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Understanding West German Economic Growth in the 1950s

Barry Eichengreen

&

Albrecht Ritschl

© Barry Eichengreen, Berkeley,
& Albrecht Ritschl, LSE

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Department of Economic History
London School of Economics
Houghton Street
London, WC2A 2AE

Tel: +44 (0) 20 7955 7860
Fax: +44 (0) 20 7955 7730

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Barry Eichengreen and Albrecht Ritschl

Abstract

We evaluate explanations for why Germany grew so quickly in the 1950s. The recent literature has emphasized convergence, structural change and institutional shake-up while minimizing the importance of the post-war shock. We show that this shock and its consequences were more important than neoclassical convergence and structural change in explaining the rapid growth of the West German economy in the 1950s. We find little support for the hypothesis of institutional shakeup. This suggests a different interpretation of post-World War II German economic growth than features in much of the literature.

1. Introduction

There is no shortage of attempts to explain West Germany's economic growth in the 1950s. With good reason: between 1950 and 1959, GDP rose by nearly 8 percent per annum, faster than anywhere else in Europe and in stark contrast to experience following World War I. Among European countries, only Austria, which shared many circumstances with Germany, came close to matching this performance. Germany's rapid growth doubled living standards in a decade. By the early 1960s it had restored Germany's status as the largest and potentially most influential economic and financial power in Europe.

Explanations for this experience are of three types (see Eichengreen, 1996, for an earlier review). A first school of thought sees West Germany's fast post-war growth in the context of productivity

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catching up and convergence. The West German economy grew rapidly after World War II, in this view, because it finally shed the shackles holding back structural change and productivity growth.² As Table 1 indicates, German GDP per man hour was never as much as 75 percent of British GDP per man hour at any point before 1950 but converged to British levels in the 1960s.³ Lower output per worker in the first half of the 20th century reflected a lower economy-wide capital-labour ratio, which in turn reflected the disruptions of World War I, the inflationary 1920s and the slump of the early 1930s. In addition, Germany's slow exit from peasant agriculture kept her economy away from the efficient frontier, even if in some sectors of manufacturing, Germany surpassed British productivity already before World War I.⁴ But there was no intrinsic reason why these differentials should persist. Germany could raise labour productivity by raising its capital-labour ratio. Inefficient labour could move from agriculture to industry, where its marginal product was higher, and economy-wide labour productivity could be raised to levels like those prevailing in Britain. West Germany's economic growth could outpace Britain's for the duration of this convergence process.⁵ Temple (2001) and Temin (2002) advance this interpretation for post-war Western Europe generally. Temin finds that the larger a country's share of employment in agriculture – his proxy for delayed structural change – the faster its growth. West Germany is simply a case in point.

² See for example Abramovitz (1986) and Baumol, Blackman and Wolff (1989).

³ Britain had been the technological and productivity leader in Europe throughout the 19th century and into the 20th and remains a useful point of comparison after World War II, as we shall see.

⁴ This point has been made by authors from Kindleberger (1967) to Broadberry (1997) to Temin (2002). Broadberry (2006) also presents evidence of lagging productivity in Germany's service sector, which points in the same direction.

⁵ These were the predictions of the first generation of neoclassical growth theorists (see e.g. Solow 1957), whose work, not coincidentally, appeared at just this time.

A second, related school of thought emphasizes institutional reasons for Germany's growth spurt after World War II. It posits sharp changes in socioeconomic institutions following World War II in directions conducive to faster growth and to the absence of comparable changes in slower growing countries like Britain. Sweeping pro-market reforms under U.S. aegis, the argument goes, abolished cartels, reduced state intervention and planning, and put the West German economy on a path toward European and world market integration. The framework for this analysis is Mancur Olson's (1982) model of the capture of policy by distributional coalitions.⁶ It argues that long-standing distributional coalitions were dissolved by the war and occupation, freeing Germany to enjoy a sustained acceleration in total factor productivity (TFP) growth, both absolutely and relative to countries like Britain that did not experience such rapid institutional change.

Members of a third school, in contrast, focus on the negative output shock in the final phases of the war and immediately following it. GDP in the three zones of Allied occupation that became the Federal Republic was only 64 percent of 1938 levels in 1948. In the UK, in contrast, output was already 13 percent higher in 1948 than in the last pre-World War II year.⁷ Germany could grow quickly, it follows, because it had been pushed off its long-term growth path, but only temporarily. Janossy (1969), Abelshauser (1981), and Dumke (1990) argue this point for Europe generally – that the larger the drop in output that a country suffered between 1938 and 1950, the faster it grew subsequently. Manz (1968), Abelshauser (1975) and Borchardt (1976) make the argument specifically for Germany.

⁶ This framework has been influentially applied to Germany by Giersch et al. (1992). Olson himself applied his theory to post-World War II Europe in Olson (1996). Critical views are provided by Paqué (1994, 1996) and Carlin (1996).

⁷ We describe the derivation of these estimates later in the paper.

That these three views all have solid pedigrees suggests that there is probably at least a grain of truth in each. The resurgence of neoclassical growth theory has provided new impetus to the catching-up hypothesis. Temin (2002) has provided a powerful restatement of the delayed-structural-change view. Recent work on the economics of institutions has made it almost obligatory to emphasize socioeconomic arrangements as determinants of economic growth.⁸ In contrast, arguments emphasizing the post-war shock have fallen by the wayside.

In this paper we argue that this tendency to de-emphasize the post-war shock as a determinant of German economic performance in the 1950s has gone too far. Recent analyses have understated how dramatically Germany was pushed off of its growth path in 1944-46 and the scope this shock opened for TFP growth. Our analysis suggests that this shock to TFP, together with its subsequent recovery, was vastly more important than neoclassical convergence and structural change in explaining differences between German and British growth in the 1950s.⁹

If a key explanation for the acceleration in German economic growth in the 1950s was the country's ability to recover from the sharp negative shock at the end of World War II, the question then is why Germany was so successful in recovering – in contrast to experience after World War I. One possibility is changes in the institutional constellation as suggested by Olson. But we show that the discontinuities in Germany's regulatory framework across World War II have been overstated. By today's standards, West Germany in the 1950s was still a tightly regulated economy with an impressive degree of institutional continuity. West Germany's pro-market reforms of 1948 were not a

⁸ For the former see Acemoglu, Johnson and Robinson (2005), and for the latter see Hall and Soskice (2001).

⁹ This, of course, being the very period for which others argue that convergence and structural change were most important.

radical departure from the past. Nor do we detect an institutional shakeup that destroyed existing distributional coalitions. Collective bargaining and workplace co-determination, the principal mechanisms through which distributional coalitions had asserted themselves in the Weimar Republic, were quickly reinstated. A series of acts passed starting in the early 1950s cemented Germany's system of industrial corporatism, drawing heavily on legislation from the Third Reich. In this reshaped form, the regulatory framework of the 1930s survived unscathed through the third quarter of the 20th century and beyond. Contrary to the Olson story, it was this very stability of institutional arrangements that facilitated the rapid post-war recovery and growth of the German economy.

How can we reach such different conclusions from previous investigators? For four reasons:

- Based on Maddison's (1991, 1995) estimates German wartime GDP, we generate new data on the sources of economic growth during World War II. We consider performance during the war rather than simply comparing the last pre-war and first post-war years and treating the war economy as a black box. This enables us to more precisely identify the magnitude of the post-war shock.
- We compare these data with the predictions of neoclassical growth theory, pinpointing the observable implications of alternative hypotheses.
- We place the performance of the economies with which we are concerned in longer-term perspective. We do not imagine that history starts in 1950 or 1938 but go back further in time as a way of helping to identify the economy's growth potential.
- Finally, we make detailed use of the Anglo-German comparison. This allows us to explore the roles of institutions and policies, using

the experience of Europe's historical productivity leader (and post-World War II growth laggard) as a benchmark.¹⁰

2. Comparative Evidence on Labour Productivity and Growth Accounts

The Anglo-German differential persisted through the first half of the 20th century. Table 1 shows that German output per capita and the country's capital/labour ratio remained far behind those of Britain at the end of the 1940s. Germany could grow faster, it follows, because she inherited a lower capital/labour ratio, implying lower output per worker. In this view, fast growth in the 1950s reflected convergence to the productivity frontier, a process during which investment and growth were higher than normal until steady-state levels of output-per-worker and capital-per-worker were achieved.

The rate of growth of West Germany's capital stock was indeed higher than in Britain: 6 versus 4 percent per annum (see Table 2). This is consistent with the idea that convergence helps to explain why Germany was now the faster-growing economy. But this differential capital-stock growth was too small to explain differences in the two countries' growth performance.

Table 2 reports two measures of the contribution of capital stock growth to total GNP growth and uses them to derive estimates of the growth of TFP. The first, TFP I, is calculated from a Cobb-Douglas production function under standard assumptions: the elasticity of output with respect to capital is set to one third, capital's share in national

¹⁰ International comparisons like those of Abramovitz (1986), Baumol, Blackman and Wolff (1989), and Broadberry (1997) emphasize that Britain had been Europe's technological leader in the 19th century, with its highest output per capita and the highest capital/labour ratio.

income.¹¹ Under neoclassical convergence, the gap between actual and steady state output is explained by the gap between actual and steady-state capital/labour ratios. Along the convergence path the growth rate of labour productivity (Y/L) equals the growth rate of the capital/labour ratio (K/L) times the contribution of capital to output.¹² Under these assumptions, K/L should return to its steady state three times as fast as Y/L . This, clearly, was not the case in 1950s Germany: capital grew more slowly than output, not three times faster. Evidently, other factors resulting in further increases in the rate of TFP growth must have also contributed to the *Wirtschaftswunder*.¹³

We construct an alternative measure, TFP II, by doubling the elasticity of output with respect to capital from 0.66 (as in Mankiw, Romer and Weil 1992). This can be thought of as capturing the external effects of capital-stock growth suggested by new growth theories. Although this second variant assigns a larger role to investment, it is still the case that K/L should be growing faster than Y/L , which is counterfactual. More than half the economy's growth in the 1950s remains to be explained.

The conclusion is reinforced by the comparison of Germany and Britain. The difference in aggregate growth rates between the two countries is larger than the difference in their capital stock growth rates. Even extreme versions of new growth theory, such as Romer (1987), which assume strong positive externalities from capital accumulation, do not posit an elasticity of output with respect to capital of greater than one.

¹¹ In the neoclassical model with perfect competition and no externalities, the elasticity of output with respect to capital and capital's share in national income can be shown to be equal.

¹² Assuming that TFP growth is unchanged (see e.g. Barro and Sala-i-Martin 1995). We return momentarily to the assumption of an unchanged TFP growth rate.

¹³ Under present assumptions, as much as three quarters of output growth remains to be explained. See Denison (1968) who similarly concluded that factor inputs explain only a quarter of the growth differential between the UK and West Germany.

As a matter of arithmetic, then, differences in the rate of capital accumulation between Germany and Britain can only explain part of observed differences in their growth performance.

So why, then, did TFP grew so fast in post-war Germany and so much faster than in Britain? One possibility is that TFP levels had received a sharp negative shock from which it bounced back subsequently. This relatively straightforward explanation for Germany's rapid growth has not received much attention in this literature. To explain why, we show that previous investigators have tended to underestimate the magnitude of this shock by comparing 1938 with 1948. In 1938 the German economy was still significantly below its steady-state growth path as a result of sharp negative shocks during World War I, the turbulent post-WWI period, and the slump of the early 1930s. The economy then expanded strongly through 1944, bringing it closer to its historical steady-state growth path.

This may seem surprising given wartime Allied efforts to destroy the productive capacity of the German economy. Yet, as Table 3 shows, the capital stock in German in fact manufacturing grew substantially during the war. The available estimates put West German industrial capacity around mid-1944 at more than one third above 1936 levels.¹⁴ In 1948, surviving industrial capacity was 13 percent higher than in 1936.¹⁵ Data for aggregate capital stock in 1950 suggest a slight decline below

¹⁴ While the capital stock grew strongly, labour input in the German war economy actually fell. Table 4 provides rough estimates for the civilian population in 1944, including forced labourers. The German war economy relied massively on slave labour: the available estimates rise to 8.5 million for mid-1944, of whom about 3.8 million may have been in West Germany. At the same time, the cumulative figure for military recruiting stood at 18 million, of which 8.4 million were from West Germany. As female labour force participation was discouraged, (voluntary) female employment declined by about 10 percent during the war.

¹⁵ In East Germany, the decline from the 1944 peak was stronger due to intense dismantling by the Soviets. However, even here the total decline just undid the wartime additions to the capital stock.

pre-war levels, caused mainly by the destruction of urban housing. The data look even better for equipment and suggest that, at the beginning of the *Wirtschaftswunder*, productive capacity in West Germany was as high as before the war. In comparison to Britain's capital stock, Germany's position around 1950 looked worse, but not dramatically so. Certainly, differences in capital stock growth and surviving capital endowment cannot account for the dramatically different growth performance in the 1950s.

And if the war did surprisingly little to reduce the capital stock, it actually increased West Germany's population and labour force. Returning soldiers and refugees from the provinces lost to Poland and Russia, as well as from Eastern Europe, swelled the population by almost 20 percent over the 1939 census. At the same time, more than eight million surviving slave labourers were repatriated or emigrated. Overall, West Germany's population increased by 9 percent from 1946 to 1950.

In Britain, unlike Germany, the capital stock increased only little during the war. The available estimates put the cumulative increase between 1936 and 1944 at 5 percent (Table 3). But wartime damage was even more limited. Thus, in 1946, Britain's aggregate capital stock was probably 7 percent higher than a decade earlier. On balance, this is very similar to West Germany (Table 3), aggregate data for which show a net increase from 1936 to 1950 by 7 percent as well. In the immediate post-war years, the civilian labour force rose considerably as soldiers were demobilized. Comparative evidence thus shows that the net changes in factor endowments in the two countries were not very different.

Yet the behaviour of output was very different. Britain suffered a substantial post-war recession, with the fall in output per worker averaging 7 percent per annum in the first two post-war years. But if Britain's post-war shock was severe, Germany's was a catastrophe. Table 5 shows output, capital, and labour on constant post-war territory.

From 1944 to 1946, output in what became West Germany fell at an annualized rate of 38 percent. Most if not all of this decline occurred between mid-1944 and mid-1945, implying that output fell by two thirds in that year.

The decline was more pronounced still in per capita terms. Table 4 suggests a rise in West German population by 20 percent between 1944 and 1946.¹⁶ Dividing the decline of output by the population increase, we arrive at an annualized rate of decline of per capita output of almost 50 percent between 1944 and 1946.

The fall in the capital/labour ratio of nearly 20 percent a year, or a cumulative 31 percent, was again an order of magnitude higher than the decline in Britain's capital/labour ratio. But comparing this with the decline in German per capita output of 47 percent per year—in other words, 7 times the British rate—it is clear that most of the loss in German output came from reduced efficiency in production rather than from a lower capital/labour ratio. On an annualized basis, West German TFP declined by almost 40 percent, which is two times as much as the decline in the capital/labour ratio.

On a smaller scale, the same conclusion holds for Britain. Between 1944 and 1946, TFP fell by 5-6 percent per year, which is again more than two times the fall of the capital/labour ratio in the same period.¹⁷ Cumulatively, the data in Table 5 suggest a decline in German TFP of 69 percent between 1944 and 1946, as opposed to a cumulative decline in British TFP of 12 percent.

¹⁶ In Table 5 we have attempted to exclude former slave labourers waiting to be repatriated from the population data for 1946. A population census in 1946 attempted to do just that but has been criticized for lacking reliability. However, most of these problems concern the Soviet occupation zone, whose data do not enter in Table 5. For a discussion, see Karlsch (1993).

¹⁷ Even faster than in the slump of the early 1930s.

The sources of this contrast are not hard to find. Beginning in mid-1944, Allied bombing changed its tactics to maximize damage to bottleneck sectors of the German economy (see Birkenfeld, 1964, Budraß, 1998). Bombing now targeted electric power, synthetic fuels generation, and the railroad network. Rather than destroying productive capacity, it simply disrupted the supply chain – most prominently supplies of coal, which were now much harder to get from the pithead to the power station and factory. Resulting shortages of raw materials and the consequent energy crisis persisted into 1947, limiting post-war production.¹⁸ This was especially true of West Germany, where coal production in 1947 was still only 52 percent of 1938 levels. In Britain, coal output in the same year reached 87 percent (see Table 3).

Both economies then rebounded from these shocks. In the immediate post-war years, British output growth outstripped the growth of capital and labour inputs, allowing TFP to rise by almost 2 percent a year. As Table 5 shows, the years 1948-1950 saw even more rapid recovery of German output. Reflecting inflows of refugees and returning prisoners of war, the labour force grew as well, together with the capital stock after 1948. But output grew faster, and very considerably so. As a result, between 1946 and 1950 TFP growth surged ahead at 15 to 20 percent per annum. These are big numbers compared to those associated with the capital deepening and structural change described above. The main factor explaining Germany's rapid growth in 1948-50, in other words, was the negative shock to TFP in 1944-46 and the scope that now existed for reversing it.

The bottom panel of Table 5 suggests that there was still considerable scope for this process to continue after 1950. While British

¹⁸ In 1946-7 coal was shipped across the Atlantic to make up for the supplies that were not forthcoming from the Ruhr, but these shipments made up only part of the shortfall.

labour productivity and TFP had recovered to within 5 percent of 1944 levels by 1950, West German output per capita and TFP were still 30 to 40 percent below their 1941 levels.

We can gain further perspective on how much scope existed for rapid growth by reversing the immediate post-war shock and returning the German economy to its long-term growth path by looking more closely at that long-term growth path itself. Had the forces driving growth in Germany and Britain before World War I prevailed throughout the 20th century, the trend growth of output could simply be extrapolated from their respective paths prior to 1914. Figure 1 shows gross domestic product per capita for Britain and Germany/West Germany, along with their extrapolated trend lines from 1900–1913.¹⁹ As can be seen, German GDP per capita hovered below historical trend throughout the interwar years and came close only during the war boom of the early 1940s. Following the catastrophic decline in German GDP at the end of the war, output per capita returned to the path established in the early 20th century. Like the preceding analysis, this suggests that for the 1950s was essentially a period of recovery from a highly irregular starting point.

Not all of the productivity gains during World War II were sustainable. While the increase in German labour productivity between 1941 and 1944 was a cumulative 13 percent, much of this reflected the involuntary extension of hours and the exploitation of slave labour. Britain's productivity record provides a counterfactual: while British productivity also increased between 1941 and 1943, it fell in 1944 despite intense efforts to keep going at the previous speed. The implication is that

¹⁹ Note that these expansion paths are plotted on a semi-logarithmic scale. We chose 1900–1913 as the base period instead of starting even earlier because of the limitations of the German data, whose quality is inferior before 1900, but also because the turn of the century marked a shift in away from extensive growth (accompanied by falling fertility and emigration rates) and therefore a significant structural break. A related exercise with data extending back to 1870 was first made by Borchardt (1977 [1991]).

the productivity gain in the German war economy between 1941 and 1944 was not sustainable in peacetime. Consequently, the productivity gap between the 1941 level and the extrapolated trend in Figure 1 indicates potential for catching up that cannot be explained by the adverse TFP shock at the end of the war. That said, Figure 1 shows clearly that growth performance in the 1950s was driven not by the remaining distance from the historical steady state in 1941 but rather by the sharp dislocation from that position around 1945—in other words, not by neoclassical convergence but by recovery from the wartime shock to TFP.

The converse is true of Britain. Britain's 1900–1913 trend is flatter than Germany's, and from the mid-1930s the extrapolated German trend line is always above the British line.²⁰ To be sure, previous authors have argued for a break in the British data around the time of the post-World War I depression (see Crafts and Mills 1996). After 1921, the British economy seems to have grown around a new trend path which is steeper than the historical one. This new trend is almost identical to the extrapolated German trend line of 1900–1913. But, importantly, Britain's growth trajectory seems only mildly affected by World War II—unlike Germany's. Germany's exceptional position in the 1950s and the subsequent return to trend are reflected in Table 2 as well. Already in the 1960s, Germany TFP growth (measured as TFP I) was back at the low British levels of two percent per year and less.²¹ In contrast, British TFP

²⁰ To establish the robustness of these results, we experimented with data from Maddison (1995) and Hoffmann and Müller (1959), extending the trend back to 1870. Although these backward extensions do affect the position of the German trend line, there is consistent evidence of German per-capita output growth having been about 40–50% higher than that of Britain in the last third of the 19th century. We also experimented with extending the British trend backwards and found it to be highly stable.

²¹ Note that our estimate of German TFP growth, derived from the standard data set of Maddison (1991), is below companion estimates for the 1960s, probably because we use hours, not persons, and standardized, not raw capital stock data here. Inspection

growth did not change much from the 1950s to the 1960s, again suggesting that Britain was already close to its steady state.

Thus, the acceleration in TFP growth that sets Germany apart in the 1950s should be understood as a reversal of the temporary collapse of TFP in the wake of World War II. Recovery from this collapse largely accounts for the subsequent acceleration in the 1950s. Capital accumulation and the associated process of neoclassical convergence can explain only a small fraction of the observed fluctuations even under the most favourable assumptions.

3. Structural Change

One possible explanation for the TFP surge in Germany in the 1950s is structural change. Throughout the 1950s, labour moved out of unproductive sectors like peasant farming. The conventional growth accounting measures discussed in the previous section would then underestimate the growth of labour in the productive sectors, and accordingly overstate TFP growth. As emphasized by Temin, and as Table 1 bears out, the inherited imbalance between agricultural labour and agricultural output shares was larger in Germany than in Britain. Britain had seen the agricultural share of employment fall to low levels as a result of its early the abolition of agricultural protection, while Germany had maintained a tradition of agricultural protectionism since Bismarck's tariff of 1879. 20th century Germany thus inherited a large agricultural sector dominated by small, unproductive family farms in the west and south and overstaffed, inefficient Junker estates in the east, which together still employed a quarter of the labour force in 1939. Agriculture

of the data reveals that Germany experienced another investment boom during that decade. But unlike in the 1950s, this investment boom failed to produce similarly high growth.

then absorbed much of the influx of refugees into West Germany after 1945, such that the sector accounted for over 20 percent of total employment in the census year 1950.

By how much could structural change involving the reallocation of labour from agriculture to industry have raised growth? Answering this question requires extending the neoclassical model, inevitably making it more complex.²² But since we wish to argue that structural change cannot explain the very sharp acceleration in German economic growth in the 1950s, we can impose any simplifying assumption that biases our conclusions in favour of the structural change hypothesis. Imagine for example that the marginal product of labour in agriculture was zero. This biases our findings in favour of the hypothesis that output and productivity were raised by shifting labour from agriculture to industry, since under this extreme assumption reallocating labour results in no fall in agricultural output. With agricultural output unchanged, we can ignore the contribution of that sector. We have:

$$Y = (BL)^{(1-a)}K^a \quad (1)$$

where Y is output, K is capital (which is employed in the industrial sector), L is labour, and B is the share of the labour force employed in the industrial sector. Log differentiating:

$$dY/Y = (1-a)(dB/B) + (1-a)(dL/L) + a(dK/K) \quad (2)$$

or

$$dY/Y - dL/L = a[(dK/K - dL/L) + (1-a)[dB/B]] \quad (3)$$

²² Previous attempts to do this include Sicsic and Wyplosz (1996), Barro (1999) and Temple (2001).

The rate of growth of output per worker is no longer just the rate of growth of the capital/ratio multiplied by the elasticity of output with respect to capital (the term appearing immediately to the right of the equality in equation 3). Now this expression is augmented by the rate of change in the share of the labour force in industry times one minus that same elasticity (labour's share of output in the Cobb-Douglas case), which captures the additional effect of structural change on output growth.

Between 1950 and 1960 the share of the labour force outside of agriculture rose at an annual rate of 1.1 percent.²³ Even assuming a relatively high elasticity of output with respect to labour such as 0.66, as in the TFP II variant in Section 2 above, this can account only for an additional $(0.66) \times 1.1$ or 0.73 percentage points of annual GDP growth, which is only a small part of the observed acceleration in growth, which averaged close to 8 percent. Under the more standard assumptions of an elasticity of 0.33, the point is reinforced. Thus, while the move out of agriculture was clearly there, it hardly accounts for the fast growth of the West German economy in the 1950s.²⁴

This appears to be a general pattern. Building on earlier work of Dumke (1990), Temin (2002) presented econometric evidence to evaluate the various explanations for post-war growth in Europe, and came out in favour of declining agriculture. In his cross-country convergence regressions, the agricultural employment share in 1950 showed up with large and significant coefficients, and dominated rival

²³ From 77.8 percent in 1950 to 86.7 percent in 1960. (Authors' calculations from Table 1.)

²⁴ Using a more complex model, Temple (2001, p.17) reaches similar results, that "the labour reallocation effect generally accounts for between a twentieth and a seventh of annual growth in output per worker." For the period 1950-55 his point estimate is 0.82 percent of output per worker per annum, almost exactly what we find under the TFP II variant. For 1955-60 his point estimate is 0.58, midway between our TFP I and TFP II variants.

explanations. Germany appeared to be just a case in point, not an exception to the rule.

The Dumke/Temin regressions have the form:

$$dY/Y = a + b(Y^*-Y) + c(GAP) + f(A^*-A) \quad (4)$$

where Y is output per capita and Y^* is its corresponding steady state, GAP is the change in output between 1938 and 1948 as a measure of the wartime and postwar shocks, and A is the share of employment in agriculture, with A^* its corresponding steady state level. a , b , c , and f are parameters to be estimated.²⁵ Assuming that Y^* and A^* are the same across European countries, they can be collected with the constant term, giving:

$$dY/Y = (a+bY^*+fA^*) - b(Y) + c(GAP) - f(A) \quad (5)$$

Here b measures the speed of neoclassical convergence, c the impact of recovery from the wartime shock, and f the importance of arrested development giving way to structural change. Temin estimates this equation for 15 Western European countries. He shows that the share of employment in agriculture (A) is often significant. In contrast, the GAP variable designed to capture the importance of wartime and post-war shocks is not significant at conventional confidence levels in any of his equations. On its face this would seem to be evidence against our interpretation.

We were able to partly replicate the results in Temin (2002) (Table 6, left panel). For the same specification and data, we find that for the

²⁵ Here we follow Temin, whose specification is more general.

1950s the coefficients on both GAP and A differ significantly from zero, A at the 95 percent level, GAP at the 99 percent confidence level. Temin, in contrast, reports an insignificant coefficient on GAP for the 1950s; this was one result that we were not able to replicate. But, notwithstanding the good fit of the equation, Germany is still an outlier. Adding a dummy variable for Germany to the equation for the 1950s yields a coefficient of 1.08,²⁶ (and then does render the GAP coefficient insignificant). In other words, these variables provide only a partial explanation for German growth in the 1950s.

As we argued previously, the 1938/48 output gap may underestimate the disruptive effect of World War II on European growth. A better comparison is with 1944, which marks the height of the war economy in Germany. However, it could be argued that this is not an appropriate basis for gauging post-war productivity capacity, since 1944 levels were artificially boosted by longer hours of work and by contributions from slave labourers and prisoners of war that did not continue after that year. As a compromise, we choose 1941 as a benchmark, when Germany was more or less back on its long-term growth path and in a position more analogous to Britain.

When we measure the wartime disruption with the 1941/1946 gap, the fit of the regression improves, and the coefficient on the output gap becomes larger.²⁷ Moreover, Germany becomes less of an outlier: unexplained German growth is now down to approximately 0.6

²⁶ That is, Germany grew by an additional 1.08 percent per annum over and above what can be explained by the three independent variables and average European experience. The coefficient in question differs from zero at the 90 percent confidence level.

²⁷ Inserting the 1944/1946 gap, which underlies also the calculations in Table 5 above, would have yielded even better results. Working instead with the 1941/46 gap thus biases the results in Table 6 against our working hypotheses of high GAP effects on the German economy.

percentage points per year, and the dummy variable for Germany no longer differs from zero at conventional confidence levels.

In addition, the dominant role of GAP compared to A during the Golden Age is confirmed if we measure growth not by the log difference in GDP, as in Temin (2002), but by the geometric growth rate (Table 6, right hand panel).²⁸ Log differences accurately approximate growth rates only for small values. The faster the growth rate, the larger the margin by which it is understated by this approximation. Measuring our data in growth rates, the coefficient on the dummy variable for Germany is reduced further, to below 0.3, and it is not different from zero. The regressions in growth rates thus capture the German case better and again confirm the importance of the drop in output across the end of World War II.

Support for our view that structural change and the post-war shock both matter comes in through the fact that both coefficients are also significant when we run the regression again for the 1960s and 1970s. As one would expect, the coefficients on both variables decline over time, signalling a weakening influence of the post-war's starting conditions on growth performance. Pooling the data for the three periods (the 1950s, 1960s, and the 1970-89 period) and running one regression on all 45 observations again delivers significant coefficients on both variables. We also regressed the difference in average growth rates after 1970 and during the 1960s. Results again point to a strong role for the GAP variable: the stronger a country's wartime shock, the faster its growth slowdown since the 1970s. By comparison, agriculture appears to play a lesser role in explaining the slowdown, and remains insignificant.

²⁸ In the RHS panel of Table 6, we also measure the independent variables in logs, as is common in the literature on convergence regressions. Doing so improved the fit further and reduced the size of the dummy variable for Germany.

This comparative evidence suggests that both Janossy (1969) and Temin (2002) were right on the causes of Europe's post-war growth. Wartime disruptions caused output to be displaced from potential, creating scope for fast recovery as the economies of Europe moved back toward trend; this is the reconstruction hypothesis specified by Janossy (1969) and tested by Dumke (1990). At the same time, the scope for growth was greater where agriculture predominated, the delayed modernization of agriculture having depressed output and productivity in many countries of continental Europe. The result of sectoral shift from low-productivity farming to high-productivity industries was now faster aggregate growth of output and productivity; this is the agricultural labour share hypothesis spelled out by Temin (2002). But the wartime and post-war shock emphasized by Janossy and Dumke is quantitatively more important, and certainly so in post-war Germany.

4. Institutional Change: The Image

Olson's (1982) institutional-change hypothesis posits a sharp shift in German institutions after World War II and an equally sharp break in the growth process. It claims that the shake-up of traditional structures caused by the Nazis and Ordo-liberalism destabilized traditional rent-seeking coalitions, unleashing a *Wirtschaftswunder* that continued until new coalitions formed and sclerosis again set in. Adherents to this view cite the break-up of industrial conglomerates, the weakening of business associations, the currency reform, the elimination of price controls, and the creation of an intensively competitive market environment as leaving little scope for lobbying by special interests. In this view, West Germany's Social Market Economy was a new economic system free of both the social divisions of Weimar and the excessive state intervention of the

Nazis.²⁹ This explains both why growth was faster in the 1950s than the 1920s and why the performance of the German economy surpassed that of other economies like Britain's where a comparable institutional shakeup was absent.

In this section we argue that this view is more image than reality. West Germany's post-war political establishment was eager to depict post-war economic reform as a radical departure from the state socialism of the Third Reich, and this image was taken up by contemporary scholars. But subsequent scholarship has shown that actual reforms were in fact quite limited.³⁰ Differences in the institutional constellation and the policies that flowed from it differed surprisingly little between Weimar and post-World War II Germany and, for that matter, between Germany and Britain. It is thus hard to point to those institutions and policies as the explanation for differences in growth and productivity performance.

A delicate issue in this context is that Weimar's regulatory framework had been extended by the Third Reich. Under the aegis of Hjalmar Schacht, industry and professional organizations were given legal power to regulate entry, to set prices and conditions of contract, and to enter into binding collective agreements. Reforms affected most major

²⁹ Coined by ordo-liberal economist Alfred Müller-Armack in 1947, the term was originally supposed to hint to the welfare efficiency of the market process itself. Soon, however, it came to denote the specific West German synthesis between regulated capitalism and the Bismarckian welfare state. A collection of seminal essays of Germany's ordo-liberals on the Social Market Economy is Koslowski (1998). Its architect, Ludwig Erhard, became a figure of mythical fame, as did the *Bundesbank* as the guardian of the deutschmark. Emblematic of this is a book by Erhard (1960) entitled *Wohlstand für alle* (or *Prosperity for Everyone*) Aimed to capitalize on Erhard's reputation as the architect of Germany's economic recovery, it shows a visibly overweight Erhard with his typical big cigar. Both the weight gain and the tobacco product conveyed the message that not just Erhard but everyone had made it.

³⁰ Abelshauser (1985) emphasized these facts. In a highly critical biography, Hentschel (1986) pictured Erhard's policies as mostly failed. The biographies by Laitenberger (1986) and recently, Mierzejewski (2004) present more balanced accounts of Erhard's successes and failures.

sectors from banking and insurance to energy, transport, the free professions and the traditional crafts (which were basically exempted from competition). As a result, large parts of the German economy were tightly regulated even before the inauguration of wartime planning. Reforms included mandatory collective bargaining in the health sector, the extension of the vocational training system from the traditional crafts to manufacturing, banking and the service sector, the tight regulation of pharmacies, and even the mandatory presence of midwives at childbirth, a profession that was itself newly regulated through vocational training (see Barkai, 1990). Much of this legislation was a reaction to the Great Depression (see Bel, 2006, on banking). It reflected a corporatist *zeitgeist* among Weimar's ministerial bureaucracy, which continued to be influential through the mid-1930s. Far from having a coherent view on economic policy, the Nazis were initially glad to accept the proposals presented by these experts so long as they did not conflict with their power political goals (Ritschl, 1992). These regulations from the first years of Nazi rule, as well as the institutions they created, all existed in 1945 and could be reactivated once wartime rationing was lifted.

Yet we are not claiming entirely seamless continuity. After 1936, Schacht's influence waned, and a second, more ideological wave of economic policy began to develop. Large economic planning boards were created during the Four Year Plan of 1937-40, as well as the *Hermann Goering Werke*, a state-run steel trust that soon became the world's largest industrial conglomerate. As the regime pressed for accelerated war preparation, more and more stringent wartime controls were superimposed on the existing regulatory framework (Buchheim and Scherner 2006). But the centralization of economic planning provoked sharp criticism and, eventually, a reaction. The turnaround came in 1941, when Goering and the bureaucracies under his control lost influence. As a consequence, the German war economy was re-privatized. The large

state agencies associated with Goering's industrial empire were partly reorganized and partly dismantled. Responsibility for economic war planning was divided between a new armament ministry and the umbrella organizations of German business created in the early years of the Third Reich. Prominent economists lobbied for relying more heavily on the market mechanism for guiding the allocation of resources. Not without success: in 1943, the Commerce Ministry established a task force to plan for post-war economic and currency reform. Upon the recommendation of and with financial support from the top industry association, a lobbyist was found who was willing to take the job—no small risk, as it violated orders against any sort of post-war planning. The successful candidate was a certain Ludwig Erhard.

Since the work of Herbst (1982) that explores these interconnections between the pro-market economists within the perimeters of power and those outside, a consensus on the continuity of economic policy doctrine between the Third Reich and early postwar Germany has emerged.³¹ Erhard's 1948 reforms are not a radical departure from a socialist past but rather as putting into practice a program that had developed since the early 1940s.

³¹ Opposition to central planning came from circles both within and outside the party. From within, microeconomist von Stackelberg tried to build a network of pro-market experts, and to lobby the Berlin ministries (Anderson 1987). From outside, economists around von Beckerath (formerly Stackelberg's thesis adviser at Cologne) and Eucken voiced their concerns and kept in close contact with political resistance circles. Despite strict censorship, Eucken (1940) published a book on economic systems, arguing that all forms of central planning inevitably led to socialism. This book later became formative for a generation of German post-war economists. Opposition to central planning enjoyed some degree of protection by a leading SS figure, Otto Ohlendorf, who headed SD Inland, the domestic Gestapo branch, since 1939, and who had led an *Einsatzgruppe* in 1941/2. An economist of ardent pro-market convictions, he became undersecretary in the commerce ministry in 1943, and was also involved in organizing Erhard's work, see Herbst (1982).

5. Institutional Change: The Reality

If institutional shake-up had been widespread, the result would have been far-reaching changes in German policy and sharp differences from policy in other countries where institutional sclerosis was more pronounced. In this section we show that this was not the case.

Competition Policy

The British occupation authorities had relied on a revitalized version of existing entrepreneurs' associations for economic planning. American pressure and allied anti-cartel legislation gradually reduced their power again, although occupation authorities admitted that reconstruction without the expertise of these associations was impossible, and there were suspicions that the old cartels continued to operate in a more covert form into the 1950s (Plumpe 1987). Grunenberg (2006) highlights the continuity of business career networks across the war. The same people who organized the war economy in the early 1940s were at the helm of German big business and its associations in the 1950s, except for a few of the most compromised collaborators with the Nazi regime.

The U.S. occupation authorities had also sought to de-concentrate big business. In some cases this was successful, as with IG Farben. The company was divided into four enterprises, creating a market structure that survived to the 1990s. One explanation for this stability is precisely that stable oligopolistic structures had always characterized the chemical industry. In the cases of heavy industry and banking, de-concentration was less lasting (Mollin 1988, Wixforth 1995). An additional problem was interdependencies within German heavy industry, which relied on the joint production of coal, steel, gas and electricity. This made it difficult to de-concentrate without replacing cartel agreements by an equally complicated regulatory framework. The solution found in the Schuman Plan of

1950 was to put the industries of the Ruhr under the control of a European-wide regulatory board. However, this did not prevent re-concentration of West German heavy industry (Abelshauser 1984, Gillingham 1991).

The most obvious defeat of American-inspired competition policies was in banking. US regulators had attempted to create a state banking system for post-war Germany. The big Berlin banks were split up and successor institutions were created on a zonal basis. The German government was pressed to cast the new situation into federal law. However, after West Germany regained its sovereignty in 1955, these laws were lifted, and the zonal banks merged. Even during the years of de-concentration, the regional successor banks of the old Deutsche Bank continued to operate a joint shadow executive board that coordinated their strategies, approved large credits, and distributed revenues (Holtfrerich 1995).³²

Under American aegis, the economic administration under Erhard and later the federal government attempted to adopt tight anti-cartel legislation, but a proposal drafted by Ordo-liberals failed in 1951. Resistance from heavy industry delayed the passage of an antitrust law until 1957, when finally a bill was adopted (Berghahn 1986).

The new law did significantly widen the scope of anti-cartel policy. Since 1897, cartels had been fully enforceable in court. Legislation in 1933 allowed for cartels to be banned if they were against the public interest, and the aforementioned wave of regulations in large sectors of the economy substituted for the old cartel arrangements. Now, most

³² The influence of large banks on German big business and the possible unofficial cartel structures created by this has continued to attract scholarly attention (e.g. Edwards and Fischer 1994), although historical research seems to imply that the influence of banks and financial conglomerates on German industry may in fact have been quite limited (see Wellhoener, 1989, for the imperial period, Wixforth, 1995, for the Weimar Republic, and James, 1995, James, 2001, and Feldman, 2001, for the Nazi years).

cartels were made illegal, but with exceptions precisely in the areas that had been regulated after the Great Depression. For the most part, the legislation adopted to fill the gaps was a carbon copy of law from the 1930s. As a result, large swaths of the German economy continued to be tightly regulated under rules set in the 1930s. Mandatory vocational training, collective bargaining in the health sector, as well as the midwife monopoly and the restrictions on pharmacies still exist in Germany today, as do many other such regulations. Deregulation of banking, insurance, transport and energy only began in the 1990s, mostly through European legislation and usually against bitter German resistance.

Thus, Erhard's struggle to push a market-friendly agenda for competition policy was uphill. Based on a consensus that formed in the early 1950s, earlier regulations limiting competition were reintroduced with only minor modifications. In contrast to the Eastern European transformation countries after 1989, Germany had inherited a fully functional, albeit highly regulatory framework of economic institutions from the 1930s. Rather than embarking on radical reform, German policymakers in the 1950s preferred the constitution inherited from the past. Only such minor changes were adopted as were needed to avoid a rupture with the Allies (see Ritschl 2005). An Olsonian structural break in German competition policy after World War II is nowhere in sight.

All this was not dissimilar from the situation in Britain. Collusive arrangements were a British tradition: during the 1930s and the war some 60 percent of British manufacturing was covered by such agreements. They were used in the 1930s to shelter weak firms from the slump, and during the war to smooth the flow of inputs to the military. Officials saw cartels as convenient for pursuing their industrial agendas; it was easier to meet with a few industrial leaders than to organize a large number of small entrepreneurs. Yet another motive for disregarding the potential for abuses by industrial rings was to exploit economies of scale and scope.

America's example suggested that units of production had to be enlarged to compete, and cooperation and consolidation were viewed as means to this end.

Legal restraints did little to inhibit collusion, Britain possessing no analogy to the U.S. Sherman Anti-Trust Act. Not until 1956 with the adoption of the Restrictive Practices Act was a serious effort made to discourage collusive practices. Even then, mergers were rarely discouraged as restraints to trade, and the Conservative Government extended legal sanction to price maintenance schemes. The impact on competition was debilitating.³³

Post-war Labour Governments, hostile to high prices and profits, acknowledged the costs of price maintenance schemes. Their solution was not to break up collusive arrangements or regulate natural monopolies, however, but to bring the offending industries under government ownership and control.³⁴ Nationalization proceeded from the Bank of England, the coal industry and BOAC in 1946 to the railways, waterways and electricity in 1947, gas in 1948, and iron and steel in 1949. By 1951 more than two million workers were employed in public corporations.

The productivity and profitability of these public companies was hardly admirable. Between 1948 and 1958, labour productivity in nationalized industry grew by only 1.5 percent per year, a percentage point below the average for the British economy as a whole. With

³³ As one contemporary observed, the restrictive practices of trade associations were "the greatest single cause of the lack of all dynamism in British industry." Cited in Harris (1972), p.222. One attempt to measure this effect is in Crafts (1995): he includes in a cross-section model of the determinants of the determinants of productivity growth in the period 1954-63 (using data for 57 British industries) the change in the five-firm concentration ratio (as a measure of the scope for collusion), finding a negative coefficient on the margin of significance at the 10 percent confidence level.

³⁴ The commitment to nationalization had been given official status in Clause IV of the party's 1918 constitution drafted by Sidney Webb.

unionists on both sides of the bargaining table, public corporations provided generous wage settlements. Soft budget constraints gave management little incentive to minimize costs. Pressured to help with political problems like the existence of depressed regions, managers had mixed motives when allocating resources.

Thus, there is a striking degree of parallelism in competition policy in Britain and in West Germany. Neither country possessed an antitrust culture resembling the Sherman Act. In Britain, nationalization, not competition, was the order of the day. In Germany, Allied decartelization had limited impact on corporate culture. Although there was much talk of privatization and competition, little happened outside the chemical industry. Privatization of the huge state-owned conglomerates in iron and steel, machinery or auto industry hardly got off the ground until the 1970s, nor did competition policy. In both countries antitrust laws passed in the 1950s left large loopholes that insulated the respective national economies from competition, a condition that changed only in the 1980s in Britain and the 1990s in Germany.

Labour markets

Similar continuity is evident in the structure of labour markets. The occupation authorities quickly resurrected Weimar's trade unions, even rehabilitating many of the same individuals who had occupied high positions prior to National Socialism. They encouraged the resumption of industry-level bargaining for the convenience of having recognized labour spokesmen with whom to deal. Unions were organized along the same lines as in the 1920s (with some 16 industrial unions, each with a corresponding employers' association) and participated in the same kind of national congress. As in the 1920s, unions were dedicated to democratic socialism and in some cases openly hostile to markets. They demonstrated their renewed strength in 1948, soon after the currency

reform, when a sharp increase in the price level led to real wages losses and provoked a wave of strikes (Buchheim 1990). The subsequent rise in unemployment fuelled resistance to Erhard's supply-side policies. The government felt the pressure so strongly that it contemplated a Keynesian job creation program, which was rejected only when recovery gained sufficient momentum to pacify union demands (Berger and Ritschl 1995, Berger 1997).³⁵

For iron and coal, the Codetermination Act of 1951 placed workers' representatives on company boards, allowing them to surveil their employers and verify that the latter were keeping their investment commitments. The Works Constitution Act of 1952, based on similar Allied acts of the late 1940s and on slightly less comprehensive legislation from the Weimar Republic, had similar effects; moreover, it secured monopoly for the trade union in representing firm workers.

Given that German mining and heavy industry enjoyed the most elaborate system of industrial relations, it was there that the success of trading wages for high investment should have been most evident. But in fact, investment rates in this sector were so low that an energy crisis developed in 1950. The Investment Aid Act of 1951 imposed a levy on wide segments of German industry in order to pour into coal, steel, electricity generation and transport funds that owners, capital markets, and banks could not or would not supply.³⁶ In 1950 when this crisis was mounting, the miners' union managed to obtain pay increases of 9 and 10

³⁵ A similar point could be made for agriculture whose lobby remained intact and powerful despite the disappearance of the "Junker" class of the politically influential landed nobility. Here as much as in iron and steel, German regulations, often inherited from Nazi economic planning, were successively replaced by EEC-wide market control that attempted to regulate the market with very similar instruments (on this, see Kluge, 1988).

³⁶ The act laid the administration of this levy in the hands of the entrepreneurs' associations, again strengthening the informal cartels that allied legislation had sought to abolish (Abelshauser, 1984).

percent (Abelshauser 1984), hardly consistent with the picture of restraint. If anything, successful wage restraint began having its effects only in the mid-1950s, at a time when economic recovery at fast rates had consolidated.

What markets could not deliver, governments sought to provide. In West Germany, extensive use was made of Marshall Plan counterpart funds to finance investment in coal, steel, public utilities, and transport. After the currency reform of 1948, coal prices had continued to be fixed at levels far below cost, and the same held true for electricity and railway transport prices; this was a deliberate policy to keep production costs low and to boost consumer purchasing power. Rents were kept artificially low, and heavy federal subsidies were provided for residential construction. This is hardly in line with the traditional praise for Erhard's free-market policy, and has induced writers to question Erhard's actual influence on policy (Abelshauser, 1984) as well as the pro-market character of his creeds (Laitenberger, 1986).

Similar continuity was evident in Britain. Early industrialization had bequeathed a myriad of small, craft-based trade unions. Their number and the autonomy of shop stewards on the factory floor frustrated efforts to achieve the industry-wide, much less economy-wide, coordination of bargaining. None of this changed as a result of World War II (Booth et al. 1997, Flanagan et al. 1974). With scores of unions squabbling over their members' shop-floor rights, work rules proved difficult to modify. Bean and Crafts (1996) analyze TFP growth in 137 British industries: they find that the presence of multiple unions significantly depressed TFP growth, with multiple-union workplaces exhibiting annual TFP growth as much as one percentage point lower than that achieved by single-union

workplaces.³⁷ In this environment, attempts to import American-style mass production methods under the aegis of the Anglo-American Council on Productivity (AACP) had little impact on growth (Crafts 1995). Unions and employers agreed that neither restrictive practices nor work rules were fair game for investigation by the AACP.

The labour market implications of these policies were mixed. Aggregate labour-market statistics for the two countries paint sharply contrasting pictures (Table 7). British unemployment was low. Many feared a post-war surge in unemployment like that which had followed World War I, but their expectations were disappointed. Between 1945 and 1951 unemployment averaged an astonishingly low 1.5 percent. For the remainder of the decade the annual average rate never once crept above 2 percent.

Germany, on the other hand, entered the 1950s with unemployment close to 10 percent. Only toward the end of the decade had German unemployment rates attained British levels. The persistence of high unemployment during the first years was itself a consequence of a very high influx of refugees after World War II. Therefore, it is not an indication of failing labour market institutions. However, the initially high level of unemployment and its subsequent decline may have contributed to an initially low but increasing bargaining power of trade unions. All this leads us to conclude that the contrasting structure of labour relations in the two countries may have mattered less for the course of the first post-war decade than is commonly supposed.³⁸

³⁷ Here too there is impressive evidence of institutional continuity: Broadberry and Crafts (1992) provide remarkably similar estimates for the interwar years.

³⁸ In a Nash bargain over the wage rate, unemployment may affect the bargaining position of the trade union. Broadberry and Crafts (1996) find evidence of this effect in post-war Britain. According to Lindlar and Holtfrerich (1997), unit labour costs started to rise at the end of the decade, and continued doing so until the labour market was opened to immigration from Southern Europe in the 1960s. Hence, to the extent that

Macroeconomic Policies

Many comparisons of the British and German recoveries credit superior German growth performance to more stable and prudent macroeconomic policies. The British stereotype is of low savings, budgetary stop-and-go, and chronic balance of payments deficits. The German image, in contrast, is of a more cautious and stable macroeconomic stance.

But Table 7 shows that private savings rates were actually quite similar in the two countries. Moreover, in both countries public sector's contribution to national saving was positive. Both countries were capital exporters.³⁹ The question therefore is how two such similar patterns could have produced such different outcomes. The answer is less different post-war policies than different financial inheritances — specifically, very different debt/income ratios. West Germany's started out lower and remained below 25 percent until the 1970s. Britain's debt ratio started out at 175 percent and remained higher than Germany's until the 1990s (Ritschl 1996). Different levels of debt meant different balance-of-payments positions, given similar savings rates. The British balance of payments was weak owing to the large amount of service due on debt to foreigners, while the German balance of payments benefited from the country's debts having been written down by the currency reform of 1948 and the London Agreement of 1953 (Buchheim 1986). Thus, the main difference lay in post-war debt arrangements which favoured Germany, allowing her to accumulate foreign currency reserves despite savings rates only marginally different from Britain's. And that accumulation of

high initial unemployment reinforced the implicit contract trading in wage increases for higher investment, this effect became weaker over time.

³⁹ Commentators have sometimes argued that the country's propensity to export capital was harmful for domestic investment, and also that Germany's ability to generate current-account and export surpluses was an important engine of growth. Table 3 reminds the reader that these views cannot be true at the same time.

reserves freed macroeconomic policy from the constraint imposed by the balance of payments.

British policymakers were single-minded in their pursuit of output and employment goals. But every time their policies of aggressive demand stimulus bumped up against the balance-of-payments constraint, they were forced to retrench. The result, it has been widely argued, was an unstable pattern of stop-go policies, which disrupted the process of economic growth. In Germany, where pressing foreign exchange constraints were absent, one might expect more stable fiscal policy.

But, once again, Table 7 shows that this was not the case. The German government ran a series of surpluses in the 1950s, the proceeds of which were spent in subsequent years. This spike in German public saving was caused by the attempt of the German government to pour money into a sinking fund for rearmament⁴⁰ Surpluses were added to the government's central bank account and removed from circulation. Soon, however, a grand coalition of politicians determined that a better use of these monies was to expand social security, and the government's account was run down. This fiscal conduct was criticized at the time for its procyclicality (Musgrave 1956).⁴¹ None of this is consistent with the stereotype of a stabilizing fiscal policy. What really seems to have mattered for Germany's fiscal system was the absence of large interest burdens on the public budget that allowed Germany to keep tax rates low and insulated the public budget from balance-of-payments pressures. Thus, the two countries' macroeconomic policies seem to explain less than might be supposed.

⁴⁰ This arrangement came to be known as the "Juliusturm." The original Juliusturm was a tower in the fortress of Spandau near Berlin where Imperial Germany had hoarded French gold paid as reparations after the Franco-Prussian War of 1871.

⁴¹ Analyzing German full employment budget surpluses, Berger (1997) similarly finds that the "Juliusturm" hoarding had strong procyclical effects.

6. Conclusion

Between 1950 and 1960, output in West Germany grew at an average of 8 percent per year, much faster than in earlier German history and faster than in Europe as a whole. This paper has reviewed popular explanations for this out-performance, identifying a kernel of truth in each of them. But of the convergence, structural change and post-war shock hypotheses, both theory and evidence suggest that the third factor was the most important. Output per capita converged back to its steady state faster than the capital/labour ratio, not three times slower as suggested by the standard neoclassical model, which suggests that neoclassical convergence explains only a fraction of observed growth in this period. The additional fillip to growth due to the reallocation of labour from agriculture to industry was even smaller. Far and away the most important of these three factors was the collapse of output in the final phases of the war and immediately thereafter. This was reflected in the concomitant collapse and subsequently in a fast recovery of total factor productivity. Given that capacity had not fallen, indeed that it continued to rise in the 1950s, there was scope for Germany to grow rapidly by closing this output and TFP gap.

All this presumes the institutional capability to restore normal levels of capacity utilization and growth. This brings us to the fourth explanation for the *Wirtschaftswunder*, namely the institutional shake-up that supposedly eliminated rent-seeking coalitions, creating scope for rapid growth. Here the evidence suggests that the Germany economy in fact remained tightly regulated, both absolutely and relative to more slowly-growing economies like Britain. The post-war model of Rhenish capitalism drew heavily on a regulatory model established in the early and mid-1930s, complemented by an improved version of the corporatist model of collective wage bargaining that had prevailed in the Weimar Republic before 1933. While questions have been raised about the sustainability of

this model in recent years, it provided accountability and predictability in the 1950s and enabled the German economy to grow back to its historical trend after heavy disruptions in the aftermath of World War II.

None of this is to imply that policy did not matter. Socialist alternatives to the German model were considered and could have been followed. The German labour movement and its moderate political wing began moving away from their socialist leanings only in the late 1950s. Inspired by organized Catholicism, German conservatism in the post-war period favoured corporatist organization and heavy regulation over an adjustment to market forces, leaving a lasting imprint on West Germany's socio-economic system of Rhenish capitalism, as this model has come to be called (Berghahn and Siegurd 2006). As we have argued, this model was by no means a radical departure from German traditions. If there is anything surprising about Germany's post-war setup, it is the high degree of institutional continuity and the absence of any radical turn in policy.

References:

- Abelshauser, Werner, 1985, *Wirtschaftsgeschichte der Bundesrepublik Deutschland 1945–1980* (Frankfurt: Suhrkamp).
- _____, 1981, „Wiederaufbau vor dem Marshallplan. Westeuropas Wachstumschancen und die Wirtschaftsordnungspolitik in der zweiten Hälfte der vierziger Jahre“, *Vierteljahrshefte für Zeitgeschichte* 29, pp. 545-578.
- _____, 1984, *Der Ruhrkohlenberghau seit 1945* (Munich: Beck).
- _____, 1975, *Wirtschaft in Westdeutschland 1945–1948* (Stuttgart: DVA).
- Abramovitz, Moses, 1986, “Catching Up, Forging Ahead and Falling Behind,” *Journal of Economic History*, vol. 46, pp. 385–406.
- Acemoglu, Daron, Simon Johnson, and James Robinson, 2005. “The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth,” *American Economic Review* 95, pp. 546-579.
- Adamsen, Heiner R., 1981. *Investitionshilfe für die Ruhr. Wiederaufbau, Verbände und Soziale Marktwirtschaft 1948-1952* (Wuppertal: Hammer).
- Alford, Bernard, 1988, *British Economic Performance, 1945–1975* (Basingstoke: Macmillan).
- Anderson, Dennis LeRoy, 1987. *The Academy for German Law: 1933-1944* (Garland, New York).
- Barkai, Avram, 1990, *Nazi Economics: Ideology, Theory, and Policy* (Oxford: Berg).
- Barnett, Correlli, 1986, *The Audit of War: The Illusion of Britain as a Great Power* (London: Macmillan).
- Barro, Robert, 1999, “Notes on Growth Accounting,” *Journal of Economic Growth* 4, pp. 119-137.

- _____, and Xavier Sala-i-Martin, 1995, *Economic Growth*, (New York: McGrawHill).
- Baumol, William, Batey Blackman, and Edward Wolff, 1989, *Productivity and American Leadership* (Cambridge: MIT Press).
- Bean, Charles, and Nicholas Crafts, 1996, "British Economic Growth since 1945: Relative Economic Decline ... and Renaissance?" in Nicholas Crafts and Gianni Toniolo (eds.), *Economic Growth in Europe since 1945* (Cambridge: Cambridge University Press), pp. 131–172.
- Bel, Germa, 2006, "The Coining of Privatization and Germany's National Socialist Party," *Journal of Economic Perspectives* 20, pp. 187-194
- Berger, Helge, 1997, *Konjunkturpolitik im Wirtschaftswunder: Handlungsspielräume und Verhaltensmuster von Bundesbank und Regierung in den 1950er Jahren* (Tübingen: Mohr).
- _____, and Albrecht Ritschl, 1995, "Germany and the Political Economy of the Marshall Plan, 1947-52: A Re-Revisionist View," in Barry Eichengreen (ed.), *Europe's Postwar Recovery* (Cambridge: Cambridge University Press), pp. 199–245.
- Berghahn, Volker, 1986, *The Americanization of West German Industry 1945–1973* (Leamington Spa: Berg).
- _____, and Sigurd Vitols (eds.), 2006, *Gibt es einen deutschen Kapitalismus?* Frankfurt/Main: Campus.
- Birkenfeld, Werner, 1964. *Der Synthetische Treibstoff, 1933-1945; ein Beitrag zur nationalsozialistischen Wirtschafts- und Rüstungspolitik* (Göttingen: Muster-Schmidt).
- Borchardt, Knut, 1976, "Wachstum und Wechsellagen 1914/1970", in: Hermann Aubin and Wolfgang Zorn, eds.: *Handbuch der deutschen Wirtschafts- und Sozialgeschichte* (Klett-Cotta, Stuttgart).
- _____, 1977 [1991], "Trends, Cycles, Structural Breaks, Chance: What Determines Twentieth Century German Economic History?" in

- idem, *Perspectives on Modern German Economic History and Policy* (Cambridge: Cambridge University Press), pp. 84-107.
- Booth, Alan, Joseph Melling, and Christoph Dartmann, 1997, "Institutions and Economic Growth: The Politics of Productivity in West Germany, Sweden and the United Kingdom, 1945-1955," *Journal of Economic History* 57, pp. 416–444.
- Broadberry, Stephen, 1993, "Manufacturing and the Convergence Hypothesis: What the Long-Run Data Show," *Journal of Economic History* 53, pp. 772–795.
- _____, 1994, "Why Was Unemployment in Postwar Britain So Low?" *Bulletin of Economic Research* 46, pp. 241–261.
- _____, 1997, "Anglo-German Productivity Differences, 1870-1990: A Sectoral Analysis," *European Review of Economic History* 1, pp. 247–267.
- _____, 2006, "Market Services and the Productivity Race, 1850-2000: Britain, the United States and Germany", mimeo, University of Warwick.
- _____, Stephen, and Nicholas Crafts, 1992, "Britain's Productivity Gap in the 1930s: Some Neglected Factors," *Journal of Economic History* 52, pp. 531–558.
- _____, and _____, 1996, "British Economic Policy and Industrial Performance in the Early Postwar Period," *Business History* 38, pp. 65–91.
- _____, and Albrecht Ritschl, 1995, "Real Wages, Productivity and Unemployment in Britain and Germany During the 1920s," *Explorations in Economic History* 32, pp. 327–349.
- _____, and Karin Wagner, 1996, "Human Capital and Productivity in Manufacturing During the Twentieth Century: Britain, Germany and the United States," in Bart van Ark and Nicholas Crafts (eds.),

- Quantitative Aspects of Postwar European Economic Growth*
(Cambridge: Cambridge University Press), pp. 244-270.
- Budraß, Lutz, 1998, *Flugzeugindustrie und Luftrüstung in Deutschland 1918–1945* (Düsseldorf: Droste).
- Buchheim, Christoph, 1990, *Die Wiedereingliederung Westdeutschlands in die Weltwirtschaft 1945-1958* (Munich: Oldenbourg).
- _____, 1988, "Die Währungsreform 1948 in Westdeutschland," *Vierteljahreshefte fuer Zeitgeschichte* 36, pp. 189–231.
- _____, and Jonas Scherner, 2006, "The Role of Private Property in the Nazi Economy: The Case of Industry," *Journal of Economic History* 66, 390-416.
- Cairncross, Alec, 1985, *Years of Recovery: British Economic Policy, 1945-1951* (London: Methuen).
- Carlin, Wendy, 1996, "West German Growth and Institutions," in Nicholas Crafts and Gianni Toniolo (eds.), *Economic Growth in Europe since 1945* (Cambridge: Cambridge University Press), pp. 455–497.
- Connolly, Tracey (2000), "Irish Workers in Britain during World War Two," in Brian Girvin and Geoffrey Roberts (eds), *Ireland and the Second World War: Politics, Society and Remembrance* (Dublin, Four Courts Press), pp.121-132.
- Crafts, Nicholas, 1987 "Revealed Comparative Advantage in Manufacturing, 1899-1950," *European Journal of Economic History* 18, pp. 127-137.
- _____, 1995, "You've Never Had it so Good? British Economic Policy and Performance, 1945-60," in Barry Eichengreen (ed.), *Europe's Postwar Recovery* (Cambridge: Cambridge University Press), pp. 246–270.
- _____, and Terence Mills, 1996, "Europe's Golden Age: An Econometric Investigation," in Bart van Ark and Nicholas Crafts (eds.),

- Quantitative Aspects of Postwar Economic Growth* (Cambridge: Cambridge University Press), pp. 415-431.
- _____, and Gianni Toniolo, 1996, "Postwar Growth: An Overview," in Nicholas Crafts and Gianni Toniolo (eds.), *Economic Growth in Europe Since 1945* (Cambridge: Cambridge University Press), pp. 1–37.
- Deutsche Bundesbank, (ed.), 1976, *Deutsches Geld- und Bankwesen in Zahlen, 1876-1975* (Frankfurt: Knapp).
- Denison, Edward, 1968, "Economic Growth," in Richard Caves (ed.), *Britain's Economic Prospects* (London: Allen and Unwin), pp. 231-278.
- Dow, John, 1964, *The Management of the British Economy 1945–1960* (Cambridge: Cambridge University Press).
- Dumke, Rolf, 1990, "Reassessing the *Wirtschaftswunder*: Reconstruction and Postwar Growth In West Germany in an international Context," *Oxford Bulletin of Economics and Statistics* 52, pp. 451-491.
- Edwards, Jeremy, and Klaus Fischer, 1994, *Banks, Finance and Investment in Germany* (Cambridge: Cambridge University Press).
- Eichengreen, Barry, 1993, *Reconstructing Europe's Trade and Payments: The European Payments System* (Manchester: Manchester University Press).
- _____, 1996, "Institutions and Economic Growth: Europe After World War II," in Nicholas Crafts and Gianni Toniolo (eds.), *Economic Growth in Europe Since 1945* (Cambridge: Cambridge University Press), pp. 38–70.
- Erhard, Ludwig, 1960, *Wohlstand für alle* (Düsseldorf: Econ).
- Eucken, Walter, 1940. *Die Grundlagen der Nationalökonomie* (Fischer, Jena).

- Feinstein, Charles H., 1972. *National Income, Expenditure and Output of the United Kingdom 1855-1965* (Cambridge: Cambridge University Press).
- Feldman, Gerald, 2001, *Allianz and the German Insurance Business, 1933-1945* (Cambridge: Cambridge University Press).
- Flanagan, Robert, David Soskice, and Lloyd Ulman, 1974, *Unionism, Economic Stabilization, and Incomes Policy* (Washington, D.C.: The Brookings Institution).
- Gehrig, Gerhard, 1961, "Eine Zeitreihe für den Sachkapitalbestand und die Investitionen," in Gerhard Gehrig, ed.: *Bestimmungsfaktoren der deutschen Produktion* (IFO-Studien 7).
- Giersch, Herbert, Karl-Heinz Paqué, and Holger Schmieding, 1992, *The Fading Miracle. Four Decades of Market Economy in Germany* (Cambridge: Cambridge University Press).
- Gillingham, John, 1991, *Coal, Steel, and the Rebirth of Europe, 1945–1955* (Cambridge: Cambridge University Press).
- Glyn, Andrew, and Bob Sutcliffe, 1972, *British Capitalism, Workers, and the Profits Squeeze* (London: Penguin).
- Grunenberg, Nina, 2006. *Die Wundertäter. Netzwerke der deutschen Wirtschaft 1942-1966* (Berlin: Siedler).
- Hall, Peter, and Soskice David, 2001, "Introduction", in: Peter Hall, David Soskice (eds), *Varieties of Capitalism*, (Oxford: Oxford University Press), pp 1-70.
- Harris, Nigel, 1972, *Competition and the Corporate Society: British Conservatives, the State and Industry, 1945–1964* (London: Methuen).
- Hentschel, Volker, 1996, *Ludwig Erhard: ein Politikerleben* (Munich: Olzog).

- Herbst, Ludolf, 1982. *Der Totale Krieg und die Ordnung der Wirtschaft. Die Kriegswirtschaft im Spannungsfeld von Politik, Ideologie und Propaganda 1939-1945* (Deutsche Verlagsanstalt, Stuttgart).
- Hoffmann, Walther, 1965, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (Berlin: Springer).
- _____, and J. Heinz Müller, 1959, *Das deutsche Volkseinkommen 1851-1957* (Tuebingen: Mohr).
- Holtfrerich, Carl-Ludwig, 1995, "Die Deutsche Bank vom Zweiten Weltkrieg über die Besatzungsherrschaft zur Rekonstruktion 1945-1957," in Lothar Gall et al., *Die Deutsche Bank 1870-1995* (Munich: Beck), pp. 409-478.
- James, Harold, 1995, "Die Deutsche Bank und die Diktatur," in Lothar Gall et al., *Die Deutsche Bank 1870-1995* (Munich: Beck), pp. 315-408.
- James, Harold, 2001. *The Deutsche Bank and the Nazi Economic War Against the Jews* (Cambridge: Cambridge University Press).
- Jánossy, Ferenc, 1969, *The End of the Economic Miracle* (New York: ISAP).
- Karlsch, Rainer, 1993. *Allein bezahlt? Die Reparationsleistungen der SBZ/DDR 1945* (Berlin: Links).
- Kindleberger, Charles P., 1967, *Europe's Postwar Growth* (New York: Oxford University Press).
- Kluge, Ulrich, 1988, *Vierzig Jahre Agrarpolitik in der Bundesrepublik Deutschland* (Hamburg: Parey).
- Koslowski, Peter (ed.), 1998, *The Social Market Economy: Theory and Ethics of the Economic Order* (New York: Springer).
- Krengel, Rolf, 1958, *Anlagevermögen, Produktion und Beschäftigung der Industrie im Gebiet der Bundesrepublik von 1924 bis 1956* (Berlin: Duncker & Humblot).

- Laitenberger, Volkhard, 1986, *Ludwig Erhard. Der Nationalökonom als Politiker* (Göttingen: Muster-Schmidt).
- Lindlar, Ludger, and Carl-Ludwig Holtfrerich, 1997, "Geography, Exchange Rates, and Trade Structures: Germany's Export Performance Since the 1950s," *European Review of Economic History* 1, pp. 217–246.
- Maddison, Angus, 1991, *Dynamic Forces in Capitalist Development* (Oxford: Oxford University Press).
- _____, 1995, *Monitoring the World Economy, 1820-1992* (Paris: OECD).
- _____, 2003, *The World Economy: Historical Statistics* (Paris: OECD).
- Mankiw, Gregory, Paul Romer, and Philippe Weil, 1992, "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics* 107, pp. 407–437.
- Manz, Mathias, 1968, *Stagnation und Aufschwung in der französischen Besatzungszone von 1945 bis 1948*, (Ph.D. Diss., University of Mannheim).
- Melzer, Manfred, 1980, *Anlagevermögen, Produktion und Beschäftigung der Industrie im Gebiet der DDR von 1936 bis 1978 sowie Schätzung des künftigen Angebotspotentials*, Berlin: Duncker & Humblot (DIW Beiträge zur Strukturforschung 59).
- Mierzejewski, Alfred C., 2004, *Ludwig Erhard. A Biography* (Chapel Hill: University of North Carolina Press).
- Mitchell, Brian, 1990, *British Historical Statistics* (Cambridge: Cambridge University Press).
- _____, 2003, *International Historical Statistics: Europe 1750 – 2000* (London: Macmillan).
- Mollin, Gerhard, 1988, *Montankonzerne und Drittes Reich* (Goettingen: Vandenhoeck & Ruprecht).
- Musgrave, Richard, 1956, "Steuerpolitik und Konjunktur," *Wirtschaftsdienst* 6, pp. 309–312.

- Olson, Mancur, 1982, *The Rise and Decline of Nations* (New Haven: Yale University Press).
- _____, 1996, "The Varieties of Eurosclerosis: The Rise and Fall of Nations Since 1982," in Nicholas Crafts and Gianni Toniolo (eds.), *Economic Growth in Europe Since 1945* (Cambridge: Cambridge University Press), pp.73-94.
- Overmans, Rüdiger, 1999, *Deutsche militärische Verluste im Zweiten Weltkrieg* (Munich: Oldenbourg).
- Paqué, Karl-Heinz, 1994, "The Causes of Slumps and Miracles: A Critical Evaluation of Olsonian Views on the German Economic Miracle," *CEPR Discussion Paper* No. 981.
- _____, 1996, "Why the 1950s and Not the 1920s? Olsonian and Non-Olsonian Interpretations of Two Decades of German Economic History," in Nicholas Crafts and Gianni Toniolo (eds.), *Economic Growth in Europe Since 1945* (Cambridge: Cambridge University Press), pp. 95–106.
- Plumpe, Werner, 1987, *Vom Plan zum Markt: Wirtschaftsverwaltung und Unternehmerverbände in der britischen Zone* (Duesseldorf: Schwann).
- Ritschl, Albrecht, 1992, "Die Wirtschaftspolitik des Dritten Reichs: Ein Überblick," in Karl-Dietrich Bracher et al. (eds.), *Deutschland 1933-1945. Neue Studien zur nationalsozialistischen Herrschaft* (Duesseldorf: Droste), pp. 118-134.
- _____, 1996a, "Sustainability of High Public Debt: what the Historical Record Shows," *Swedish Economic Policy Review* 3, pp. 175–198.
- _____, 1996b, "Aufstieg und Niedergang der DDR-Wirtschaft 1945-1989," *Jahrbuch für Wirtschaftsgeschichte* 2, pp.11-46.
- _____, 2005, "Der späte Fluch des Dritten Reichs: Pfadabhängigkeiten in der Entstehung der bundesdeutschen

- Wirtschaftsordnung," *Perspektiven der Wirtschaftspolitik* 6, pp. 151-170.
- _____, and Mark Spoerer, 1997, "Das Bruttosozialprodukt in Deutschland nach den amtlichen Volkseinkommens- und Sozialproduktsstatistiken 1901-1995," *Jahrbuch für Wirtschaftsgeschichte* 2, pp. 11-37.
- Romer, Paul, 1987. "Crazy Explanations of the Productivity Slowdown," *NBER Macroeconomics Annual* (Cambridge, Mass.: MIT Press).
- Sicsic, Pierre and Charles Wyplosz, 1996. "France 1945-92," in Nicholas Crafts and Gianni Toniolo (eds), *Economic Growth in Europe Since 1945* (Cambridge: Cambridge University Press), pp. 210-239.
- Solow, Robert, 1957, "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics* 39, pp. 312-320.
- Spoerer, Mark, and Jochen Fleischhacker, 2002, "Forced Laborers in Nazi Germany: Categories, Numbers, and Survivors," *Journal of Interdisciplinary History* 33, pp. 169-204.
- Temin, Peter, 2002, "The Golden Age of European Growth Reconsidered," *European Review of Economic History* 6, pp.3-22.
- Temple, Jonathan, 2001, "Structural Change and Europe's Golden Age," unpublished manuscript, University of Bristol.
- Wellhoener, Volker, 1989, *Großbanken und Großindustrie im Kaiserreich* (Göttingen: Vandenhoeck & Ruprecht).
- Wixforth, Harald, 1995, *Banken und Schwerindustrie in der Weimarer Republik* (Cologne: Boehlau).

Table 1

Comparative Levels of Productivity and Agricultural Employment Shares, 1870-1973

Y / L (UK=100)		K / L (UK=100)	Agricultural employment and income shares				
Year			Year	Germany		Britain	
				labour	income	labour	income
			1907/11	35.2	12.7	11.8	6.3
1913	72.2	102	1925	30.5	8.6	7.8	4.9
1929	70.0	79	1933	28.2	8.4	6.4	4.8
1938	75.8	88	1938/39	25.0	8.6	5.4	3.9
1950	61.7	71	1950	22.2	6.1	5.0	4.1
1960	95.5		1960	13.3		4.0	
1973	109.3		1973	7.1		2.9	

Sources: Output per capita: Calculated from Maddison (1991, 2003), Feinstein (1972)

Capital/labour ratio: Hoffmann (1965)

Agricultural employment and income shares: Germany: Calculated from Statistisches Jahrbuch fuer das Deutsche Reich, various issues; Deutsche Bundesbank (1976)

Britain: Calculated from Maddison (1991), Feinstein (1972)

Table 2

Comparisons of Output Growth and its Determinants, 1960-1973
Percentage Growth per year

	Output Y	Capital K	Labour L	Y/L	K/L	TFP I	TFP II
<i>(a) 1950-1960</i>							
W. Germany	7.96	5.66	1.02	6.94	4.64	5.39	3.85
Britain	2.85	3.90	0.55	2.30	3.35	1.19	0.07
<i>(b) 1960-1973</i>							
W. Germany	3.45	6.50	-0.81	4.26	7.31	1.82	-0.61
Britain	3.16	5.32	-0.69	3.85	6.01	1.85	-0.16

Sources:

Calculated from Maddison (1991, 1995), Ritschl and Spoerer (1997).

Methods:

Approximate TFP growth: $TFP\ I = Y/L - 1/3 * K/L$

$TFP\ II = Y/L - 2/3 * K/L$

Table 3

Gross Capital Stock and Coal Output in Germany and Britain across World War II
(1936 = 100)

Germany (Postwar Territory, at 1936 prices)						Britain (at 1938 prices)				
Mining and Manufacturing			Aggregate Economy (West)			Aggregate Economy				
West		East	Equip- ment	Structures	Aggregate	Capital Stock	Cumulative Investment	Interpolated Capital Stock	Coal Output	
Capital Stock	Coal Output									
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	
1938	118		107	103	102	104.16	104.16	104.16		99
1944	136	143					115.21	106.41		84
1946	116	102					118.78	107.05		83
1947						108.57	121.77	108.57		86
1948	113	103				110.46				90
1950	122	107	107	92	95	115.15				95

- (i) West Germany and West Berlin, Krengel (1958)
(ii,x) Mitchell (2003), Abelshauser (1975).
(iii) East Germany and East Berlin, Melzer (1980)
(iv-vi) West Germany, Gehrig (1961)
(vii) Feinstein (1972), Table 43.
(viii) Calculated from Feinstein (1972), Table 40.
(ix) Linear interpolation of (vii) by (viii).

Table 4

Population in Germany
1939-1950
- millions -

		1937 territory	1942 territory *	1946 territory *
1939	Total West	67.8	99	59.74 42.09
1944 Extrapolation from 1939 census (i)	Total	69.9	99	
	West			42.44
Slave labourers (ii)	Total		8.3	
	West			3.85
Servicemen abroad (iii)	Total		18.1	
	West			8.4
Total 1944			89	
West				37.89
Total 1946				64.07
West				45.71
Total 1950				68.23
West				49.84

Sources and Methods:

Data for 1937 borders: Maddison (1991).

(i) Statistisches Handbuch von Deutschland

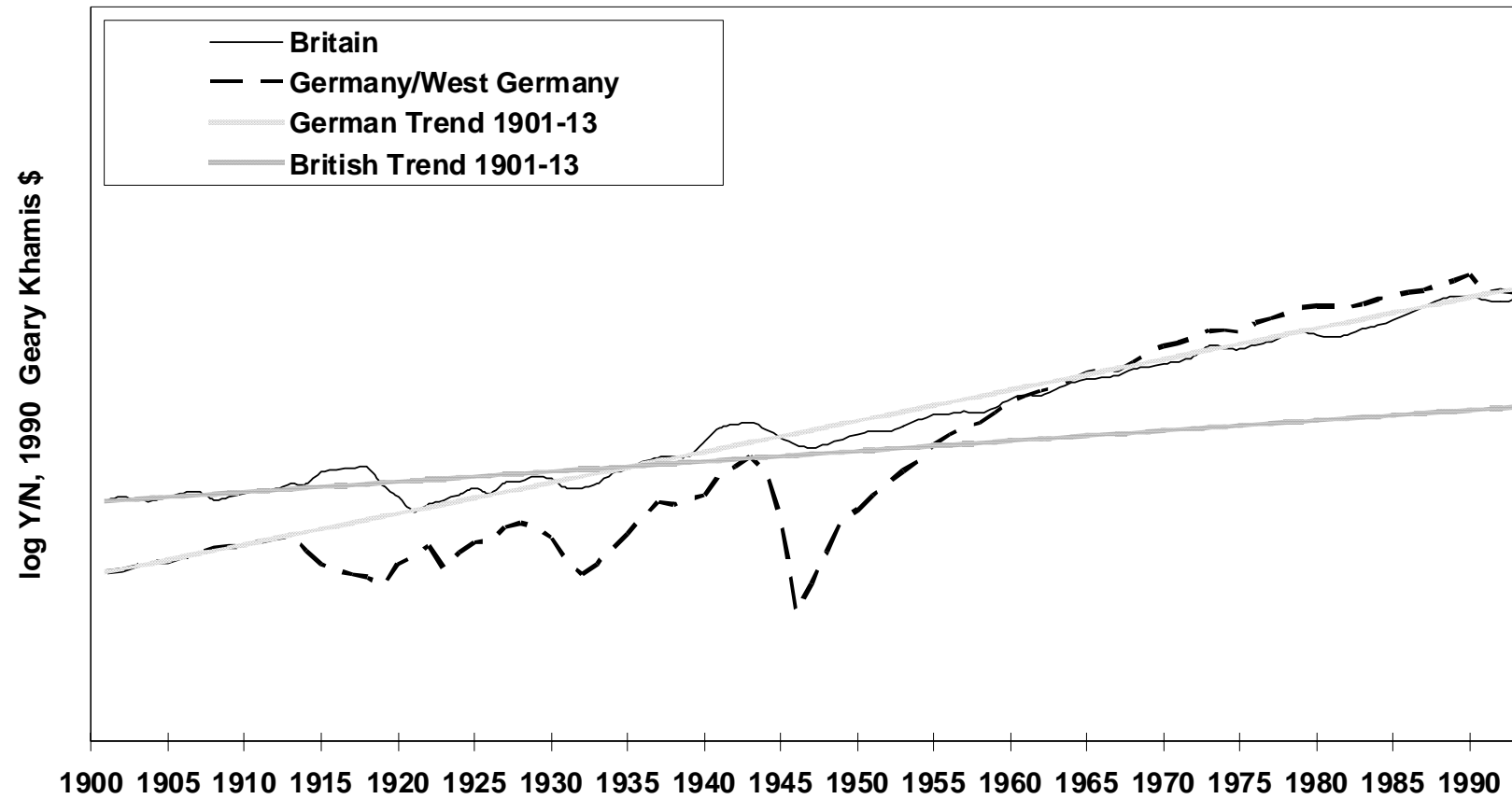
(ii) Spoerer and Fleischhacker (2002).

(iii) Overmans (1999).

* 1942 territory includes Germany in 1937 borders, annexed Austria, as well as annexed parts of Czechia, France, Poland, Lithuania, and Yugoslavia. "Protektorat" part of Czechia and "General-gouvernement" part of Poland not included.

**1946 territory includes Germany in 1937 borders, less territories annexed by Poland and Soviet Union, and less Sarre region. Figures exclude former slave workers waiting to be repatriated.

Figure 1: Growth of GDP Per Capita in Britain and Germany, 1901-1993



Sources: see legend to Table

Table 5

Comparisons of Output Growth and its Determinants, 1929-1950							
	Average percentage growth, annualized*						
	Output Y	Capital K	Labour L	Y/L	K/L	TFP I	TFP II
<i>(a) 1913-1929</i>							
Germany	0.63	-0.05	-0.17	0.8	0.12	0.76	0.72
Germany (rev.)	0.59	-0.05	-0.17	0.76	0.12	0.72	0.68
Britain	0.71	1.51	-0.74	1.45	2.25	0.71	-0.04
<i>(a) 1929-1938</i>							
Germany	3.78	1.74	1.36	2.42	0.38	2.29	2.17
Germany (rev.)	3.39	1.74	1.36	2.03	0.38	1.90	1.78
Britain	1.89	2.20	0.96	0.93	1.24	0.52	0.11
<i>(b) 1938-1944</i>							
W. Germany	3.67	2.87	-2.34	6.01	5.21	4.28	2.54
Germany/ Greater Germany	8.36	5.81	4.45	3.74	1.31	3.30	2.86
Britain	3.36	0.36	-1.10	4.52	1.48	4.01	3.51
<i>(c) 1944-1946</i>							
W. Germany	-37.6	-8.8	0.09	-47.4	-18.6	-41.2	-39.3
Britain	-4.37	0.30	2.76	-6.94	-2.39	-6.19	-5.44
<i>(d) 1946-1950</i>							
W. Germany	19.9	1.17	2.19	17.74	-1.02	18.08	18.4
Britain	3.75	1.84	1.76	1.96	0.08	1.93	1.91

Level of Reconstruction in 1950**							
Indices 1944=100							
W. Germany	80.6	87.1	131.5	59.4	66.2	68.2	78.2
Britain	106.0	108.2	113.2	93.6	95.6	95.0	96.4

Sources: Calculated using data from Feinstein (1972), Maddison (1991, 2003), and Ritschl and Spoerer (1997) as described in text.

Methods: *Data in growth rates.
 $TFP\ I = Y/L - (1/3) * K/L$
 $TFP\ II = Y/L - (2/3) * K/L$

**Data in levels. $TFP\ I = \exp[\log(Y/L) - (1/3)*\log(K/L)]$
 $TFP\ II = \exp[\log(Y/L) - (2/3)*\log(K/L)]$

Rough estimates in italics.

Capital stock estimates for 1944 and 1946 from Table 4 as described in text.

Table 6
Convergence of Per-Capita Income in Postwar Europe, 1950-1989

	Log differences				Annualized growth rates					Growth slowdown
	1950-60				1950-60	1960-70	1970-89	1950-89	1970-89/ 1960-70	
C	2.754	1.859	0.915	0.709	-0.001	0.023	1.066	1.084	1.035	0.116
	<2.834>	<1.820>	<0.918>	<0.703>	<0.003>	<0.071>	<18.985>	<42.278>	<0.071>	<1.718>
GAP <1938-1948>	0.028	0.018								
	<3.057>	<1.727>								
GAP <1941-1946>			1.198	0.975	0.466	0.352	0.009	0.004	0.012	-0.019
			<5.015>	<3.091>	<4.736>	<2.815>	<2.608>	<2.537>	<2.815>	<-4.608>
GNP PER CAPITA 1950	0.199	0.145	0.099	0.094	-0.026	-0.044	-0.006	-0.026	-0.003	-0.011
	<1.032>	<0.809>	<0.821>	<0.781>	<0.269>	<0.462>	<-0.950>	<-0.269>	<-0.462>	<-1.530>
AGRIC.EMPL'SHARE 1950	0.042	0.040	0.033	0.034	0.141	0.138	0.037	0.018	0.033	-0.028
	<2.145>	<2.203>	<2.555>	<2.638>	<1.927>	<1.961>	<1.942>	<1.927>	<1.961>	<-1.213>
1960s									0.005	
									<2.057>	
1970s									0.008	
									<3.436>	
WEST GERMANY		1.083		0.582		0.218				
		<1.778>		<1.076>		<1.385>				
R ²	0.614	0.707	0.783	0.805	0.755	0.794	0.727	0.867	0.645	0.549
N	15	15	15	15	15	15	15	15	45	15
t statistics in italics										

Table 7
Macroeconomic Performance in Britain and Germany, 1950-1960

	Private savings ratios, per cent		Public debt/ GNP ratio, per cent		Public savings rates, per cent		Unemployment rates, per cent	
	GB	D	GB	D	GB	D	GB	D
1950	1.3	3.2	193.5	19.7	19.1	7.5	1.3	11.0
1951	1.1	3.2	175.4	17.5	15.2	11.7	1.1	10.4
1952	3.4	5.7	162.7	16.5	8.6	11.6	1.6	9.5
1953	3.6	6.9	152.3	21.6	6.1	13.0	1.5	8.4
1954	3.0	7.4	147.3	23.1	6.6	12.3	1.2	7.6
1955	3.6	6.6	139.1	21.4	11.2	13.7	1.0	5.6
1956	5.3	5.7	128.9	19.9	9.3	13.7	1.1	4.4
1957	4.5	8.0	121.8	19.1	11.3	9.4	1.3	3.7
1958	3.9	8.7	117.6	18.8	12.2	4.6	1.9	3.7
1959	4.8	8.9	112.5	18.2	10.1	5.6	1.9	2.6
1960	6.7	9.0	107.7	17.4	6.0	9.3	1.5	1.3

Sources: Britain: Calculated from Mitchell (1990), Feinstein (1972).
Germany: Calculated from Deutsche Bundesbank (1976).

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