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Prosperity and Depression in the European Economy during the Interwar Years (1913-1950): An Introduction[†]

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Aggregate Growth, 1913-195 Prosperity and Depression in the European Economy during the Interwar Years (1913-1950): An Introduction

I. European Economic Growth 1913-1950: a comparative perspective

From 1913 to 1950 the European growth record was rather poor. The "Second Thirty Years War" (Temin), or the period from the beginning of the First World War in 1914 to the end of the Second World War in 1945 stands in sharp contrast to the following Golden Age of Growth between about 1950 and 1973 (see Crafts and Toniolo, this book). And indeed, the rates of economic growth across European countries were "unusually" low as they seem to distinguish Europe from other parts of the world during that time-span but also stand out compared to Europe's growth experience from about 1870 to 1913. A substantial literature has pointed to several key factors that may account for this slowdown of growth rates in Europe. Not surprisingly, a central role is attributed to the occurrence of two devastating wars that raged in the centre of Europe over a third of the entire period 1913-1950 (see Svennilson, 1954). The remaining 20 years have often been characterised by political turmoil, in many cases misguided macroeconomic policies and related to this the general failure to coordinate policies between countries, which prevented Europe to fully realize its economic potential (Feinstein, Temin, Toniolo 1997).

To see how policies and coordination failures affected economic growth, we need to understand how large Europe's potential for growth actually was after World War One. In a nutshell, the economic potential of Europe was rising considerably between 1913 and 1950, driven by technological, organisational and sectoral change, by the accumulation of physical capital and by the formation and accumulation of human capital. There is plenty of evidence for significant technological progress during the 1920s and 1930s. The period saw the beginnings of mass-motorization, advances in chemical and electrical engineering, the construction of an extensive road network, the emergence of commercial aviation, and crucially the electrification of large parts of the European economy, including some of the most remote rural areas. European industry underwent a broad process of modernization, including many firms that attempted to introduce and adapt new methods of American-style standardised mass-production (Chandler 1990). Moreover, the share of agriculture declined in all European economies between 1913 and 1950 with labour moving into the more productive industrial and service sectors, especially in Northern and Western Europe (Broadberry and

Federico, this book). The governments of newly created states all aimed for a rapid economic development of their largely backward countries, and the records show rising school enrolment and numbers of students, high and in some cases rising participation rates in the labour markets joint with a steady growth of the European population.

So why did Europe not enter into a Golden Age of Growth already in the 1920s? Europe's cultural history, especially the "golden twenties" or "*les années folles*", intriguingly reflects the tensions between the vast unexplored possibilities of modern life and looming disaster. The First World War brought the liberal economic order of the late 19th century to an end, foreshadowed by increasing protectionism in large parts of the Atlantic economy (Kindleberger 1989, Findlay and O'Rourke 2003) and first signs of dissolution of the Central European Empires from the 1880s onwards (Schulze and Wolf 2007). And protectionism continued after the war. Many tariffs, quotas and other restrictions on trade installed during the war remained in place in the 1920s. This, together with limits on migration and declining capital mobility inevitably led to a misallocation of resources across states. Especially the failure to resolve the international issue of war debt and reparations (Ritschl 1998) and tensions due to the emergence of new states and the redrawing of political boundaries (Rothschild 1974, Broadberry and Harrison 2005) are discussed in this context (see Ritschl in this book). Any existing attempts to improve international policy coordination, such as the re-establishment of the gold-standard as a monetary system in the late 1920s, surrendered to economic nationalism or club-formation during the great depression (Eichengreen 1992). In a similar vein, mass migration, which had favoured wage convergence between Europe and the New World during the first Globalization (Hatton and Williamson 1998), fell sharply as war and depression halted the previous trend and immigration policies entered a new age of restriction. Restrictive immigration policies not only proliferated in the receiving countries, like the United States and Australia, but also some sending countries like the Soviet Union introduced severe emigrant restrictions (Chiswick and Hatton 2005). To some extent these coordination failures can be related to increased costs of political coordination within states due to the extension of the political franchise and the associated rebalancing of political power during and after the First World War (Nurkse 1944, Eichengreen and Temin 2003).

In the following we will survey the European growth experience during the interwar years, with a special focus on the period 1920-1938. That is, we will largely exclude the direct effects of the two wars and their immediate aftermath. Nevertheless it will become clear that both the legacy of the First World War and the foreshadowing of the Second World War had strong indirect effects on economic growth in the 1920s and 1930s. Given that the time-span

under consideration is relatively short, we will remain largely descriptive and exploit as far as possible the large cross-sectional variation in growth rates across European countries. Section I sketches the general picture of European economic growth 1913-1950. Section II presents briefly some theoretical background to sharpen our focus on possible explanations for different growth experiences, and section III presents several explanations for aggregate growth in interwar Europe. In section IV we summarize the evidence and reach some general conclusions.

I.1 European Growth Performance: inter-temporal comparisons

Let us start by putting the European experience between the wars in a wider perspective. Figure 1.1 shows the share of Europe in the World economy (GDP measured in 1990 International Geary-Khamis dollars). Here we distinguish three concepts of "Europe": first all European countries including Turkey and the USSR, second Europe without Turkey, and third Europe without both, the USSR and Turkey.

(Figure 1.1 about here)

The interwar years mark the beginning of a decline of Europe's share in the World Economy after a longer period of expansion with the Industrial Revolution at least since 1800. At its zenith around 1913, Europe (including Turkey and the USSR) accounted for 47% of world GDP. By 1950, after two world wars and the interwar period, this share had decreased to about 40%. It is notable that the relative decline of Europe in the world economy could not be reversed despite spectacular growth rates during the "Golden Age" of economic growth from 1950 to 1973. After this, Europe's share in the world economy declined even faster to about one forth around 2000. Obviously, a main driver for this relative "decline" need to be seen in the economic development of hitherto stagnant economies in Asia and other parts of the world, with a largely positive impact on the European economy. A more optimistic picture emerges from figure 1.2, which contrasts the GDP-shares with the levels of European GDP (measured in million 1990 International Geary-Khamis dollars) from 1870 onwards.

(Figure 1.2 about here)

No matter what aggregate is considered, the European economy grew 1870 - 2003 by a factor of about 20. If compared against a long-run trend (based on "Europe" *without* Turkey and the USSR) extrapolated backwards from 2003 the interwar years stand out as a period of rather poor economic performance. This underperformance against a long-run trend is even more visible when we consider the development of GDP per capita, which will be our focus on the following pages: while the standard of living continued to increase across Europe during the interwar years, the rate of increase was low if put in a long-run perspective (see Figure 1.3).

(Figure 1.3 about here)

The aggregate data masks another feature of the interwar years, namely a significant increase in the fluctuations of growth rates 1913-1950 compared to 1870-1913, both in the cross-section of European countries and in a short-run business-cycle perspective (see Ritschl, this book).

I.2 European Growth Performance: spatial comparisons

The long-run perspective on the interwar growth experience raises several related issues. First and foremost, what accounts for the marked slowdown in GDP per capita growth in Europe after 1913? The long-run decline of Europe's share in the World Economy suggests that European growth may have been adversely affected by the rise of strong competitors in world markets overseas (especially the USA and Japan). While there is certainly an element of reverse causation, overseas competition can only in part explain the slowdown in growth rates, because the share of Europe continued to decline even during the Golden Age of exceptionally high growth rates. Also, the large variation in intra-European experiences indicates that some country- or country-group-specific factors affected growth rates. As stated in the introduction, among these factors was the degree to which a country was involved in the two wars. Table 1.1 shows the year in which European countries regained their 1913 levels in GDP per capita and their involvement in World War One.

(Table 1.1 about here)

The defeated Central Powers recovered significantly slower from the war than members of the winning coalition, which in turn were outperformed by war neutrals such as the Netherlands, Norway or Spain during the 1920s. The data also show that among the winners, the UK and Romania did not perform particularly well; the UK experienced a severe post-war recession and recovered only slowly and Romania's GDP per capita was not growing at all during the interwar period. Also, countries that gained independence during or immediately after the war such as Czechoslovakia, Poland or Ireland had quite diverging experiences. Some did exceptionally well, including the two (of three) new Baltic States for which sufficient data are available (Latvia and Estonia), while the economies of Ireland and Yugoslavia developed very slowly. In the following we will focus on the growth performance of 27 European over the years 1920-1938. Table 1.2 shows their average annual growth rates over that time span, including the corresponding standard deviations for various periods.

(Table 1.2 about here)

The impression we get from table 1.2 is that of a very heterogeneous development: the average annual rate of growth over the entire period 1913-1950 was 0.72% (weighted by population), but varied from a maximum of 2.15% (Norway) to a minimum of -1.04% (Romania). Over the entire period, only three Nordic countries (Norway, Sweden and Finland) and the neutral Switzerland grew faster than the United States and the USSR, with growth rates of respectively, 1.61 and 1.76 percent annually. Only four other European countries (Denmark, France, Czechoslovakia and Yugoslavia) grew at rates over 1% per year, while the remaining countries failed to reach even these low levels of growth.

But there were some regularities. Broadly speaking, all European countries (except Romania) share the experience of relatively high growth rates during the 1920s. Also, Europe was rapidly converging with the United States during that decade, with a weighted average of 3.21% per annum compared to 1.94% per annum observable at the other side of the Atlantic. Up to ten countries grew at rates above four percent per year and only four countries (Britain, Ireland, Italy and Romania) grew at rates below that of the United States. This strong growth can only partially be explained by reconstruction growth after the First World War because growth rates stayed quite high even when the 1913-levels were regained (compare table 1.2, columns 2 and 3). It is also noteworthy that several neutral states that had not experienced any major destruction during the war grew faster than the European average, notably Sweden and Finland in Scandinavia and Switzerland. In these three cases, growth was accompanied with

visible changes in the structure of the economies: in Sweden and Switzerland a major shift towards higher value-added industries (see Krantz 1987 and Siegenthaler 1987 resp.), in Finland a significant industrialisation following political independence (Hjerppe and Jalava 2006). We will come back to these factors in section III.

Table 1.2 also shows clearly that the great depression is a watershed for Europe's economic development. During the second decade of the interwar period growth slowed down in all European countries, but somewhat less so in Scandinavia, the UK, Latvia and Estonia. While most governments attempted to protect their economies from further exogenous shocks by raising tariff barriers, introducing capital controls and the like, the Scandinavian countries, and interestingly also Estonia and Latvia managed to coordinate an early exit from the Gold Standard with the UK in late 1931, and outperformed the rest of Europe. This illustrates how macroeconomic policy and its cross-border coordination mattered during the interwar years: "the timing and extent of depreciation can explain much of the variation in the timing and extent of economic recovery" (Eichengreen 1992, p. 232). Germany's growth performance in turn overstates the improvements in the standard of living during that period, because it is already from 1934 onwards largely driven by massive rearmament policies at the expense of rising government debt and low nominal and real wages in a strictly regulated labour market (see Ritschl 2002).

Finally, our panel of European countries shows some interesting distribution dynamics that are not visible from the mentioned figures and tables (for more on this see Epstein, Howlett, Schulze 2000). Table 1.3 gives the ranking of sample countries according to their GDP per capita for 1922, 1929 and 1938.

(Table 1.3 about here)

While the UK lost her leading position to Switzerland and the Netherlands during the 1920s, it nearly caught up again by the late 1930s due to the prolonged stagnation of the Swiss and the Dutch economies after the depression. Apart from this, the most remarkable changes include the steady improvement in the relative positions of Scandinavian countries especially during the 1930s, the positive development of Latvia and Estonia (while the estimates here might be on the high side) and the relative and even absolute decline of Austria and Spain. The Balkan countries with Romania but also Portugal and Spain (after the devastating Civil War, see Prados 2005) remained the European economic periphery, while Greece and Poland started to improve their position in the 1930s. Taken together, this

suggests that there was little overall convergence during the interwar years. Nevertheless, there might have been "conditional" convergence, conditional on country- or country-group specific factors that affected the pace of productivity growth via structural change, schooling, the propensity to save and invest and the like. To explore more systematically, how such factors can explain Europe's growth during the interwar years we should introduce shortly some background on the economic theory of growth.

II. Some theoretical background

Why do some countries prosper, while others suffer from stagnation? To answer this question, it is useful to consider the benchmark neoclassical growth model, first developed by Solow (1956) and Swan (1956); for a good exposition see for example Barro and Sala-i-Martin (2003: ch. 1). In the benchmark model with labour-augmenting technological progress, growth of GDP per capita is driven by the rate of technological change and capital accumulation, which is subject to diminishing returns. The production function is typically specified as a Cobb-Douglas function of the form

$$(1) \qquad Y = K^{\alpha}(AL)^{1-\alpha},$$

where Y is GDP, K capital, L is labour and A is the level of technology.[1] A central prediction of this model is convergence: everything else including technology being equal, poorer economies grow at higher rates than richer economies due to diminishing returns to capital accumulation. Therefore, all economies should in the long-run converge in terms of income per capita and productivity. Note that the model crucially assumes that the markets for labour, capital and technology transfer are efficient. Imperfections in domestic or international markets would affect the speed of convergence, for example because good access to international capital markets can foster the capital accumulation in poor countries and richer countries can earn higher returns on their savings by lending to the poor (Barro, Mankiw and Sala-i-Martin 1995). Moreover, the model predicts that changes in the savings rate (the proportion of output used to create more capital rather than being consumed) and the rate of capital depreciation affect the levels of output and transitional dynamics, but not the long-run rate of growth. If savings and depreciation rates or the rate of technological change differ across countries, the model predicts convergence only conditional on these differences; a

[1] This formulation of technology is called labour-augmenting because it raises output in the same way as an increase in the stock of labour, which is essential for the existence of a steady-state.

prediction that receives much more empirical support than that of un-conditional convergence (see the debate between Baumol 1986 and DeLong 1988).

While it provides a convenient starting point, the benchmark model needs to be further modified to be useful for empirical analysis. Mankiw et al. (1992) propose an augmented model that includes human capital formation interacting with labour as an input factor, for example through schooling, and show that this provides a better description of cross-country income differences over time. Recent research has mainly focussed on the microeconomic foundations of growth, including the idea of endogenous growth due to endogenous innovation (Romer 1990) or benefits from proximity (Krugman and Venables 1995); others have stressed the effects of sectoral change (Broadberry 1998) due to technological differences between sectors, and the impact of market inefficiencies. The current consensus is that differences in efficiency are at least as important as factor accumulation in explaining income differences across countries. This is robust to attempts to improve the measurement of human capital, to account for the age composition of the capital stock, to sectoral disaggregations of output, and to several other robustness checks (Caselli 2005). Directly related to this is the large literature in the wake of Abramovitz (1986) who observed that cross-country growth patterns are characterised by catch-up to technological leaders. The scope for catch-up in turn depends on the "social capability" of a country and "technological congruence" between countries. From this perspective national policies and institutions, but also the market size of a country are not neutral but closely associated with long-run economic growth rates (see Acemoglu, Johnson and Robinson (2003); Easterly and Levine (2003); Engerman and Sokoloff (1997); Hall and Jones (1999); Mauro (1995); and North 1990).

There exist generally two approaches to evaluate the explanatory power of these various theoretical concepts, both starting from the benchmark neoclassical growth model. One approach attempts to test the key prediction of convergence, controlling for conditioning factors such as differences in savings or investment rates, the stock or formation of human capital, or differences in institutions or market size (see Sala-i-Martin et al., 2004). This typically takes the form of estimating

$$(2) \qquad \ln(\frac{y_T}{y_0}) = a + b(\ln(y_0)) + \sum_{i=1}^{J} c_i \ln(X_i) + \varepsilon \ ,$$

where y is GDP per capita (that is per population), T denotes the time of the last observation and 0 the starting point, X are conditioning factors, and ε is an error term. The prediction of convergence implies b < 0.

The other approach is that of growth accounting, following Tinbergen (1942) and Solow (1957). The rate of growth in levels of GDP or in GDP per labour input is decomposed into the growth contributions of production factors and changes in productivity. Typically, the underlying model is specified as a Cobb-Douglas production function:

$$(3) \qquad Y = AK^{\alpha} L^{1-\alpha} .$$

Note that two identifying assumptions are usually made in this framework. First, the technology parameter A is interpreted as Total Factor Productivity (TFP) and assumed to be "Hicks-neutral" instead of labour-augmenting (or "Harrod-neutral"), such that technological change would be unbiased with respect to capital and labour. Second, the production function is assumed to feature constant returns. Define labour productivity as y=Y/L, and capital intensity as k=K/L. Given this, the growth rate can be approximately decomposed as follows:

$$(4) \qquad \ln(\frac{Y_{t+1}}{Y_t}) = \ln(\frac{A_{t+1}}{A_t}) + \alpha \ln(\frac{K_{t+1}}{K_t}) + (1-\alpha)\ln(\frac{L_{t+1}}{L_t}) \text{ or equally as}$$

$$(5) \qquad \ln(\frac{y_{t+1}}{y_t}) = \ln(\frac{A_{t+1}}{A_t}) + \alpha \ln(\frac{k_{t+1}}{k_t}),$$

where the growth rate of A (TFP) is always calculated as the residual, given that we have data only on Y, K, and L. The formulation in (5) shows that the growth of labour productivity, can be decomposed into changes in TFP and changes in capital intensity (or "capital deepening"). This can also be expressed in terms of GDP per capita, which differs from labour productivity according to the participation rate defined as employment per population. The resulting estimates of TFP have often been interpreted as approximations for technological progress, but some caveats are important. First, any mis-measurement of factor inputs or output will affect the estimated TFP. Second, any mis-specification of the functional relationship, for example when in fact there are increasing returns of scale, or if the aggregate production function changes over time due to sectoral change, or when technological progress is biased, will equally affect the results. Finally, changes in "TFP growth" can also reflect changes in policies and the institutional environment, given that TFP is calculated as the residual. Nevertheless, accounting of this sort is useful to develop a general idea about the factors that drive economic growth.

III. Explaining European Growth Rates during the Interwar Period

III. 1. Was there Conditional Convergence?

We start with a test of the strongest possible hypothesis from neoclassical growth theory: unconditional convergence. In a first step we simply plot the average annual rate of growth between 1913 and 1950 against GDP per capita in 1913 as in (2), without controlling for any conditioning factors. As shown in Figures 3.1a-3.1d we can reject the idea that there was unconditional convergence across European countries, neither for the period 1913-1950, nor for any of the sub-periods. The relationship between initial income and growth was very weak. Given the evidence from section I, especially table 1.3, this is hardly surprising. The absence of unconditional convergence over the years 1913-1950 can be easily explained by the fact that both rich and poor countries were involved in the wars and experienced destruction and reconstruction growth that were largely unrelated to their 1913 levels of development. However note that there is a weakly negative relationship between growth and initial income during the peace-period. In this light we can explore whether there was convergence over 1920-1938 conditional on country-specific factors. But what factors did condition growth rates? As outlined in sections I and II there are many possible candidates.

The empirical literature on economic growth faces a serious "small-sample" problem: because sample sizes for regressions on the determinants of long-run growth rates are typically small compared to the number of variables proposed by the theoretical literature, parameter estimates can be often far from the "true" parameters of the data generating process. This problem is especially severe in our case of interwar Europe as the number of countries for which sufficient (reliable) data is available is extremely limited, while on the other hand the number of possible causes for (slow) growth in interwar Europe is exceedingly large. Given this, one could either refrain entirely from the idea to put economic theories to econometric tests, or try to narrow the focus of the analysis using some "out-of-sample" information. Such information is provided by a "meta-analysis" of Sala-i-Martin, Doppelhofer and Miller (2004) who employ a Bayesian Averaging of Classical Estimates (BACE) approach to weight the relevance of 67 explanatory variables as proposed by various economic models. Their results are based on the growth experience of 88 countries for the years 1960-1996 and several million randomly drawn regressions. They show that three variables have a particularly high explanatory power for growth of GDP per capita, namely the rate of primary school enrolment, which captures human capital formation, the relative price of investment goods, which captures physical capital accumulation and the initial level

of income. Some geographical and institutional variables do also help to explain growth rates, but to a lesser extend.

On these grounds, we can augment the neoclassical benchmark model by measures of primary school enrolment and the investment environment. Enrolment rates are estimated as the share of children in school age (5-14) that attend primary schools in a given country over the years 1920-1939, where we use a data-set from Benavot and Riddle (1988). Moreover we will use lagged enrolment rates (10 years earlier) instead of contemporaneous rates to take into account that primary school enrolment should affect the economy only with a certain time-lag of about 10 years on average before children enter the workforce. We lack reliable data on the prices of investment goods relative to the general price level but capture investment dynamics by an index based on per capita consumption of steel and cement, which we derived from Svennilson (1954). The per capita consumption data allows us to specify this index relative to the UK with UK 1925-1929 = 100. Hence, it contains both relevant variations over time and in the cross-section. Moreover, for some European countries we have estimates of capital stocks from Madsen (2007). Table 3.1 shows how school enrolment rates, investment-indices and capital stocks developed over time. There were apparently vast differences in the formation of human capital and in the conditions for investment across European countries, which should have affected their growth performance.

(Table 3.1 about here)

We can explore conditional convergence in two steps. We first estimate, again for a sample of 23 European countries, the relationship between annual growth, income in the preceding year, changes in schooling (with a 10 year lag) and investment using simple OLS. Next, we calculate the counterfactual growth rate controlling for the varying effects of schooling and investment and plot this against initial income. The results indicate that European countries did - ceteris paribus –converge somewhat over the interwar period, conditional on the differences in human capital accumulation and in investment conditions (see Figure 3.2).

(Figure 3.2 about here)

The estimated effect of initial income on growth implies for example that on average the difference between a rich and a poor country in 1922, say Belgium and Finland, would be

halved after 23 years (we estimate a beta of about 0.029, see Barro and Sala-i-Martin 2003, ch.1). Good conditions for capital investment and rising rates of primary school enrolment could speed up this convergence. In fact, Finish GDP per capita in 1922 was 47% the level of Belgium, but 16 year later already 74%. Instead, GDP per capita in Greece in 1922 was 55% the level of Belgium, which was virtually unchanged still in 1937/38. To some degree this can be explained by the fact that both school enrolment rates and investment grew relatively faster in Finland than in Greece. However, our results also suggest that the effect of human and physical factor accumulation on growth was quite limited.

III. 2. Growth Accounting and Productivity Performance

We now turn to a growth accounting framework where we decompose growth rates into the contributions of factor accumulation and changes in productivity, which is useful to explore the relationship between economic potential and realised growth. To do this for a country, we need estimates on its total stock of capital and good measures of its total labour input and this data does not exist for all European countries in the interwar period. Jacob Madsen (2007) provides estimates of capital stocks and total hours worked for several European, which we will use in the following analysis, together with GDP estimates from Maddison (2007). There is no data on Eastern European countries available, so the following results do not represent the entire European continent.

As usual, we decompose the growth of GDP into the contribution of changes in capital stock, changes in total labour input and the growth of TFP according to (4). Note that the change in labour input are measured in terms of total hours worked, defined as total employment (full-time equivalents) times the average number of hours worked in a given country and a given year. All estimates are based on country specific capital shares, given at the end of table 3.2, and the assumption of constant returns to scale.

(Table 3.2 about here)

Three results from this exercise clearly stand out. First, the contribution of growth in total labour input to GDP growth was generally small, in some cases negative, reflecting an upward trend in labour productivity joint with changes in labour market policies such as the introduction of the eight-hour working day in Germany in 1918. Second, when we consider growth in the 1920s (starting in 1922, when most countries had regained their pre-war income

levels), we find that growth rates were typically higher in the 1920s than in the decade before the Great War and this difference can mainly be attributed to increases in TFP-growth. Third, the significant slowdown in growth during the 1930s was driven by a combination of slow capital accumulation, slow or negative growth in total labour input and low TFP-growth.

A different way to estimate TFP is to decompose the growth in labour productivity into its components. Table 3.3 gives the decomposition of labour productivity into TFP and capital deepening according to (5).

(Table 3.3 about here)

However we look at it, our measurement of TFP is certainly incomplete, for example because we did not distinguish between TFP and changes in human capital via education, and because the measurement rests on some debatable assumptions. Nevertheless, the indicated patterns in TFP and factor accumulation are highly suggestive. The rapid increase in TFP during the 1920s reflects the existence of many unused possibilities of increasing the efficiency of Europe's economies at the end of the war, especially along two dimensions: technological change and sectoral change. Many new technical possibilities had emerged during the war, in most cases already prior to the war, and their diffusion across Europe from one region to another and from one industry to another just started in the early 1920s. Two innovations easily stand out as the most important here: the combustion engine and new applications of electricity, which in combination revolutionised mechanical motive power in industry, transport and agriculture. Table 3.4 gives the production and number of private and commercial cars in use in four leading European car producing countries and the United Stats, 1923 to 1950. Table 3.5 shows the changes in total energy production between 1922 and 1950 in Europe and the United States.

(Tables 3.4 and 3.5 about here)

By implication, these technological changes deeply affected the sectoral structure of Europe's economy. New techniques in the field of electricity raised the efficiency of electricity production from coal and water, while the development of high voltage transmission made this electrical energy available even in remote parts of the European countryside. Simultaneously, the motor vehicle (as lorry, bus or private car) joint with improvements in road networks allowed to transport goods and people between these parts

and the urban agglomerations cheaper and faster than ever before (see Svennilson 1954, Ch. II).

Technological change contributed to the increase in labour productivity via several channels. For one thing, lower unit costs of energy and cheaper transport raised labour productivity in all sectors of the economy and thereby they raised incomes. Moreover, given the low income elasticity of demand for food, the demand for labour in agriculture declined relative to the labour demand of other sectors. The share of agriculture in total employment declined significantly during the 1920s, and continued to decline during the 1930s at a lower rate. This sectoral change of employment out of agriculture into industry and services had an additional effect on aggregate labour productivity, due to the fact that the sector-specific labour productivity was higher in industry and services than in agriculture (see Broadberry 1997 and Broadberry and Federico, this book). Note that this also implied changes in the geographical distribution of economic activities across Europe, for example because improved access to energy and new transport facilities opened possibilities to reap the benefits of low labour costs in rural areas for industrial expansion. An interesting example for this is the rise of Bavaria from a backward rural economy to a leading industrial region of Europe, which started in the 1920s (Salin, 1928). By hindsight we know that the economic possibilities opened by electrification and motorisation were huge and would transform every part and region of Europe over the next decades.

III. 3. The Role of Coordination Failure

Some of these changes that occurred during the 1920s were supported by economic policies. Most European governments saw the necessity to transform their economies after the Great War to the circumstances of peace and to help their industries to catch-up with the technological leaders. Some early "corporatist" organisations emerged in the early 1920s like the Zentral-Arbeitsgemeinsachft (ZAG) in Germany that sought to help economic recovery via new rules for collective bargaining or the Reichskuratorium fuer Wirtschaftlichkeit (RKW) that aimed at fostering technological and organisational change across the German economy (Shearer 1997). They had some similarities to the "corporatist arrangements" established after World War II that are mentioned among the factors, which helped to unleash Europe's economic potential during the "Golden Age" (see Eichengreen 1996, Crafts and Toniolo, this book). In Eastern Europe, where agriculture was typically still the dominant economic sector, most governments attempted to implement policies that would

simultaneously increase agricultural productivity but also help to develop the industrial sector - with limited success (see Aldcroft 2006). On an international scale, the 1920s saw many efforts to coordinate economic policies across borders, especially with respect to the position of Germany after the war. While the level of tariff-protection remained high after the war, international capital markets experienced a remarkable stabilisation with a stabilisation of most currencies by about 1926 and the de-facto establishment of the gold-exchange standard as an international monetary system in 1928 and new arrangements on reparation payments and war-debt settlements with the Young Plan in 1929. However, the fragility of these international arrangements became quickly visible.

As a counterpart to Europe, the United States had experienced an economic boom during the late 1920s, fuelled to a large extend by the vast prospects of economic growth following electrification and mass-motorisation at home and overseas. When this boom ended in October 1929, the European economy split along the fault-lines of protectionism and economic nationalism that were visible already much earlier. Some European countries were quick to swap the gold-exchange standard for a currency arrangement with their main trading partners, while others feared a unilateral move to relapse into hyperinflation similar to the early 1920s (see Wolf 2008). The London monetary and economic conference to coordinate a policy response to the economic crisis failed to prevent the further fragmentation of Europe's economy, exemplified by Germany's move to autarky (see Ritschl, this book). This inward-move of economic policies blocked further sectoral change, limited the mobility of capital and labour and slowed down significantly the diffusion of technology (see Madsen 2007).

IV. Summary and Conclusions

Let us try summarizing the evidence on aggregate growth in interwar Europe. Notwithstanding the devastations of two world wars, the twenty years of relative peace in Europe after 1918 were characterized by missed opportunities. The European economy continued to grow, and growth was fuelled by several sources. To start with, many countries experienced a push for modernization that was implied by the process of reconstruction after the First World War but went far beyond that. The new states in Eastern Europe made much effort to modernize their economies and help a transition into industrialization, however with mixed success. Many new technical possibilities had emerged during the war, in most cases already prior to the war, and their diffusion across Europe from one region to another and from one industry to another just started in the early 1920s. Among the many innovations of

that period, the combustion engine and new applications of electricity easily stand out as the most important ones. In combination they revolutionised mechanical motive power in industry, transport and agriculture, driving the levels of investment and energy consumption. Moreover, many European countries accumulated a large stock of human capital over the last decades of the 19th century and continued to do so during the interwar years as visible in a secular rise of primary school enrolment rates. We showed that neoclassical growth theories need to be modified for the impact of institutions and policies to be useful for an analysis. We found some evidence for (conditional) convergence as well as evidence that primary school enrolment and the conditions for investment were important factors, similar to broad international evidence on economic growth after the 1950. From a growth accounting perspective we found that the relatively strong performance during the 1920s was mainly driven by increases in TFP, which in turn can be related to technological and structural change. However, the vast potential from these manifold sources for growth was poorly exploited due to a failure to coordinate economic policies, especially in the 1930s. Conflict about the redistribution of economic and political power in the wake of the First World War slowed down investment or channelled resources into unproductive employment in preparation of another armed conflict. A much needed coordination of cross-border economic policies failed in many instances, visible in an increase in protectionism and fragmentation of labour and capital markets that prevented an efficient allocation of resources across the continent. Instead, the economic policies of the 1930s turned increasingly inwards, blocking further sectoral change and significantly slowing down the diffusion of technology both within Europe and between Europe and the United States as the technological leader. Once these political obstacles to growth were removed, Europe would be prepared to enter a Golden Age of economic growth.

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Figure 1.1: The share of “Europe” in the World Economy (based on Maddison 2007)

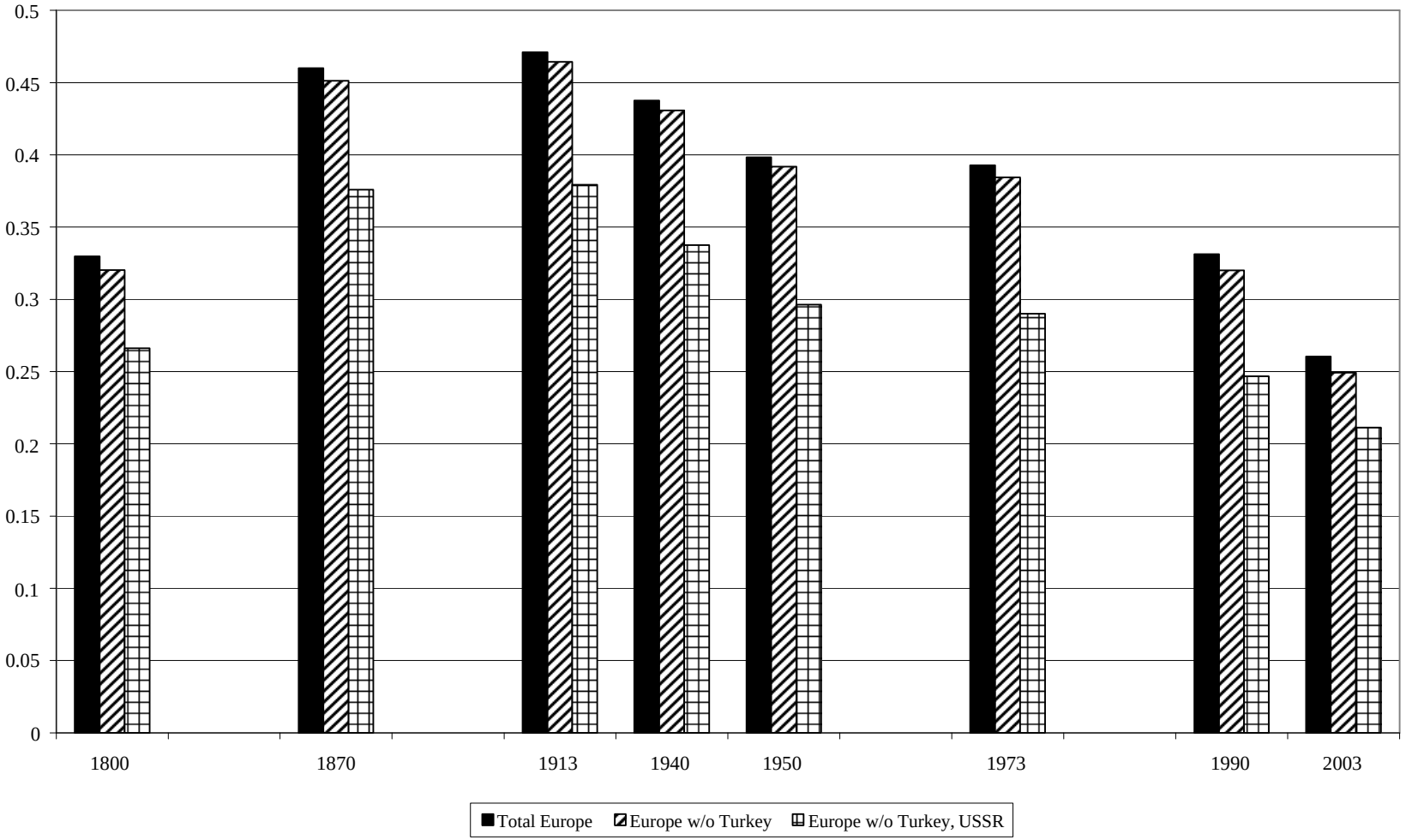


Figure 1.2: European GDP, 1870-2003 (based on Maddison 2007)

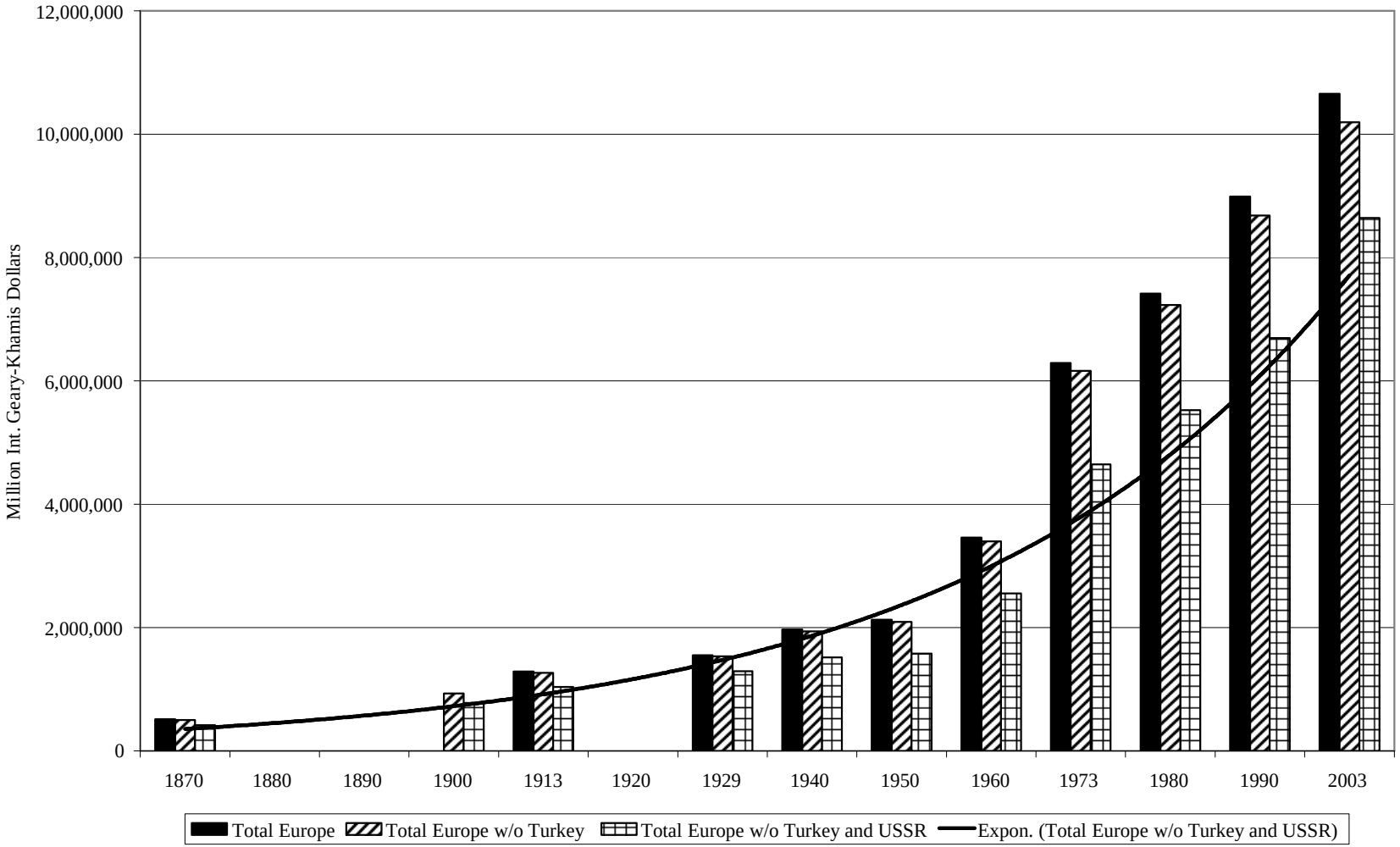


Figure 1.3: European GDP per Capita, 1870-2003 (based on Maddison 2007)

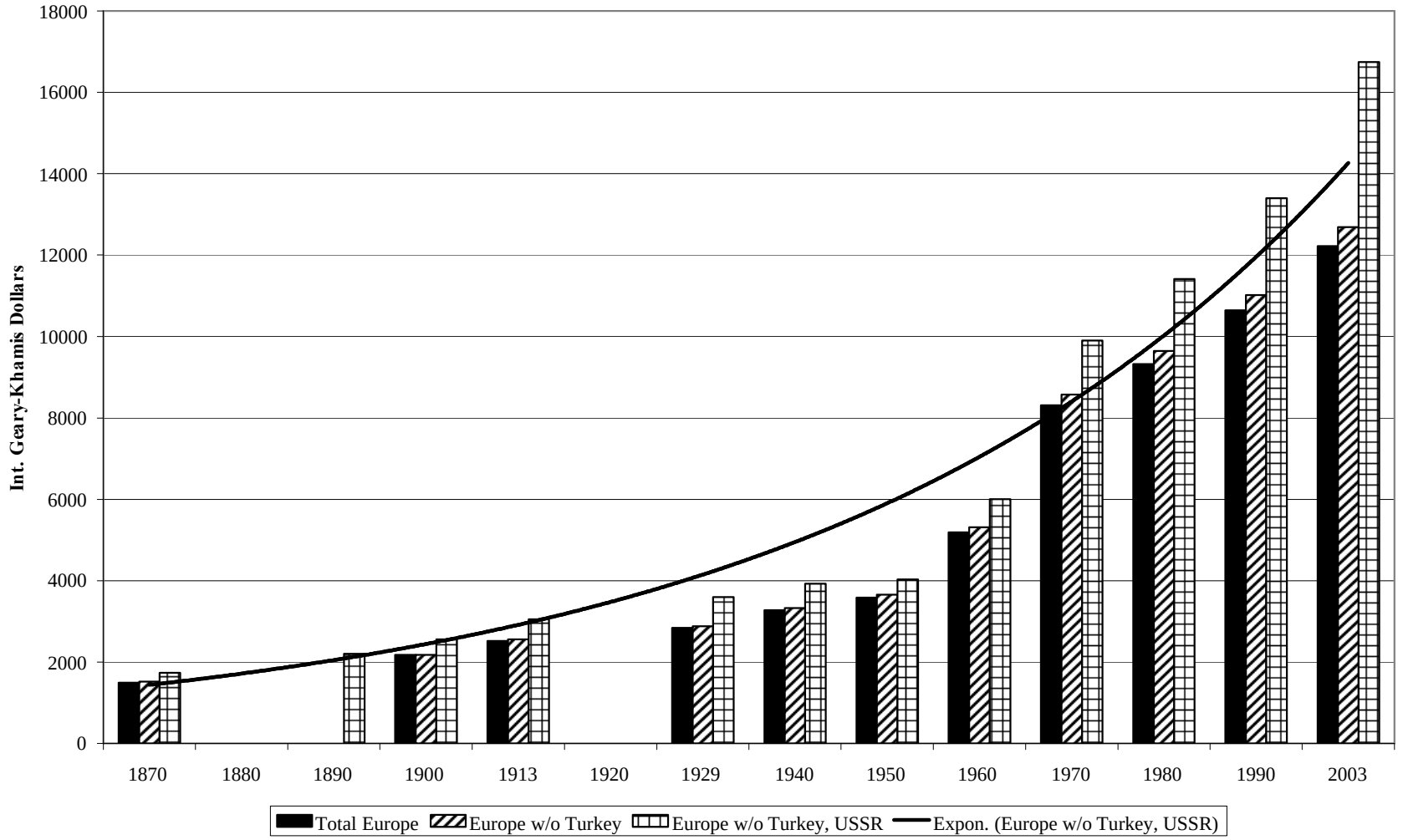


Figure 3.1 a) Unconditional Convergence, 1913-1950?
23 European Countris and the USA

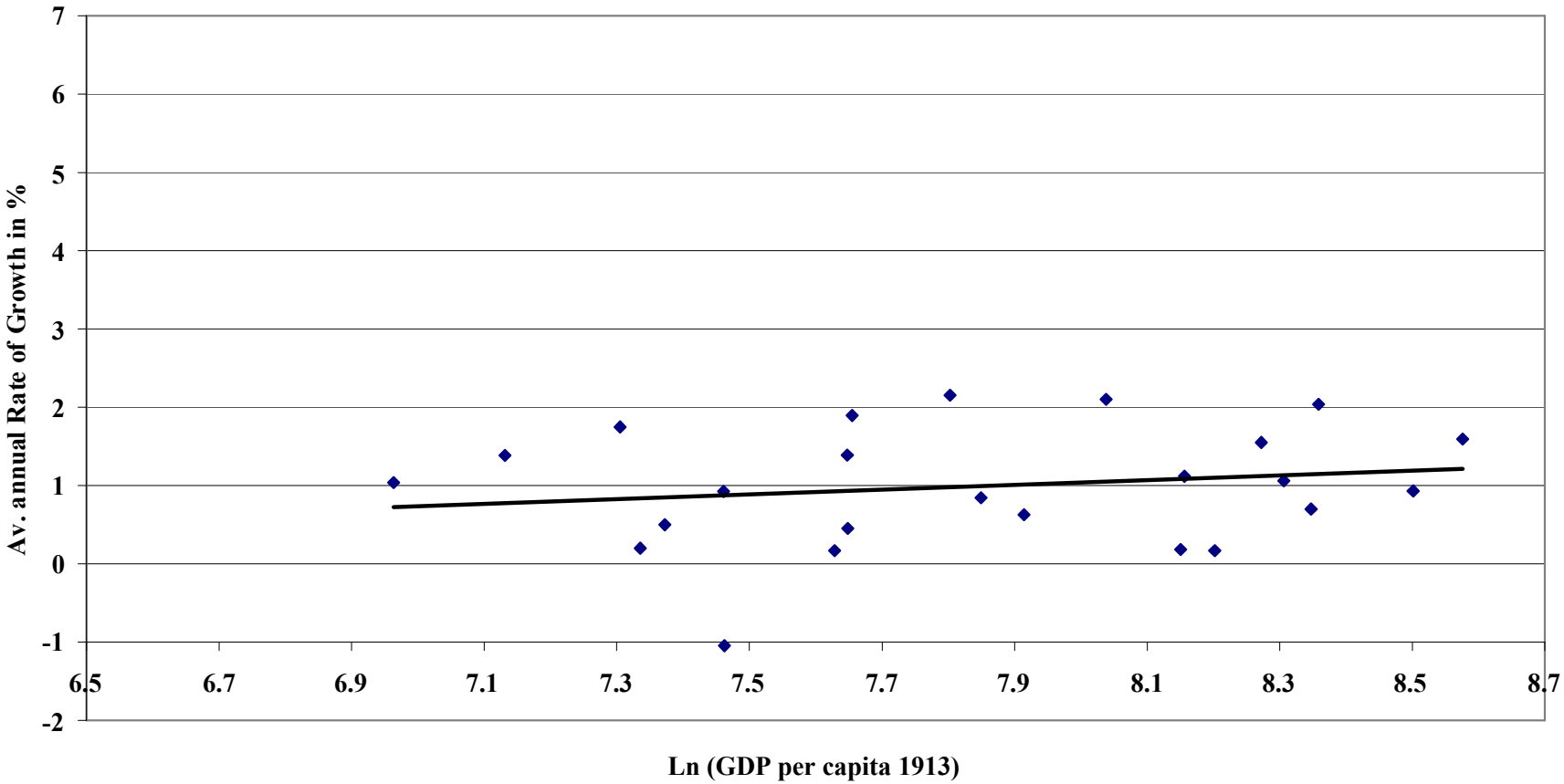


Figure 3.1 b) Unconditional Convergence, 1922-1938?
23 European Countris and the USA

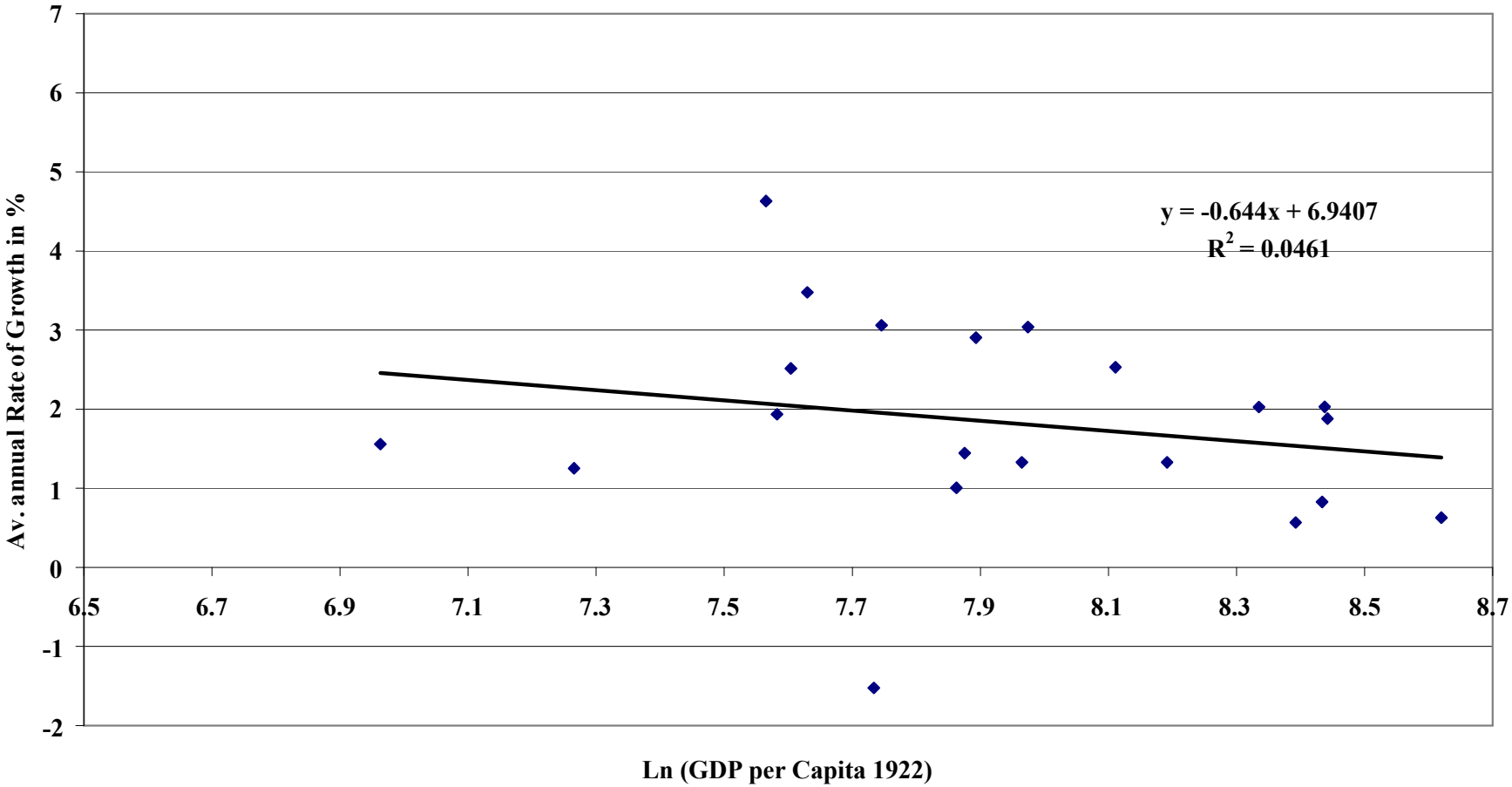


Figure 3.1 c) Unconditional Convergence, 1922-1929,
23 European Countris and the USA

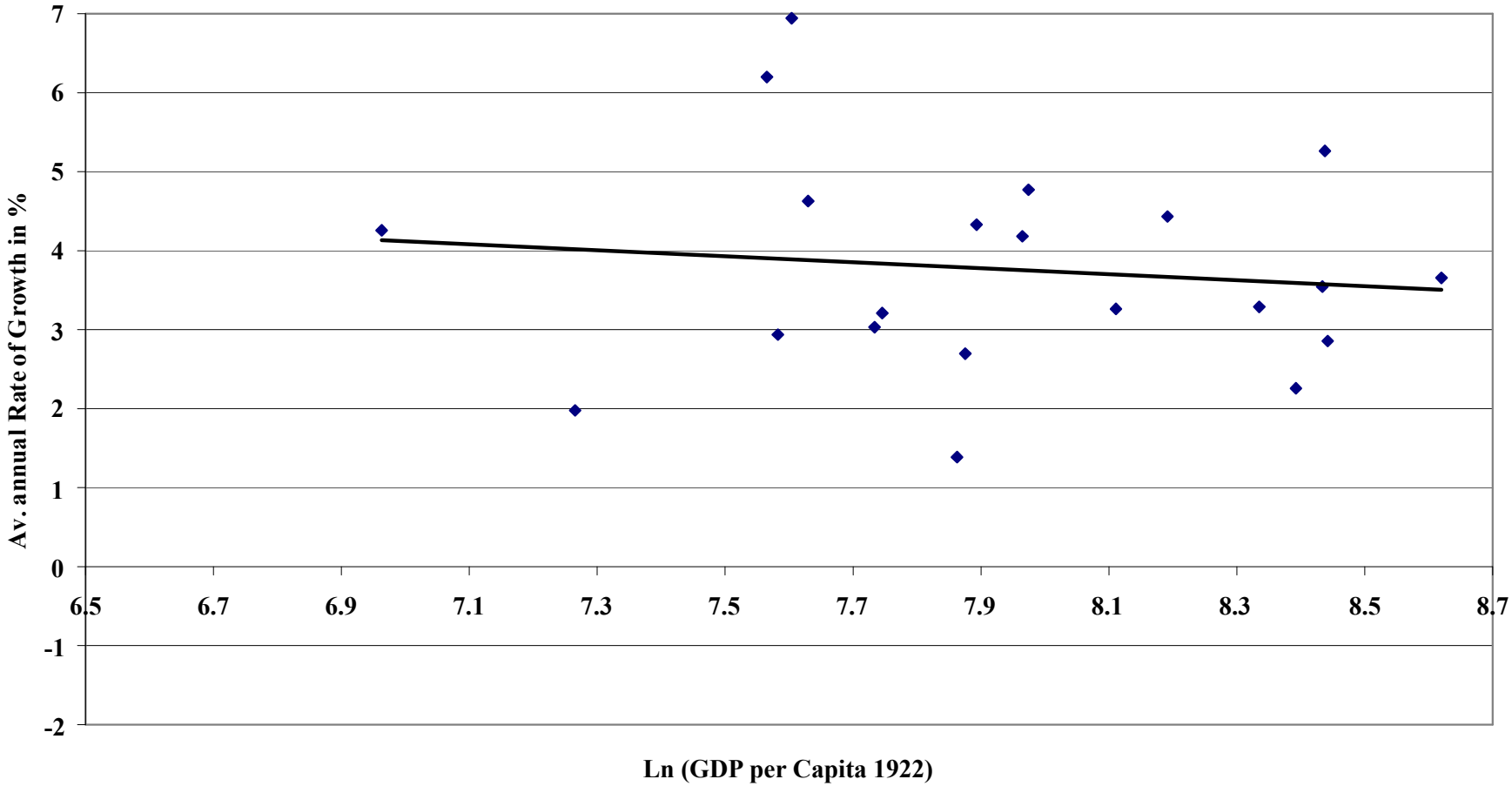
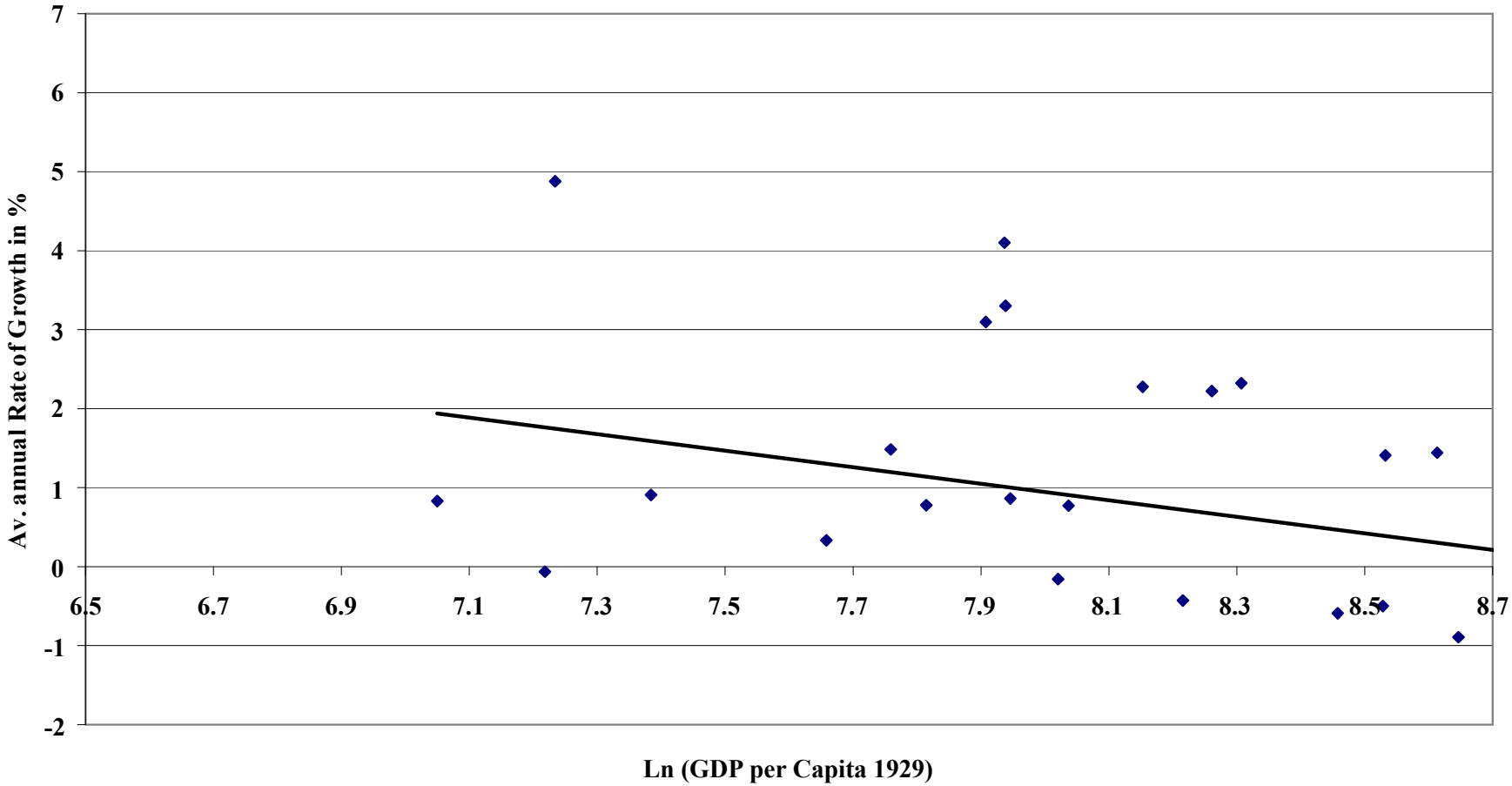


Figure 3.1 d) Unconditional Convergence, 1929-1938?
23 European Countris and the USA



Conditional Convergence, 1922-1938,
22 European Countries

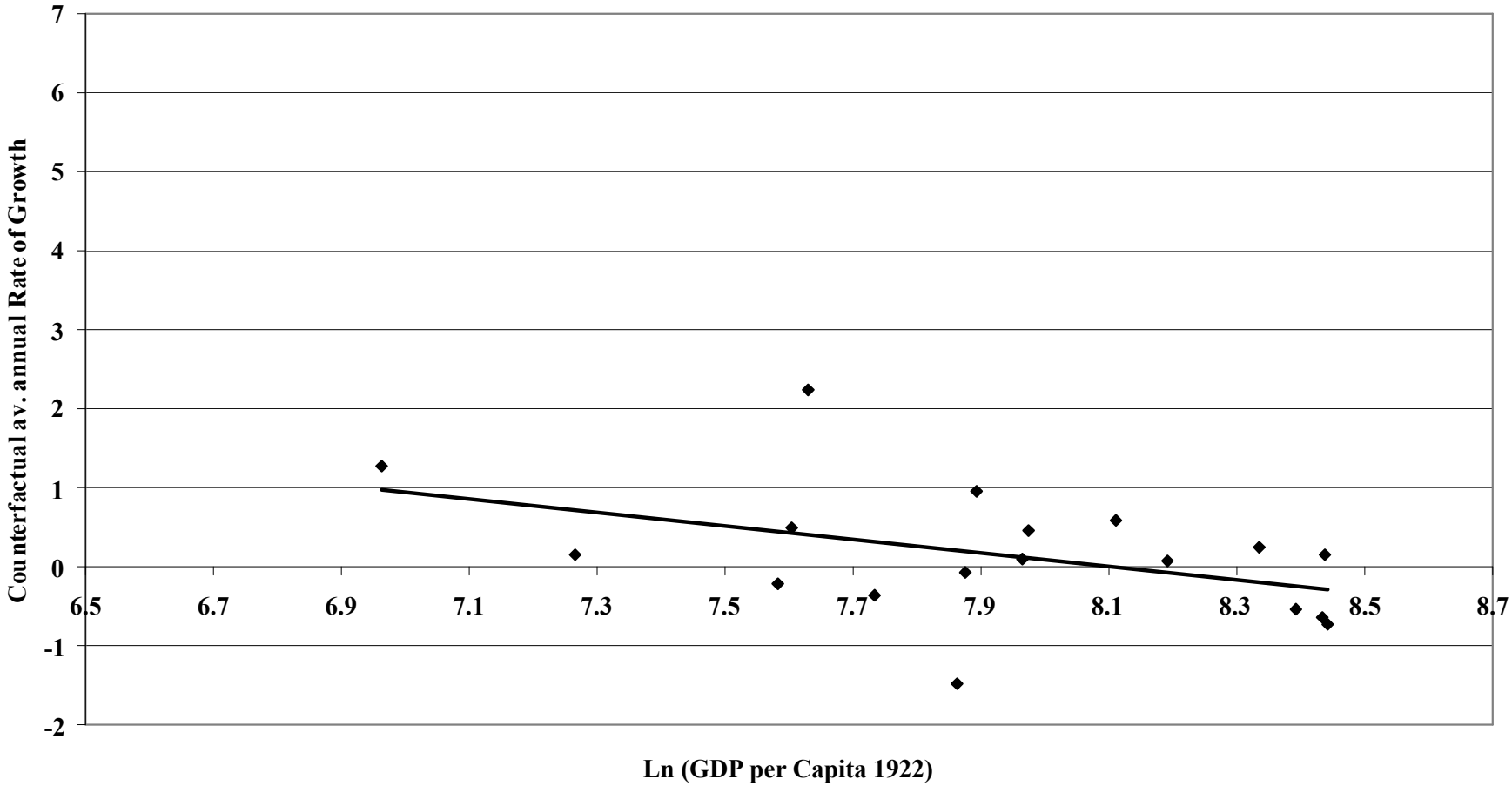


Table 1.1: Recuperation of GDP per capita to levels of 1913, 27 European Countries (Maddison 2007 and own calculations)

Country	GDP per Capita 1922 relative to 1913 in %	Year when level of 1913 was regained	Participation in WWI
Austria	83	1927	Loser
Belgium	105	1922	Winner
Denmark	106	1922	Neutral
Finland	98	1923	Neutral
France	103	1922	Winner
Germany	91	1926	Loser
Italy	102	1922	Winner
Netherlands	114	1919	Neutral
Norway	109	1919	Neutral
Sweden	94	1924	Neutral
Switzerland	108	1920	Neutral
United Kingdom	94	1924	Winner
Ireland	95	1928	Independence (from Winner)
Greece	123	1919	Winner (but enters war with Turkey 1919)
Portugal	114	1921	Winner
Spain	111	1920	Neutral
Albania	Na	Na	Independence (from Loser)
Lithuania	Na	Na	Independence (from Loser)
Latvia	Na	Na	Independence (from Loser)
Estonia	Na	Na	Independence (from Loser)
Bulgaria	59 (1924/1913)	1937	Loser
Czechoslovakia	96	1923	Independence (from Loser)
Hungary	91 (1924/1913)	1925	Loser
Poland	79	1926	Independence (from Loser)
Romania	72 (1926/1913)	1959	Winner
Yugoslavia	99	1922	Independence (from Loser)
Russia/ USSR	Na	1933	Loser

Table 1.2: Average Annual Rates of Growth (GDP per Capita), 27 European Countries and the USA (based on Maddison 2007 and own calculations)

Country	1913-1950 (StdDev)	1920-1929 (StdDev)	year of recuperation – 1929 (StdDev)	1929-1938 (StdDev)
Austria	0.18 (0.17)	4.93 (0.04)	2.68 (0.02)	-0.43 (0.07)
Belgium	0.70 (0.07)	3.99 (0.05)	2.75 (0.03)	-0.50 (0.03)
Denmark	1.55 (0.06)	2.74 (0.05)	3.53 (0.04)	1.41 (0.02)
Finland	1.89 (0.07)	4.94 (0.03)	3.97 (0.02)	3.09 (0.04)
France	1.12 (0.12)	5.16 (0.07)	5.33 (0.02)	-0.59 (0.05)
Germany	0.17 (0.16)	4.49 (0.09)	3.43 (0.04)	2.32 (0.07)
Italy	0.84 (0.09)	0.83 (0.05)	2.52 (0.03)	0.77 (0.04)
Netherlands	1.06 (0.13)	3.22 (0.02)	4.81 (0.06)	-0.89 (0.04)
Norway	2.15 (0.06)	2.71 (0.06)	3.75 (0.07)	2.55 (0.05)
Sweden	2.10 (0.04)	3.71 (0.03)	3.98 (0.03)	2.22 (0.04)
Switzerland	2.04 (0.06)	4.44 (0.03)	4.44 (0.03)	0.10 (0.03)
United Kingdom	0.93 (0.04)	1.22 (0.04)	2.42 (0.04)	1.44 (0.03)
Ireland	0.63 (0.02)	1.36 (0.02)	3.12 (0.01)	0.86 (0.03)
Greece	0.50 (0.12)	2.49 (0.01)	2.50 (0.01)	1.48 (0.05)
Portugal	1.33 (0.06)	3.17 (0.08)	2.99 (0.08)	0.91 (0.07)
Spain	0.25 (0.06)	2.92 (0.03)	2.92 (0.03)	-4.72 (0.09)
Albania	0.57 (-)	Na	Na	Na
Lithuania	Na	Na	Na	Na
Latvia	Na	5.31 (0.11)	Na	4.10 (0.12)
Estonia	Na	2.75 (0.10)	Na	3.30 (0.06)
Bulgaria	0.19 (-)	5.23 (0.11)	Na	3.35 (0.09)
Czechoslovakia	1.40 (-)	5.04 (0.05)	5.95 (0.04)	-0.68 (0.06)
Hungary	0.45 (-)	5.17 (0.08)	5.17 (0.08)	0.78 (0.05)
Poland	0.93 (-)	5.24 (0.07)	8.38 (0.04)	0.34 (0.09)
Romania	-1.04 (-)	-2.91 (0.03)	Na	0.83 (0.05)
Yugoslavia	1.04 (-)	3.11 (0.03)	3.37 (0.03)	-0.06 (0.06)
Un-weighted Average	**0.91 (-)**	**3.43 (-)**	**3.90 (-)**	**0.88 (-)**
Weighted Average	**0.72 (-)**	**3.21 (-)**	**3.69 (-)**	**0.53 (-)**
Russia/ USSR	1.76 (-)	Na	Na	4.87 (0.05)
USA	1.61 (0.09)	1.94 (0.04)	1.94 (0.04)	-1.32 (0.09)

Table 1.3: Distribution Dynamics: Country Ranking acc. to GDP per capita 1922, 1929, 1938 (based on Maddison 2007 and own calculations)

1922		1929		1938	
Country	GDP per Capita	Country	GDP per Capita	Country	GDP per Capita
UK	4637	Switzerland	6332	Switzerland	6390
Switzerland	4618	Netherlands	5689	UK	6266
Netherlands	4599	UK	5503	Denmark	5762
Belgium	4413	Denmark	5075	Netherlands	5250
Denmark	4166	Belgium	5054	Germany	4994
France	3610	France	4710	Belgium	4832
Germany	3331	Germany	4051	Sweden	4725
Sweden	2906	Sweden	3869	France	4466
Austria	2877	Austria	3699	Norway	4337
Norway	2784	Norway	3472	Latvia	4048
Italy	2631	Italy	3093	Estonia	3771
Ireland	2598	Czech.	3042	Finland	3589
Estonia	2311	Ireland	2824	Austria	3559
Spain	2284	Estonia	2802	Italy	3316
Finland	2058	Latvia	2798	Ireland	3052
Czech.	2006	Spain	2739	Greece	2677
Greece	1963	Finland	2717	Hungary	2655
Latvia	1929	Hungary	2476	Poland	2396
Portugal	1430	Greece	2342	Spain	1790
Poland	1382	Poland	1994	Portugal	1747
Yugoslavia	1057	Portugal	1610	Bulgaria	1595
		Yugoslavia	1364	Yugoslavia	1356
		Bulgaria	1180	Romania	1242
		Romania	1152		
		Albania	926		
No data on Albania, Bulgaria, Hungary, Romania				No data on Albania, Czechoslovakia	
Poorest as % of Richest: 22.8		Poorest as % of Richest: 14.6		Poorest as % of Richest: 19.4	

Table 3.1: Primary School Enrolment and Investment Dynamics, 1922-1938

	Primary School Enrolment Rates		Per Capita consumption of cement and steel (UK 1925-29=100)		Change in Capital Stock
	1922	1938	1922	1938	1938 as % of 1922
Austria	0.70	0.71	44	117	91
Belgium	0.62	0.73	127	191	125
Denmark	0.41	0.67	75	114	157
Finland	0.26	0.51	37	119	180
France	0.86	0.79	72	93	148
Germany	0.73	0.73	101	229	119
Italy	0.45	0.59	48	79	209
Netherlands	0.70	0.74	79	127	135
Norway	0.69	0.72	81	129	161
Sweden	0.67	0.64	56	168	188
Switzerland	0.71	0.70	63	122	130
United Kingdom	0.78	0.82	54	162	172
Ireland	0.78	0.87	34	86	-
Greece	0.40	0.53	7	37	-
Portugal	0.19	0.27	12	29	-
Spain	0.35	0.36	30	45 (1935)	184
Albania	Na	Na	Na	Na	-
Lithuania	Na	Na	Na	Na	-
Latvia	0.22	0.37	Na	Na	-
Estonia	0.14	0.27	Na	Na	-
Bulgaria	0.41	0.73	9	28	-
Czechoslovakia	0.71	0.66	32	92	-
Hungary	0.53	0.64	30	40	-
Poland	0.24	0.57	23	47	-
Romania	0.34	0.59	17	34	-
Yugoslavia	0.20	0.42	19	29	-

Sources: see text.

Table 3.2: Growth Accounting for Western Europe, 1900-1938 (% growth per year), according to Equ. (4)

1900-1914				
	Capital Accumulation	Total Hours Worked	TFP	GDP Growth
Belgium	1.08	0.50	-0.22	1.35
Denmark	1.35	0.27	1.76	3.38
Finland	1.10	0.37	0.85	2.32
France	0.55	-0.15	0.60	1.00
Germany	1.30	0.35	-0.08	1.57
Italy	1.80	-0.37	1.86	3.30
Netherlands	0.92	0.65	0.73	2.30
Norway	1.41	0.46	0.84	2.70
Spain	1.22	-0.48	0.80	1.53
Sweden	1.12	0.92	-0.08	1.96
Switzerland	1.01	0.52	0.37	1.90
UK	0.65	0.60	0.21	1.46

1922-1929				
	Capital Accumulation	Total Hours Worked	TFP	GDP Growth
Belgium	0.86	0.13	2.61	3.60
Denmark	1.17	1.01	2.20	4.39
Finland	1.42	0.70	3.42	5.54
France	1.36	0.40	4.19	5.95
Germany	0.56	-1.72	5.22	4.06
Italy	2.40	0.01	1.00	3.41
Netherlands	0.95	1.14	2.50	4.59
Norway	0.98	-0.04	3.72	4.67
Spain	1.95	0.27	1.45	3.68
Sweden	1.22	2.00	1.78	5.00
Switzerland	0.83	0.18	4.56	5.57
UK	1.53	0.88	0.72	3.13

1929-1938				
	Capital Accumulation	Total Hours Worked	TFP	GDP Growth
Belgium	0.30	-1.06	0.72	-0.04
Denmark	0.91	1.18	0.12	2.20
Finland	0.97	1.05	1.80	3.83
France	0.53	-2.23	1.30	-0.40
Germany	0.40	0.55	2.01	2.96
Italy	1.12	-0.44	0.88	1.55
Netherlands	0.37	0.12	-0.17	0.33
Norway	1.62	0.24	1.24	3.10
Spain	0.83	-0.29	-4.31	-3.78
Sweden	1.34	-0.14	1.35	2.55
Switzerland	0.31	-0.49	0.74	0.56
UK	1.35	0.73	-0.20	1.88

1922-1938				
	Capital Accumulation	Total Hours Worked	TFP	GDP Growth
Belgium	0.56	-0.50	1.61	1.68
Denmark	1.03	1.10	1.10	3.23
Finland	1.18	0.89	2.56	4.63
France	0.92	-0.99	2.66	2.59
Germany	0.48	-0.52	3.52	3.48
Italy	1.72	-0.23	0.94	2.43
Netherlands	0.65	0.60	1.09	2.33
Norway	1.32	0.11	2.41	3.84
Spain	1.36	-0.03	-1.60	-0.27
Sweden	1.28	0.87	1.55	3.70
Switzerland	0.55	-0.17	2.54	2.92
UK	1.44	0.80	0.23	2.47

Country specific Capital Shares in Order of Table (from Madsen 2007): 0.37, 0.37, 0.33, 0.38, 0.40, 0.38, 0.32, 0.47, 0.35, 0.33, 0.33, 0.44.

Table 3.3: Decomposing Labour Productivity Growth for Western Europe, 1900-1938 (% growth per year), according to Equ. (5)

1900-1914			
	Capital Deepening	TFP	Labour Productivity (GDP per Total Hours Worked)
Belgium	0.78	-0.22	0.56
Denmark	1.19	1.76	2.95
Finland	0.92	0.85	1.77
France	0.64	0.60	1.23
Germany	1.07	-0.08	0.98
Italy	2.02	1.86	3.89
Netherlands	0.61	0.73	1.35
Norway	1.00	0.84	1.84
Spain	1.48	0.80	2.28
Sweden	0.66	-0.08	0.58
Switzerland	0.75	0.37	1.12
UK	0.18	0.21	0.39

1922-1929			
	Capital Deepening	TFP	Labour Productivity (GDP per Total Hours Worked)
Belgium	0.78	2.61	3.39
Denmark	0.59	2.20	2.79
Finland	1.08	3.42	4.49
France	1.11	4.19	5.30
Germany	1.69	5.22	6.91
Italy	2.40	1.00	3.40
Netherlands	0.41	2.50	2.91
Norway	1.02	3.72	4.74
Spain	1.80	1.45	3.25
Sweden	0.22	1.78	2.00
Switzerland	0.74	4.56	5.30
UK	0.85	0.72	1.57

1929-1938			
	Capital Deepening	TFP	Labour Productivity (GDP per Total Hours Worked)
Belgium	0.93	0.72	1.65
Denmark	0.23	0.12	0.34
Finland	0.45	1.80	2.25
France	1.90	1.30	3.20
Germany	0.04	2.01	2.05
Italy	1.38	0.88	2.26
Netherlands	0.32	-0.17	0.15
Norway	1.41	1.24	2.65
Spain	0.99	-4.31	-3.32
Sweden	1.41	1.35	2.76
Switzerland	0.55	0.74	1.29
UK	0.78	-0.20	0.58

1922-1938			
	Capital Deepening	TFP	Labour Productivity (GDP per Total Hours Worked)
Belgium	0.86	1.61	2.47
Denmark	0.40	1.10	1.50
Finland	0.75	2.56	3.31
France	1.53	2.66	4.19
Germany	0.82	3.52	4.34
Italy	1.86	0.94	2.80
Netherlands	0.36	1.09	1.45
Norway	1.23	2.41	3.63
Spain	1.37	-1.60	-0.23
Sweden	0.85	1.55	2.40
Switzerland	0.64	2.54	3.17
UK	0.82	0.23	1.05

Country specific Capital Shares in Order of Table (from Madsen 2007): 0.37, 0.37, 0.33, 0.38, 0.40, 0.38, 0.32, 0.47, 0.35, 0.33, 0.33, 0.44.

Table 3.4 Cars Produced and Used in four major European Economies, 1923-1949.

		Passenger Cars (1000)		Commercial Vehicles (1000)	
		Production	Use	Production	Use
UK	1923	71	384	24	259
	1929	182	981	57	428
	1938	341	1944	104	583
	1949	412	1961	218	896
Germany	1923	31	98.6	9	53.5
	1929	117	422	39	155
	1938	277	1272	65	384
	1949	104 (FRG)	352	58 (FRG)	329
France	1923	-	294	-	155
	1929	211	930	42	366
	1938	200	1818	27	451
	1949	188	1200*	98	750*
Italy	1923	-	53.8	-	24.5
	1929	-	170	-	52.7
	1938	59	289	8	83.6
	1949	65	267	21	214

Sources: Mitchell (2003), Svennilson (1954), (*) own estimate.

Table 3.5: Energy Production in Europe and the United States, 1922 – 1950 (Billion Kilowatt-hours)

	Europe			United States		
	Hydro	Thermal	Total	Hydro	Thermal	Total
1922	24.5	36.0	60.5	21.3	39.9	61.2
1929	43.7	70.3	114.0	-	-	116.7
1937	65.3	106.2	171.5	48.3	98.2	146.5
1950	112.1	189.1	301.2	101.0	287.7	388.7

Source: Svennilson (1954).