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The Statistical Underestimation of Structural Modernisation in Europe's Postwar Golden Age

Ross Kelly

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Economic History Department, London School of Economics and Political Science,
Houghton Street, London, WC2A 2AE, London, UK. T: +44 (0) 20 7955 7084.

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1. Introduction

Europe's golden age saw unprecedented GDP per capita growth rates.[1] The growth record of these three decades is insufficiently explained by convergence and orthodox growth models. One classic thesis purporting to properly explain the observed variations of this period - the "structural modernisation" argument - has come into question in recent decades. An alternative "reconstruction" thesis, more compatible with neoclassical models of growth and trade, has been applied to put into question the validity of the structural modernisation thesis and the more antagonistic vision of postwar trade its discussion of scale effects implies. Surveying the literature on convergence, structural modernisation and reconstruction in postwar Europe, we conclude these recent major challenges to the structural modernisation thesis suffer from a series of statistical errors. The effect of shifting redundant labour into higher-productivity modern sectors has consequently been consistently underestimated in this body of work and deserves rehabilitation.

2. Convergence

2.1 Convergence in Theory

The importance of the structural modernisation thesis emerges from the inability of neoclassical theories of convergence and catch-up growth to explain the postwar European productivity growth record. Conventional economic theory

[1] In the first decade alone, GDP per capita expanded by roughly 38%. Germany's output per head grew at a jaw-dropping 85% across 1950-1959. Growth rates are calculated using most recent Maddison datasets and are proportional differences of 1959 levels over 1950 levels. These crude calculations may actually understate West Germany's growth rate due to the 2023 Maddison dataset probably grouping East and West Germany into one unit. See: J. Bolt and J. van Zanden, *Maddison Project Database 2023*, https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2023, (Accessed 04/09/2024).

demands we consider the postwar growth experience in terms of the Solow model, convergence, and factor price equalization.[2] Application to the postwar period has produced unsatisfactory results, however - theoretical weaknesses in applied methodologies and large variations in growth rates across this period unexplained by these models leave much to be desired. Lacklustre results create an impetus to turn to alternative explanatory models such as the structural modernisation thesis.

While originally a corollary of the Solow model of economic growth, convergence's specific application to the postwar period is best represented by William J. Baumol's paper from 1986.[3] Here, Baumol uses Maddison's 1982 real GDP per hour dataset to draw up a strong negative correlation between 1870 aggregate productivity levels and subsequent productivity growth rates across the next century for 16 major countries.[4] To explain this convergence process, Baumol

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[2] The position of factor-price equalization theories in modern orthodox economics is a complicated matter. The prominence in the literature of theories such as the Law of One Price, which implies that in a world of absolute purchasing power parity and perfect competition neither prices nor cost competitiveness should vary from country to country, and the enduring presence of the Stolper-Samuelson model which rather sceptically swears allegiance to the Heckscher-Ohlin theorem of factor-input price convergence for economies with sufficiently similar inputs and production functions, implies that this remains for many the standard economic framework for pondering international trade. Its relevance here is more so in relation to capital-inputs than labour-inputs. See: Carlin, Wendy and Soskice, David, *Macroeconomics: Imperfections, Institutions, and Policies* Oxford University Press, 2006, 298-300, and: Stolper, Wolfgang F., and Paul A. Samuelson. "Protection and Real Wages." *The Review of Economic Studies* 9, no. 1 (1941): 58–73.

[3] Unconditional convergence is famously implied by the Solow model's central equation regarding the growth rate of capital per worker:

$$g_{\hat{k}} = \frac{sf(\hat{k})}{\hat{k}} - (\delta + x + n)$$

This equation can be differentiated with respect to capital to obtain:

$$\frac{dg_{\hat{k}}}{d\hat{k}} = \frac{s}{\hat{k}}(MPK - APK) < 0$$

where *APK* is average product of capital and *MPK* is marginal product of capital. Due to the diminishing returns to capital property of the Solow model ($MPK < APK$) this derivative is less than zero, with the overall implication that the growth rate of the capital-labour ratio declines as an economy's capital intensity rises. The key implication is that less developed countries should see significantly higher rates of growth of their capital-labour ratio and therefore output than richer countries. Proper derivation of this result, as well as discussion of its troubled relationship to observed international development patterns can be found in: Carlin, Wendy and Soskice, David. *Macroeconomics: Imperfections, Institutions, and Policies* Oxford University Press, 2006, 460-496.

[4] These countries are Australia, United Kingdom, Switzerland, Belgium, Netherlands, Canada, United States, Denmark, Italy, Austria, Germany, Norway, France, Finland, Sweden, Japan.

points to the "public good" characteristics of productivity-enhancing innovations and investments.[5] Innovations, whether technological or organisational, will be adopted by follower-economies due to competitive pressures and falling communication costs. Productivity-enhancing investments, meanwhile, have their own spillover effects due to the specialisation demanded by international trade and comparative advantage.[6] Competitive pressures, Baumol argues, will lead investment leaders to specialise in higher-capital goods production, but also to raise real wages and therefore imports due to a demand for workers to produce these goods. This in turn leads to a higher demand for the lower-capital goods of follower countries. Higher investment in one country therefore ripples out and causes a higher value productivity and real wage in follower countries as well, consequently leading to an international expansion of productivity growth rates.[7] With "information activities" expanding from under 1% of total labour force employment in 1830 to some 45% as of the mid 1980s, the direct investment of the US into Europe, and the postwar development of multinational corporations facilitating technological transfer, the postwar period was primed for Baumol to be one of heightened convergence for the advanced economies.[8] In this account, therefore, the postwar miracles can be subsumed under the broader long-run phenomena of less developed follower countries integrating the advances of the leader to rapidly converge to its productivity level.[9]

See: Baumol, William J. "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show." *The American Economic Review* 76, no. 5 (1986): 1079-1080.

[5] William J. Baumol, "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show,"*The American Economic Review* 76, no. 5 (1986): 1078.

[6] Ibid., 1079.

[7] Baumol notably stops short here at swearing unconditional allegiance to a Hesckher-Ohlin model of factor-input price convergence, although this is clearly the kind of mechanism he has in mind regarding trade specialisation and knock-on investment effects. See: William J. Baumol, "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show," *The American Economic Review* 76, no. 5 (1986): 1078.

[8] Baumol, "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show," 1078.

[9] In addition to his basic regression, Baumol points to the work of Abramovitz, who famously finds a falling coefficient of variation in productivity levels of "follower" countries across the 20th century, as confirmation of this theorem. Between 1870 and 1979 Abramovitz finds the productivity level of 15 "follower" countries to have fallen from 0.5 to 0.15. See: Abramovitz, Moses. "Catching Up, Forging Ahead, and Falling Behind." *Journal of Economic History* XLVI, no. 2 (1986): 393.

2.2 Postwar Convergence in Practice

There are a number of problems with viewing the postwar booms as simply a matter of convergence, however. Baumol consistently points out the convergence pattern he has identified holds only for the "developed" world - which not all of Europe was part of in 1945 - and unless an economy is participating in the production of modern, industrial goods it will see de-convergence, not catch-up growth.[10] Even in this happy narrative, therefore, convergence in the postwar period is restricted to the advanced countries, and requires a certain degree of educational and productive sophistication.[11] The issues with this approach to the postwar growth booms do not stop at the matter of convergence clubs, however. For two additional reasons, the convergence model comes up severely lacking when applied to postwar Europe. First, and more broadly speaking, Baumol's manner of testing for convergence faces a serious issue of sample bias. Second, and more specific to our period and region, there were serious divergences in postwar growth rates from country to country within this European "convergence club" difficult to ascribe totally to national capacity for convergence.

The broader selection bias issue was made apparent by Bradford DeLong in a 1988 response article. DeLong concisely points out Baumol's regression relies wholly on an *ex post* sample of 16 countries economically developed by the end of

[10] Baumol, "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show," 1079.

[11] Although the Abramovitz-esque argument that a certain level of education is required for technological transfer is compelling, the requirement for countries to be producing specific industrial goods sits awkwardly with the comparative advantage specialisation mechanism presented by Baumol throughout the rest of the article. Baumol's initial explanation for convergence processes being dependent on the production of specific goods and a certain level of education is that countries cannot benefit from factor-price equalization effects if they have no excess labour in industries now being dominated by the investment leader that can be shifted into lower-capital industries. One could easily point out that specialisation in the investment-leading country could involve the shifting of labour out of low enough capital-intensity industries that demand even rises for goods produced outside of its convergence club. A historical example of this is Britain's becoming totally dependent on countries such as Argentina for primary goods like beef during its time as the specialised industrial leader of the nineteenth century. Baumol eventually simply admits that there is probably more to the matter of convergence and non-convergence in this period than what he has discussed, but that this is not the main concern of his paper. It is clear, therefore, that convergence is not so easy and automatic a process as it is advertised to be.See: William J. Baumol, "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show," *The American Economic Review* 76, no. 5 (1986): 1080-1081.

the century, rather than an *ex ante* sample of countries appearing to have the capacity to converge in 1870 regardless of their subsequent performance.[12] Additionally, he points out, the unsophisticated character of the 1870 income level data introduces estimation errors biasing the slope of the regression towards -1 (a perfect negative relationship).[13] DeLong therefore runs his own regression correcting for these issues as far as is possible. He expands the sample to include countries at or above the per capita income of the second poorest economy in Baumol's regression, Finland, in 1870, resulting in a grouping he names the "once-rich twenty-two".[14] DeLong argues the case for his "once-rich twenty-two" sample by pointing out that these countries were all integrated into the Europe-focused international economy, often sported temperate climates and lavish resource endowments, and were all noted by contemporaries as likely to soon industrialise.[15] For his "central case" regression on this sample, DeLong notes that the resulting slope coefficient of 0.110 shows no convergence and indeed that countries with higher income per capita in 1870 have maintained their advantage.[16] As DeLong himself concludes, the

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[12] J. Bradford DeLong, "Productivity Growth, Convergence, and Welfare: Comment," *The American Economic Review* 78, no. 5 (1988): 1138.
[13] Ibid., 1139.
[14] In an appealing passage that further substantiates his argument of selection bias, DeLong points out he cannot simply correct the first issue by including all those economies that were at the same level of per capita income as the poorest country in Baumol's sample, as this would expand the regression to the point of covering half of the world. The poorest country of the sample was Japan and, as DeLong puts it, Japan's growth miracle was, ultimately, a miracle in the sense that many of the countries it subsequently outperformed were far richer than it in the 1870s. See: J. Bradford De Long, "Productivity Growth, Convergence, and Welfare: Comment," *The American Economic Review* 78, no. 5 (1988): 1141.
[15] Indeed, he points out that Herbert Feis' standard estimates of British and French overseas investment between 1870 and 1913 see four of the five top recipients belonging to the "once-rich twenty-two". Too numerous to discuss in detail, the footnotes of DeLong's piece are also littered with very strong arguments for the inclusion of other non-converging countries that would further weigh the regression results against convergence. See: J. Bradford De Long, "Productivity Growth, Convergence, and Welfare: Comment," *The American Economic Review* 78, no. 5 (1988): 1142-3.
[16] To tackle his second, data-related issue, DeLong reruns the regression on his new sample multiple times while assuming different values for the ratio of the variance of the measurement error for 1870 income η against the variance of the common OLS disturbance error e. The result is a stark demonstration of the effect of data quality assumptions on the regression coefficient: as one assumes a larger value for this ratio – an assumption not too unfavourable to believers in convergence as this implies a lower spread of relative incomes on top of its recognition of the limits of the data – the slope coefficient β becomes more and more positive. When more directly measuring the effects of data quality by rerunning the regression for the more accurately

implication of this lack of convergence for *ex ante* samples is that technology transfer is neither inevitable nor the key factor in economic growth - differences in per capita income may persist durably.

These sample bias issues are compounded by the fact that, even if they were to be ignored there would be large variations in growth rates across the European economies in the postwar period left unexplained by Baumol's convergence model. This is a point made by Barry Eichengreen, who although finding convergence to be a broadly convincing idea argues that it is insufficient for explaining the observed growth rates of the postwar period. Cross-section regressions of growth rates for 1950-1973 on per-capita GDP differentials can only explain part of the postwar boom, he points out, and when this explained growth is deducted from the observed figures the growth of the European countries in this period is still 50% faster than it would become subsequently.[17] Eichengreen fills this explanatory gap by pointing towards the exceptional investment rate in Europe in the postwar decades – net investment rates were almost twice as high in the 1950s and 1960s as that seen previously and subsequently.[18] This high investment rate itself needs to be explained, however, and Eichengreen's analysis therefore highlights the inability of convergence to explain all of the observed growth in Europe's three postwar decades.[19]

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recorded period of 1913-1979, DeLong finds convergence to be even less apparent, with the slope coefficient closer to zero for all assumed values of ρ.
See: J. Bradford De Long, "Productivity Growth, Convergence, and Welfare: Comment," *The American Economic Review* 78, no. 5 (1988): 1144-1145.

[17] Barry Eichengreen, "Economic Growth in Europe since 1945," chap. Institutions and Economic Growth: Europe After World War II (Cambridge University Press, 2003), 38.

[18] Ibid., 39.

[19] Eichengreen advances an institutional model of postwar wage restraint and export growth facilitating both the supply and demand for increased productive investment. This institutional analysis of the postwar growth boom is fascinating and quite compatible with the structural modernisation thesis, although in the text Eichengreen does not stray too far from a convergence model of postwar growth – he notes that the expansion of European exports in this period, with trade volumes expanding by more than 8% per year in the 1950s and 1960s, point towards the capacity for European countries to exploit their comparative advantage instead of being constrained by domestic demand. For now, we simply note the importance of wage restraint and expansive investment for the postwar European growth booms, as alternative models of postwar development for which rising exports are important are discussed below. See: Barry Eichengreen, "Economic Growth in Europe since 1945," chap. Institutions and Economic Growth: Europe After World War II (Cambridge University Press, 2003), 41.

Clearly, therefore, something else is going on in the postwar decades aside from European countries that were advanced socially but behind in terms of capital-per-head making up for this by integrating American technology and specialising in comparative-advantage goods. The unexplained degree and variation in growth rates demand additional explanations. Structural modernisation is one such explanation.

3. Structural Modernisation

3.1 Kaldor and Kindleberger

The importance of the structural modernisation thesis is that, while offering a clear explanation for the rapid postwar growth rates in Europe and the relative under- and overperformance of individual countries, it also implies a model of development and international exchange at odds with harmonious convergence and Heckscher-Ohlin-esque factor-price equalization processes. The prominence of increasing returns to scale in Kaldor's model in particular not only offers an explanation for the industrial goods convergence stipulation presented by Baumol but also presents an interesting, yet significantly less optimistic picture of postwar development and international trade.[20] According to the authors presenting this thesis, postwar growth and productivity miracles were matters of a more antagonistic securing of markets for their modern, increasing returns to scale industries at the expense of other nations.

The structural modernisation thesis is principally associated with two economists, Charles P. Kindleberger and Nicholas Kaldor. Both writing in the late 1960s, the two authors point to the shifting of redundant labour out of "traditional" sectors into more productive "modern" industries as the key factor

[20] The vision of international political economy and development that this leads to, and the important role for regional, interventionist policies that is consequently implied, sits well with recent developments in development economics regarding industrial policy. A notable turn against the received wisdom that industrial policy will only ever end in tears has observably taken place in this discipline, and at points has involved investigations of the role of increasing returns to scale and industrial policy in the development process of now-developed Western countries. This turn is arguably best represented by the figure of Ha-Joon Chang. See: Chang, Ha-Joon. *Kicking Away the Ladder*. Anthem Press, 2002.

driving the postwar boom across Europe. In the literature the two are consistently lumped together as authors of the "Kaldor-Kindleberger" thesis, but their arguments are not exactly the same.

Kaldor's intervention, presented as his inaugural lecture at Cambridge in 1966, preceded that of Kindleberger's by a year. Kaldor's motivation for pondering postwar growth differentials is the United Kingdom's relatively sluggish growth performance.[21] He noted that, whereas countries such as Japan and West Germany were seeing average annual exponential GDP growth rates of 6 and 9.6% in the preceding decade of 1953-4 to 1963-4, the figure for Britain was only 2.7.[22] To explain such differences Kaldor argued that fast postwar rates of economic growth were linked to fast rates of growth of the secondary sector (specifically manufacturing, public utilities and construction) over and above the rest of the economy and, regressing annual GDP growth on annual manufacturing output growth for twelve industrial countries across 1953-1963, found a significant positive relationship between the two.[23] Because the model's coefficient was less than unity at 0.614 and its constant was positive at 1.153, Kaldor argued that that annual growth rates over 3% would only be seen if manufacturing output growth significantly exceeded the overall rate of economic growth of a country.[24] He in turn explains this relationship as reflecting the unique capacity for economies of scale of modern industrial sectors and their driving increasing returns to scale at the aggregate level through specialisation and learning-by-doing effects.[25] Notable differences in performance such as the Germany-Britain case are therefore a matter of sectoral makeup: large pools of redundant agricultural labour were needed if the aim was rapid expansion of employment in the modern, high-productivity secondary and tertiary sectors.[26]

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[21] Nicholas Kaldor, *The Essential Kaldor* (Duckworth, 1989), 282
[22] Ibid.
[23] Kaldor also sees the tertiary sector, especially in those industries related to the output of the secondary sector in some capacity, as contributing to this effect. See: Nicholas Kaldor, *The Essential Kaldor* (Duckworth, 1989) 285-289.
[24] Kaldor, *The Essential Kaldor,* 285.
[25] Here Kaldor is leaning on the work of Allyn Young, Alfred Marshall, Smith and, in particular, P. J. Verdoon. See: Kaldor, *The Essential Kaldor*, 287-288.
[26] Kaldor, *The Essential Kaldor,* 299.

In this regard, European countries like Germany and Italy had an advantage over Britain, which was peerless in having achieved a net agricultural output per head approaching that of its industry; While West Germany still had 14.1% of total employment in the primary sector in 1963, Britain only had 6.7.[27] Consequently while across 1954-1964 Britain's labour force expanded faster than almost half of Kaldor's sample of industrialised countries, it was the slowest overall to expand employment in services and industry and the second slowest at shaking additional labour out of agriculture and mining.[28] The "miracle" economies of West Germany, Japan and Italy were meanwhile the fastest to expand industrial and service-sector employment, leading Kaldor to conclude that Britain's lacklustre postwar growth record should be understood as a consequence of its "premature maturity", and the European miracles as matters of rapid structural modernisation.[29]

A year later, Charles P. Kindleberger's *Europe's Postwar Growth* made a similar but slightly different argument. For Kindleberger, the importance of shifting excess labour supplies into more productive industries is explained by way of the Lewis model, rather than Verdoon and industrially driven increasing returns to scale. In Kindleberger's two sector model, labour in agriculture or traditional sectors has a marginal product of zero and can be transferred elsewhere without negatively influencing total output.[30] In modern sectors, meanwhile, labour has a positive marginal product and is increasingly in demand as technological advance, access to capital and demand for industrial products rises, yet its wage is determined by its infinitely elastic supply and hovers at a price slightly above the agricultural subsistence level.[31] This constant wage created by elastic labour supplies, simultaneously high enough to draw labour from less productive traditional industries but also low enough to ensure rising profits and therefore

[27] Ibid., 300-301.
[28] with a rate of decrease of 2.3 percent, Britain's rate of decreasing primary sector employment was almost half that of Italy and was only faster than the Netherlands across this period. See: Nicholas Kaldor, *The Essential Kaldor* (Duckworth, 1989), 300.
[29] Kaldor, *The Essential Kaldor,* 284, 300.
[30] Charles P. Kindleberger, *Europe's Postwar Growth* (Harvard University Press, 1967), 7.
[31] Kindleberger, *Europe's Postwar Growth,* 5.

capital-widening investment in modern industries, is the “permissive” factor allowing rapid expansion in countries integrating technological innovations or experiencing demand shocks.[32] Building on this simple model throughout the text by describing other sources of elastic labour supply such as immigration, Kindleberger reveals Britain's problem in the postwar period was not only its uniquely efficient primary sector but its restrictive immigration policies of the early 1960s and its undeveloped union system creating labour bottlenecks and hoarding.[33] Britain consequently struggled to expand its exports in competitive industrial goods in a manner comparable to the postwar European miracles, with its exports expanding less than half as fast as the other developed European economies at only 2.7% a year from 1949-1959.[34] Kindleberger's analysis clearly aligns with Kaldor's regarding European postwar economic performance reflecting capacity for quick expansion into highly competitive modern industries, therefore.

The important difference between these theories, however, is that increasing returns to scale play no role for Kindleberger. Although noting that recent work from the IFO-Institut fur Wirtschaftforschung in Munich had run over a hundred regressions to find evidence of significant economies of scale in Germany for the period 1957-1961, he takes issue with the institute's methodology and simultaneous use of pre- and postwar data.[35] As with many other theories that Kindleberger considers throughout this text, therefore, he simply notes that the argument is reasonable but more evidence is required for the thesis to be taken as explaining the postwar European record as a whole.[36]

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[32] Ibid., 12.
[33] Ibid., 22-23, 82-84.
[34] Ibid., 81.
[35] Ibid., 139-140.
[36] We note here that Kindleberger, as in other parts of the text where he is discussing demand-side theories of postwar growth, also essentially offers an argument for scepticism regarding Kaldor's thesis. While it is unclear how familiar he is with the work of Kaldor his arguments against Vera Lutz that the share in output of chemicals and metal-using industries are not significantly different between Britain and Germany could easily be applied to the Hungarian economist's work. The obvious retort, especially in light of Kindleberger's own reference to rapid expansion of these heavier industries on continental Europe relative to Britain, is that countries such as Germany and France were developing these industries with modern techniques and technologies transferred from the economic leader, whereas Britain's prematurely developed

This difference, although initially seeming minor, leads to significant differences in the image painted of international trade and development. While there is certainly a sense in Kindleberger's work that industrial and manufacturing sectors are at the heart of the growth process, his narrative could arguably still hold up alongside a qualified Baumol-esque convergence model. Kaldor meanwhile, is quite clear that his model of modern increasing returns sectors is totally incompatible with neoclassical models of factor-price equalisation and convergence: much of his broader work on increasing returns to scale specifically focuses on the challenge increasing returns pose to models of comparative-advantage-based exchange and the consequent need they introduce for interventionist regional policies in the development process.[37]

Kaldor argues that, in a process of "cumulative causation", expanding industry sees cumulative advantages emerging from developments in skills, know-how, communications and process differentiation that causes sustained rises in productivity and therefore international competitiveness.[38] Entrance into this wondrous, self-sustaining process of industrial expansion and sub-division is not, consequently, an automatic or non-zero-sum matter.[39] Success, by creating relative cost and therefore competitive advantages, breeds further success while failure to develop domestic industries means losing domestic markets to larger,

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industry was unable to integrate these advances due to hoarding of resources and parochial unionism strengthened by a lack of elastic labour supplies. Indeed, this is an argument made by Kindleberger himself earlier in the text. as Ferdinando Targetti has pointed out, introducing technology transfer to the equation in this way does not deflate Kaldor's central arguments. See: Charles P. Kindleberger, *Europe's Postwar Growth* (Harvard University Press, 1967), 83, and: Targetti, Ferdinando. *Nicholas Kaldor*. Clarendon Press, 1992: 162.

[37] Interestingly, part of this relates to the stipulation that Baumol himself makes: if countries want to be part of the advanced "converging" group of economies they have to produce advanced, industrial goods. However, while Baumol sees education and Abramowitz-esque social capabilities as the limiting factors blocking economies from entry into the advanced convergence club and mutually beneficial specialisation in non-competing industrial goods, Kaldor sees education as much a consequence as a cause of fast, industrial growth, and entry into this club as partly antagonistic due to scale effects. He makes the case that it is just as reasonable to see capital accumulation of all kinds, whether plant and machinery or human skills resulting from education, as resulting from economic development as it is to see economic development resulting from capital accumulation. See: Nicholas Kaldor, *The Essential Kaldor* (Duckworth, 1989), 313.

[38] Kaldor, *The Essential Kaldor,* 314.

[39] Ibid., 316.

more integrated foreign industries.[40] Instead of introducing the benevolent effects of modern technologies and investment spillovers, falling transport costs and increased international trade can banish follower economies to traditional, mostly agricultural primary-product industries featuring decreasing returns to scale due to their connections to land: upon seeing their infant modern industrial sectors outcompeted by the cheaper export goods of developed leader economies, follower countries become wholly dependent on their primary products sectors of limited employment and expansion capacity.[41] Countries that managed to avoid this and enter the club of advanced “convergers” throughout the late 1800s, Kaldor holds, did so only with the aid of interventionist, protective tariffs and the construction of a system of duties specifically propagating the development of domestic modern industries capable of developing an export capacity.[42] The postwar expansion of trade between these developed countries, meanwhile, was a further matter of competing for exports in the same industrial goods markets, and therefore competing for further output in the same increasing returns to scale industries, with growing exports for an advanced economy not being the result of specialisation in the production of comparative advantage goods, but technological advances in product development allowing one economy to supplant rival nations' goods with their own.[43] The postwar boom, then, was a race to expand modern, increasing-returns-to-scale industries and capture highly competitive international markets, in which those countries with excess and therefore mobile labour were well positioned.

Structural modernisation therefore both offers a compelling corrective for the empirical shortcomings of the conventional convergence story and, in Kaldor's version, implies a vision of the postwar international system at odds with conventional theories of comparative advantage and convergence. Non-convergence is, in this story, a product of specialisation and trade itself, not simply of social "backwardness".

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[40] Ibid., 331.
[41] Ibid.
[42] Ibid., 332.
[43] Ibid., 340.

3.2 Kaldor-Kindleberger Corroboration

The structural modernisation theses, both Kaldor's Verdoorn version and Kindleberger's Lewis version, were subsequently repeatedly corroborated by papers using a range of statistical methods and have maintained a durable presence in the literature on Europe's postwar boom.

The year after the pair presented their arguments, Edward Denison presented evidence on both the importance of shifting labour out of the traditional sector and the importance of increasing returns to scale for postwar growth. Applying a basic growth accounting technique to measure the contribution of each input to the growth rate of national income for nine advanced economies across 1950-62, Denison finds that contributions from increasing labour inputs and resource reallocation were over 2 percentage points for the miracle economies of Germany and Italy.[44] Comparing price differentials in components of consumption between Europe and America, Denison also measures the capacity for expanding the scale of key, high income elasticity of demand industries in each country across the same period, arguing this highlights the key impact of economies of scale on observed growth differentials between the advanced European nations.[45] Reweighting these consumption costs in American prices, he determines that, for instance, German growth across 1950-1962 would have been 0.9 percentage points smaller if these capacities for consumption-driven economies of scale did not exist.[46] The same did not hold for Britain, he argues, where the impact would have been a much smaller drop of 0.1 percentage points.[47] Contemporaneous statistical research was therefore corroborating the idea of both structural

[44] Edward F. Denison, "Sources of Postwar Growth in Nine Western Countries," *The American Economic Review 57*, no. 2 (1967): 328–329.
[45] We note that this is a slightly different argument to that of Kaldor, in that Denison is essentially focusing on the impact of domestic consumption structures on domestic economies of scale whereas exports are a more important factor for expanding industry in Kaldor's work. In a subsequent work on the same topic, *Why Growth Rates Differ*, Denison additionally takes into account general economies of scale effects not specifically determined by domestic income elasticities by introducing a multiplier of input increases. See: Edward F. Denison, "Sources of Postwar Growth in Nine Western Countries," *The American Economic Review* 57, no. 2 (1967): 330.
[46] Denison, "Sources of Postwar Growth in Nine Western Countries," 330.
[47] Ibid.

transformation and scale effects as key drivers of growth differentials during the golden age.

Stephen Broadberry subsequently built on Denison's methods of sectoral analysis to offer additional evidence in support of the broader reallocation argument in a 1998 article studying the shrinking productivity differential between Germany and Britain across the longer-run period of 1871-1990. Applying a modified shift-share model decomposing labour productivity growth into intra-sectoral productivity growth effects and shifting sectoral shares of employment effects, Broadberry finds that the closing of this historic gap was almost entirely a matter of structural modernisation.[48] While his approach advances on prior shift-share analyses by integrating negative aggregate productivity effects of additional employment growth in traditional sectors into the model, Broadberry explicitly points out that he cannot capture Kaldor's scale effects in this model and so may still be underestimating the reallocation effect.[49] All the same, Broadberry finds structural change to have contributed a whopping 0.55 percentage points of the observed aggregate labour growth differential of 0.62% per annum between Germany and Britain across the period of 1871-1990.[50] Although looking at a much longer period, therefore, Broadberry's paper still offers additional support to the claim that over- and underperformance in this period was a matter of relative development of traditional and modern sectors.

Peter Temin, advancing further on this prior work in 2002, updates Kaldor's regression to look at Europe-wide determinants. Assuming that Western Europe is a single convergence club and that all countries in the region share equilibrium income per capita and agricultural share of employment levels, Temin regresses decadal and vicennial growth of GDP per capita across 1950-

[48] Stephen N. Broadberry, "How Did the United States and Germany Overtake Britain? A Sectoral Analysis of Comparative Productivity Levels, 1870-1990," *The Journal of Economic History* 58, no. 2 (1998): 389.
[49] Ibid.
[50] Ibid., 390.

1995 on conditional convergence capacity, wartime dislocation, and share of employment in agriculture.[51] These variables are respectively constructed from: the difference between a country's GDP level at the end of the war and the club's equilibrium GDP level; the percentage difference between a country's per capita GDP in 1948 and 1938; and the difference between a country's immediate postwar agricultural share of employment and the club's equilibrium employment share.[52] The results of his regression quite starkly support the broader Kindleberger-Kaldor thesis in that he finds the last of these variables to be the most broadly significant and for the specific decade of the 1950s finds convergence to be irrelevant. Reconstruction and the capacity to reallocate surplus labour, meanwhile, explain the bulk of observed variation in growth rates: turning to that favourite case study of postwar over- and underperformance, Temin argues that the 20 percentage point difference in 1950 agricultural employment share between Britain and Germany explains more than half of the difference in their subsequent 1955-75 growth rates.[53] This is therefore an additional paper producing statistical evidence in support of the shifting of labour out of traditional sectors as the core determinant of postwar productivity growth rates in Europe.

In all, the structural modernisation thesis presented by Kaldor and Kindleberger is a compelling argument for understanding the postwar golden age as one of elastic labour supplies and expansion into increasing returns to scale industries that is clearly supported by a wealth of statistical studies applying a range of empirical techniques. According to this body of work, both the exceptionally fast average growth rate and the individual "miracle" economies such as West Germany can be understood in terms of a rapid shift of labour into modern industries.

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[51] Peter Temin, "The Golden Age of European growth reconsidered," *European Review of Economic History* 6, no. 1 (2002): 12.
[52] Ibid., 12-13.
[53] Ibid., 15.

4. Reconstruction and the Underestimation of Structural Modernisation

The alternative corrective to the empirical and theoretical issues facing convergence models is found in the "reconstruction" thesis, which begins with soviet Hungarian economist Ferenc Jánossy but in its modern application is quite close to the new growth theory of Paul Romer. The “reconstruction” thesis offers an alternative explanation of the variations in growth rates in postwar Europe that is much more compatible with neoclassical models regarding convergence, trade and the causes of economic growth.[54]

The central argumentative manoeuvre behind the "reconstruction thesis", taken from Ferenc Jánossy’s 1971 text *The End of the Economic Miracle*, is that reconstruction periods continue well beyond the point at which prewar output levels are met.[55] Potential GDP per capita of an economy is ultimately determined, Jánossy argues, by the "collective labour power" of nations accumulating skills and productive knowledge.[56] This accumulation of potential and actual human capital can continue independently of the status of physical capital and actual output, and will therefore follow its long run steady-state growth trend even during crisis periods of wartime dislocation.[57] Postwar

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[54] This model's role as an alternative to the structural modernisation thesis of the postwar golden age is presented in the literature sometimes explicitly, and other times implicitly. In some papers such as those by Ritschl and Eichengreen it is explicitly presented as a more determining influence on the postwar European economies than structural modernisation. In other papers, meanwhile, such as that of Dumke, the structural modernisation thesis continues to receive lip service, but the paper’s findings implicitly demonstrate that the shifting of excess labour into modern sectors is less important than previously thought when Jánossy's reconstruction effect is introduced to the analysis.

[55] This text, defined by Jánossy's position as a Hungarian economist, is principally concerned with the interpretation of rapid growth observed to the east of the iron curtain in the first postwar decade. In light of the GDP per capita of the satellite states continuing to rise beyond that of their prewar level in the 1950s, soviet economists had misinterpreted rapid postwar reconstructive growth as the new economic norm resulting from soviet control of the economy. Jánossy argues that this mistake was a product of failing to understand that reconstructive pushes last beyond the point that prewar output is met. The most relevant example of this for Jánossy's concerns is Hungary, which met its prewar output level in 1949 but continued to expand rapidly afterwards. Hungarian soviet economists therefore set optimistic planning targets and forecasts for the 1950s and found their hopes dashed when Hungary's growth rate slowed from 1952 onwards. See: Ferenc Jánossy, *The End of Economic Miracles: Appearance and Reality in Economic Development* (International Arts and Sciences Press, Inc., 1971), 15.

[56] Jánossy explained the mechanism behind this in Marxist terms, but his work is now commonly discussed via new growth theory models of human capital investments.

[57] Ferenc Jánossy, *The End of Economic Miracles: Appearance and Reality in Economic Development* (International Arts and Sciences Press, Inc., 1971), 101.

reconstructive pushes therefore rapidly approach not only the prewar level of output but the new, higher level of long-run potential output determined by the nation's additional wartime accumulation of knowledge and skills. This level is quantitatively represented by the position of the economy's historical log GDP per capita peak-to-peak trendline (see figure 1).[58] As it is these intensive, knowledge-based characteristics of an economy that determine its long-run potential output; however, growth will slow once extensive, physical capital investments have reached this point, and will not be able to push beyond it. The postwar "golden ages" seen across Europe were therefore explainable, according to Jánossy, as prolonged reconstruction periods where economies were reallocating resources to efficiently meet the level of potential output that wartime dislocation had blocked them from properly meeting.

[58] Ibid., 10.

Figure 1

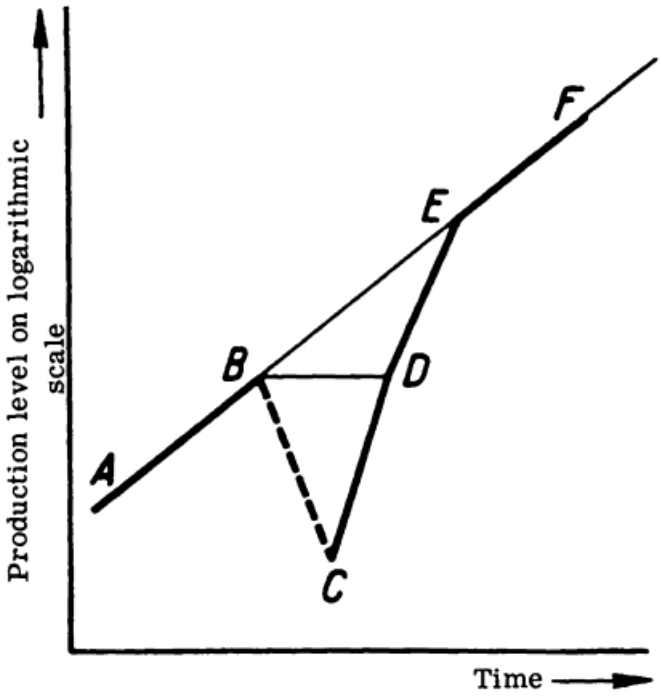

Fig. 1. Diagram of the course run by a postwar reconstruction period.

AF — Trendline of economic development
AB — Course of production-level line until outbreak of war
BC — Decline of production level caused by the war
CE — Course of production-level line during the reconstruction period:
CD — up to the prewar level
DE — up to the trendline
EF — Course of the production-level line after the reconstruction period

The "reconstruction" thesis strand of the literature that turns to Jánossy in explaining observed variations can be divided into two camps. The first group decompose the determinants of postwar growth using growth accounting methodology, while the second use growth regressions. All of these authors purport to show that reconstructive efforts were the key determining variable in the variations and exceptions observed in the postwar golden age, yet both of the applied statistical approaches consistently feature serious defects that put into question their challenge to the Kaldor-Kindleberger theses. For the former group

the unflinching use of the Cobb Douglas production function undermines their findings, while for the latter the issue of misspecified variables re-occurs.

4.1 Underestimation via Growth Accounting

The growth accounting challenge to the structural modernisation thesis arguably begins with Jonathan Temple's 2001 paper *Structural Change and Europe's Golden Age*. Although not mentioning Jánossy, Temple is an important stepping stone as his work explicitly questions Denison and Temin's findings. His main contribution is an attempt to arrive at a more precise growth accounting estimation of the marginal product of labour differential between modern and traditional sectors throughout Europe by constructing approximate bounds this differential must fall within.[59] To derive these bounds, Temple makes use of two neoclassical production functions representing agricultural and non-agricultural sectors of each economy and a handful of assumptions such as constant returns to scale, perfectly mobile capital between sectors, and that workers are paid the value of their marginal product in the form of wages.[60] Applying his model to ten industrial European countries and the USA, Temple uses data from the OECD, Maddison, Denison and van Ark to construct output per worker, aggregate labour share and agricultural share of employment variables for the period 1950-1990. Deciding on upper and lower bounds of roughly 0.8 and 0.4 for the agricultural labour share by way of OECD data and estimates from Hayami and

[59] Jonathan Temple, "Structural Change and Europe's Golden Age," *CEPR Discussion Papers*, no. 2861 (2001): 3.

[60] Beginning with these production functions and assumptions, Temple rearranges his formulae to arrive at an expression for the reallocation component of the aggregate TFP growth rate:

$$(d-1)(1-a)\phi\frac{\dot{m}}{m}$$

Where d is the marginal productivity differential, a is agricultural employment share, the term $\frac{\dot{m}}{m}$ is the rate of growth of the non-agricultural employment share, and ϕ is the product of the agricultural wage and total employment over total output. Temple then argues that the all-important marginal productivity differential term d can be more precisely estimated than in prior work by the likes of Denison by way of the following bounds:

$$\left(\frac{\eta-\lambda_H s}{\lambda_H s}\right)\frac{a}{1-a} < d < \left(\frac{\eta-\lambda_L s}{\lambda_L s}\right)\frac{a}{1-a}$$

where η is aggregate labour share of national income, s is agricultural share of output, and $\lambda_L$and λ_H are lower and upper bounds on the agricultural labour share of national income respectively. See: Jonathan Temple, "Structural Change and Europe's Golden Age," *CEPR Discussion Papers*, no. 2861 (2001): 5-12.

Ruttan, Temple then uses his marginal productivity differential variable to see how far his estimated reallocation component of aggregate TFP growth aligns with Denison and Temin. While not wildly different in terms of absolute size and still demonstrating an important role for reallocation in intra-European growth rate variance, Temple's reallocation effect estimates are consistently smaller than that found by either author, and he points out that Temin's regression may be overstating the influence of labour reallocation due to agricultural labour share proxying other developmental factor such as non-agricultural total factor productivity.[61] For the immediate postwar period, he notes, the reallocation effect is rather unimpressive, ranging from between a twentieth and a seventh of growth in annual output per worker.[62]

This approach was subsequently developed further by Ritschl and Eichengreen, who, focusing specifically on the German-British case study, challenge the idea that structural modernisation was the determining factor in the "miracle" stories such as West Germany by combining growth accounting methodology with insights from Jánossy. In this 2009 paper, the pair draw on Jánossy to argue that the *Wirtschaftswunder* was not the result of structural modernisation but of Germany taking advantage of its industrial capacity having continually grown throughout the war and rapidly bouncing back from a severe yet temporary postwar TFP downturn.[63] Ritschl and Eichengreen highlight by way of growth accounting how, although West Germany's immediate postwar cumulative TFP dip of 69% was far larger than Britain's 12%, this could not have been the result of dislocated capital stock or industrial incapacity as West Germany's industrial capacity in 1948 was 13% larger than in 1936.[64] Indeed, the state of Germany's aggregate capital stock was broadly comparable to that of Britain's.[65] The pair explain that this reflects the allies' aerial bombing strategy, which in 1944 switched from ineffectively destroying capital stock to creating bottlenecks and

[61] Temple, "Structural Change and Europe's Golden Age," 22.
[62] Temple, "Structural Change and Europe's Golden Age," 17.
[63] Barry Eichengreen and Albrecht Ritschl, "Understanding West German Economic Growth," *Cliometrica* 3, no. 3 (2009): 215.
[64] Ibid., 199.
[65] Ibid., 197.

disrupting the supply of key industrial inputs such as coal.[66] Overcoming Germany's huge TFP dip in 1945 was therefore simply a matter of shaking off of these localised disruptions and speeding towards its long-run trendline à la Jánossy.[67] Britain's 1945 dip in TFP was far smaller, meanwhile, and so while Germany saw TFP growth expanding at 15-20% per annum across 1946-1950, this figure was only 2% for Britain.[68] To show that this explosion in TFP growth was indeed a matter of Jánossy-esc reconstruction and not the product of modernising labour reallocation, the pair then draw up a modified Cobb-Douglas production function weighting labour inputs by industrial share of employment so to estimate the effects of increasing industrial employment on Germany's productivity growth across 1950-1960. Even though their model should be biased towards the structural modernisation thesis as it assumes labour's marginal productivity is zero in the agricultural sector, they find the reallocation effect contributing at most 0.73 percentage points to an the average annual TFP rise of 8 percent.[69] The relative overperformance of the likes of West Germany and underperformance of the likes of Britain are revealed therefore to overwhelmingly be a matter of the reconstructive drive towards long-run potential output per capita levels, not structural modernisation effects.

The major issue with papers following this approach to studying the determinants of the European Golden age lies in their consistent use of the Cobb-Douglas production function with constant returns to scale. This leaves these papers unable to account for the increasing returns to scale aspect of Kaldor's argument.[70] Requiring Euler's homogeneous function theorem to be able

[66] Ibid., 200.
[67] Ibid., 201.
[68] Ibid., 200.
[69] Ibid., 203.
[70] Additional assumptions necessary for conducting growth accounting studies leave these studies further insufficient for considering the validity of Kaldor or Kindleberger's models. Temple, for example, openly admits that he is only accounting for the direct effects of structural modernisation on the TFP residual and his work cannot account for its permissive effect or contribution to broader growth as an enabling factor. Additionally, In assuming that labour receives the value of its marginal product as a wage, these papers assume away a major feature of Kindleberger's thesis, in that following the Lewis model Kindleberger assumes the industrial wage to be determined by infinitely elastic labour supply, not labour's marginal product. See:

to compartmentalise his production functions, Temple at least acknowledges this, even throwing his hands up at the end of the paper and admitting he cannot account for Kaldor's scale effects.[71] Similar discussion of the unsuitability of a Cobb-Douglas production function with constant returns to scale does not appear in Ritschl and Eichengreen's paper, however, which is surprising considering the latter half contains an argument against the work of Olson that involves explicitly drawing out the reintroduction of anti-competitive German institutions in the postwar period and the presence of collusive, monopolistic arrangements in both Britain and Germany.[72] If European economies indeed demonstrated increasing returns to scale and less-than-perfectly competitive markets, assumptions of constant returns to scale will overestimate TFP contributions and underestimate the contribution of factor inputs across this period.[73] This is a major methodological issue potentially leading this strand of the literature to consistently underestimate the impact of structural modernisation on the postwar European golden age.

4.2 Underestimation via Growth Regression

The application of Jannossy's trendline theory to growth regressions over the wider European golden age arguably begins with Rolfe Dumke's 1990 paper.[74] Here, Jánossy's reconstruction thesis is presented quite explicitly as essentially a new growth theory model and companion to traditional convergence theories of the postwar boom: convergence explains postwar growth, the reconstruction effect explains individual variations.[75] Again using Maddison's 1982 sample of 16

Jonathan Temple, "Structural Change and Europe's Golden Age," *CEPR Discussion Papers*, no. 2861 (2001): 6.

[71] Temple, "Structural Change and Europe's Golden Age," 25.

[72] Eichengreen and Ritschl, "Understanding West German Economic Growth," 210-211.

[73] For a formal derivation of this property of the cobb-douglas model see: Carlin, Wendy and Soskice, David, *Macroeconomics: Imperfections, Institutions, and Policies* Oxford University Press, 2006, 520-521.

[74] We note, however, that Dumke was here expanding upon prior work focusing specifically on the *Wirtschaftswunder*.

[75] Indeed, Dumke makes clear from the start of his paper that reconstruction alone cannot explain the postwar miracles such as that of West Germany, but that technological catch-up growth as theorised by the likes of Solow is still the crucial cause of postwar growth. See: Rolf H. Dumke, "Reassessing the Wirtschaftswunder: Reconstruction and Postwar Growth in West Germany in an International Context," *Oxford Bulletin of Economics and Statistics* 52, no. 2 (1990): 452.

Industrialized countries, Dumke regresses mean growth of real GDP per Capita for the 1950-1980 on three separate variables: the level of real GDP in 1950, so to capture the influence of convergence; the gap between GDP in 1938 and 1948, attempting to account for Jannosy's reconstruction effect; and finally the share of the Labour Force in Agriculture in 1960, so to account for structural modernisation effects.[76] He also includes squared reconstruction and agricultural employment variables to account for non-linearities. The results show all three variables to be significant, with clear indication of non-linearities at play in the case of the reconstruction variable.[77] Although for both Dumke's reported 2SLS and OLS regressions, the agricultural employment variable has the largest regression coefficient, and the convergence variable is far smaller than that of the other two, he turns to unreported regression coefficients of the standardized variables to claim that, while agricultural employment has the largest coefficient, the other two variables show similar influence and ultimately all three explanatory variables are "about equally important".[78] As Dumke finds average European growth to be predominantly explained by convergence capacity, the overall result, he argues, is that while convergence was the broader driving force behind average postwar growth, the introduction of a Janossy-esc reconstruction-potential essentially explains away the mystery of the variations in individual growth rates.[79] The *Wirtschaftswunder*, for example, is therefore a reconstructive boom.[80]

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[76] Rolf H. Dumke, "Reassessing the Wirtschaftswunder: Reconstruction and Postwar Growth in West Germany in an International Context," *Oxford Bulletin of Economics and Statistics* 52, no. 2 (1990): 480.
[77] Dumke, "Reassessing the Wirtschaftswunder: Reconstruction and Postwar Growth in West Germany in an International Context," 480.
[78] Ibid., 481.
[79] Looking at contributions of these variables to the overall average growth of these 16 countries across 1950-1980, Dumke finds that the net effect of the catch-up effect was the largest at -1.89 percent, and that the contribution from reconstruction was the smallest at only 0.15 percent. We note however that the effect of capacity for labour re-allocation did remain strong on this front at 0.69%. See: Dumke, "Reassessing the Wirtschaftswunder: Reconstruction and Postwar Growth in West Germany in an International Context," 481.
[80] Dumke, "Reassessing the Wirtschaftswunder: Reconstruction and Postwar Growth in West Germany in an International Context," 485.

Advancing on the work of Dumke, Vonyó applies Jánossy's ideas to demonstrate that Temin's regression explaining postwar European growth rates by way of structural modernisation underestimated reconstruction effects and overestimated structural modernisation effects. The closer affinity of the reconstruction thesis with the more conventional story of convergence and harmonious, specialised trade is demonstrated nicely in this paper with Vonyó pointing out that Temin's taking agricultural employment share as a proxy for development fails to account for the comparative advantage some countries have in agricultural goods, and that large agricultural shares of employment do not necessarily imply underemployment, with Ireland, Portugal and Greece having all been unable to reduce their agricultural employment share in the postwar period even though Greece saw extremely fast growth in GDP per capita across the 1950s.[81] Temin additionally overestimates the effects of agricultural employment share by failing to account for multicollinearity with the income variable proxying convergence, and failing to control for the effects of general labour force expansion.[82] Most importantly, both Dumke and Temin's reconstruction capacity variables are inadequate as they simply capture the difference between postwar and pre-war output, rather than the potential per

[81] We focus on a different critique of Vonyó's paper below, but it is worth highlighting that these comments reveal a failure to properly engage with the works of Kindleberger and Kaldor. For Kaldor the fact that these countries cannot draw more labour out of their less productive traditional sectors is itself arguably a function of more industrialised countries expanding their own modern export industries. For Kindleberger, meanwhile, less developed countries such as Ireland, Portugal and Greece played the important role of net exporters of labour, and in the second half of his text these economies are treated as if they were the traditional sector of the Lewis model, and the advanced economies were the modern sectors. The idea here is that while labour is leaving the countryside, it is not ending up in modern industry within these underdeveloped countries but is emigrating to the West. The aggregate share of employment in agriculture may remain high in these countries, as a result, even while labour is fleeing traditional industries. This not only reveals that Temin was arguably correct to view these countries as having faced issues of underemployment, but that even the labour force expansion variable of Vonyó's regression is insufficient for fully capturing labour reallocation effects. Underemployed labour emigrating from less-developed countries ultimately had a productivity-augmenting effect in Kindleberger's model, which will not be properly accounted for by a variable simply measuring the annual increase in economically active population. See: Tamás Vonyó, "Post-war Reconstruction and the Golden Age of Economic growth," *European Review of Economic History* 12, no. 2 (2008): 225, and Charles P. Kindleberger, *Europe's Postwar Growth* (Harvard University Press, 1967), 8.

[82] Tamás Vonyó, "Post-war Reconstruction and the Golden Age of Economic growth," *European Review of Economic History* 12, no. 2 (2008): 225.

capita output implied by Jánossy's log trendline.[83] After introducing a variable capturing labour force growth and altering the GAP variable to be an estimation of the proportional difference between potential and actual output at the end of the war, Vonyó finds that share of labour employed in agriculture becomes statistically insignificant.[84] Consequently dropping this variable from the regression entirely, Vonyó concludes that while labour flexibility remains important, the observed differences in growth rates seen across the golden age in Europe in the 1950s and 1960s was clearly a matter of reconstructive catch-up growth.[85]

The core issue with this strand of the reconstruction thesis literature relates to the variable used to capture Jánossy-style recontruction capacity - in short, it is unapparent how exactly one should estimate the long-run potential output per capita trendline when conducting these studies. This is an issue discussed explicitly in Dumke's paper, where following Bombach he points out that the estimated trendline will change arbitrarily depending upon the chosen beginning and end points, the inclusion or exclusion of exceptional years, and the time series under study.[86] Vonyó's paper reflects this central ambiguity perfectly in that, even while attempting to overcome it by staying as true to Jánossy's original text as possible his results can be shown to be entirely dependent upon his choice of GAP variable. Vonyó points towards Jánossy's skepticism regarding the estimation of the trendline based on longer-run, prewar time series to argue that the variable measuring the difference between actual and potential output per head in 1948 should be based on the estimation of peak-to-peak trendlines of log GDP per capita across the interwar period of 1920-1938 (with the exceptions

[83] Ibid.
[84] Ibid., 229.
[85] Again, pre-empting fuller critique of this paper laid down below, we note here that the dropping of variables showing multicollinearity is not an uncontroversial practice, and that many would argue it is essentially theoretically unjustified. See: Blanchard, Olivier. "Comment." *Journal of Business Economic Statistics* 5, no. 4 (1987): 449–451, and Gujarati, Damodar N., and Dawn C. Porter. *Basic Econometrics*. McGraw-Hill, 2009: 320.
[86] Dumke, "Reassessing the Wirtschaftswunder: Reconstruction and Postwar Growth in West Germany in an International Context," 460.

of Spain and Portugal).[87] While arguing that this is closer to Jánossy's original methodology than prior research, and that if anything the shocks of the interwar period will simply lead to an underestimation of the dislocation effect, the page cited from Jánossy to justify this move also includes a section explicitly decrying the difficulties of determining output trendlines for the interwar period due to overlapping crises seriously distorting available time series.[88] Indeed, when we compare the interwar GDP per capita trendlines for the OECD countries to their historical trendlines estimated across 870-1914, the distorting effect of the overlapping interwar shocks on these trendlines stands out in sharp relief. Not only are the interwar trends often exceedingly optimistic relative to the historical trends but in multiple cases produce spurious predictions of stagnant or negative postwar growth (see figure 2).[89] When Vonyó's regression is rerun with a GAP variable estimated from the historical trendline rather than the interwar trendline, the results reverse and share of employment in agriculture becomes the most significant variable (see table 1).[90] Vonyó's finding structural

[87] Vonyó, "Post-war Reconstruction and the Golden Age of Economic growth," 226.
[88] See: Tamás Vonyó, "Post-war Reconstruction and the Golden Age of Economic growth," *European Review of Economic History* 12, no. 2 (2008): 237, and Ferenc Jánossy, *The End of Economic Miracles: Appearance and Reality in Economic Development* (International Arts and Sciences Press, Inc., 1971), 36-37.
[89] Vonyó's interwar trendlines are presented in blue while the 1870-1914 historical trendlines are in orange. The shaded block is the interwar period used by Vonyó for trendline estimation. We use the most recent Maddison data to make these estimates. While we present a sample of some of the most worrying examples in Figure 2, trendlines for every country in the sample are presented in a graphical appendix as well. See: J. Bolt and J. van Zanden, Maddison Project Database 2023, https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2023, (Accessed 04/09/2024).
[90] Vonyó's regression is replicated as closely as possible. All variables are constructed exactly as described throughout the paper. A major issue, however, is data. When FAOSTAT and ILOSTAT were consulted for the original datasets discussed in Vonyó's paper, I found that these databases only had employment data running as far back as the late 1960s. Consulting the original author, he advised that the datasets used in the original paper can no longer be accessed. Instead, therefore, we recreate Vonyó's dataset using Maddison GDP per capita data, a combination of OECD and ILO employment data retrieved online, and data transcribed from archival ILO statistical yearbooks. The central finding of Agrishare becoming the most significant variable is robust to alterations in the variables (for example, changing the time period across which the rates of change of each variable are calculated), the inclusion of fixed effects, and the use of an unbalanced dataset that does not interpolate over gaps in the data. No matter the alterations made to the regression, it proved consistently difficult to achieve Vonyó's original result of a statistically significant convergence variable. This is likely a product of multicollinearity and the use of a more recent Maddison dataset than in Vonyó's paper. See: International Labour Organisation. ILOSTAT. https://ilostat.ilo.org/data/, (Accessed 04/09/2024), International Labour Organisation. *Year book of labour statistics: retrospective edition on population censuses 1945-89.* International Labour Office, 1990 OECD, OECD Labour Statistics.

modernisation to be overestimated and reconstruction effects to be underestimated therefore appears to depend on an arbitrary variable.[91]

Table 1: Rerunning Vonyó's regressions

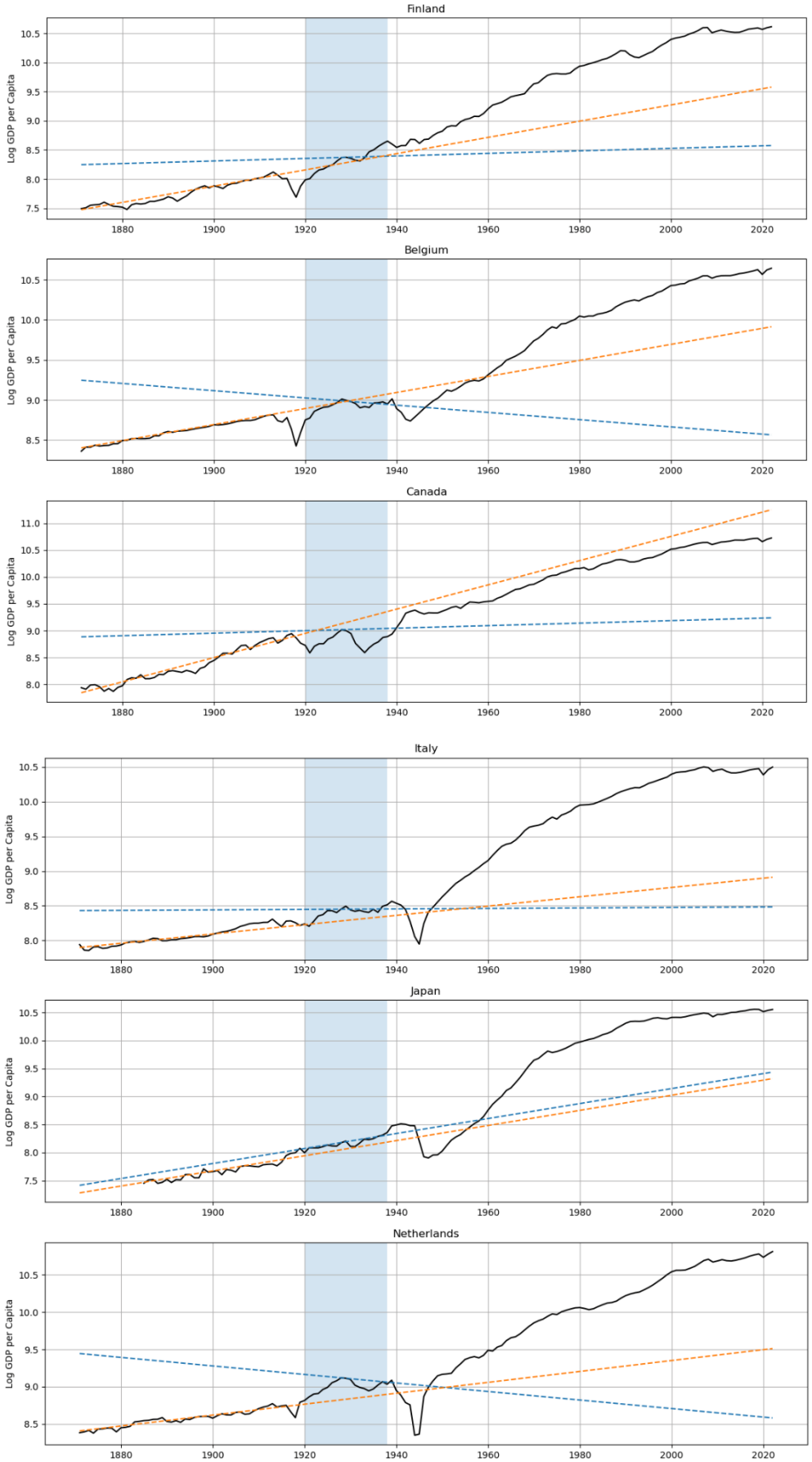
	I	*II*
Income	-1.476×10^{-7}	-6.298×10^{-7}
	(5.173×10^{-7})	(6.865×10^{-07})
Agshare	0.0335	0.0563*
	(0.0291)	(0.0296)
Labgrowth	0.4471***	0.2904
	(0.1655)	(0.1777)
GAP1*Time	-0.0033*	
	(0.0018)	
GAP2*Time		-0.0002
		(0.0024)
(constant)	0.0333***	0.0282**
	(0.0111)	(0.0116)
N	88	84
F	12.810	11.049
R squared	0.4525	0.4283
F (all u_i = 0)	1.6209	1.0352

Notes: See additional details in footnote 90. All variables are the same as in Vonyó's original regression except for GAP, which is the same as in Vonyó's regression for GAP1, but for GAP2 is instead estimated using the 1870-1914 trend. P<0.5 = *, P<0.1 =**, P<0.01=***

https://www.oecd.org/employment/labour-stats/, (Accessed 04/09/2024), International Labour Organisation. *Labour Force Estimates and Projections 1950-2000 Volumes I-VI.* International Labour Office, 1977.

[91] Interestingly, this issue seems to have perhaps been noticed by Vonyó himself as in a later paper looking at the Eastern Bloc growth experience, he returns to the Temin specification of GAP due to data scarcity and produces findings more sympathetic to the misallocated labour argument. When including the Eastern Bloc in his broader regression for postwar growth, Vonyó now points to the strong correlation between income growth and the scope for structural modernization, whereas specifically for the socialist states he finds that excess employment in traditional sectors has a higher coefficient than his Gap dummies, which become statistically insignificant when East Germany is excluded. Indeed, Vonyó finds that the reconstruction dynamics in the East were relatively weak due to an overall weakness in investment and labour inputs compared to the West. This in turn, he argues, explains why East Europe fell behind West after the 1950s, and paints us a picture of the postwar Eastern Bloc "growth miracles" as one of structural modernisation boosting growth in spite of the limitations to reconstruction dynamics. See: Vonyó, Tamás. "War and socialism: why eastern Europe fell behind between 1950 and 1989." *The Journal of Economic History* 70, no. 1 (2017): 248–274.

Figure 2


Finland
Belgium
Canada
Italy
Japan
Netherlands
Log GDP per Capita
1880
1900
1920
1940
1960
1980
2000
2020

5 Conclusion

To conclude, we emphasise that in many respects the reconstruction thesis is quite compelling. In cases such as West Germany, for example, it seems plausible that much of the extremely rapid growth of the first few postwar years is ascribable to reconstructive efforts and immediate reallocation efforts. The suggestion that the majority of observed variation in European growth rates across this period can be understood by way of Jánossy-esc reconstruction processes seems too large a claim in light of theoretical and statistical faults identifiable in this body of work, however. The claim from Ritschl and Eichengreen that structural modernisation contributed less than a percentage point to German TFP growth in the 1950s, for example, and Vonyó's disregarding redundant agricultural labour as a contributing factor to the growth process, go too far. The importance of the structural modernisation effect on postwar European growth, and the alternative vision of postwar international trade and development this implies, consequently deserve reconsideration.[92]

[92] So to end productively with a suggestion of where future research in this area may go, we note the potential for difference-in-difference study of the effect on Western European economies of blockages to labour supply elasticity in 1961-2. Conveniently, this single year period saw both the construction of the Berlin Wall for Germany and independent policies in France and Britain blocking immigration from former colonies. This seems a potentially rich natural experiment waiting to be studied. See: Kindleberger, Charles P. *Europe's Postwar Growth*. Harvard University Press, 1967: 173.

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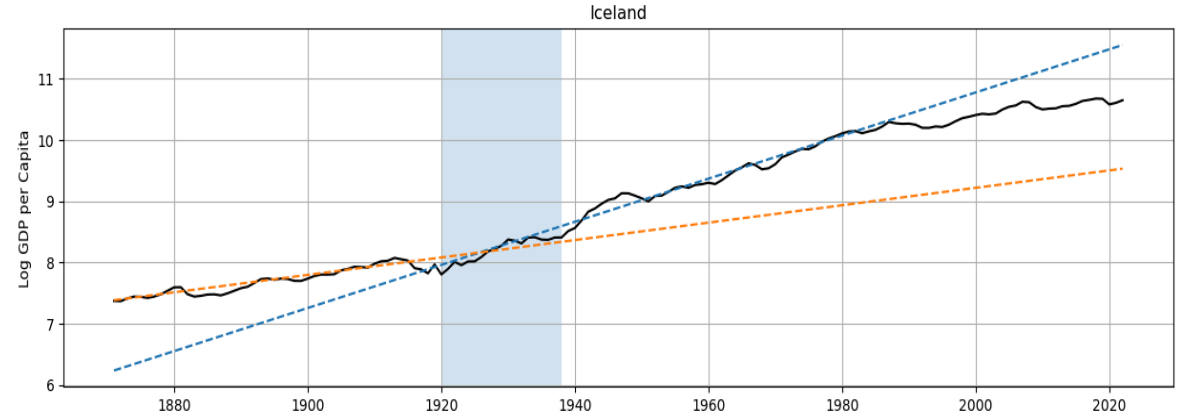
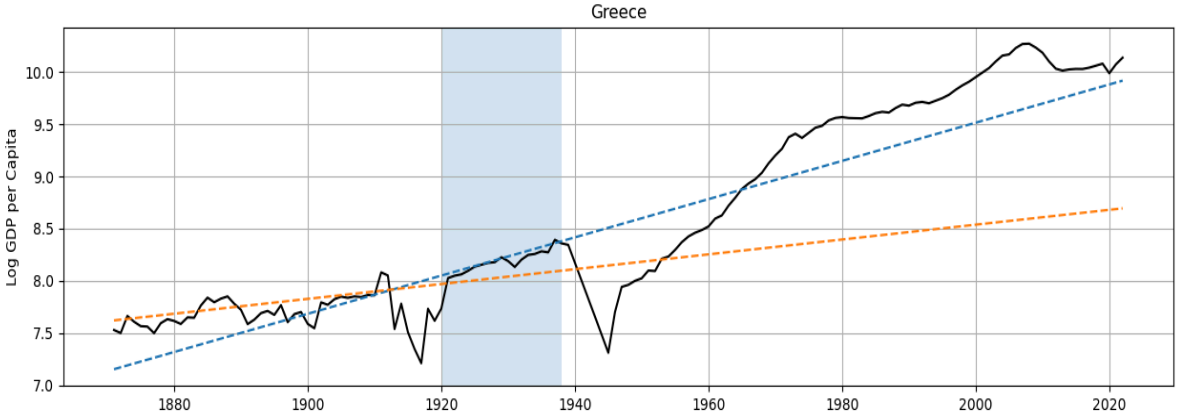
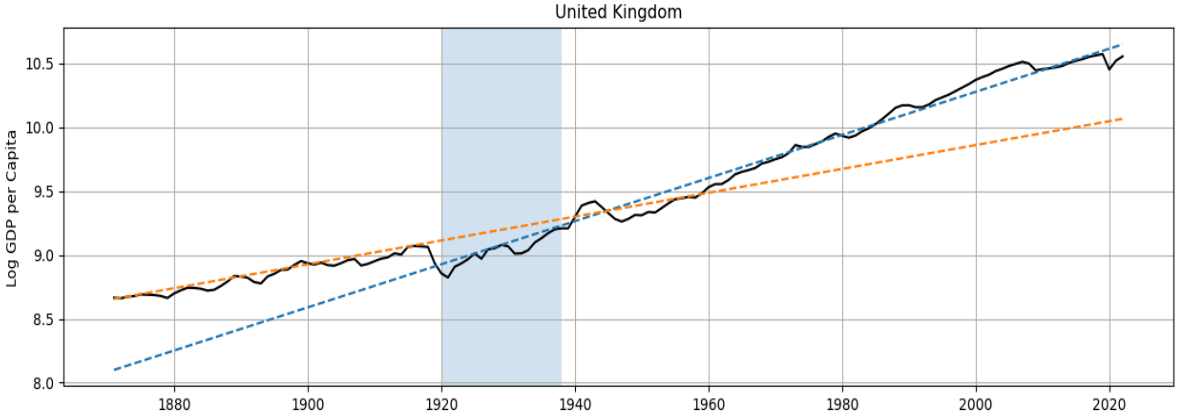
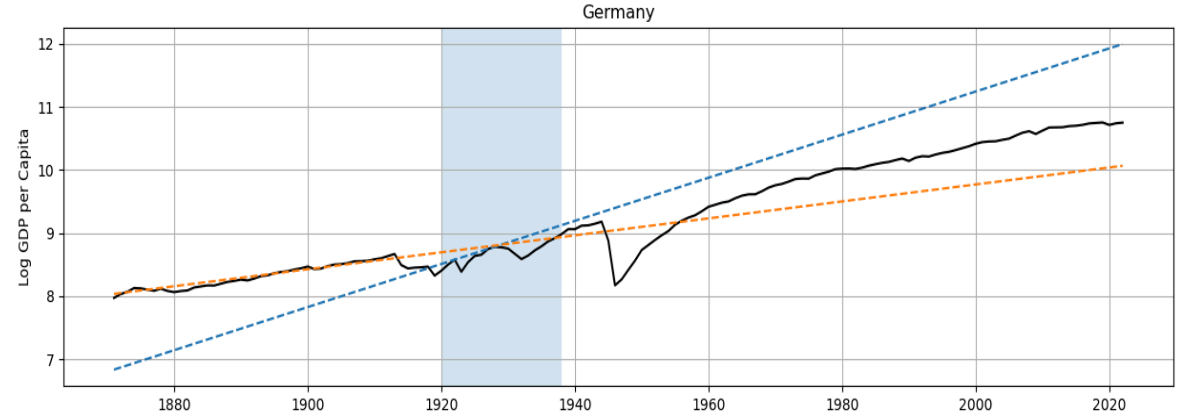
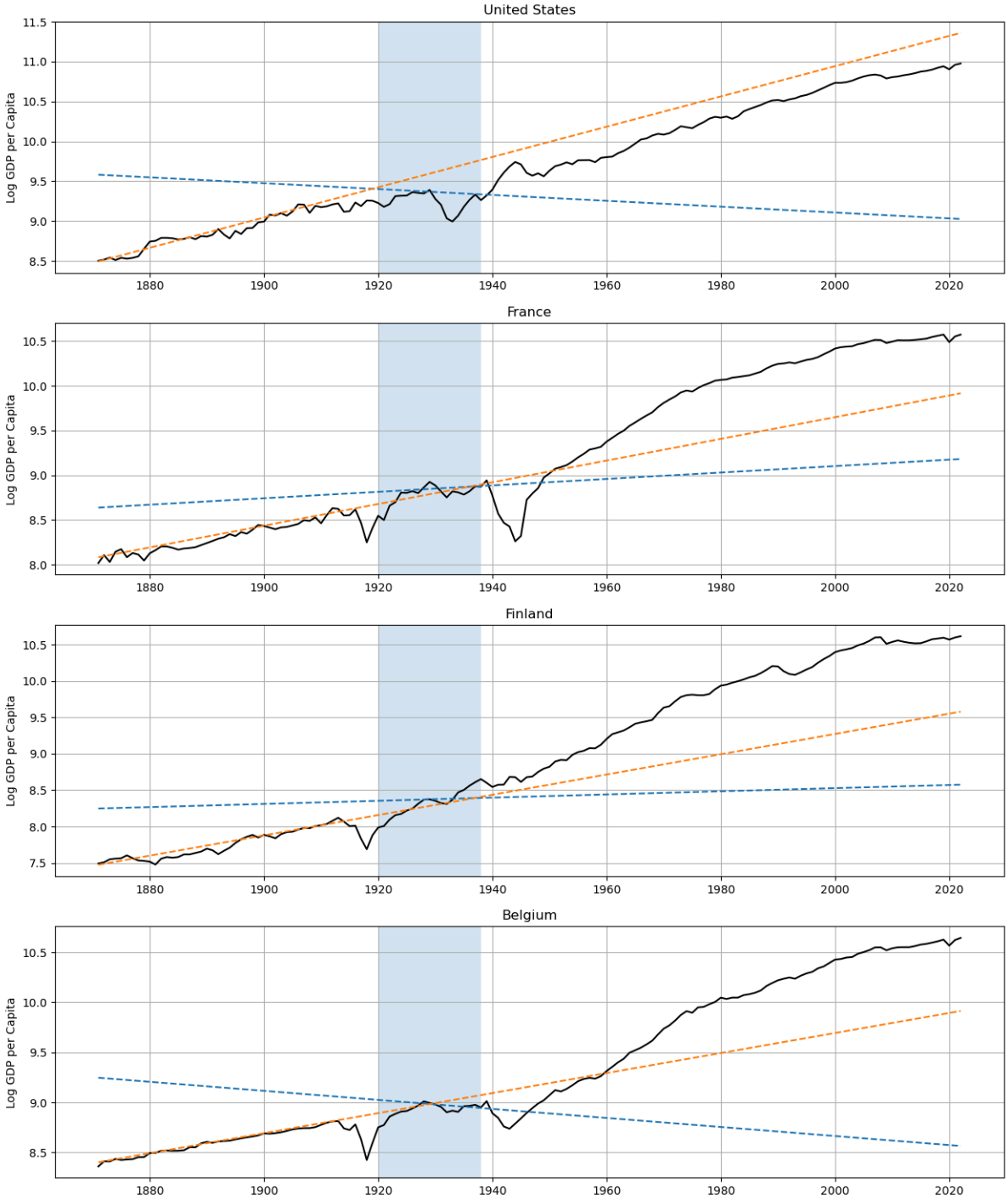
6. Graphical Appendix

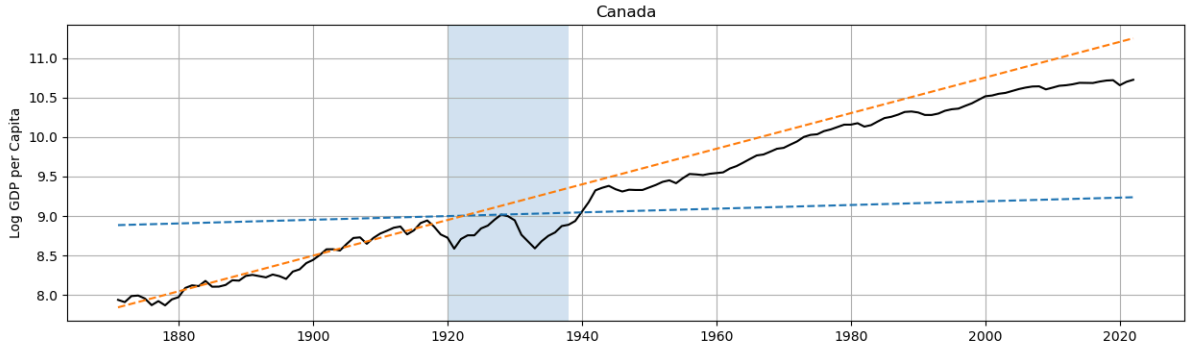


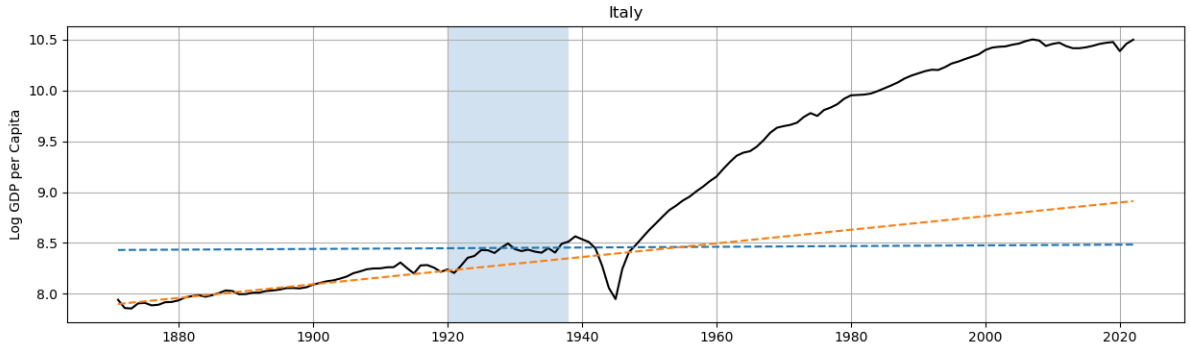


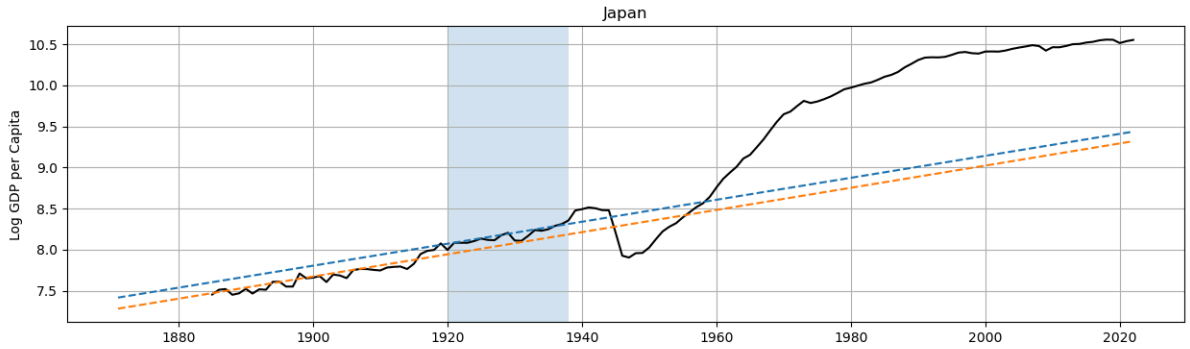


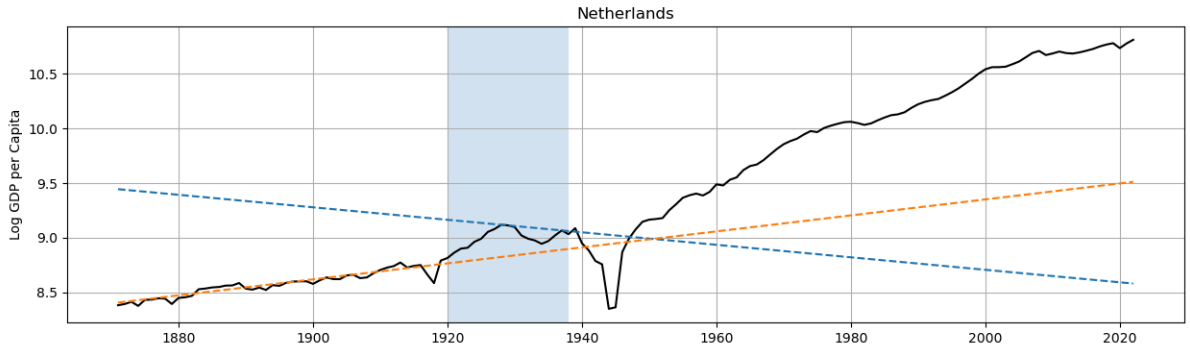


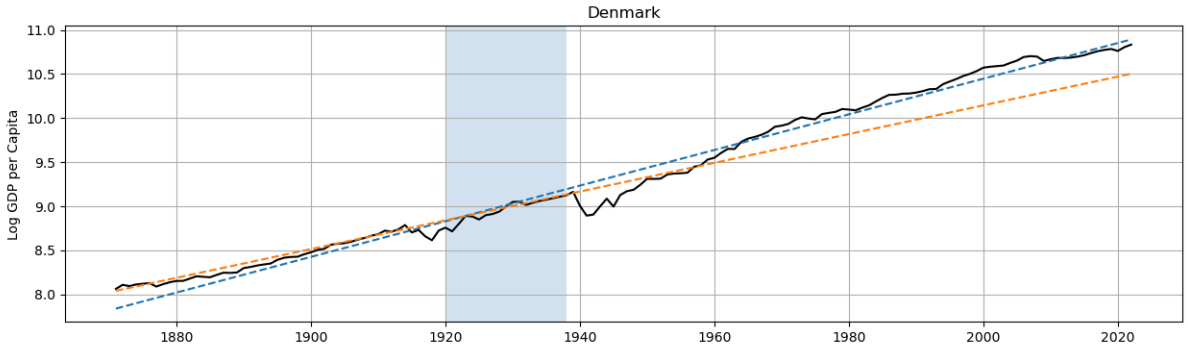

United States
France
Finland
Belgium
Log GDP per Capita
1880
1900
1920
1940
1960
1980
2000
2020

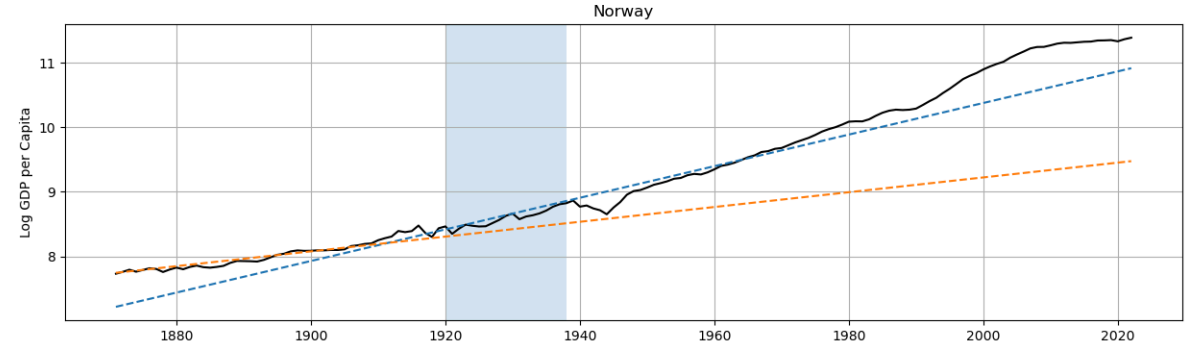

Canada
Log GDP per Capita
11.0
10.5
10.0
9.5
9.0
8.5
8.0
1880
1900
1920
1940
1960
1980
2000
2020

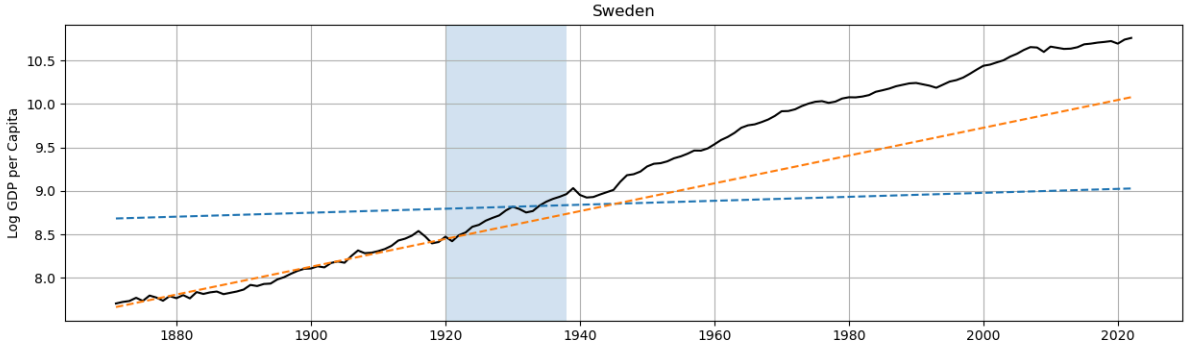

Italy
Log GDP per Capita
10.5
10.0
9.5
9.0
8.5
8.0
1880
1900
1920
1940
1960
1980
2000
2020

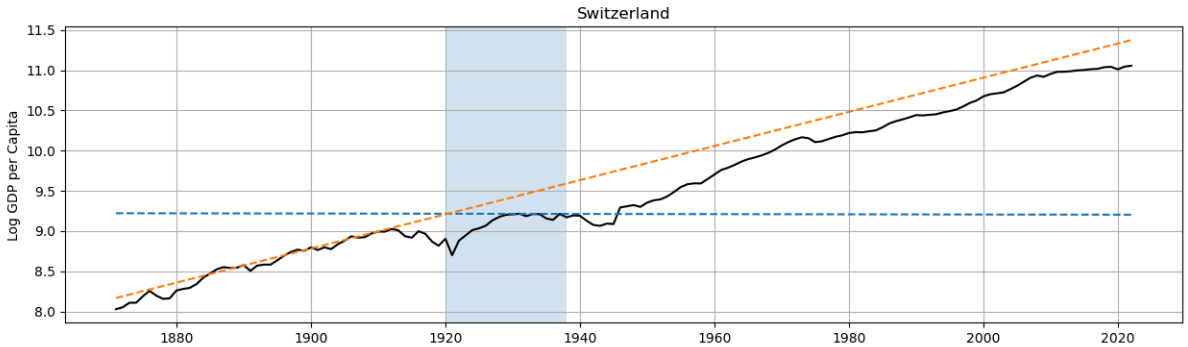

Japan
Log GDP per Capita
10.5
10.0
9.5
9.0
8.5
8.0
7.5
1880
1900
1920
1940
1960
1980
2000
2020

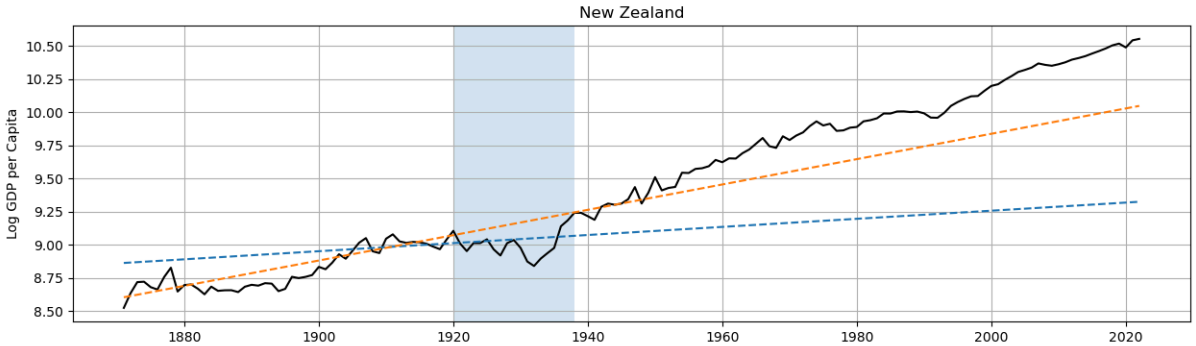

Netherlands
Log GDP per Capita
10.5
10.0
9.5
9.0
8.5
1880
1900
1920
1940
1960
1980
2000
2020

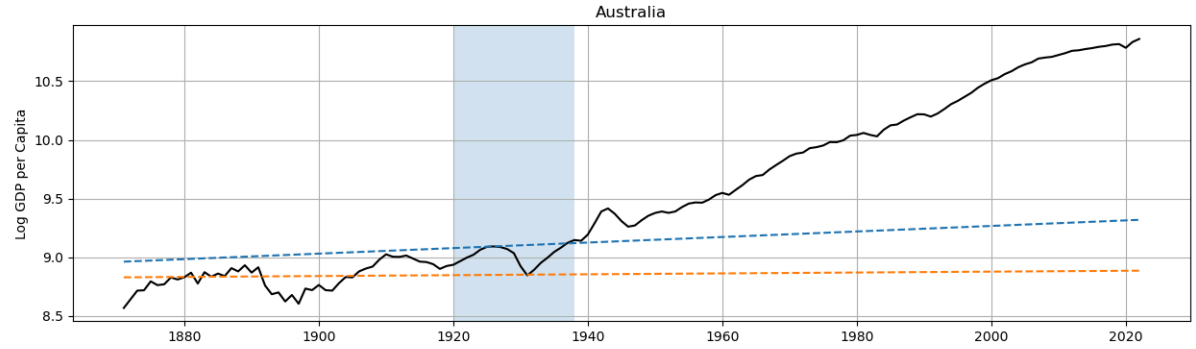

Denmark
Log GDP per Capita
11.0
10.5
10.0
9.5
9.0
8.5
8.0
1880
1900
1920
1940
1960
1980
2000
2020

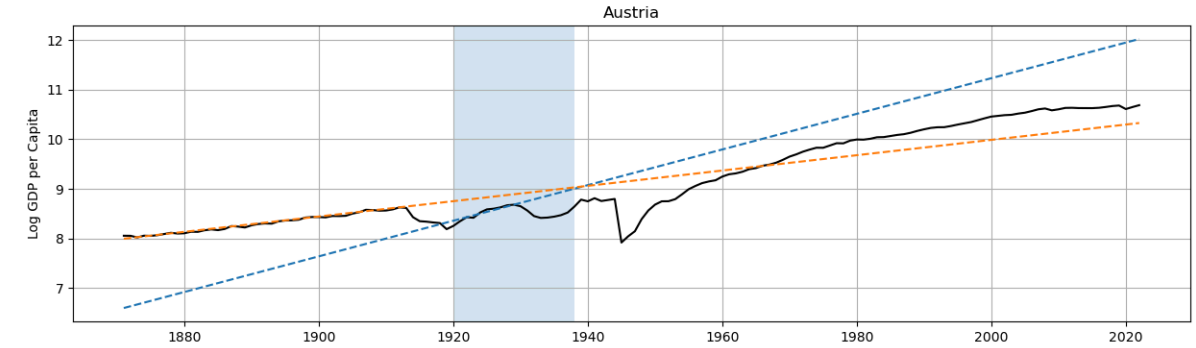

Norway
Log GDP per Capita
11
10
9
8
1880
1900
1920
1940
1960
1980
2000
2020

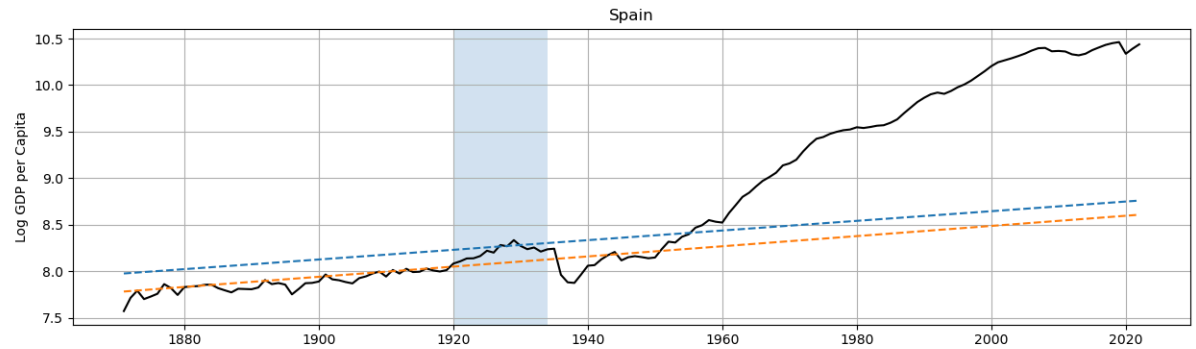

Sweden
Log GDP per Capita
10.5
10.0
9.5
9.0
8.5
8.0
1880
1900
1920
1940
1960
1980
2000
2020

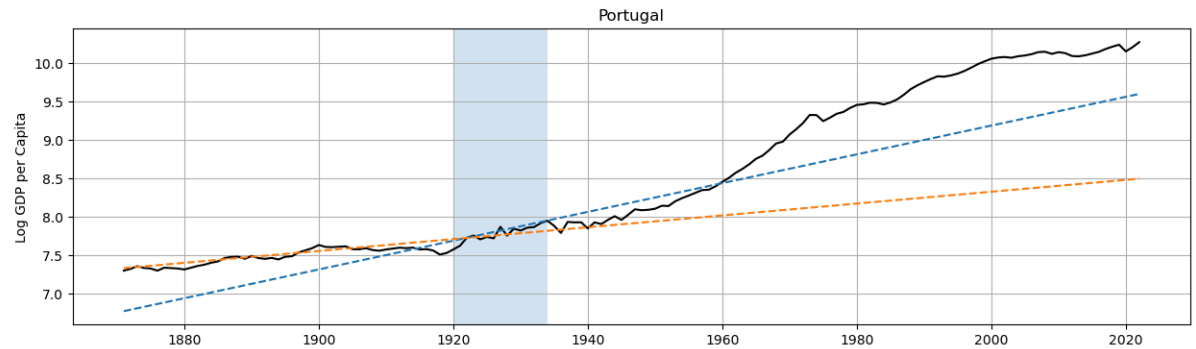

Switzerland
Log GDP per Capita
11.5
11.0
10.5
10.0
9.5
9.0
8.5
8.0
1880
1900
1920
1940
1960
1980
2000
2020


New Zealand
Log GDP per Capita
10.50
10.25
10.00
9.75
9.50
9.25
9.00
8.75
8.50
1880
1900
1920
1940
1960
1980
2000
2020


Australia
Log GDP per Capita
10.5
10.0
9.5
9.0
8.5
1880
1900
1920
1940
1960
1980
2000
2020


Austria
Log GDP per Capita
12
11
10
9
8
7
1880
1900
1920
1940
1960
1980
2000
2020


Spain
Log GDP per Capita
10.5
10.0
9.5
9.0
8.5
8.0
7.5
1880
1900
1920
1940
1960
1980
2000
2020


Portugal
Log GDP per Capita
10.0
9.5
9.0
8.5
8.0
7.5
7.0
1880
1900
1920
1940
1960
1980
2000
2020