

The Golden Age of European growth reconsidered

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I reconsider the growth of Western Europe during the Golden Age of European Economic Growth after the Second World War. The preceding thirty years of conflict and depression impeded the normal path of industrialisation in these countries, and they had too much labour in agriculture for their level of income and stage of development at the end of the war. The disequilibrium added to other more ordinary forces to produce unusually rapid economic growth. This hypothesis explains the speed of economic growth during the Golden Age, differences between growth rates in these years, and the end of this historical episode.

It is hardly news that the years following World War II were far different from those following World War I. Economists writing during the war anticipated repetition of some of the depressing forces and events that followed the Great War (Samuelson 1943). But their predictions were not accurate, at least partly because of their studies. Policymakers had the experience of the interwar years to reflect on, and it is comforting to think that they learned from experience (Feinstein, *et al.* 1994).

The good times came to an end in their turn during the oil crises and ‘stagflation’ of the 1970s. We look back on these times perhaps with more nostalgia than may be warranted, giving them names like the Golden Age of European Growth and *les Trente Glorieuses*. Economists since then have been trying to understand both the sources of the rapid growth immediately after the Second World War and of the slowdown in the 1970s. This article is a contribution to that literature.

An explanation of the Golden Age of European Growth should answer three questions. Why was European economic growth so rapid between the world war and the first oil crisis? Why did different countries grow at different rates during this time? And why did the rapid growth come to an end? I argue that these questions can be answered in a unified framework by bringing economic history to bear on this question of economic growth. The preceding years of wars and depression impeded the process of industrialisation that had engaged the economies of Western Europe since at least the mid-nineteenth century. There was as a result a disequilibrium that has not been noted before, that was the source of the rapid and varied growth during the Golden Age.

I proceed by describing the phenomenon to be explained and reviewing earlier attempts to explain it. I add insights from recent research in economic history to propose a new explanation. I then formulate this hypothesis explicitly and test it against the data. Finally, I return to the three questions posed above and summarise the new answers.

1. The phenomenon to be explained

The phenomenon to be explained is shown in Table 1. The difference between the growth rate of GDP and GDP *per capita* comes from the gradual slowdown of population growth, and the growth rate of GDP *per capita* in recent years is very close to its rate before the Great War. In between, Western Europe had first slow growth and then rapid growth. It is the latter I am trying to explain.

Slow growth from 1913 to 1950 was the result of two world wars and the Great Depression. It is common to regard the Great Depression as a failure of aggregate demand. Prices fell at the same time as industrial production, indicating a movement along an aggregate supply curve rather than a shift of that curve (Bernanke 1995). Although the wars had many effects on the supply side, their primary impact was also on demand (Feinstein, *et al.* 1997). To a first approximation, therefore, the slow growth was the result of deficient aggregate demand.

It follows that the overall path of GDP *per capita* in Table 1 can be seen as a steady growth of ‘potential GDP’ with a deviation from this potential during the world wars and Great Depression. Total factor productivity in this view continues on its way, independent of all the demand-side activity in the wars and interwar turbulence. This extreme version of Solow growth theory ignores all fluctuations in the rate of growth of knowledge and of capital, but it does not seem to be too far from the experience of the United States where we have the data to look at the early twentieth century (Solow 1957). Slow growth from 1913 to 1950 then left Western Europe below its potential GDP, and rapid growth thereafter brought it back to its growth path.

Table 1. *Economic growth in Western Europe at different times (per cent per year).*

Period	GDP	GDP <i>per capita</i>
1890–1913	2.2	1.4
1913–1950	1.4	0.9
1950–1973	4.8	4.0
1973–1994	2.1	1.7

Source: Feinstein, *et al.* 1997, p. 7. Fifteen countries; data from Maddison (1995).

The problem is the length of time in Table 1. The business cycle can produce a path like this with a time span of a year or two. New growth theory and conditional convergence can produce a history like this with convergence with about 35 years or so to half-way convergence (Mankiw, *et al.* 1992). It is harder to find a good explanation for this intermediate time frame, for quite complete convergence in about thirty years. Business cycles generally are a demand phenomenon (Temin 1998); conditional convergence involves supply phenomena. It would not be surprising if the explanation of the intermediate case involved both demand and supply.

While this simple model of deviation from a smooth trend is appealing, I do not want to suggest that the disequilibrium studied here was the only phenomenon taking place after the war. As noted in several studies, several European countries did not return to their prewar trend paths of growth after the war or even after the Golden Age (Crafts and Mills 1996). For those countries, the end of the Golden Age represented a return to a more durable growth path, but not necessarily the same one they had experienced before the war. I reserve for future work the integration of the Golden Age and the subsequent growth path.

In addition to the time-series questions about the beginning and end of the Golden Age, there also is a cross-section question: Why did some countries grow so much more rapidly in this period than others? The spread of growth rates among Western European countries in this period is shown in Table 2. Annual rates of growth varied from two to five per cent a year. It is a wide range and needs to be explained. National histories always contain developments that can be used to explain rapid or slow growth; the more challenging question is whether there is a unified explanation for the variety shown in Table 2.

Table 2. *Annual rates of growth in Western Europe, 1955–75 (per cent per year).*

Austria	AUT	4.3
Belgium	BEL	3.3
Switzerland	CHE	2.4
Germany	DEU	3.4
Denmark	DNK	3.2
Spain	ESP	5.2
Finland	FIN	3.8
France	FRA	3.9
Great Britain	GBR	2.1
Ireland	IRL	3.2
Italy	ITA	4.3
Netherlands	NLD	3.4
Norway	NOR	3.3
Portugal	PRT	5.3
Sweden	SWE	3.0

Source: Penn World Tables 5.6.

An early contribution to the literature on postwar growth was provided by Kindleberger (1967) using the Lewis (1954) model of excess labour supply to explain both differences in growth rates between countries and the slowdown in growth he could detect in the mid 1960s. Kindleberger's argument was simple: an elastic labour supply promotes economic growth by keeping wages low and preserving industrial peace. It was the exhaustion of cheap labour that caused economic growth to slow. This article builds upon and extends Kindleberger's view of thirty years ago.

The slowdown of growth in the 1970s, known at the time as stagflation, was the subject of myriad papers and books. Many people argued that movements in aggregate supply led to the slowdown of growth as well as higher inflation. The two shocks most often identified were the rise in oil prices in 1973 and increasing rigidity in industrial labour markets (Bruno and Sachs 1985). The oil shocks have faded into history while remaining the most popular candidates for causing the end of the Golden Age. Characteristics of the labour market continue to be active topics in the explanation of European economic difficulties.

The focus on supply conditions led to new growth theory, which stressed the role of supply in the long run. Solow's framework had provided a way to organise historical data on economic growth. Population, investment and TFP could be listed as determinants of growth, and growth accounting was born. This proved to be an enormously illuminating way to summarise a vast body of knowledge and begin the process of explaining economic growth (Solow and Temin 1978; Griliches 1996). But Solow's growth model did not include any other variables, it could not account for the wide differences between countries that we observe, and it predicted that all countries would converge to the same rate of growth. This limitation led people to lump all other differences between countries into TFP and provide explanations outside the theory why they differed (Denison 1967).

The limitations of the Solow growth model were attacked in turn, giving rise to new growth theory. Romer (1986) argued that TFP growth was endogenous, not exogenous. Lucas (1988) introduced human capital to the model as an additional determinant of growth, as had been done informally in growth accounting and in economic history (Denison 1967, Easterlin 1981). Differences in education between countries eliminated the prediction of unconditional convergence (that is, convergence to the same rate of growth by all countries), although they still left room for conditional convergence for groups of similar countries, sometimes called 'convergence clubs'. Wide differences between countries now could be explained within the model by differences in educational attainment (Mankiw, *et al.* 1992).

New growth theories provided extensions to get around the limitations of old growth theory at the expense of Solow's simplicity and elegance; education is only the most prominent of many putative inputs to growth. Empirical investigations flowered in the form of growth equations, but few

of these regressions acknowledged anything special about the Golden Age of Economic Growth. The regressions focused on identifying the equilibrium growth rate to which countries were converging rather than estimating conditional convergence itself. The latter by the 1990s was simply assumed as a fact of economic life.

Baumol (1986) provided evidence of convergence over a century for a sample of mostly Western European countries. The claim that this was a universal pattern did not stand up (De Long 1988), and the field turned to a prolonged investigation of the factors that determine to what rate of growth countries will converge. Growth regressions typically are done for as many countries as possible, which means over a hundred in today's world. The time period chosen is much shorter than Baumol's in order to exploit the plentiful data after World War II. Two recent surveys of this literature describe the diversity of approaches taken to identify 'convergence clubs', but they do not remark on any special treatment of the Golden Age of Economic Growth (Durlauf and Quah 1998, Temple 1999).

Barro's Robbins Lectures, for example, were based on regressions for periods stretching from 1965 to 1990 with no acknowledgment that the process of growth might be different at the beginning and end of the period. He commented that this was an improvement on his prior practice of using a single cross-section, but not because the data came from two separate economic periods (Barro 1997, pp. 12–15). The common practice still is to lump the postwar period into one cross-section, as done in Young's famous dissection of economic growth among the Asian NICs and Jones' survey of the world income distribution (Young 1994, 1995; Jones 1997). The period typically starts in 1960 – Barro started later so he could use 1960 GDP as an instrument – both to exploit easily available data and to avoid the recovery period just after the war. Dowrick and Nguyen (1989) provide a solitary exception to this rule. They examine whether the convergence found by Baumol (1986) continued after 1973, testing earlier informal results with growth equations. The focus was on convergence rather than the rate of growth.

Economic historians also have turned their attention to the postwar years. Crafts and Toniolo opened a volume of essays on the period by asserting, 'the years 1950–73 witnessed a unique episode in the history of European "modern economic growth"' (Crafts and Toniolo 1996, p. 3). They argued that rapid growth in this period was partly a consequence of slow growth in the previous period, but they did not dwell on the mechanism of such a reaction. The book as a whole is a survey of the experience of about a dozen Western European countries during the Golden Age in a compatible format. This exercise of fitting diverse histories into a common mould, however, was overwhelmed by the strengths of particular issues in the debates about individual countries, and the essays are quite diverse (Temin 1997).

One country study that anticipated the approach here conceptualised the

German *Wirtschaftswunder* as a disequilibrium phenomenon. Dumke (1990) argued that greater wartime destruction generated faster postwar growth and provided evidence for this proposition in growth regressions for OECD countries. His inquiry was in the spirit of Abramovitz (1986), who asserted that the destruction of physical capital during the war was less important than the maintenance of what he called 'the social capability' of growth. I take my start from Dumke, but shift his emphasis and his sample.

Eichengreen (1996) offered a synthetic view in his contribution to the Crafts and Toniolo volume. Starting from the observation that growth in the Golden Age was related to catching up and high investment, he asked why investment was both high and productive in the Golden Age. He answered that wage moderation and export growth made investment attractive and profitable. These in turn were due to government institutions and policies that were sharply different from those pursued before the war. Eichengreen saw an implicit bargain between workers and investors that is similar to the implicit contracts Aoki (1988) described in what he called the J-firm, typical of postwar Japan. The bargain was that workers would not push for higher wages if investors would make productive investments that would, over time, create jobs and raise wages. Investors would agree to invest on the condition that the workers did not immediately try to take all the gains in higher wages.

This bargain is time-inconsistent. If workers moderate wage demands, investors have an incentive to pay themselves the resulting profits instead of reinvesting them. And if investors make productive investments that enhance the productivity of labour, workers have the incentive to take the gains home in the form of higher wages. These perverse incentives were countered in postwar Europe by a complex set of institutions that made renegeing harder and increased incentives for honouring the long-term implicit contract in the face of short-run gains from abrogating the contract. The institutions were both domestic and international; domestic to enforce the bargain just described, international to promote national specialization that increased efficiency. The domestic institutions included national wage bargaining, union representation on company boards, and conditional access to government programmes. The international ones included institutions like GATT, ECSC and EPU that appeared to have had little positive effect. Eichengreen emphasised their role in precluding negative effects, assuring that trade would remain free as conditions changed.

This is an intriguing and plausible hypothesis; it explains how demand could grow to promote rapid economic growth during the Golden Age. But it cannot explain how Western Europe found itself so far from equilibrium at the start of the Golden Age. This organizational view also does not distinguish between different countries in Western Europe because the international agreements that form such a large part of the story include them all. Eichengreen listed many causes for the end of the Golden Age, revealing the

absence of a unified explanation. Among the reasons offered were the capture of institutions by firms and unions, the oil shocks, the end of the Bretton Woods System, the end of general catch-up, and reduced incentives to keep the bargains that produced the Golden Age of Economic Growth.

2. Recent theories of economic growth

I approach the Golden Age in the context of economic growth over the past century or two, which had a large component of economic transition. National economies around 1800 with very few exceptions were almost completely agricultural. Starting in the nineteenth century and even later, productive resources were moved out of agriculture into manufacturing and services. Residents became urban, and the share of the labour force in agriculture fell. Since workers were more productive in non-agricultural activities, national income grew during this transition.

Theorists of economic growth recently have begun to acknowledge the importance of this transition in the process of economic growth. There are now several models attempting to integrate structural shifts with the theory of economic growth (Kongsamut, *et al.* 1997, Temple and Voth 1998, Galor and Weil 2000). Taylor (1999) used a model of this type in his exploration of convergence in seven countries before World War I. All of these papers share with this one the attempt to bring the historical experience of industrialisation into the mainstream of thinking about economic growth.

Broadberry (1997) evaluated the importance of this transition in Germany's convergence to British levels of labour productivity. The first column of Table 3 shows his estimate of aggregate labour productivity in Germany compared to the United Kingdom. The familiar rise over the last century can be seen, with a dip in 1950 – just after the Second World War. The second column of Table 3 reveals that the rise in comparative labour productivity in manufacturing did not echo the rise in the aggregate. In fact, there is very little evidence of a trend at all. German relative labour productivity was as high in 1913 as it would get, and the temporary decline in 1950 was eliminated by 1960 when it stood at 115 (Broadberry 1997, p. 251). Catch-up, Broadberry asserts, is not the result of improving efficiency in manufacturing, but the result of transferring resources from low-productivity sectors like agriculture to high-productivity ones like manufacturing.

It follows that faster economic growth in Germany than in Britain was due largely to the more rapid sectoral shifts in the German economy. Germany had a larger share of its labour force in agriculture than the United Kingdom throughout the past century. In 1950, around the start of the Golden Age of European Growth, Germany had 24 per cent of its labour force in agriculture, compared to five per cent for the United Kingdom (Broadberry 1997, p. 252). If rapid economic growth is the result of the

Table 3. *Comparative labour productivity in Germany and the United Kingdom (UK = 100).*

Year	GDP	Manufacturing
1870	60	93
1913	78	119
1950	66	96
1973	112	119
1989	116	105

Source: Broadberry 1997, p. 250.

transition from an agrarian economy, then Germany was still engaged in the process during the Golden Age while Britain had completed its transition.

Why was Germany lagging behind Britain in this transition? Three reasons come to mind, of which the third has not been appreciated. First, Germany started its industrialisation after Britain. Second, Germany chose to protect its farmers against low-priced American grain in the late nineteenth century. Third, the Second Thirty Years War – the turbulent period from 1913 to 1945 – interrupted international trade and slowed the transition. The third of these reasons has been neglected; I want to expose its importance.

The growing literature on globalisation argues that it has ebbed and flowed in the course of the twentieth century. Before the Great War, international commerce and travel were free and open, more or less as they are today. But in between these two end points, the flow of goods, finance, and people was interrupted by world wars and depression. Authors disagree among themselves about whether today's globalisation actually existed a century ago, but there is no disagreement about the interruption during the world wars and Great Depression (Bordo *et al.* 1999, Obstfeld and Taylor 1999, Temin 1999).

International trade was interrupted by the First World War. The postwar settlement created many new boundaries that provided the opportunity to impose tariffs on trade. And the Great Depression led to restrictive trade policies that reversed whatever expansion had taken place in the 1920s. The volume of exports for the major Western European countries was lower in 1938 than it had been in 1913, in sharp contrast to its rapid growth both before and after this period (Feinstein, *et al.* 1997, p. 10).

Sachs and Warner (1995) argued that trade promoted economic growth in the postwar world. Their regressions showed that closed economies did not exhibit convergence, while open economies did. Why did closed economies suffer? Because they did not undertake the reallocation of resources needed to increase productivity. They could not exploit their comparative advantages, and they could not end their reliance on domestic

agriculture. Open economies decreased the proportion of food and raw materials in their exports more rapidly than closed economies. Sachs and Warner did not dwell on the connection between their theory and the history of industrialisation in Europe during a previous period, but the parallel is clear. Before World War I, participation in international trade promoted industrialisation. One has only to recall the discussion of Britain's 'climacteric' in the late nineteenth century to see the importance of international trade in economic growth. Britain was surpassed, a prominent story asserts, because the United States and Germany were better able to exploit world markets (Temin 1966).

It follows from this view that the barriers to international commerce during the world wars and Great Depression constituted barriers to the continued industrialisation of European countries. This slowdown in the process of industrialisation created a disequilibrium after the war. As suggested by Table 1, the supply frontier continued to expand during the Second Thirty Years War. The United States, insulated from the wars if not the Depression, was able to continue its transformation from an agricultural to an industrial economy. Its exports were primarily food and raw materials before this protracted conflict; they were manufactures afterwards (Irwin 1996). European countries emerged from the war with a developmental deficit.

This disequilibrium is separate from the low income that generates conditional convergence. Low income in the standard story is produced by low levels of physical and human capital relative to saving rates. The developmental deficit highlighted here is produced by a misallocation of resources. The first takes place in a single-sector economy; the second, in a disaggregated model of development.

The rate at which workers left agriculture accelerated after the war. The decline in the share of the labour force in agriculture was twice as rapid in the 1950s and 1960s as before. The variance of the measured change fell as the rate increased, whether because of the greater stability of Western Europe or because of noise in the imperfect earlier data. The standard deviation of the decadal rate of change in the share before World War II was three times as large as the standard deviation of the quinquennial change thereafter. As a result, changes from before World War I to the interwar period are lost in this volatility (Bairoch 1968, as quoted in Mitchell 1998, pp. 145–62).

The misallocation of resources can be measured by the share of the labour force in agriculture. There are many ways to divide up the economy, but the division between agriculture and all other activities appears to be the most important. Broadberry (1997) distinguished nine sectors of the economy, but he concluded that most of the effect came from the changing size of agriculture. Denison (1967), much earlier, talked of the misallocation of resources in Europe during the Golden Age of European Growth, and he

too meant the European countries were growing rapidly when they were getting out of agriculture.

The misallocation, according to this story, came from a generation – thirty years – of economic insularity. It is reasonable to think that the excessive resources in agriculture could be moved to other sectors in another thirty years. This hypothesis therefore provides a way to rationalise the history shown in Table 1. Wartime destruction was like a business cycle in leading to a short-term disequilibrium. Conditional convergence might explain long-term disequilibria. Autarchy in the Second Thirty Years War can explain a disequilibrium that can be eliminated in twenty or thirty years.

This phenomenon may be more general than Europe after the Second World War. Jones (1997) conceptualised growth as a kind of Markov process. Countries drew their rate of growth from an urn once every thirty years or so, drawing fast, slow or medium growth rates. Jones characterised the fast growth as growth miracles and asserted that they were most prevalent among poorer countries, although not among the poorest. Young (1994) showed that these growth miracles were accomplished by very high investment rates. They also were accomplished by rapid reductions in the size of agriculture in these countries.

3. Testing the hypothesis

I test this hypothesis by formalising the story in a simple model and testing it against data from the Golden Age of European Growth. The model distinguishes three kinds of disequilibria that can affect growth:

- (1) Conditional convergence, that is, starting from a level of income low relative to the country's equilibrium income.
- (2) Wartime destruction that deranges production in the short run. Dumke (1990) measured the extent of this dislocation by the percentage gap between *per capita* GDP in 1948 and in 1938. I use this measure here as well, labelling it GAP, and recalculating it from Maddison (1995).
- (3) Arrested development, that is, excessive labour in agriculture. In parallel with conditional convergence, this phenomenon will be measured by the difference between the initial proportion of the labour force in agriculture, A , and the equilibrium share, A^* .

The model then is as follows, where g is the average growth rate of y , *per capita* GDP.

$$g = a + b(y^* - y) + c \text{ GAP} + d (A - A^*) + e \quad (1)$$

This regression, despite its conventional appearance, differs from growth regressions in the literature. Those growth regressions are designed to elicit differences between y^* in different countries. Growth is regressed on cur-

rent income and many variables, like education, that proxy for and identify y^* . I assume here that y^* is the same for all countries in Western Europe. This emphasis is appropriate in a study of a single region and in the investigation of disequilibrium growth during the Golden Age of Economic Growth. I am trying to describe the process of convergence, while growth regressions typically assume that countries are near their growth path and investigate the nature of the equilibrium income (y^*) to which they are converging.

I also assume that the equilibrium share of agriculture, A^* , is the same for all Western European countries. The influences of geography, history, and the Common Agricultural Policy are taken to be second-order effects. One could not make this heroic assumption with a wider sample, but it is appropriate when discussing economic growth in Western Europe. The share of the labour force in agriculture is measured at the beginning of each period, so that it is a predetermined variable. Differences between countries will show up in the error term and in the goodness of fit.

Equation (1) can be rewritten, collecting the unobserved equilibrium levels with the constant term.

$$g = (a + by^* - dA^*) - by + c \text{ GAP} + dA + e \quad (2)$$

I estimate this equation for all 15 Western European countries after the Second World War. (This is the same set of countries whose growth is reported in Table 1, except that Czechoslovakia has been replaced by Portugal.) They all are part of the same 'convergence club', harking back to the origins of new growth theory. They all have stable governments, secure property rights, and universal education, and it is reasonable to argue that A^* is vanishingly small in Western Europe today.

I use this regression to test three hypotheses. First, all three kinds of disequilibrium affected the rate of growth in different countries in the Golden Age of European Growth. The presence of the second two disequilibria account for the rapidity of economic growth during the Golden Age.

Second, these disequilibria had their main impact at different periods. Wartime destruction affected growth in the immediate postwar years, then resource misallocation became important, and finally conditional convergence became central. In normal periods of peace, only the last of these is relevant. The special, historical quality of the Golden Age comes from the presence of the first two. The sustained rapid growth comes from the presence of the second disequilibrium, resource misallocation.

Third, wartime destruction and the misallocation of resources ceased to have an effect on growth some time around 1970. In other words, the end of the Golden Age came when these unusual disequilibria were removed. We cannot observe these effects at other times because they are not there; they were present in postwar Europe only because of the historical circumstances that were unique to this time and place.

Table 4. *Regressions explaining twenty-year growth rates.*

Variable	1950–70	1955–75	1965–85
Y_0	–0.00561 (–0.29)	–0.0238 (–1.95)	–0.0223 (–2.09)
GAP	–0.0172 (–1.84)	–0.00204 (–0.32)	0.00252 (0.38)
A	0.0575 (2.79)	0.0389 (2.44)	0.00554 (0.26)
Constant	2.58 (2.01)	3.76 (4.08)	4.07 (3.84)
Adjusted R ²	0.70	0.79	0.55
N	15	15	15

Sources: Postwar GDP *per capita* data from the Penn World Table 5.6; GAP = *per capita* GDP in 1948 over *per capita* GDP in 1938, from Maddison (1995); ‘A’ from International Labor Office (1986), FAOSTAT (on the web), and Social Indicators of Development (on the web). T-statistics are below the coefficients.

Table 5. *Regressions explaining decadal growth rates.*

Variable	1950–60	1955–65	1965–75	1975–85	1985–1995
Y_0	0.0327 (1.02)	0.0171 (0.80)	–0.0439 (–3.61)	–0.00154 (–0.08)	–0.0315 (–2.30)
GAP	–0.0499 (–3.20)	–0.0163 (–1.48)	0.00644 (0.85)	–0.0111 (–0.89)	–0.00479 (–0.46)
A	0.0872 (2.53)	0.0713 (2.54)	0.0156 (0.64)	–0.00662 (–0.11)	0.0180 (0.31)
Constant	0.162 (0.08)	1.37 (0.84)	6.02 (4.97)	2.22 (0.89)	5.43 (2.67)
Adjusted R ²	0.56	0.42	0.80	–0.17	0.58
N	15	15	15	15	15

Sources: See Table 4. Preliminary data for 1995 from Robert Summers by private correspondence, 7 March 1999. T-statistics are in parentheses below the coefficients.

The regressions are shown in Tables 4 and 5. The first of these tables shows regressions for twenty-year intervals which correspond closely to the Golden Age; the second, for ten-year intervals, following Barro (1997). The data start in 1950 because data for 1945 are unavailable and unreliable. The results in Table 4 are useful for looking at the Golden Age as a whole; those in Table 5, for tracking the effect of different disequilibria within the Golden Age.

The first thing to note is that the regressions account for a substantial amount of the variation in growth rates among the Western European coun-

tries during the Golden Age, despite the drastic simplifications of the model. The assumption that y^* and A^* are the same for all countries in Western Europe after the Second World War does not appear misleading. The second thing to note is that inferences from the standard errors are slightly problematical in this context, as for many growth regressions. These countries are not a random sample of a larger set; they are all the countries of Western Europe. The years also are not a random sample from a larger set; they are the years of the Golden Age of European Growth. An inference based on a t -test would be wrong in only 5 per cent of cases if we could find similar sets of countries after similarly long periods of war and economic autarky to study.

The first two columns of Table 4 show regressions for the Golden Age. The effect of excessive labour in agriculture (A) is visible clearly. This indicates that the misallocation of resources arising from the limitation of international trade during the Second Thirty Years War was costly to Western Europe. It also created the opportunity for many countries to grow rapidly as they allocated their resources more efficiently. The effect was large. The share of Germany's labour force in agriculture at the start of the Golden Age was 20 percentage points higher than the share of Britain's agricultural labour force. Germany's growth rate received a boost of approximately one percentage point from this initial condition. (The effect is 1.2 per cent if 1950–70 is used; 0.8 per cent if 1955–75 is used.) The actual difference in growth rates in 1955–75 was 1.3 per cent as shown in Table 2; this effect explains over half the difference for these years.

Neither wartime destruction nor long-run conditional convergence were as important as the misallocation of resources in explaining differences between growth rates in Western Europe at this time. Dumke (1990) found wartime destruction to be more important for two reasons. First, he lumped the entire Golden Age into one regression, and he did not track effects within the period. He also included Japan in his sample, which – like Germany – had extensive wartime damage. The presence of two heavily damaged countries was enough to make wartime destruction appear important.

The first column of Table 5 contains regression for the first postwar decade for which we have reliable data. Wartime destruction (GAP) was important in determining the rate of growth of different countries in this period, as was the misallocation of resources (A). Conditional convergence, by contrast, was not an important factor. Succeeding columns show that the influence of wartime destruction faded rapidly into the background. It was only an important factor at the start of the Golden Age. The effect of the agricultural labour force faded away as well, but more slowly. As the share of the labour force in agriculture approached its equilibrium level, the estimated effect became smaller, both absolutely and relative to its standard error. The decreasing size of the coefficient over time suggests

a non-linearity, perhaps an ‘S-shaped’ relation between the excess share of labour in agriculture and economic growth.

The regression for 1975–85 is markedly worse than those for other decades. No coefficients are estimated tightly, and the share of variance of growth rates explained is negligible. This decade, of course, contained the effects of two oil shocks which disrupted the longer-run processes of interest here. The presence of these disruptions makes it hard to identify timing in longer-run phenomena. In the view I am presenting here, these disruptions confuse the story, but they are not the story itself. The end of the Golden Age was brought about by the return to equilibrium growth paths on the part of these countries, not by adverse economic shocks in the 1970s. The regression for 1985–95 in the final column of Table 5 shows that conditional convergence as indicated by a significant coefficient of y_0 is verified, while the other forces present in the Golden Age do not show up.

Although it is hard to test for robustness with only 15 observations, various experiments show these equations to be robust. The results differ only in details if $\log(y_0)$ is used in place of y_0 to indicate general convergence, and intermediate ten and twenty year time periods yield intermediate results to those shown here. Truncating GAP to be less than zero also does not change the results. Lagging A by five years to avoid any hint of simultaneity preserves the results in Tables 4 and 5. And the results are unchanged if one or another small country is dropped from the sample, or even if two outliers like Spain and Portugal are dropped together.

Scatter diagrams illustrate the regression results. Figures 1 and 2 show the relation between the rate of growth and the initial share of the labour force in agriculture for two overlapping 20-year periods starting in the 1950s. In both diagrams, the correlation shown in Table 4 is quite apparent. While the diagrams are similar, there are a few differences worth noting. Figure 1, showing 1950–70, reveals Germany (DEU) to be an outlier. The *Wirtschaftswunder* appears clearly. But in Figure 2, showing 1955–75, Germany no longer is an outlier. Instead, Belgium looks to be an economic miracle. We need to be careful in our claims of special conditions in individual countries.

Britain is at the low end of European growth rates, as everyone knows. This model provides an explanation for this slow growth at variance with that in the literature (Bean and Crafts 1996). For the slow British growth is explained quite fully by the low share of the labour force in agriculture at the start of the Golden Age. Britain had started industrialisation with a low share of labour in agriculture, it industrialised first, and it kept tariffs low when American grain was able to be transported cheaply to Europe in the late nineteenth century. These past accomplishments implied slow growth during the Golden Age.

It follows that postwar British economic policies were not the cause of slow economic growth. It may not be too farfetched to say that poor poli-

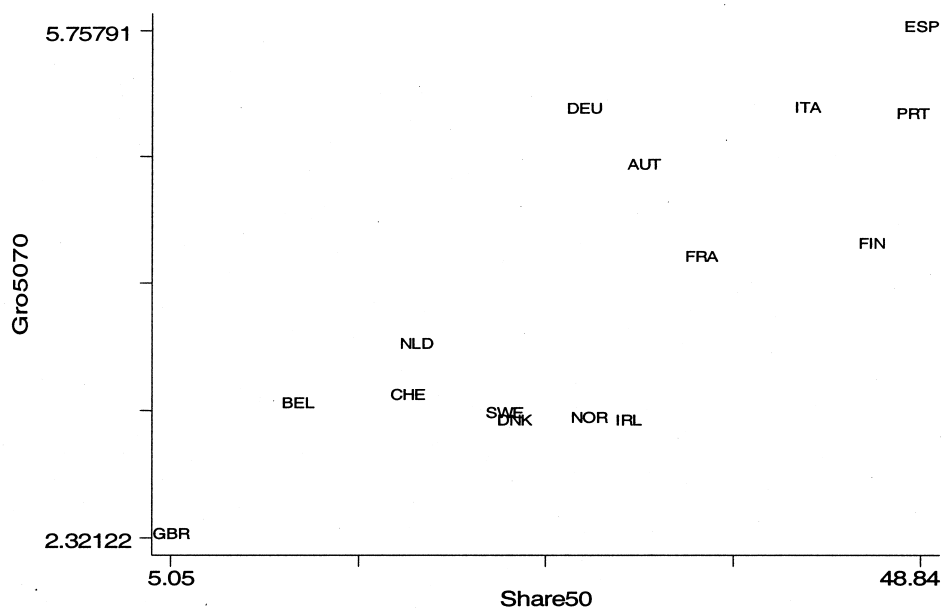


Figure 1. Regression of economic growth rate and initial share of labour force in agriculture, 1950-70.

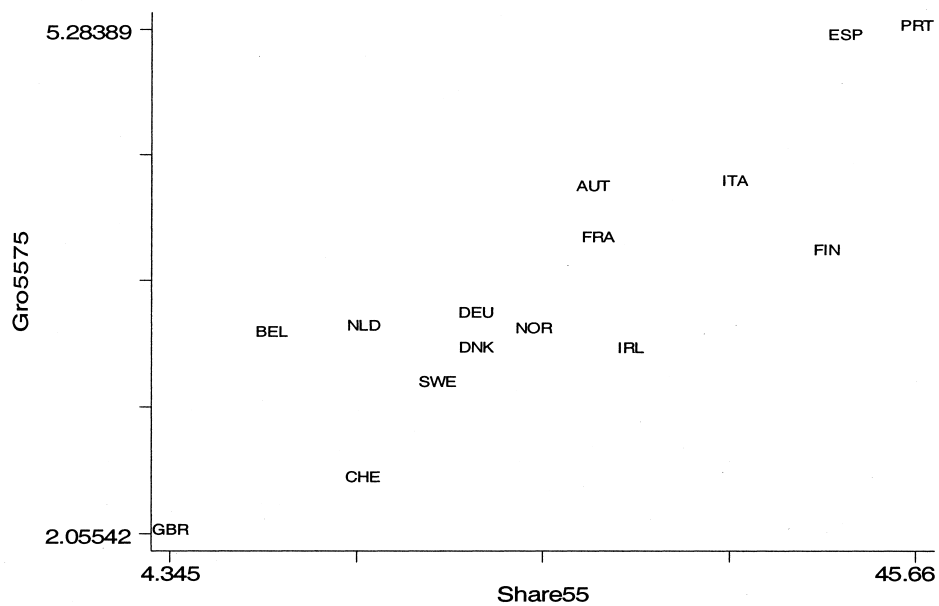


Figure 2. Regression of economic growth rate and initial share of labour force in agriculture, 1955-75.

cies were the result of slow growth rather than its cause. Bean and Crafts (1996) offer a multi-layered picture of British policies, in which Britain's initial position plays only a minor role. This view suggests that British economic policies did not have the potential effects attributed to them in this kind of account. And it suggests even further that what we regard as poor policies – because Britain grew so slowly – were either reasonable adaptations to Britain's initial position or the results of Britain's slow growth.

The Golden Age of Economic Growth ended when this disequilibrium was eliminated, that is, when the share of the labour force in agriculture approached its equilibrium level. This can be seen in the regressions in Tables 4 and 5, where the coefficient of A is not estimated clearly in the later regressions. It can be seen also in the rate of change of the share of labour in agriculture. If one examines the change in the labour force in agriculture, as in equation (1), then the rate of change falls over time, that is, becomes less negative, as shown in the first row of Table 6. This is the variable that is relevant for growth, since it is the movement of people that generates growth. If, however, one examines the rate of change of the agriculture share, that is, the change in the share divided by the initial share, then there is no change over time. The share approaches its asymptote at a constant rate.

The regressions in Table 6 help us to understand why this is a historical explanation. In peaceful times, the share of labour in agriculture falls as income rises. The change in the agricultural labour force gets smaller (more positive) over time, but there is no evidence of a change in the proportionate rate of decline. The evidence is consistent with an asymptotic approach to an equilibrium share. Various factors and policies can inhibit this change in individual countries, but there are no other historical cases where large numbers of industrial countries were in the same disequilibrium position. The model of equation (1) may be the correct model for all time, but GAP

Table 6. *Trends of the agricultural labour share.*

Variable	Change in the share		Growth in the share
	(1)	(2)	(3)
Trend	0.426 (12.4)	0.633 (4.08)	0.00247 (1.53)
Trend squared		-0.021 (-1.38)	
Constant	-4.75 (-12.98)	-5.13 (-11.17)	-0.17 (-16.00)
Overall R ²	0.33	0.34	0.01
N	135	135	135

Source: See Table 4. Z-statistics in below the coefficients.

and (A-A*) typically are at or near zero. It is impossible to estimate their coefficients under these circumstances. The final regressions in Tables 4 and 5 illustrate the inability to estimate these coefficients outside the Golden Age.

4. Conclusion

I return now to the three questions posed at the beginning of this article.

First, why was growth so rapid in Western Europe during the Golden Age of Growth? The answer is disequilibrium. The normal catch-up that works in general was not important right after the war, but other kinds of disequilibrium were. The most important of these was the misallocation of resources that came from the lack of international trade during the preceding thirty years. In this state of arrested industrialisation, too many resources still were employed inefficiently in agriculture. The institutional factors cited by Eichengreen (1996) helped create the needed demand; reallocated labour rapidly enhanced the supply.

Second, why did different countries grow at different rates during the Golden Age? They grew at different rates during the Golden Age because of their initial position. National policies had secondary effects relative to countries' initial position. Labour relations were tumultuous in both Italy and Britain, but Italy grew rapidly while Britain did not. At the least, policies of the time have been blamed for events outside the control of policymakers. In addition, some of the bitterness of policy in slowly-growing Britain may have been the result of slow growth instead of its cause.

Third, why did the rapid growth come to an end? Growth slowed in the 1970s and 1980s because the disequilibrium that had generated unusually rapid growth no longer existed. The developmental deficit of a generation was eliminated in a generation. The Common Agricultural Policy may have kept some excessive labour in agriculture, but the misallocation of resources had ceased to be a large macroeconomic issue by the time of the oil crises. These crises muddied the historical waters, confusing short-run and long-run factors. It is only with the hindsight of another thirty years that we can see that while the oil crises were disruptive, the slowdown of growth would have taken place even if they had not occurred.

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References

- ABRAMOVITZ, M. (1986). Catching up, forging ahead, and falling behind. *Journal of Economic History* **46**, pp. 385–406.
- AOKI, M. (1988). *Information, Incentives, and Bargaining in the Japanese Economy*. Cambridge: Cambridge University Press.
- BAIROCH, P. *et al.* (1968). *The Working Population and Its Structure*. Brussels: Institut de Sociologie, Université Libre de Bruxelles.
- BARRO, R. J. (1997). *Determinants of Economic Growth*. Cambridge, MA: MIT Press.
- BAUMOL, W. (1986). Productivity growth, convergence and welfare. *American Economic Review* **76**, pp. 1072–85.
- BEAN, C. and CRAFTS, N. (1996). British economic growth since 1945. In Nicholas Crafts and Gianni Toniolo (eds), *Economic Growth in Europe Since 1945*. Cambridge: Cambridge University Press.
- BERNANKE, B. (1995). The macroeconomics of the Great Depression: a comparative approach. *Journal of Money, Credit and Banking* **27**, pp. 1–28.
- BORDO, M. D., EICHENGREEN, B. and IRWIN, D. A. (1999). Is globalization today really different than globalization a hundred years ago? *Brookings Trade Forum*. Washington DC: The Brookings Institution, pp. 1–50.
- BROADBERRY, S. N. (1997). Anglo-German productivity differences, 1870–1990. *European Review of Economic History*, **1**: pp. 247–67.
- BRUNO, M. and SACHS, J. (1985). *Economics of Worldwide Stagflation*. Cambridge, MA: Harvard University Press.
- CRAFTS, N. and MILLS, T. C. (1996). Europe's Golden Age: an econometric investigation of changing trend rates of growth. In Bart van Ark and Nicholas Crafts (eds), *Quantitative Aspects of Post-War European Economic Growth*. Cambridge: Cambridge University Press.
- CRAFTS, N. and TONIOLO, G. (eds), (1996). *Economic Growth in Europe since 1945*. Cambridge: Cambridge University Press.
- DE LONG, J. B. (1988). Productivity growth, convergence, and welfare: comment. *American Economic Review* **78**, pp. 1138–54.
- DENISON, E. (1967). *Why Growth Rates Differ*. Washington, DC: Brookings Institution.
- DOWRICK, S. and NGUYEN, D.-T. (1989). OECD comparative economic growth 1950–85: catch-up and convergence. *American Economic Review* **79**, pp. 1010–30.
- DUMKE, R. (1990). Reassessing the *Wirtschaftswunder*: reconstruction and postwar growth in West Germany in an international context. *Oxford Bulletin of Economics and Statistics* **52**, pp. 451–91.
- DURLAUF, S. N. and QUAH, D. T. (1998). The new empirics of economic growth. Working Paper no. 6422, National Bureau of Economic Research.
- EASTERLIN, R. A. (1981). Why isn't the whole world developed? *Journal of Economic History* **41**, pp. 1–19.
- EICHENGREEN, B. (1996). Institutions and Economic Growth in Europe After World War II. In Nicholas Crafts and Gianni Toniolo (eds), *Economic Growth in Europe Since 1945*. Cambridge: Cambridge University Press.
- FEINSTEIN, C. H., TEMIN, P. and TONIOLO, G. (1994). Three shocks, two

- recoveries: historical parallels for the end of the Cold War. *Rivista di Storia Economica* **11**, pp. 297–316.
- FEINSTEIN, C. H., TEMIN, P. and TONIOLO, G. (1997). *The European Economy Between the Wars*. Oxford: Oxford University Press.
- GALOR, O. and WEIL, D. N. (2000). Population, technology and growth: from Malthusian stagnation to the demographic transition and beyond. *American Economic Review* **90**, pp. 806–28.
- GRILICHES, Z. (1996). The discovery of the residual: a historical note. *Journal of Economic Literature* **34**, pp. 1324–30.
- INTERNATIONAL LABOR OFFICE (1986). *Economically Active Population Estimates and Projections, 1950–2025*, vol. 4. Geneva: ILO.
- IRWIN, D. A., (1996). The United States in a new global economy? A century's perspective. *American Economic Review, Papers and Proceedings* **86**, pp. 41–6.
- JONES, C. I. (1997). On the evolution of the world income distribution. *Journal of Economic Perspectives* **11**, pp. 19–36.
- KINDLEBERGER, C. P. (1967). *Europe's Postwar Growth: The Role of Labor Supply*. Cambridge, MA: Harvard University Press.
- KONGSAMUT, P., REBELO, S. and XIE, D. (1997). Beyond balanced growth. Working Paper no. 6159, National Bureau of Economic Research.
- LEWIS, W. A. (1954). Development with unlimited supplies of labor. *Manchester School* **22**, pp. 139–91.
- LUCAS, R. E., Jr. (1988). On the mechanics of economic development. *Journal of Monetary Economics* **22**, pp. 3–42.
- MADDISON, A. (1995). *Monitoring the World Economy, 1820–1992*. Paris: OECD.
- MANKIW, N., GREGORY, D. R. and WEIL, D. N. (1992). A contribution to the empirics of growth. *Quarterly Journal of Economics*, **107**, pp. 407–37.
- MITCHELL, B. R. (1998). *International Historical Statistics: Europe, 1750–1993*. London: Stockton Press.
- OBSTFELD, M. and TAYLOR, A. M. (1999). *Global Capital Markets: Integration, Crisis, and Growth*. New York: Cambridge University Press.
- ROMER, P. (1986). Increasing returns and long-run growth. *Journal of Political Economy* **94**, pp. 1002–3.
- SACHS, J. D. and WARNER, A. (1995). Economic reform and the process of global integration. *Brookings Papers on Economic Activity*, pp. 1–118.
- SAMUELSON, P. A. (1943). Full employment after the war. In S. E. Harris (ed.), *Postwar Economics Problems*. New York: McGraw-Hill.
- SOLOW, R. M. (1957). Technical change and the aggregate production function. *Review of Economics and Statistics* **39**, pp. 312–20.
- SOLOW, R. M., and TEMIN, P. (1978). Introduction: The inputs for growth. In *The Cambridge Economic History of Europe*, vol VII: *The Industrial Economies: Capital, Labour, and Enterprise*. Cambridge: Cambridge University Press.
- TAYLOR, A. N. (1999). Sources of convergence in the late nineteenth century. *European Economic Review* **43**, pp. 1621–45.
- TEMIN, P. (1966). The relative decline of the British steel industry, 1880–1913. In Henry Rosovsky (ed.), *Industrialization in Two Systems*. New York: Wiley.
- TEMIN, P. (1997). The Golden Age of European growth: a review essay. *European Review of Economic History* **1**, pp. 127–49.
- TEMIN, P. (1998). The causes of American business cycles: an essay in economic

- historiography. In Jeffrey C. Fuhrer and Scott Schuh (eds), *Beyond Shocks*. Boston, MA: Federal Reserve Bank.
- TEMIN, P. (1999). Globalization. *Oxford Review of Economic Policy* **15**, pp. 76–89.
- TEMPLE, J. (1999). The new growth evidence. *Journal of Economic Literature* **37**, pp. 112–56.
- TEMPLE, J. and VOTH, H.-J. (1998). Human capital, equipment investment, and industrialization. *European Economic Review* **42**, pp. 1343–62.
- YOUNG, A. (1994). Lessons from the East Asian NICs: a contrarian view. *European Economic Review* **38**, pp. 964–73.
- YOUNG, A. (1995). The tyranny of numbers: confronting the statistical realities of the East Asian growth experience. *Quarterly Journal of Economics* **110**, pp. 641–680.

Internet sources

- Penn World Tables 5.6: <http://arcadia.chass.utoronto.ca/pwt/>.
- FAOSTAT Statistics Database:
<http://apps.fao.org/lim500/nph-wrap.pl?Population&Domain=SUA>.
- Social Indicators of Development: http://www.ciesin.org/mep-bin/charlotte?state=START&event=start&protocol=sid&charlotte_dir=prod.