

Aggregate Growth, 1913-1950

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First Draft, October 2007

Preliminary, please do not quote

Abstract

We survey aggregate growth in a sample of 26 European countries during the interwar period. We discuss the available data, possible explanations for a slowdown in growth rates and test the explanatory power of several hypotheses put forward in the literature.

Keywords: Aggregate Growth, Interwar Period, Europe

I. European Growth Performance during the interwar period: a comparative perspective

Average annual growth-rates of the European economy between 1913 and 1950 were low. “The Second Thirty Years War” (Temin) is often used as a contrast to highlight the following success of European integration and the Golden Age of Growth. But indeed, growth rates 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 experiences not just afterwards but also before 1914. The literature has pointed to several key factors that may account for this slowdown of growth rates. 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 (Svennilson 1954). Apart from this, many authors have argued in one way or another, that a failure to coordinate economic policies prevented Europe to realize its full economic potential (Feinstein, Temin, Toniolo 1997). Emanations of this coordination failure can be seen in both, a misallocation of resources across states (limits on migration, declining capital mobility, increasingly protectionist trade policies) but also within states (namely a marked increase in military spending). Especially the failure to resolve the international issue of war debt and reparations (Ritschl 1998) and inappropriate monetary policies during the great depression (Eichengreen 1985, 1992) are discussed in this context. Some authors attempted to relate these coordination failures to increased costs of political coordination within states due to the extension of the political franchise (Nurkse 1944, Johnson 1965, Eichengreen and Temin 2003) as well as between states due to the

emergence of new independent states (for example Thomson 1966, also Broadberry and Harrison 2005).

The European economy had a large potential for growth after World War One. There is plenty of evidence for significant technological progress including the beginnings of motorization, advances in chemical and electrical engineering, the construction of an extensive road network, improvements in telecommunication, the electrification of large parts of the European countryside, and significant sectoral change. The governments of newly created states all aimed for a rapid economic development of their largely backward countries, and the records show increasing stocks of physical and human capital, high and in some cases rising participation rates in the labour markets with a steady growth of the European population. But it seems clear that Europe did not enjoy a growth-enhancing environment during the 1920s and 1930s. World War One brought the liberal economic order of the late 19th century to an end, foreshadowed by increasing protectionism in large parts of the Atlantic economy and first signs of dissolution of the Central European Empires from the 1880s onwards (Schulze and Wolf 2007). Moreover, protectionism continued after the war. Many tariffs, quotas and other restrictions on trade installed during the war remained prevalent during the 1920s. After the 1929 crisis and problems of overproduction, several countries made another decisive move towards protectionism and even autarky in the 1930s (Findlay and O'Rourke 2005). In sum, the degree of trade openness decreased severely during the interwar period. This probably led to lower GDP growth rates since openness is correlated with increases in productivity and economic growth (Alcalá and Ciccone 2004). Similarly, there is strong evidence that international capital flows were less important than in previous and subsequent periods. The gold standard was restored only for a short period and only in the form

of a modified gold-exchange standard. Whether this gold-exchange standard was ever a credible monetary framework is disputed in the literature (Bordo et al. 1999 vs. Obstfeld and Taylor 2003). The problem of war reparations hampered international transfers of capital, which rarely followed the pattern of capital scarcity (as described in Barro and Sala-i-Martin 1995). 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).

In the following we will survey the European growth experience during the interwar years, with a special focus on the period 1920-1939. 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. Moreover, given that the time-span under consideration is relatively short for an analysis of economic growth, we will exploit as far as possible the large cross-sectional variation in growth rates across European countries. Section I starts with a brief description of European economic growth, 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 that followed a longer period of expansion with the Industrial Revolution at least since 1800. Note however, that this decline slowed down but was not reversed during the “Gold Age” of economic growth and continued thereafter. Figure 1.2 contrasts this 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 21. 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 volatility of growth rates 1913-1950 compared to 1870-1913, both over time and in the cross-section of European countries. Short periods of very low or negative growth rates were followed by short periods with very high growth rates, which cannot be fully explained by war and reconstruction.

(Figure 1.4 about here)

Figure 1.4 plots the annual growth rates of per capita GDP of 17 European countries over 1870-1950. Clearly, volatility in both the cross-section and over time starts to increase with World War One and continues to stay above the pre-war level afterwards. While the two wars apparently led to higher volatility in growth, volatility stayed high even in peacetime during the 1920s and 1930s.

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 the growth of GDP per capita in Europe after World War One? 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 endogeneity, 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 other strong country- or country-group-specific factors affected growth rates. One of these factors may have been 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. However, it is notable 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 economy was entirely stagnant 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 26 European over the years 1920-1939. 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 rather complex: in general all European countries share the experience of relatively high growth rates in the decade after the Great War. In part this can be explained by reconstruction growth, but several neutral states that had not experienced any major destruction during the war grew much faster than the European average, notably Sweden and Finland in the north 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 (Hjerpe and Jalava 2006). We will come back to these factors in section III.

Next, the great depression is a watershed for Europe's growth experience. During the second decade of the interwar period growth slowed down in all European countries except Norway and notably the UK. A prominent explanation for this is the UK's early departure from the Gold Standard in September 1931 that limited the negative effects of price deflation (Eichengreen and Sachs 1985). Table 1.2 suggests that indeed countries that followed the UK off Gold in 1931 (notably Scandinavia, Latvia and Estonia but also Bulgaria) experienced growth rates above the European average in stark contrast to members of the "Gold Bloc" (France, Belgium and the Netherlands, Switzerland and not at least Poland). That monetary policy was not the only factor to drive growth rates in the 1930s is underlined by the successor states of the former Habsburg Empire that all left gold early but failed to recover. We will explore below what additional factors might account for this.

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 followed by the Netherlands during the first decade after the Great War, 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 joined by 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 does not suggest that (unconditional) convergence was a major factor to explain the European growth experience during the interwar years. Nevertheless, there might have been convergence, conditional on country- or country-group specific factors that affected the pace of productivity growth via structural change, schooling, the propensity of save and invest and the like. To explore these factors more systematically, 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? The predictions of the neoclassical growth model (that is, the Solow growth model) for economic growth are well known (see, for example, Barro and Sala-i-Martin (2003): ch. 1). In the benchmark neoclassical model with labour-augmenting technological progress, growth is driven by capital accumulation, the returns to which decline with higher income. Therefore, the model predicts convergence: a poor country will grow relatively fast (capital and output grow faster than average), while a rich nation will grow quite slowly (capital and output grow slower than average). Perfect international capital markets accelerate the speed of convergence: less developed economies can use international markets to finance capital accumulation, because richer countries can earn higher returns on their savings by lending to the poor. Other implications of the model are straightforward. The rate of growth as the economy converges to the steady state is determined by the rate of capital accumulation. Capital accumulation is in turn determined by the savings rate (the proportion of output used to create more capital rather than being consumed) and the rate of capital depreciation. Policy measures like tax cuts or investment subsidies can affect the steady state level of output but not the long-run growth rate. In an influential contribution, Mankiw et al. (1992) show that observed rates of convergence among countries are extremely low, below 2 percent per year. Coefficients of these magnitudes imply a half-life of convergence anywhere from about 30 to 50 years. To account for this they propose an augmented Solow model that includes human capital formation, for example through schooling, and show that this provides a better description of cross-country income differences.

Recent research has questioned much of the explanatory power of the Solow model, and other factor-accumulation based models of growth. The current consensus is that efficiency is 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 by allowing for differences in the quality of schooling and in health status of the population; to attempts to account for the age composition of the capital stock; to sectoral disaggregations of output; and to several other robustness checks (Caselli 2005). What is more, several stylized facts of economic growth do not fit with neoclassical growth models (Easterly and Levine 2001). Income diverges over the long run because, despite the persistence of factor accumulation, growth is not persistent and the growth path of countries exhibits remarkable variation across countries. Moreover, national policies and institutions 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); North 1990). Finally, the economic geography literature has stressed that economic activity is highly concentrated in certain richest areas which can be better captured by model exhibiting increasing returns and economies of agglomeration (Redding and Venables 2004).

[To be continued: growth accounting, the components of growth and causes for labour productivity growth]

III. Explaining European Growth Rates 1920-1939

III. 1 Conditional Convergence?

We start with a test of the strongest possible hypothesis from neoclassical growth theory: unconditional convergence. This implies regressing the average annual rate of growth over a time period T on a common constant and the initial levels of per capita GDP (see Barro and Sala-i-Martin 2003). As shown in Table 3.1 we can clearly 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 fit of the model is deplorable; the estimated parameters are far from significant. This holds also when we extend the sample and use the annual rate of growth defined as $\log(y_{t+1}/y_t)$ instead of the average annual rate of growth (Table 3.1, last column). Given the evidence from section I, especially table 1.3, this is not surprising. The absence of unconditional convergence over the years 1913-1950 or 1913-1939 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 unrelated to their 1913 levels of development. However, note that - while not significant - theory for the peace years the initial levels enter with the sign suggested by neoclassical, especially the period 1920-1929. In this light the results from table 3.1 encourage us to test for convergence over 1920-1939 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

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 very 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 et al. (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 about 89 million randomly drawn regressions. Sala-i-Martin et al. (2004) show that three variables have a particularly high explanatory power for growth rates, namely the rate of primary school enrolment, the relative price of investment goods and the initial level of income. Some geographical and institutional variables do also help to explain growth rates, but to a lesser extent.

On these grounds we will pursue the following empirical strategy: first we estimate a model of conditional convergence that enriches the baseline Solow-model by a measure of primary school enrolment, and the investment environment. Given what we said in the introduction and what the data description showed so far, we do not expect that such a simple model can capture all variation in European growth rates, but hope that it might provide us with a useful benchmark. If so, we can build on this benchmark model to test additional factors that feature prominently in the literature - keeping in mind that the power of that test will be low. 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 (20 years earlier) instead of contemporaneous rates to take into account that primary school enrolment should affect the economy only with a certain time-lag. We lack reliable data on the prices of investment goods relative to the general price level but capture investment by an index of investment based on per capita consumption of steel and cement (from Svernilson 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. Table 3.2 gives some simple OLS estimates for such an augmented neoclassical growth model for the period 1920-1939.

(Table 3.2 about here)

All three key variables apparently affected growth rates with the expected sign (table 3.2, column 1). Growth increased in investment and primary school enrolment which is interpreted here as a proxy for human capital formation. Conditional on this, growth rates were lower, the higher growth in the previous period was, hence we find evidence for conditional convergence (see Barro and Sala-i-Martin 2003, Chap. 11). However, the point estimates and especially the effect of school enrolment are very sensitive to the inclusion of country and period effects. Given the historical experiences of many European countries and the massive changes in the institutional environment during the interwar years, we would expect that both country and time effects should matter. A simple way to look at this more systematically is to allow for unobserved factors that were both country-specific and changed over time. To avoid running out of degrees of freedom, in table 3.3 we re-estimate the benchmark model

with country-specific effects that are allowed to vary for the time prior to the great depression (1920-1929) and thereafter (1930-1939).

(Table 3.3 about here)

The inclusion of sub-period specific country effects takes into account (among other things) that countries were destroyed during the Great War to a different degree and were also to a different degree affected by the great depression. Controlling for this increases the explanatory power of all three benchmark variables: previous income, investment and lagged school enrolment. In column 2 of table 3.3 we test whether these effects were stable over time and find that they were not. While the changes are small there is evidence for some structural break in the model 1929-30. Especially the accumulated human capital (enrolment) had a less positive effect on growth after 1929 than for the period 1920-1929. To understand this, note that average rates of school enrolment increased significantly over the late 19th and early 20th century. Average primary enrolment rates in the sample showed a secular increase from below 0.5 in 1890 to 0.54 in 1920 and 0.6 in the 1930s. The estimates indicate that this increase in human capital was poorly used in the 1930s and we will have to seek for explanations of this finding. Instead, investment rates also tended to raise, but varied over time. The average of the index (with UK 1925_29 = 100) stood at 38 in 1920 and increased without interruption to 86 in 1929. Afterwards, investment declined during the depression to reach a trough in 1932 at 59 before the index increased again to reach 126 in 1939. One might wonder, to what extent the estimated effect of investment on growth is upward biased due to endogeneity. Aggregate growth should as well increase aggregate demand for investment as

investment fosters growth. Column 3 of table 3.3 presents an IV estimation which indicates that our estimates are not biased downwards.¹ Taken together, the model fit encourages us to use this as a benchmark for our further analysis. However, the large effects of unobserved country effects and the instability of some coefficients over time suggest that other factors have to be taken into account to understand aggregate growth in the interwar years.

In a next step we extend our model by several policy variables and other structural factors that are ignored in the neoclassical framework. To start with, we consider the effects of monetary and trade policies on growth, two tightly interrelated issues. The role of monetary policy for growth can be seen in enhancing macroeconomic stability and increasing the efficiency of allocation not at least through trade and capital flows. The gold standard, which prior to World War One helped to create a stable economic environment that fostered trade and capital flows, was abandoned during the war. The reintroduction of the gold-standard in the wake of the conference of Genoa 1922 was an attempt to regain stability and credibility for many European currencies after pressure from war-debts and the need to transform production after the war. Especially the newly created states were desperate to import stability, especially to attract foreign capital, with adherence to a resurrected gold standard. By 1926 14 of our 26 sample countries had joined, by 1929 all sample countries except Spain, Portugal that never were on gold and Yugoslavia that joined not before 1931 were part of this monetary system. However, joining the interwar gold standard had not the expected effects for reasons that are beyond the scope of this chapter (see Obstfeld and Taylor 2003). There is little evidence that adherence to the gold standard had a positive effect on trade. In contrast, there is evidence that

¹ If anything, the opposite seems to be true which might be due to serial correlation. We rerun the estimates with the growth rate of investment instead of investment in t and could reproduce our results without major changes. Nevertheless, we will employ a GMM systems estimator in an updated version.

trade after the war continued to be fragmented, and to be fragmented along lines that would become prominent in the 1930s (Ritschl and Wolf 2003). Also, the evidence that adherence to the gold standard of the 1920s increased the efficiency of capital markets is mixed at best (Obstfeld and Taylor 2003). With the spread of deflationary pressures during the depression after 1929, adherence to the gold standard changed from being a doubtful asset into an outright burden: without international coordination, a country under the gold standard was unable to loosen monetary policy and help economic recovery (Eichengreen 1992). Moreover, the decline in prices and the slump in aggregate demand triggered dumping strategies and in turn protectionism. When the UK left the gold standard in September 1931, her main trading partners esp. in Scandinavia followed suit, while France and her main trading partners stayed on gold; Germany pursued from 1931 onwards a strategy of exchange controls that became more and more protectionist within a larger central European trading bloc: European trade declined with probably adverse effects for growth.

A simple way to capture all these complex factors is to extend our benchmark model by an indicator variable set to 1 whenever a country adheres to the gold standard and 0 else. Moreover, we add a control for openness ratios (measured as the sum of imports and exports over national income, all in local current currency). We expect to find that openness is positively related to growth, while adherence to gold might well have adverse effects on growth. Table 3.4 gives the results.

(Table 3.4 about here)

The evidence from table 3.4, column 1 is far from conclusive. In a simple OLS estimation neither adherence to gold nor trade openness has a significant effect on

growth. However, the effects of openness and monetary policy on growth should vary widely across countries due to their different economic structures: the extended model should fit better some countries than others. If we allow for various forms of cross-sectional heteroskedasticity we find that countries that were more open to trade tended to grow faster and that adherence to gold had in general an adverse impact. The watershed of the great depression did surprisingly little to change this: growth declined, trade collapsed and there is great variation in monetary policies across Europe after 1929-31. But the relationship between trade and growth and the impact of adherence to gold and growth did apparently not change or at least not enough to be clearly visible in our estimation.

Extensions with other policy variables:

- political instability
- impact of military spending on growth

III. 2. Productivity Performance

Instead of estimating (semi-) structural equations derived from theory, another way to explore aggregate growth is to analyse its underlying components. GDP per capita can be decomposed into labour productivity and the labour input per population:

$$(1) \quad \frac{GDP}{population} = \frac{GDP}{labour\ input} \times \frac{labour\ input}{population}.$$

The standard approach to measure labour input is to use the number of hours worked in an economy, hence labour productivity would be measured by GDP per total hours worked. Total hours worked in turn can be split into average annual hours worked per employed person and total employment. Hence, we can decompose GDP per capita into three elements: labour productivity, the total participation rate defined as total employment per population and expressed in percent, and average annual hours worked expressed in 100s:

$$(2) \quad \log \frac{GDP}{population} = \log \frac{GDP}{employment \times hours\ worked} + \log 100 \frac{employment}{population} + \log \frac{hours\ worked}{100}$$

The data that is necessary for this decomposition is available only for a smaller subset of European countries over the years 1920-1939. Jakob B. Madsen (2007) has compiled a large international data set that includes annual estimates of hours worked for the following 13 European countries: Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the UK. Hence, data for eastern European countries is entirely missing from this set. Nevertheless, it can be very useful to explore the available evidence, keeping in mind that it will hardly be representative for all parts of Europe. To do this, we employ a two-step approach. First we document the changes in labour productivity, participation rates and hours worked across the 13 sample countries 1920-1939 and show how this relates to growth. Next, we focus on changes in labour productivity and analyse which factors can account for them, especially accumulation of physical capital, the accumulation of human capital via schooling, changes in energy usage, and a changing sectoral composition of the economy. Figure 3.1 shows how the three components added up to (weighted) average GDP per capita over the 13 named

countries 1920-1939. **[We will have to put this into a larger time horizon to show whether labour productivity growth slowed down during the interwar years].**

(Figure 3.1 about here)

The average level of GDP per capita is apparently largely explained by participation rates and average annual hours worked, but the contribution of labour productivity is increasing. Put differently, on average over the 13 sample countries we find that growth in GDP per capita was mostly driven by labour productivity, while changes in participation rates had a negligible impact and average annual hours worked a significant negative effect. To see this more clearly, figure 3.2 shows the rates of growth of the three components 1920-1939 together with GDP per capita growth rates.

(Figure 3.2)

The contribution of labour productivity to aggregate growth was clearly positive **(we have to check some of this data)**, in contrast to that from hours worked and participation. On average, labour productivity increased by 2.7% per annum, participation defined in employment per total population rose by 0.2% per annum, while hours worked actually declined by 0.6% per annum. As so often, these aggregate figures mask large cross-country variations. The largest reduction in hours worked took place in France, Norway and Germany while there was little change in the Netherlands, Portugal or Spain. The Scandinavian Countries, Germany and the UK experienced increasing participation rates, while other showed stagnation or

decline. Labour productivity shows even more cross-country variations (see table 3.5). Productivity increased by 80% -100% between 1920 and 1939 in all Scandinavian countries (excl. Denmark) but also in Germany and in France, improved significantly elsewhere but rather little in the UK. Spanish labour productivity did not visibly improve over the period, which is unsurprising given the political circumstances of the Civil War.

(Table 3.5 about here)

Table 3.5 contains several striking facts. First, labour productivity increased rapidly during the 1920s, much less so during the 1930s (**we have to check some of this data**). Second, labour productivity typically did not decline during the great depression but rather continued to improve slowly. And finally, third there was a clear change in country ranking: notably the UK lost her position close to the top, while Germany moved upward in the ranking.

What factors can account for this very heterogeneous experiences? In the following we will explore three possible source for changes in labour productivity: the accumulation of both physical and human capital, technological change, and structural changes in the economies, especially a relative decline in agricultural employment.

[To be continued]

IV. Summary and Conclusions

Let us try summarize 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 World War One but went far beyond that. Especially the new states in eastern Europe made much effort to modernize their economies and help a transition into industrialization. Investment and Energy Consumption grew, and there are countless examples for technological advance during the interwar years. 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, literacy and so forth. We showed that many predictions from standard neoclassical growth theories hold for the interwar period. There was conditional convergence, human capital and the investment environment did contribute to growth. But there is evidence that the potential from these manifold sources for growth was not well exploited. Conflict about the redistribution of economic and political power in the wake of World War One slowed down investment. Moreover, 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.

[To be continued]

Sources and References (incomplete)

Acemoglu, Daron, Simon Johnson, and James A. Robinson, 2002, "Reversal of Fortunes: Geography and Institutions in the Making of the Modern World Income Distribution," *Quarterly Journal of Economics*, Vol. 117 (November), pp. 1231–94.

———, and Yunyong Thaicharoen, 2003, "Institutional Causes, Macroeconomic Symptoms: Volatility, Crises, and Growth," *Journal of Monetary Economics*, Vol. 50 (January), pp. 49–123.

Easterly, William, and Ross Levine, 2003, "Tropics, Germs, and Crops: How Endowments Influence Economic Development," *Journal of Monetary Economics*, Vol. 50 (January), pp. 3–39.

Engerman, Stanley L., and Kenneth L. Sokoloff, 1997, "Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States," in *How Latin America Fell Behind*, ed. By Stephen Haber (Stanford, California: Stanford University Press), pp. 260–304.

Hall, Robert E., and Charles I. Jones, 1999, "Why Do Some Countries Produce So Much More Output per Worker Than Others?" *Quarterly Journal of Economics*, Vol. 114 (February), pp. 83–116.

Mauro, Paolo, 1995, "Corruption and Growth," *Quarterly Journal of Economics*, Vol. 110 (August), pp. 681–712.

North, Douglass C., 1990, *Institutions, Institutional Change and Economic Performance* (New York: Cambridge University Press).

Prados de la Escosura, L (2005). El progreso económico de España, Bilbao: Fundación BBVA.

J. Bradford DeLong and Barry Eichengreen (1993), "The Marshall Plan: History's Most Successful Structural Adjustment Programme," in Rüdiger Dornbusch, Wilhelm Nöbling, and Richard Layard, eds., Postwar Economic Reconstruction and Lessons for the East Today (Cambridge, MA: M.I.T. Press), pp. 189-230.

Barro, R., Mankiw, G. and Sala-i-Martin, X. (1995): Capital Mobility in Neoclassical Models of Growth. American Economic Review, March

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

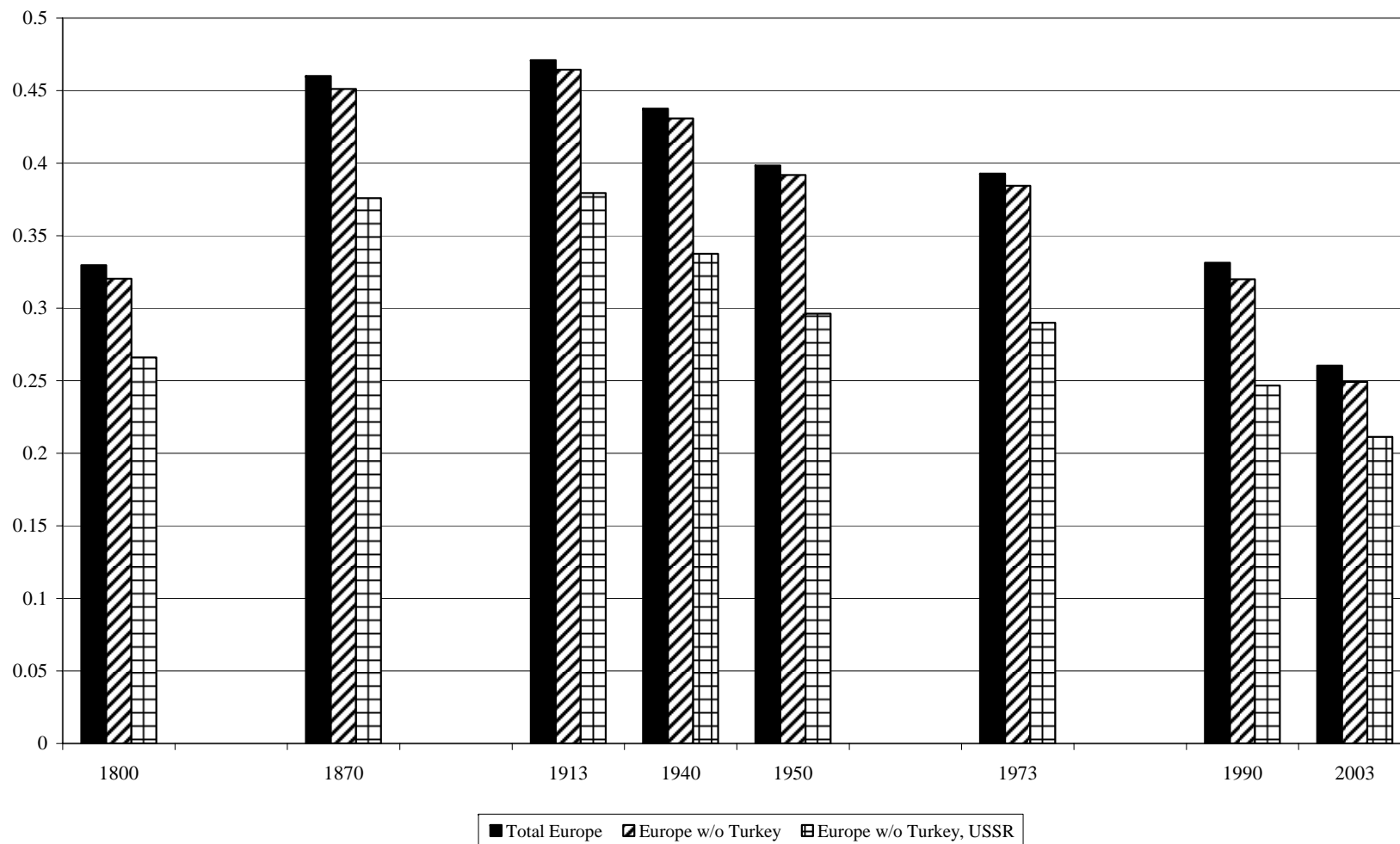


Figure 1.2: European GDP, 1870-2003 (based on Maddison 2007)

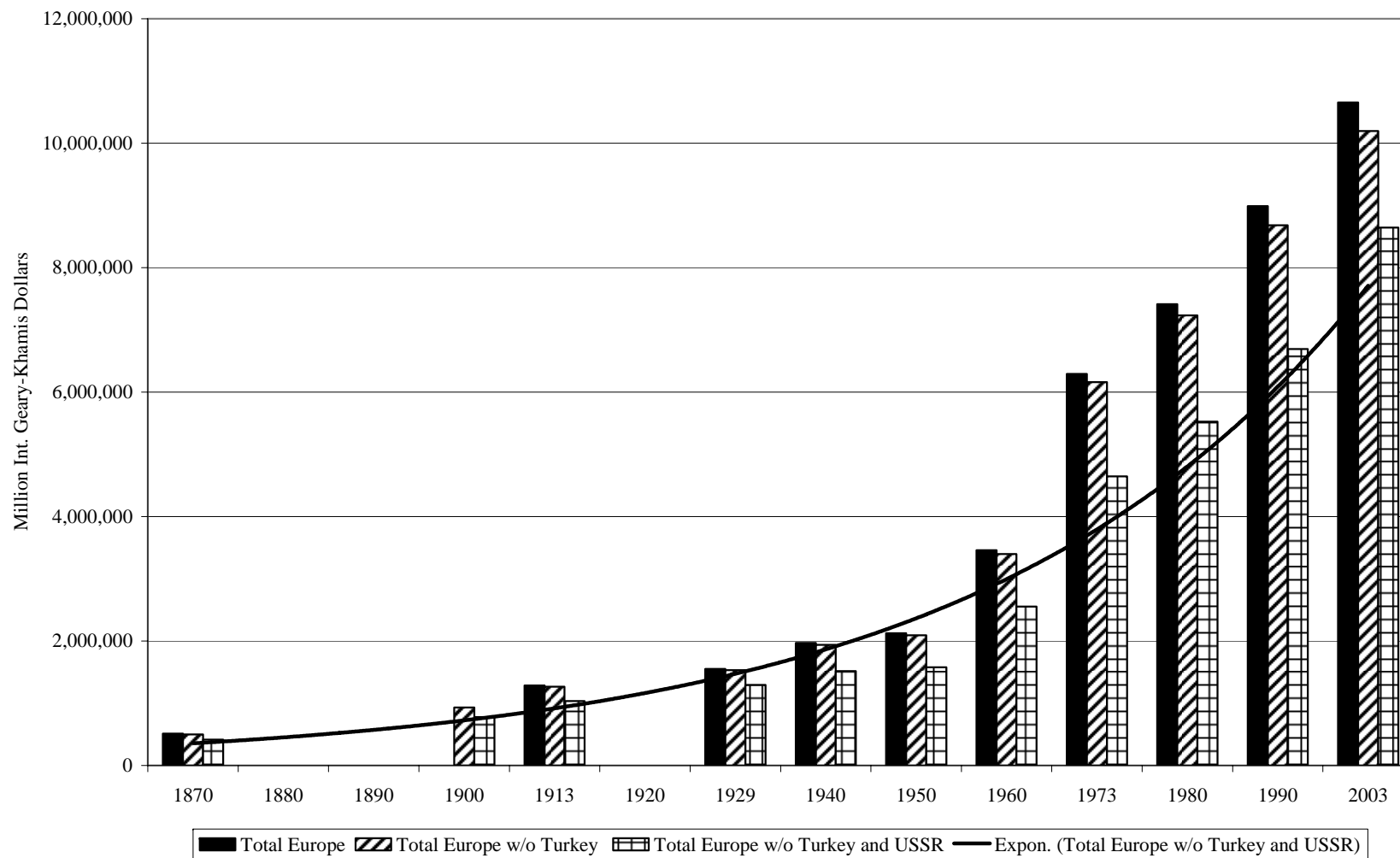


Figure 1.3: European GDP per Capita, 1870-2003 (based on Maddison 2007)

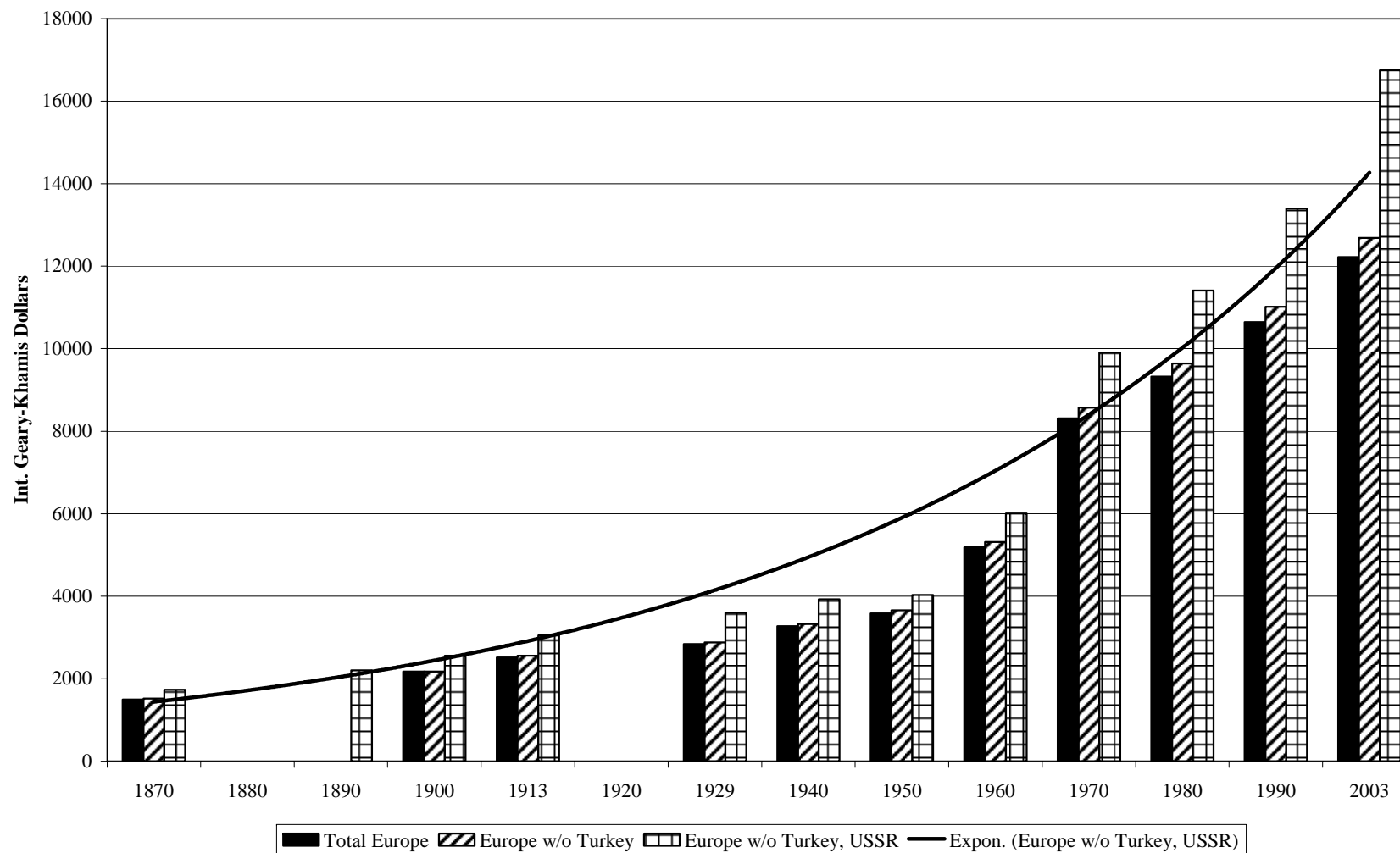


Figure 1.4: Annual Growth-Rates of GDP per capita (measured in 1990 Geary-Khamis Dollars) and annual standard deviation (cross-section), 17 European Countries, 1871-1950 (based on Maddison 2007)

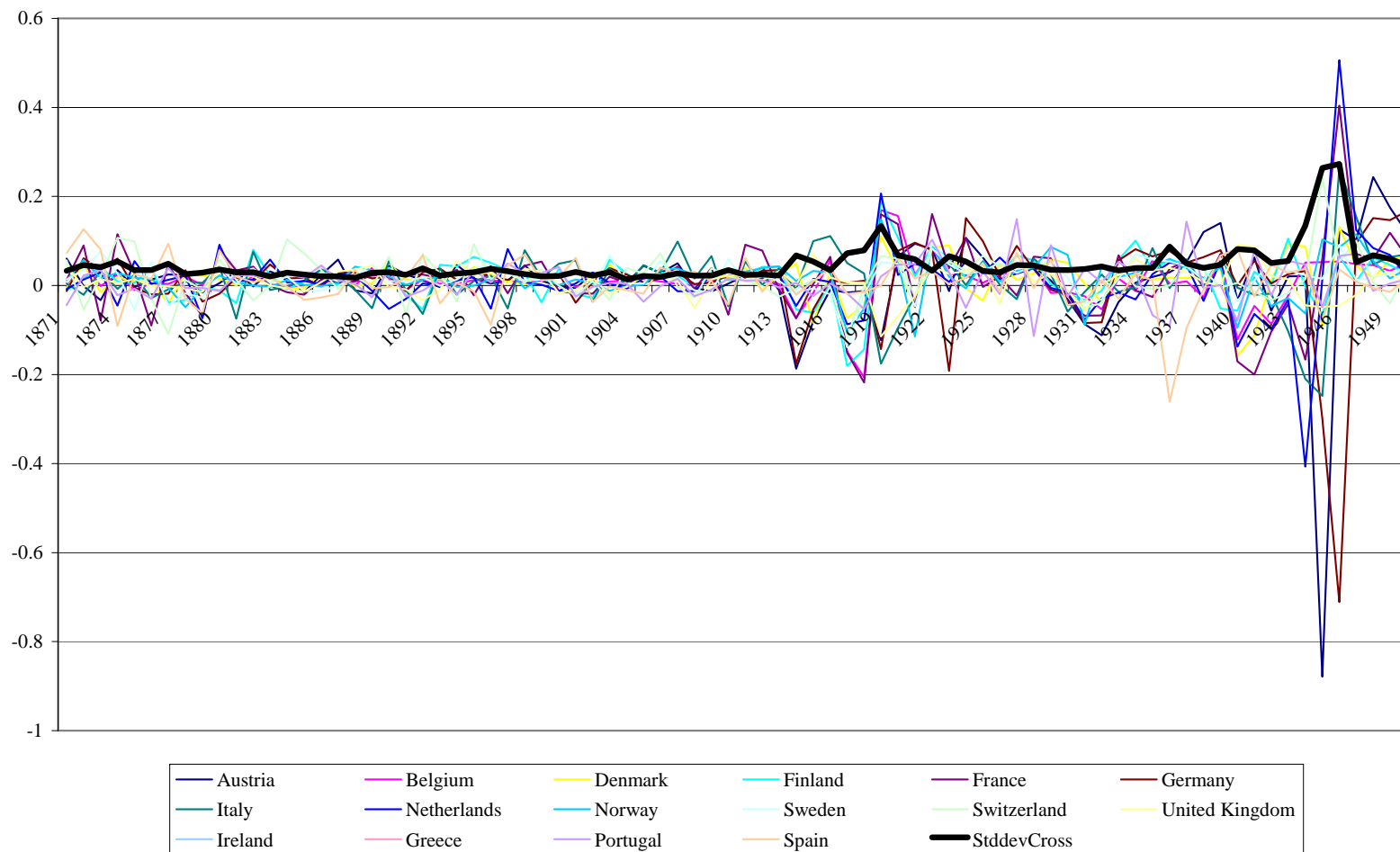


Figure 3.1: GDP per Capita in 13 European Countries and its components: labour productivity, participation rates, and hours worked



Figure 3.2: the contribution of labour productivity, participation rates and hours worked to aggregate growth, 13 European countries, 1920-1939

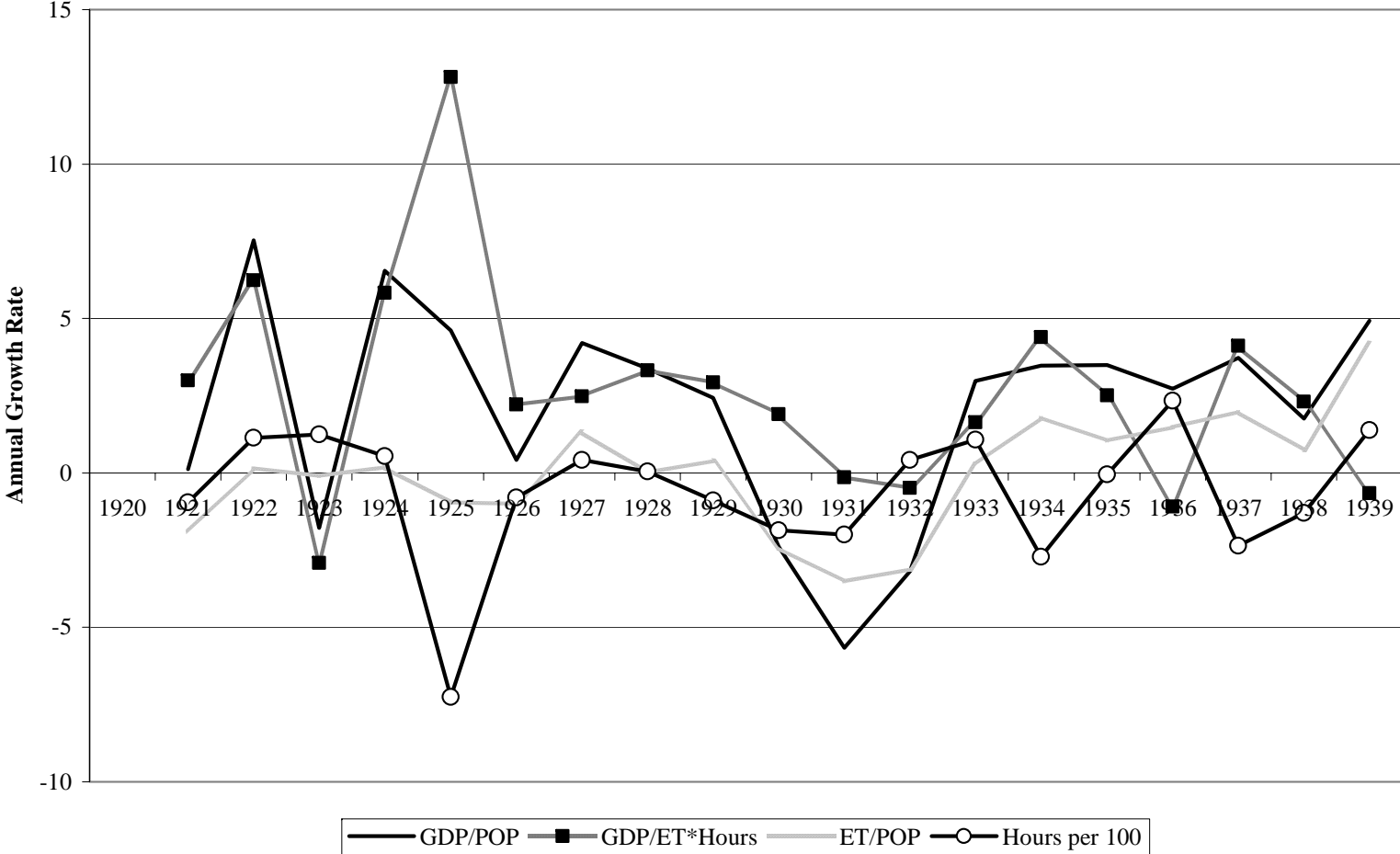


Table 1.1: Recuperation of GDP per capita to levels of 1913, 26 European Countries
(Maddison 2007 and own calculations)

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)

Table 1.2: Average Annual Rates of Growth, 26 European Countries USA and Japan
(based on Maddison 2007 and own calculations)

Country	Av. Annual Growth Rate, year of recuperation – 1939 in % (StdDev)	Av. Annual Growth Rate 1920-1939 in % (StdDev)	Av. Annual Growth Rate 1920-1929 in % (StdDev)	Av. Annual Growth Rate 1929-1939 in % (StdDev)
Austria	1.40 (0.07)	2.97 (0.07)	4.93 (0.04)	1.03 (0.08)
Belgium	1.32 (0.04)	2.09 (0.05)	3.99 (0.05)	0.02 (0.04)
Denmark	2.49 (0.03)	2.20 (0.06)	2.74 (0.05)	2.05 (0.03)
Finland	2.97 (0.04)	3.60 (0.04)	4.94 (0.03)	2.09 (0.05)
France	2.47 (0.06)	2.67 (0.07)	5.16 (0.07)	0.71 (0.05)
Germany	3.04 (0.06)	3.69 (0.08)	4.49 (0.09)	2.54 (0.06)
Italy	1.84 (0.04)	1.07 (0.04)	0.83 (0.05)	1.41 (0.04)
Netherlands	1.48 (0.04)	1.48 (0.04)	3.22 (0.02)	-0.28 (0.04)
Norway	2.67 (0.05)	2.67 (0.05)	2.71 (0.06)	3.17 (0.04)
Sweden	3.13 (0.03)	3.17 (0.04)	3.71 (0.03)	2.90 (0.04)
Switzerland	2.24 (0.04)	2.24 (0.04)	4.44 (0.03)	0.27 (0.03)
United Kingdom	1.72 (0.03)	1.26 (0.04)	1.22 (0.04)	1.42 (0.03)
Ireland	1.17 (0.03)	1.04 (0.02)	1.36 (0.02)	0.99 (0.03)
Greece	1.77 (0.04)	1.77 (0.04)	2.49 (0.01)	1.51 (0.05)
Portugal	1.85 (0.07)	1.99 (0.07)	3.17 (0.08)	1.58 (0.07)
Spain	-0.33 (0.07)	-0.33 (0.07)	2.92 (0.03)	-2.73 (0.08)
Albania	Na	Na	Na	Na
Lithuania	Na	Na	Na	Na
Latvia	Na	4.42 (0.11)	5.31 (0.11)	3.78 (0.10)
Estonia	Na	3.35 (0.08)	3.78 (0.10)	3.60 (0.08)
Bulgaria	2.36 (0.02)	3.78 (0.09)	5.23 (0.11)	2.49 (0.08)
Czechoslovakia	2.41 (0.06)	2.35 (0.06)	5.04 (0.05)	-0.36 (0.06)
Hungary	2.63 (0.06)	2.63 (0.06)	5.17 (0.08)	1.47 (0.05)
Poland	3.49 (0.09)	3.44 (0.08)	5.24 (0.07)	1.24 (0.09)
Romania	Na	-0.10 (0.05)	-2.91 (0.03)	0.14 (0.05)
Yugoslavia	1.69 (0.05)	1.65 (0.05)	3.11 (0.03)	0.65 (0.06)
Weigh. Average of European Sample	2.05 (-)	2.14 (-)	3.22 (-)	1.10 (-)
USA	0.72 (0.07)	0.72 (0.07)	1.94 (0.04)	-0.01 (0.09)
Japan	2.16 (0.05)	2.16 (0.05)	-0.01 (0.09)	3.15 (0.06)

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: Unconditional Convergence?

Dep. Variable: Growth Rates, t-stat in brackets

Dep. Var.	1/T(log(y _T /y ₀))					Log(y _t /y _{t-1})
	1913-1950	1913-1939	1920-1939	1920-1929	1929-1939	1920-1939
Constant	-3.074 (-0.68)	-1.821 (-0.361)	3.995 (1.278)	5.604 (1.619)	3.551 (0.307)	0.08 (1.715)
Log(y ₀)	1.357 (0.621)	0.928 (0.384)	-1.543 (-1.017)	-2.157 (-1.268)	-1.660 (-0.296)	-0.01 (-1.360)
# of Obs.	22	22	22	22	22	447
R2	0.01	0.01	0.04	0.05	0.01	0.03

Table 3.2: Conditional Convergence: extended neoclassical growth model

Dep. Variable: Growth Rate: Log(y_t/y_{t-1}), t-stat in brackets (White Robust SE)

	Simple OLS	OLS with Country Effects	OLS with Country and Period Effects
Log(y _{t-1})	-0.09 (-5.39)	-0.32 (-8.39)	-0.29 (-5.88)
Log(Inv _t)	0.05 (5.27)	0.11 (8.52)	0.07 (5.54)
Log(SchoolLag)	0.02 (1.85)	0.05 (1.55)	0.03 (0.99)
Period Effects	No	No	Yes
Country Effects	No	Yes	Yes
# of Obs.	312	312	312
Adj R2	0.10	0.25	0.38

Not reported: constant

Table 3.3: Conditional Convergence: extended neoclassical growth model 1920-29, 30-39. Dep. Variable: Growth Rate: $\text{Log}(y_t/y_{t-1})$, t-stat in brackets (White SE)

	OLS		IV
$\text{Log}(y_{t-1})$	-0.48 (-10.22)	-0.65 (-3.84)	-0.72 (-2.85)
$\text{Log}(y_{t-1}) * 1930_38$	-	0.00 (1.18)	0.00 (1.67)
$\text{Log}(\text{Inv}_t)$	0.14 (10.71)	0.11 (2.61)	0.17 (1.82)
$\text{Log}(\text{Inv}_t) * 1930_38$	-	0.00 (0.81)	-0.00 (-1.12)
$\text{Log}(\text{SchoolLag})$	0.06 (1.43)	0.28 (3.01)	0.11 (0.83)
$\text{Log}(\text{SchoolLag}) * 1930_38$	-	-0.01 (-2.44)	-0.00 (-0.05)
Country Effects 1920_29	Yes	Yes	Yes
Country Effects 1930_39	Yes	Yes	Yes
# of Obs.	312	312	302
Adj R2	0.35	0.37	0.23

Not reported: constant

Table 3.4: Conditional Convergence: extended neoclassical growth model with policy variables. Dep. Variable: Growth Rate: $\text{Log}(y_t/y_{t-1})$, t-stat in brackets (White SE)

	OLS	EGLS (cross-section weights)	EGLS (cross-section weights with correction for cont.correlation)
$\text{Log}(y_{t-1})$	-0.64 (-3.93)	-0.71 (-6.31)	-0.71 (-6.41)
$\text{Log}(y_{t-1}) * 1930_38$	0.00 (1.32)	0.00 (1.97)	0.00 (1.93)
$\text{Log}(\text{Inv}_t)$	0.11 (2.60)	0.14 (5.05)	0.14 (4.48)
$\text{Log}(\text{Inv}_t) * 1930_38$	0.00 (0.87)	0.00 (0.10)	0.00 (0.09)
$\text{Log}(\text{SchoolLag})$	0.26 (2.94)	0.20 (3.13)	0.20 (2.11)
$\text{Log}(\text{SchoolLag}) * 1930_38$	-0.00 (-2.41)	-0.00 (-1.63)	-0.00 (-1.20)
$\text{Log}(\text{openness})$	0.05 (0.89)	0.06 (1.63)	0.06 (1.86)
$\text{Log}(\text{openness}) * 1930_38$	-0.00 (-1.12)	-0.01 (-1.46)	-0.00 (-1.57)
Ongold	-0.03 (-1.09)	-0.02 (-1.38)	-0.02 (-1.63)
Ongold * 1930_38	0.00 (0.69)	0.00 (0.94)	0.00 (1.11)
Country Effects 1920_29	Yes	Yes	Yes
Country Effects 1930_39	Yes	Yes	Yes
# of Obs.	312	312	312
Adj R2	0.37	0.64 (0.41)	0.64 (0.41)

Not reported: constant

Table 3.5: Labour Productivity in 13 European Countries (Int. Dollars per hour)

	1920	1929	1934	1939
Belgium	5.74	7.63	9.17	9.23
Denmark	5.77	6.79	7.00	7.08
Finland	1.99	3.05	3.55	3.80
France	3.31	4.95	5.22	6.93
Germany	3.67	6.97	7.86	7.63
Italy	2.98	3.81	4.37	4.84
Netherlands	5.30	7.20	6.68	7.59
Norway	3.02	4.54	5.38	5.72
Sweden	3.10	4.01	4.45	5.62
Switzerland	4.33	6.49	6.80	6.91
UK	5.14	6.37	6.30	6.45
Portugal	1.33	1.97	2.53	2.38
Spain	2.63	3.47	3.72	2.72

Source: Madsen (2007) and own calculations