probably tend to stress the relatively low level of investment in physical capital in the UK; had investment been at the median level of Maddison's European countries during the Golden Age (i.e., some eight percentage points higher as a share of GDP), the Levine and Renelt model suggests the growth rate would have increased by about 0.8% per year.[29]

The optimizing framework of new growth models would also direct our attention to the net return on investment as a key element in the picture. Here, taxes and subsidies would be seen as important aspects of government policy. At first sight, there would appear to be no reason to regard British investment as unduly disadvantaged - average direct tax rates were only about 3.3 percentage points higher than the European median during 1950-73 and were offset by generous tax breaks on investment which had reached 9.5 per cent by 1960.[30] This may be misleading, however. The British economy was characterized by exceptionally steep marginal direct tax rates and the effectiveness of the subsidies is doubtful because their

value frequently changed.[31]   Some serious empirical investigation is needed on this topic which new growth economics suggests has been unwisely neglected.

A major theme of recent theoretical work is that human capital plays a much more important role in growth than used to be thought. Here, using conventional measures based on formal schooling, the UK is close to the European median during the Golden Age - for example, the secondary school enrolment rate of 67% compares with a median of 58%.[32] Nevertheless, the prominence of human capital in today's growth models and recent concerns over lack of skills in the British workforce both suggest the need for a closer look.

When human capital is measured by vocational qualifications the UK does not compare so well, at least in recent years, and the econometric estimates reported in Table 7 suggest that this accounted for a substantial part of the UK's manufacturing productivity gap with West Germany in 1987. To judge from the apprenticeship data, also shown in Table 7, the skills gap between the UK and other European countries emerged and enlarged during the postwar period but we lack appropriate data with which to pin this down in any detail.

O'Mahony's estimates also offer some tentative evidence relating to competing new growth models. The production function that she ends up with implies that there are positive externalities to human but not to physical capital formation and that the exponents on the reproducible factors sum to less than one. In other words, these estimates give support to a model of the type represented by equation (5) rather than (1) (2) or (4) in which diminishing returns to broad capital accumulation will be quite weak; i.e., an Augmented-Solow model seems more likely than the endogenous growth of the Rebelo model.

It seems quite probable that relative weakness in human capital formation may have played a greater part in British relative decline than used to be thought. Once again, however, theory has moved ahead of measurement and the most important message is the

Table 7 : Vocational training and manufacturing productivity

a)   **Vocational qualifications/labour force (%)**

	University	Intermediate	None
France	7	40	53
Netherlands	8	57	35
Switzerland	11	66	23
UK	11	25	64
West Germany	11	63	26

b)   **Sources of West German lead over UK in manufacturing labour productivity, 1987 (%)**

Labour Force Skills	13.4
Physical Capital	10.1
Research & Development	5.8
Total Factor Productivity	-7.5
Total	22.2

c)   **Apprenticeships/employment in engineering (%)**

	UK		Germany
1924	12.9	1925	12.1
1938	12.1	1939	10.6
1950	4.4	1950	8.0
1980	3.4	1980	7.1
1989	1.6	1988	7.5

Notes: The estimates in b) are based on an estimated production function which can be written as $Y = AK^{0.25}H^{0.40}L^{0.35}$ where H includes both skills and R&D. Skills are measured by vocational qualifications.

Sources: a) Prais, "Economic performance"; b) O'Mahony, "Productivity"; c) Broadberry and Wagner, "Human capital".

very high priority which should be attached to obtaining better estimates of the growth of the stock of human capital in the postwar period.

Although new growth economics seems to offer better ways explicitly to account for British relative decline than did earlier growth models, as I suggested earlier, it should be complemented by looking closely at 'social capability' for catch-up. The UK seems not only to have had weaknesses in investment in broad capital but also to have failed to use its investment efficiently during the Golden Age.

Table 8 : Estimates of comparative levels of value-added per hour worked in manufacturing (% = 100)

	France	Germany
1950	76.7	88.8
1960	90.3	115.7
1973	111.3	126.8
1979	134.1	151.0
1989	120.4	117.4

Source: van Ark, *International comparisons.*

Table 8 is suggestive of this. From the 1950s through the 1970s France and Germany did much better in reducing the initial manufacturing gap with the USA and built up a substantial labour productivity lead over the UK. In the 1980s, the UK made up a good deal of the lost ground not through a surge in investment but through a shakeout of inefficient firms and work practices as competition intensified, unemployment increased and both economic rents and workers' bargaining power declined sharply.[33] The implication of the 1980s experience seems to be that productivity growth was foregone during the Golden Age, a proposition which would not surprise observers of British industry during the period.[34]

Several aspects of British institutions may have contributed to this relative growth failure but would not be variables usually considered by growth economists. These include the weakness of both competition and takeover as devices to discipline management and the

unreformed state of industrial relations.[35]   In particular, it is interesting to note that Eichengreen points to Britain as failing to establish the framework in which an equilibrium of high investment/wage moderation could be sustained.[36] Given the economic pressures of the early postwar years this is quite understandable.[37]   Indeed, the perceived payoffs of successive governments seem effectively to have precluded urgent institutional reforms, to have reinforced undesirable incentive structures and thus to have damaged 'social capability'.[38]

V

The chance to look again at postwar European economic growth informed by ideas coming from new work in economics is welcome. Research on this topic provides an important opportunity for fruitful interaction between economic history and economics while the new growth theory embodies more of the views about the growth process commonly held by economic historians.

In the light of new growth economics, it seems appropriate to emphasize rather more the roles of increased investment in both physical and human capital in the acceleration of growth during the 1950 and 1960s. Catch-up growth was a key feature of the Golden Age and economic historians have made important contributions by pointing to reasons why this was much stronger post 1950 than before and by stressing that social capability for catch-up varies between countries.

While new growth theory focuses strongly on the role of taxes in promoting a high investment fast growth path the economic history of European postwar reconstruction suggests a more subtle interpretation involving institutional reform as a substitute. Recognizing that institutions matter reminds us that changing them usually involves governments and emphasizes the need to think about economic growth in a political economy context.

Footnotes

1/ For non-technical, accessible introductions to the recent growth economics literature see Romer, 'Origins' and Solow, 'Perspectives'. A diagrammatic treatment is available in van de Klundert and Smulders, 'Reconstructing'. For an excellent but mathematical introduction see Sala-i-Martin, 'Lecture notes'.

2/ The well-known works are Denison, *Why growth rates differ*, Maddison, *Dynamic forces* and Matthews et al., *British economic growth*.

3/ See the review of the evidence in Crafts, 'Productivity growth' and the econometric investigation of UK manufacturing in O'Mahony, 'Productivity'.

4/ For a full exposition of the model see Rebelo, 'Long run policy'.

5/ Barro and Sala-i-Martin, 'Convergence'; Mankiw et al., 'A contribution'.

6/ In this Cobb-Douglas case marginal product of a factor is its exponent multiplied by its average product. The sum of the exponents on K and H is typically estimated to be around 0.6 to 0.8 compared with about 0.3 for physical capital alone.

7/ Barro and Sala-i-Martin, 'Convergence'.

8/ Ibid.; for the postwar OECD countries see also the empirical results in Andres et al, 'Growth and convergence' and in Dowrick and Nguyen, 'Catch-up and convergence'.

9/ Abramovitz, 'Catching up'.

10/ Ibid..

11/ Maddison, *Dynamic forces*, ch. 5-6.

12/ Abramovitz, 'Catching up'.

13/ Crafts and Mills, 'Europe's golden age'.

14/ Andres et al., 'Growth and convergence'.

15/ Levine and Renelt, 'Sensitivity analysis'.

16/ See the survey and extensive references in Crafts, 'Reversing'.

17/ van de Klundert and van Schaik, 'Historical continuity'.

18/ Dumke, 'Reassessing'.

19/ Nelson and Wright, 'Rise and fall'.

20/ Olson, *Rise and decline.*

21/ On interest group persistence see Grant et al., *Organising business* and on econometric tests using the so-called 'Choi variable' see Castles and Dowrick, 'Impact of government'.

22/ For a helpful overview see Richardson, 'Empirical research'.

23/ Emerson, *Economics of 1992.*

24/ Crafts, 'Productivity', p. 402.

25/ This calculation is based on data for selected years in OECD, *Long term trends*.

26/ Boltho, 'Economic growth'.

27/ Eichengreen, 'Institutions and economic growth'.

28/ Cf. the estimates in Matthews et al., *British economic growth*.

29/ Based on the data and calculations underlying Table 4.

30/ For the tax rates see OECD, *Long term trends*; on investment subsidies see Musgrave and Musgrave, 'Fiscal policy', p.59.

31/ Tanzi, *Individual income tax*, pp. 123-6 stresses the particularly adverse effects of the British tax system for growth; Kirby, 'Supply-side', pp.241-2 suggests that inconsistent policy undermined the impact of investment subsidies.

32/ Based on data from various issues of UNESCO, *Statistical Yearbook*.

33/ See the econometric studies by Bean and Symons, 'Ten years' and Haskel, 'Imperfect competition'.

34/ Inefficient use of labour is a constant theme in reports during the period, see for example the survey by Pratten and Atkinson, 'Use of manpower'.

35/ On the ineffectiveness of competition and takeover in disciplining management see, for example, Cowling et al., *Mergers*; on the failure to reform industrial relations see Flanagan et al., *Unionism*.

36/ Eichengreen, 'Institutions and economic growth', p.23.

37/ In particular the need to cope with a massive monetary overhang and balance of payments deficit without igniting inflation and while maintaining full employment, see Crafts. 'Adjusting'.

38/ In particular, the weight given to the short relative to the long term, the macroeconomic imperatives and, linked to these a preference for pursuing cooperative policies with both business and trade unions, seem to have blocked economic liberalization and effective anti-trust legislation as well as reform of industrial relations, see Crafts, 'Adjusting'.

Footnote References

Abramovitz, M., 'Catching up, forging ahead and falling behind', *J. Econ. Hist.*, 46 (1986), pp. 385-406.

Andres, J., Domenech, R. and Molinas, C., 'Growth and convergence in OECD countries: a closer look', in B. van Ark and N.F.R. Crafts, eds., *Quantitative aspects of Europe's postwar growth* (Cambridge, 1995), forthcoming.

Barro, R. and Sala-i-Martin, X., 'Convergence across states and regions', *Brookings Pap. on Econ. Activity* (1991), pp.107-82.

Bean, C. and Symons. J., 'Ten years of Mrs T.', Centre for Economic Policy Research Discussion Paper No. 316 (1989).

Broadberry, S.N. and Wagner, K., 'Human capital and labour productivity in manufacturing during the twentieth century: Britain, Germany and the United States', in B. van Ark and N.F.R. Crafts, eds., *Quantitative aspects of Europe's postwar growth* (Cambridge, 1995), forthcoming.

den Bakker, G.P., Huitker, T.A. and van Bochove, C.A., 'The Dutch economy 1921-39: revised macroeconomic data for the interwar period', *Rev. Inc. & Wealth*, 36 (1990), pp. 187-206.

Boltho, A., 'Economic growth', in A. Boltho, ed., *The European economy: growth and crisis* (Oxford, 1982), pp. 9-37.

Castles, F.G. and Dowrick, S., 'The impact of government spending levels on medium-term economic growth in the OECD, 1960-85', *J. Theoretical Pol.*, 2 (1990), pp. 173-204.

Cowling, K.G., Stoneman, P., Cubbin, J., Cable, J., Hall, G., Domberger, S. and Dutton, P., *Mergers and economic performance* (Cambridge, 1980).

Crafts, N.F.R., 'Reversing relative economic decline? The 1980s in historical perspective', *Oxford Review of Economic Policy*, 7(3) (1991), 81-98.

Crafts, N.F.R., 'Productivity growth reconsidered', *Econ. Pol.* 15 (1992), pp.388-426.

Crafts, N.F.R., 'Adjusting from war to peace in 1940s Britain', *The Econ. & Soc. Rev.*, 25 (1993), 1-20.

Crafts, N.F.R. and Mills, T.C., 'Europe's golden age: an econometric investigation of changing trend rates of growth', in B. van Ark and N.F.R. Crafts, eds., *Quantitative aspects of Europe's postwar growth* (Cambridge, 1995), forthcoming.

Crafts, N.F.R. and Toniolo, G., 'Postwar growth: an overview', in N.F.R. Crafts and G. Toniolo, eds., *Europe's postwar growth: country studies* (Cambridge, 1995), forthcoming.

Denison, E.F., *Why growth rates differ* (Washington DC, 1967).

Dowrick, S. and Nguyen, D-T, 'OECD comparative economic growth 1950-85: catch-up and convergence', *Amer. Econ. Rev.*, 79 (1989), pp. 1010-30.

Dumke, R.H., 'Reassessing the Wirtschaftswunder: reconstruction and postwar growth in West Germany in an international context', *Ox. Bull. Econ. & Stat.*, 52 (1990), pp. 451-90.

Eichengreen, B., 'Institutions and economic growth: Europe after World War II', in N.F.R. Crafts and G. Toniolo, eds., *Europe's postwar growth: country studies* (Cambridge, 1995) forthcoming.

Emerson, M., *The Economics of 1992* (Oxford, 1988).

Feinstein, C.H., *National income, expenditure and output of the UK, 1855-1965* (Cambridge, 1972).

Flanagan, R.J., Soskice, D.W. and Ulman, L., *Unionism, economic stabilization and incomes policies: the European experience* (Washington, DC, 1983).

Grant, W., Nekkers, J. and van Waarden, F., eds., *Organising business for war* (Oxford, 1991).

Hansen, S.A., *Okonomisk voekst i Danmark* (Copenhagen, 1974).

Haskel, J., 'Imperfect competition, work practices, and productivity growth', *Ox. Bull. Econ. & Stat.*, 53 (1991), pp. 265-79.

Hjerrpe, R., *The Finnish economy, 1860-1985* (Helsinki, 1989).

Kirby, M., 'Supply-side management', in N.F.R. Crafts and N. W.C. Woodward, eds., *The British economy since 1945* (Oxford, 1991), pp. 236-60.

Krantz, O. and Nilsson, C-A., *Swedish national product, 1861-1970* (Lund, 1975).

Levine, R. and Renelt, D., 'A sensitivity analysis of cross-country growth regressions', *Amer. Econ. Rev.*, 82 (1992), pp. 942-63.

Maddison, A., *Dynamic forces in capitalist development* (Oxford, 1991).

Maddison, A., 'A long run perspective on saving', *Scand. J. Econ.*, 94 (1992), pp.181-96.

Mankiw, N.G., Romer, D. and Weil, D.N., 'A contribution to the empirics of economic growth', *Qu. J. Econ.*, 107 (1992), pp.407-37.

Matthews, R.C.O., Feinstein, C.H. and Odling-Smee, J.C., *British economic growth, 1856-1973* (Stanford, 1982).

Mitchell, B.R., *European historical statistics*, 3rd ed. (1992).

Musgrave, R.A. and Musgrave, P.B., 'Fiscal policy', in R.E. Caves, ed., *Britain's economic prospects* (1968), pp.21-67.

Nelson, R.R. and Wright, G., 'The rise and fall of American technological leadership', *J. Econ. Lit.*, 30 (1992), pp.1931-64.

OECD, *Long term trends in tax revenues of OECD member countries, 1955-1980* (Paris, 1981).

Olson, M., *The Rise and Decline of Nations* (New Haven, 1982).

O'Mahony, M., 'Productivity and human capital formation in UK and German manufacturing', National Institute of Economic & Social Research Discussion Paper No. 28 (1992).

Prais, S.J., 'Economic performance and education: the nature of Britain's deficiencies', National Institute of Economic & Social Research Discussion Paper No. 52 (1993).

Pratten, C.F. and Atkinson, A.G., 'The use of manpower in British industry', *Department of Employment Gazette*, 84 (1976), 571-6.

Rebelo, S., 'Long run policy analysis and long run economic growth', *J. Pol. Econ.*, 99 (1991), 500-21.

Richardson, J.D., 'Empirical research on trade liberalisation with imperfect competition', *OECD Economic Studies*, 12 (1989), pp.7-50.

Romer, P.M., 'The origins of endogenous growth', *J. Econ. Perspectives*, 8(1) (1994), pp. 3-22.

Rossi, N., Sorgato, A. and Toniolo, G., 'Italian historical statistics: 1880-1990', University of Venice Department of Economics Working Paper 92-18 (1992).

Sala-i-Martin, X., 'Lecture notes on economic growth', National Bureau of Economic Research Working Papers Nos. 3563 and 3564 (1990).

Solow, R.M., 'Perspectives on growth theory', *J. Econ. Perspectives*, 8(1) (1994), pp.45-54.

Sommariva, A. and Tullio, G., *German macroeconomic history, 1880-1979* (1986).

Tanzi, V., *The individual income tax and economic growth* (Baltimore, 1969).

van Ark, B., *International comparisons of output and productivity* (Groningen, 1993).

van de Klundert, T. and Smulders, S., 'Reconstructing growth theory: a survey', *De Economist*, 140 (1992), 177-202.

van de Klundert, T. and van Schaik, A., 'On the historical continuity of the process of economic growth', in B. van Ark and N.F.R. Crafts, eds., *Quantitative aspects of Europe's postwar growth* (Cambridge 1995), forthcoming.

Villa, P., *Une analyse macroeconomique de la France au XXe siecle* (Paris, 1993).