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**Western
European Long
Term Growth,
1830-2000: Facts
and Issues**

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and Xavier Tafunell**



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Western European Long Term Growth, 1830-2000: Facts and Issues.¹

Albert Carreras and Xavier Tafunell

1. Introduction

Most of what we know about long term economic growth is based on experiences of individual countries. The most advanced countries of the early post war years — the United States, United Kingdom and Sweden — and the other major economies that happened to be defeated or occupied during the war — Germany, Japan, France and Italy — were the focus of initial measurement. Kuznets and his associates developed a first generation of historical national accounts during the 1950s and 1960s.² Most of the stylized facts about economic growth rely on the achievements of this early research effort. Half a century later we know a lot more about these same countries and a lot more about many others. The efforts made by Maddison have been fundamental in this regard.³ Intriguingly enough, the more we know about the whole world, the more the attention of the academic community is fascinated by the United States' long term experience. The weight of economic research there, combined with the size of the US economy

and its long term success, has been attracting a lot of attention to its economic past. However interesting the United States' growth experience can be, it is fair to say that it is unique. Because of its history, its size and its political fragmentation, Europe is a very different case that may not be, to say the least, adequately described by the United States.

There has also been a dramatic improvement in the knowledge of Western European historical national accounts over the past few decades. Almost all the research effort has been allocated to national (that is, state-defined) entities. Very few efforts, comparatively speaking, have gone into regional estimates. A pioneering effort was made some thirty years ago by Paul Bairoch, for Europe as a whole in the period 1830–1975.⁴ There is a simple but powerful reason for this lack of regional data: it becomes much more difficult to build macro-economic aggregates as their geographical, political and institutional scope becomes more diverse.

Luckily enough, the community of researchers in Western European historical national accounting has been very active during this last generation. In many conferences, workshops, research projects and related publications, the academic standards of Western European historical national accounts have been cross-checked many times.

We are still far away from a new Europe wide measure, including Eastern Europe. This is not because of the lack of research on the long nineteenth century (there are very good estimates for Austria-Hungary and even for Russia), but because of the lack of reliable estimates for the communist era both in the former Soviet Union and in the Eastern European countries.

The concept of Western Europe that we use is, thus, synonymous of the Europe that has never been under communist rule. It is also quite close to the European Union formerly of 15 countries, but with the addition of Norway and Switzerland — that is, the European Union designed and envisaged in the Maastricht Treaty⁵. If we consider shorter periods — before 1939 or even before 1914 — it is possible to enlarge the geographical scope to Eastern Europe or to the whole of Europe, Russia included. But time and geographical consistency support the preference for a Western European approach. For the time being, it makes more sense. It will also allow us eventually to deal better with an alternative economic entity to the United States.

In this *opuscle* we will present new long-term Western European estimates for the basic macro-economic variables used in economic growth research: gross domestic product (GDP), population, GDP per capita, gross fixed capital formation (GFCF), investment rate, foreign trade, openness, and inflation rate. There are many more that could be of great interest, but all of these are essentially of the same kind and they are built out of quite comparable sets of national data. In the appendix to our *opuscle* we provide detailed reference to the sources, to the aggregation methods and to the criteria used. To limit the length of this *opuscle*, we will provide only a cursory, preliminary reading and interpretation of the newly available information. We rely heavily on Mitchell's (1992 and 2003) and Maddison's previous work in compiling data, but we upgrade both with the many latest developments in historical national accounting.

2. The new data

Sixteen Western European countries are surveyed (Luxembourg is not considered). The chronological coverage is quite diverse. The following table sketches the main features of our data set. It should be stressed that the GDP data used are, to our best knowledge, the most accurate available. Most of them come from output data, others from expenditure, and a few from income.

As is obvious after a cursory look at the table, there are some major shortcomings in terms of coverage. For the first two decades, from 1830 to 1850, GDP data are only available for seven countries: Denmark, France, Greece (from 1833), the Netherlands, Norway, Sweden and the United Kingdom⁶. We decided to proceed with these seven countries as France, the Netherlands and the United Kingdom represent a substantive share of all the variables, while the others help in providing enough diversity. By 1850, four more countries enter into the sample: Belgium (since 1846), Germany, Spain and Switzerland. These eleven cases provide a really diverse array of countries: from Norway to Spain to Greece, including the three largest European economies and a number of other medium size countries. By 1860 and 1861, Finland and Italy join the previous eleven to enhance the basic features of the 1850 sample. Portugal is added from 1865 on, and Austria is included from 1870 on. Ireland is only present since her independence in 1921. All in all, the coverage for GDP data is quite satisfactory.

It is not so much the case for capital formation and foreign trade. The former is missing for Austria, Belgium and Portugal before World War I

Table 1
Chronological coverage

Country	GDP	Capital Formation	Foreign Trade	Prices
Austria	1870–	1924–37; 1948–	1924–37; 1950–	1874–1913; 1914–
Belgium	1846–	1948–	1850–1913; 1921–39; 1947–	1840–1913; 1914–1940; 1946–
Denmark	1830–	1844–1914 1921–	1850–1914; 1921–	1840–
Finland	1860–	1861–	1861–	1870–
France	1830–	1830–1913; 1922–38; 1949–	1850–1913; 1920–38; 1949–	1840–
Germany	1850–	1850–1913; 1925–38; 1950–	1880–1913; 1925–38; 1950–	1840–
Greece	1833–	1947–	1929–39; 1946–	1914–1941; 1945–
Ireland	1921–	1947–	1947–	1922–
Italy	1861–	1861–	1861–1942; 1947–	1861–
Netherlands	1830–	1830–1913 1921–39; 1948–	1830–1939; 1948–	1870–
Norway	1830–	1865–1939; 1946–	1865–1939; 1946–	1870–
Portugal	1865–	1910–	1870–	1865–
Spain	1850–	1850–	1850–	1840–
Sweden	1830–	1861–	1861–	1860–
Switzerland	1850–	1950–	1929–	1914–
United Kingdom	1830–	1830–	1850–	1840–

Sources: See Appendix.

Notes: Population is always available since 1830, except for Ireland, that starts in 1921, with independence. The borders are the current ones.

(circa), and for Greece, Ireland and Switzerland before World War II. The latter is missing for Germany before 1880, for Austria, Greece and Switzerland before the 1920s and for Ireland before World War II.

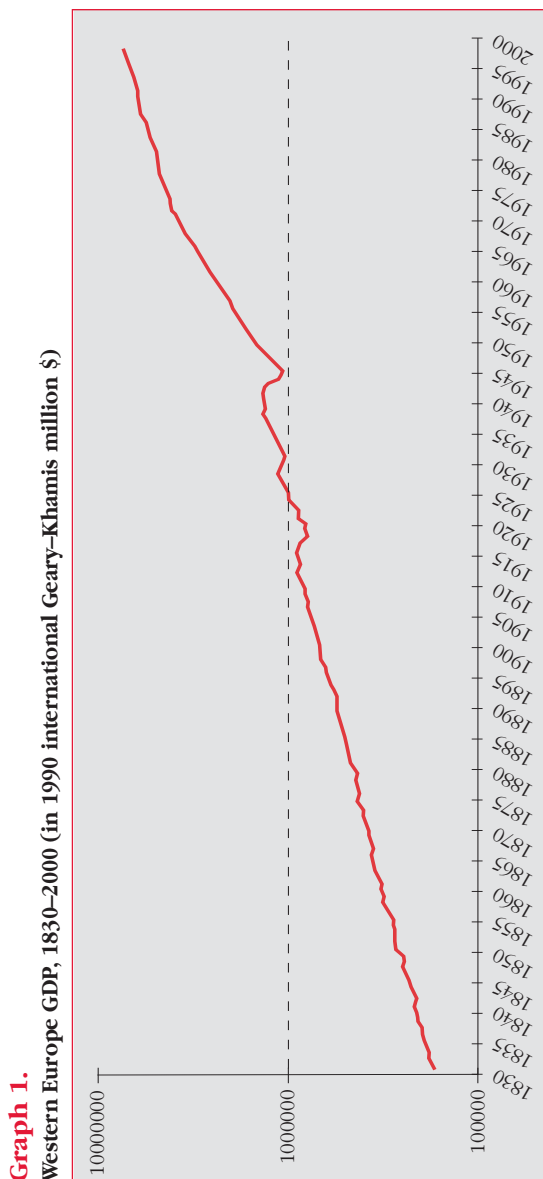
The world wars are the other cause of major weaknesses of the series. Currently, GDP is available for all years for most of the countries,

but that is not the case for GFCF and for foreign trade in a number of countries, including Belgium, France, Germany and the Netherlands. Substantial damage during the world wars also introduced underreporting for several countries. Prices, on the other hand, are always more readily available.

3. A first picture: GDP, population and GDP per capita

It is unlikely to find major discoveries from our new GDP series — still, there are some. Western European GDP is highly dependent on the four major economies — United Kingdom, Germany, France and Italy — and the estimates for each of these countries are quite stable, academically speaking. There have only been significant changes in the French series. The research innovations of the last few years have mainly come from middle-sized countries such as the Netherlands and Spain, and even more so from small countries such as Greece, Norway, Portugal and Switzerland. The addition of more individual, nation-based, series has largely stabilized the overall profile. The individual series happen to be quite similar. The European profile resulting from the aggregation of national profiles is interesting and valuable as it is consistent with the current state of academic knowledge.

To make a long story short, we recognize a long period of quite stable growth, reaching as far back as 1830 and continuing until 1913. This much has been clear at least since Paul Bairoch's 1976 European GDP estimates were made known, but more generally speaking European economic historians were fully aware of the progressiveness, generality and smoothness of the aggregate growth experienced in the nineteenth



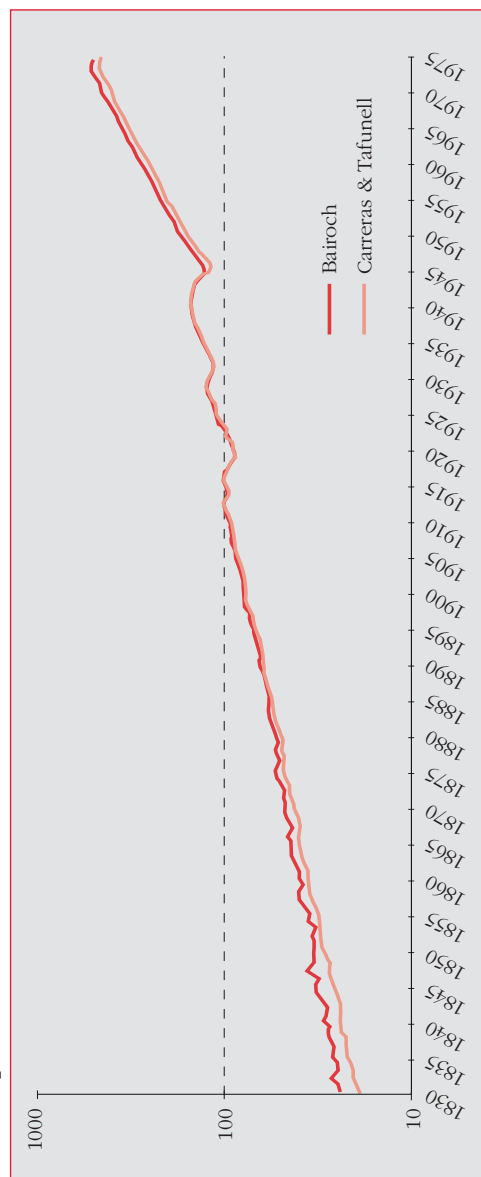
Source: See Appendix.

century. Any doubts that still remained can, in our opinion, be laid to rest. Furthermore, the comparison with 1976 Bairoch's estimate in graph 2 shows how close his 30 year old estimates for the whole of Europe between 1830 and 1975 are to ours. The two series are very similar since 1880 onwards. We add more estimates for the war years and a small change in level for 1946 onwards.

The major differences of our new estimates are twofold. Firstly, the new series has less volatility during the first half a century. The addition of detailed new estimates for more countries has produced the expected result of smoothing the overall Western European fluctuations. Secondly, our yearly growth rate for 1830 to 1886 is more than 20% higher: 1.95 versus 1.54. These are two changes that are consistent with old and new historiography.

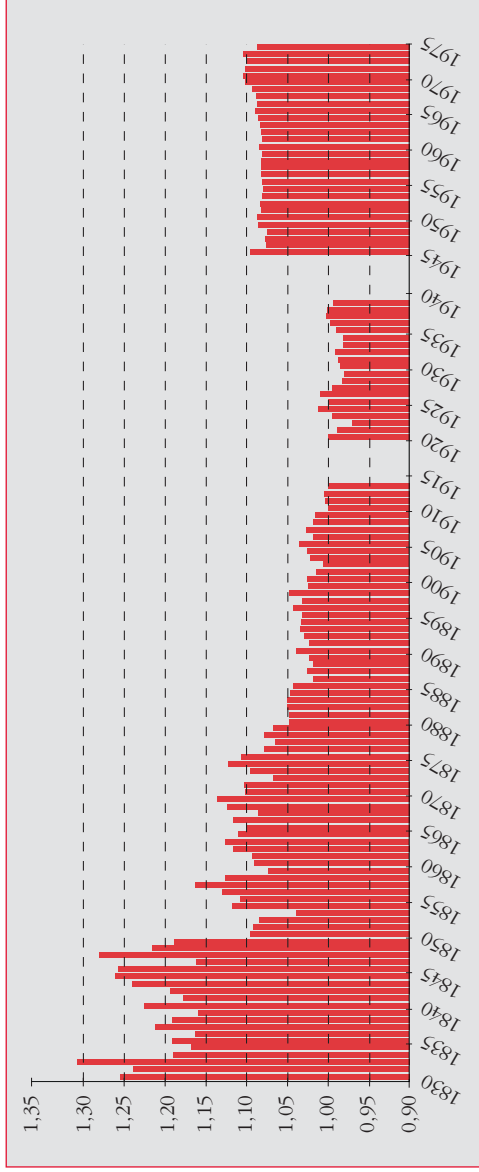
There is still a lot of missing data for the pre-1830 period, but the data available from U.K., France, Denmark, the Netherlands and Sweden tend to confirm that the growth trend started before 1830, in fact around the end of the Napoleonic wars (see footnote 3). This is the case for France and the United Kingdom, but not for Sweden and the Netherlands. The upward trend is more clear and general since 1820, when Germany (the German States) seems to be the fastest growing Western European economy.⁷ The early nineteenth century is still a period inviting further research as the evidence gathered until now is focused on the more economically advanced countries, and there could be some growth bias if we attempt to build a Europe wide estimate out of the available data. To be fair, this could even have been the case for the 1830–1850 data, which is why it is worthwhile to emphasize the continuity

Graph 2. West European GDP: Bairoch vs. Carreras & Tafunell, 1830–1975 (1913=100)



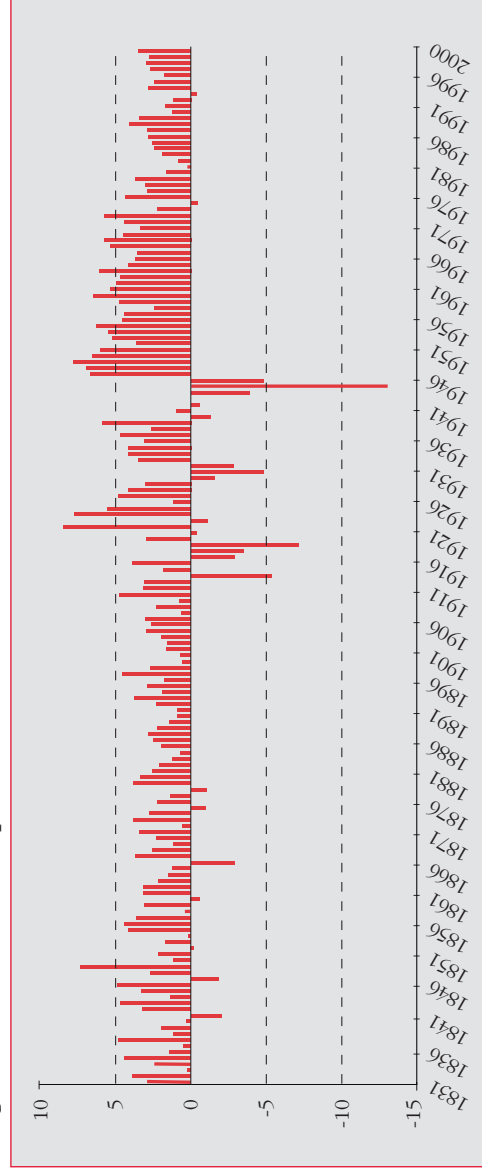
Source: see graph 1 and Bairoch (1976).

Graph 3.
West European GDP. Bairoch GDP / Carreras & Tafunell GDP, 1830–1975



Source: see graph 2.

Graph 4.
GDP growth rates, Western Europe, 1831–2000 (in %)



Source: See Appendix.

in growth rates from the 1830s and 1840s to the 1850s and 1860s.

The average yearly growth rate from 1830 to 1880 still suffered from a lot of volatility. Western Europe could attain growth rates as high as 7.2%, but they also could fall as low as -2.6%. The 'bad' years — those with negative growth rates — numbered as many as seven during the first half a century (1830 to 1880). Something fundamental did change around 1880. The GDP series became smoother in its growth trend: that is, the growth rate reduced its variability. The 'highs' were less frequent but, much more important, the 'lows' disappeared. It was not a matter of disappearance of the business cycle, of course — it was rather its smoothing. Fluctuations changed by their very nature: before 1880 they were as irregular as harvests and after 1880 they seemed much more like business cycles. There was less variability while cycle-like movements appeared. It was an outstanding change that could be explained by a wide variety of reasons, mainly the following two: a) the diffusion of industrialization made economies less dependent on agricultural output, and b) Western European economies had become increasingly integrated, allowing for the smoothing of economic fluctuations as Craig and Fisher (1997) have shown. There was some evidence of an accelerating trend from the mid-1890s onwards.

National GDP performances can be better assessed within this Europe wide framework. Early starters and latecomers are easy to distinguish. The countries with fast growth early in the century typically switch to a slow growth path after two or three generations of high growth rates. In contrast, countries showing low growth rates at the beginning of the series are those that, by the turn of the century, are

growing more rapidly: namely, Germany, Italy, and Sweden. Of course, there are also countries that fail to achieve significant growth before 1913. Some of the Southern Europe 'failures' can now be better assessed against the Western European norm.

Obviously, the whole picture changed after 1913. The two world wars and the depression of the early 1930s are three dramatic cuts in the European GDP growth path during the first part of the twentieth century. Many Western European countries suffered the three shocks while some of them were luckier and suffered only one or two. There is no country, however, that escaped facing any of these shocks during the century. Neutral countries also suffered, albeit much more slightly, during the world wars. The Great Depression had an impact — big or small — on all of them.

Recovery efforts after World War I and the Great Depression were important but they failed to create a path back to the long-term growth trend. Only the third attempt — post-World War II reconstruction — was successful. For the period 1913 to 1945 the amplitude of the fluctuations increased a lot. World War I led to a steep decline of GDP. The recovery efforts produced extraordinary achievements — up to 8.4% growth in 1922 — but these did not last. The Great Depression hit the Western European countries even harder than World War I, but for a shorter period. World War II was even worse than the Great Depression. Fortunately the recovery was also more exceptional. Graph 3 is crystal clear in showing how exceptional the post-war boom was. Growth rates were high and sustained for a bit more than a quarter of a century, from 1946 to 1973. It is also clear that the years of high growth displayed an overall declining trend that came to an end by the late 1970s. The 1974 oil crisis

brought growth rates to a sudden halt, but the declining trend continued on until much later. The 1980s and 1990s appear, in the light of long historical experience, to be more similar to the period 1880–1913 than to any other period in the last century and a half.

Western European population growth is presented in graph 5. The impact of the two world wars is visible, as well as the demographic consequences of the declining fertility trend starting in the 1970s. Graph 6 displays the annual rates of growth. The impact of the world wars is even more evident. But it also becomes possible to capture the impact of the Irish potato famine in the late 1840s, a period of extreme hunger that also affected other regions, and some other wars such as those that occurred between 1867 and 1871, in relation to the German and Italian unifications.

The population figures are necessary to assess per capita GDP (see graphs 7 and 8). As population growth rates were much smaller than GDP's, it is no wonder to discover that per capita GDP is very similar in its trends and fluctuations to GDP. Nevertheless, it is worth emphasising that the slight evidence of an accelerating Western European GDP growth trend in the pre-1913 period disappears when looking at the per capita GDP. Indeed, the similarity in GDP figures between the last quarter of the twentieth century and the pre-1913 period is nowhere to be found in the per capita GDP. The deceleration of European population growth since the 1970s has produced (arithmetically speaking, without implying any causality) a better per capita GDP performance than for the period 1890–1913 (see graph 5).

Graph 5. Population of Western Europe, 1830–2000 (in 000s)



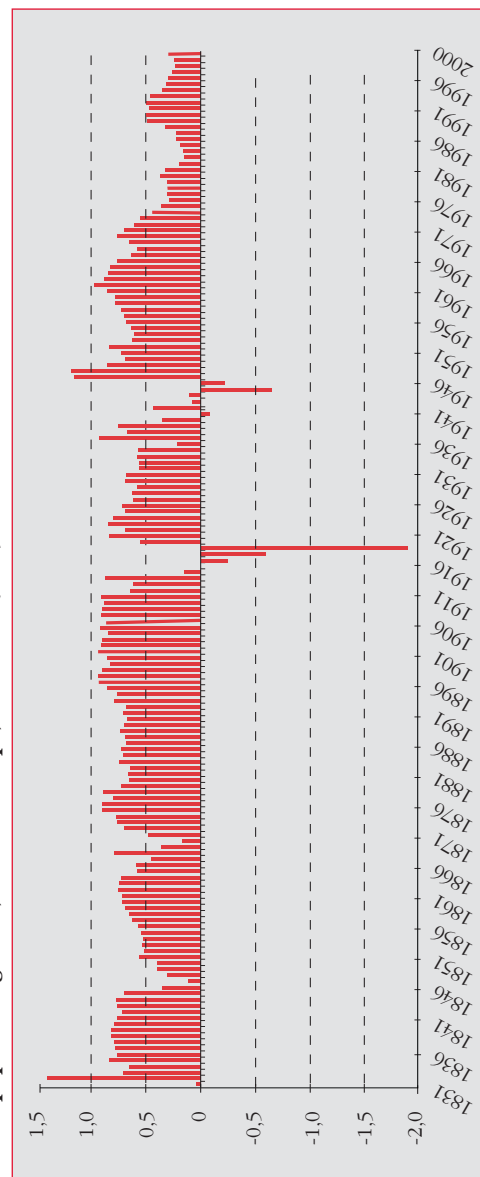
Source: See Appendix.

All of this is quite well known at the national level and our exercise does not pretend to add anything special to our knowledge on this matter. Rather, it is meant to confirm, on the Western European dimension, what has emerged from previous exercises in national accounting and in regional aggregation, as for example those performed by Angus Maddison on a number of occasions⁸.

Up to now we have used national series to assess regional aggregates. Per capita GDP series are also the pillars for convergence estimates. Our data set allows for a calculation of the standard deviation (identical to the coefficient of variation since all the constituent series are calculated as ratios to the mean) of our basket of countries on the Western European per capita GDP. We rely on the fifteen countries with data starting in 1870 (that is, all except Ireland). Graph 9 displays the outcome of this exercise.

The basic trends stand out clearly but have nevertheless gone unnoticed so far. From 1870 to the outbreak of World War II, the values of the coefficient of variation of per capita GDP among Western European countries have been very stable, around 35%. A slightly declining trend was at work, especially before World War I, but the interwar years did not confirm it. World War II — not World War I — was the period when the coefficient of variation increased the most, up to 55%, in 1946. Coming back to the pre-war values was not immediate: it took more than fifteen years, until the early 1960s, to reach those values. But — and this is the big new fact — the declining trend continued for almost two more decades. By the end of the 1970s the coefficient of variation was reduced to 21%. During the following two decades, further reductions, down to 18%, were slower to happen, but they did exist

Graph 6. Rate of population growth, Western Europe, 1831–2000 (in %)



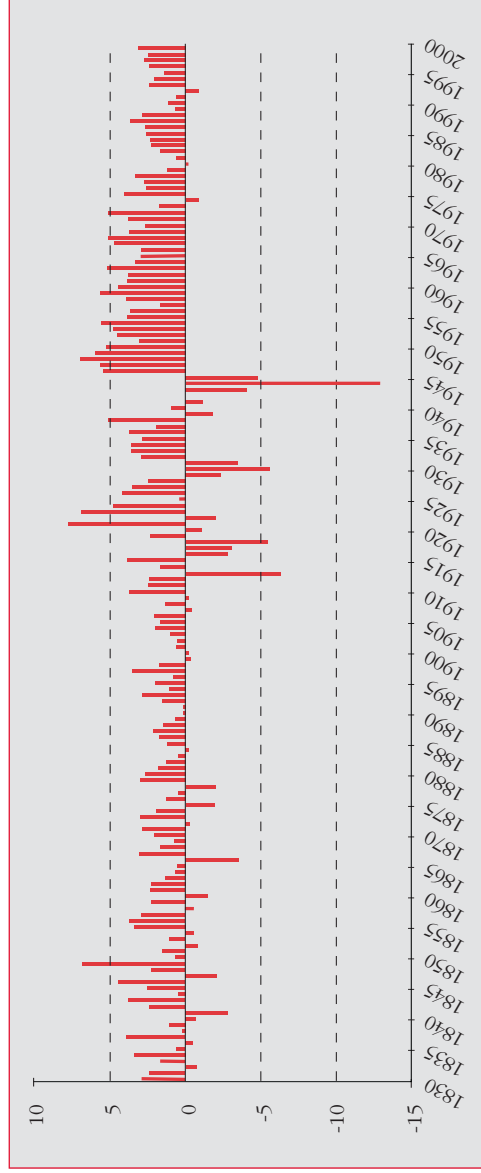
Source: see graph 5.

Graph 7.
Per capita GDP, Western Europe, 1830–2000 (in 1990 international G-K \$)



Source: See Appendix.

Graph 8.
Per capita GDP growth rates, Western Europe, 1830–2000 (%)



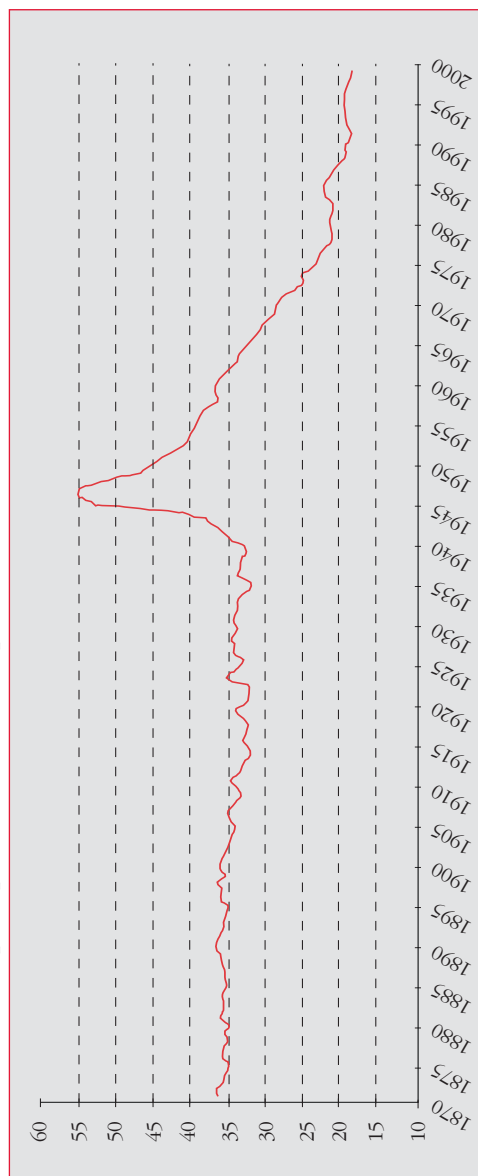
Source: See graph 7.

from 1986 to 1991 and after 1997 (they are even more visible in a graph with a semi logarithmic scale). Roughly speaking, intra-Western European dispersion of per capita GDP levels has been halved during this last century or more.

At this stage we can state that the cause of these reductions below the historical traditional level lies in post-war catching up during the Golden Age. European economic integration has contributed to it. The success of the Rome Treaty (the process known as European economic integration) has been particularly visible in bringing together the standards of living of the various countries belonging to the European communities. The further reduction of 1986 to 1991 confirms this view: these are the years of the integration of the Iberian countries into the European Economic Community. The interesting issue in our finding is not so much the existence of intra-Western European convergence after World War II, which is known, but the comparative assessment with what happened before — that is, the lack of any convergence trend, and the size of the historical, pre-war, trend.

The beauty of the trend displayed in graph 9 has to be checked in various ways. Graph 10 shows the convergence trends among the countries with the longest per capita GDP data (Denmark, France, Germany, Netherlands, Norway and the United Kingdom). According to this graph, the standard deviation/coefficient of variation has been reduced in a much smoother way than for the full sample of 16. Convergence has been much more complete (from over 40 to 5). The declining trend was at work since the 1850s and it lasted until the 1980s. It is worth mentioning that the 1990s have not been a converging period for this sample of countries.

Graph 9. Standard deviation of per capita GDP, Western Europe, 1870–2000 (%)



Source: Our own calculation with data from the Appendix.

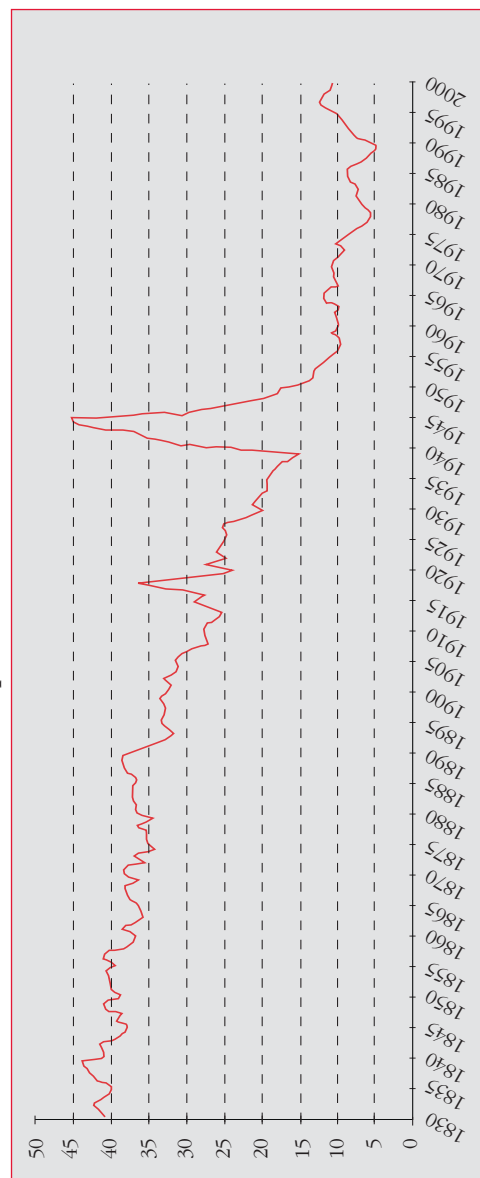
Each subsample of countries can provide a different picture. The exclusion of Greece — the country with the most volatile per capita GDP estimates — and the consideration of all the others as they enter the database suggests a still different convergence path (see graph 11), with a downward step in the 1840s, a long stability until World War II and a steeper decline in the 1980s and 1990s than the previous graphs.

Another check is to look at the standard deviation of the growth rates, shown in graph 12. In this case, it is not convergence or divergence that we get, but the degree of integration. There is a clear and continuing reduction in the post World War II standard deviation averages compared to pre World War I.

What we obtain, across Europe, is more a smooth reduction over two centuries, with the exception of the period 1914–1950. Table 2 summarizes the various averages that can make sense. In calculating them we have taken into account the issue raised by Romer (1986a and 1986b) on the volatility of United States GDP before and after the Great Depression and the World War II and the first check of her argument with Western Europe data by Sheffrin (1988), who compares pre World War I European data with post World War II. Our results display a clear decline in volatility from pre World War I to post World War II. The decline happens both at intra-country and at inter-country levels (but with some exceptions).

Contrary to evidence on standard deviation, the coefficient of variation delivers some different news (see Table 3). To start with, we find much smaller rates for the countries with high incomes at the start of the series, but still quite large rates for the poorest. The periods that were compared

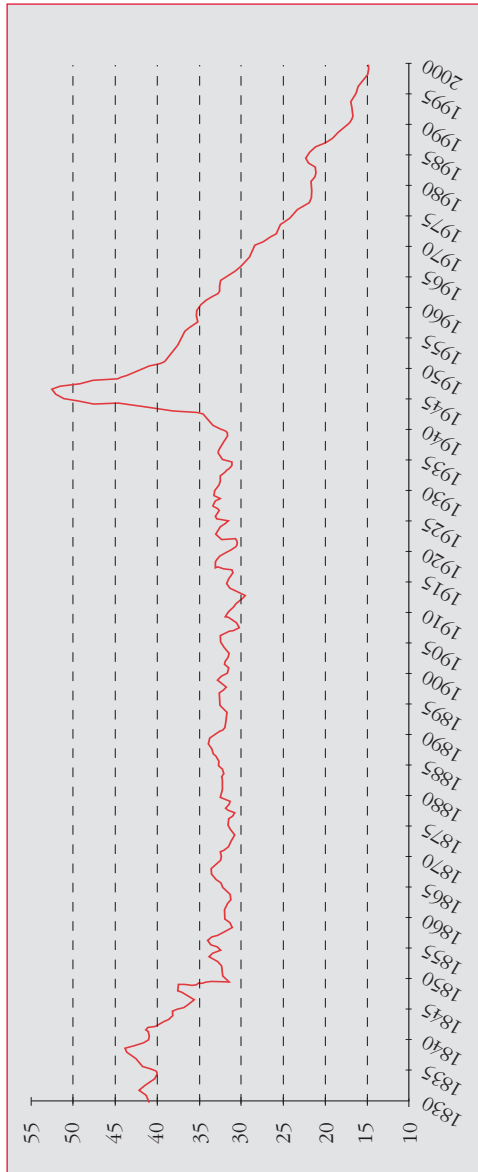
Graph 10. Standard deviation of GDP for six Western European countries (DK, FR, GE, NE, NO, UK), 1830–2000



Sources: See text and graph 9.

Graph 11.

Standard deviation, Western European countries (without Greece), 1830–2000



Sources: See text and graph 9.

by Sheffrin provide, Europe wide, an amazing stability (even more amazing if Greece is excluded). But the country developments suggest significant declines. The exception to the declining trend (1881–1913 compared to 1951–1980) is only Denmark (while the exceptions were more frequent with the standard deviations). All these elements provide indirect evidence of the quality of most of the series considered. Intra country variability is very much related with the weight of Mediterranean agricultural activities that suffer above average harvest variation.

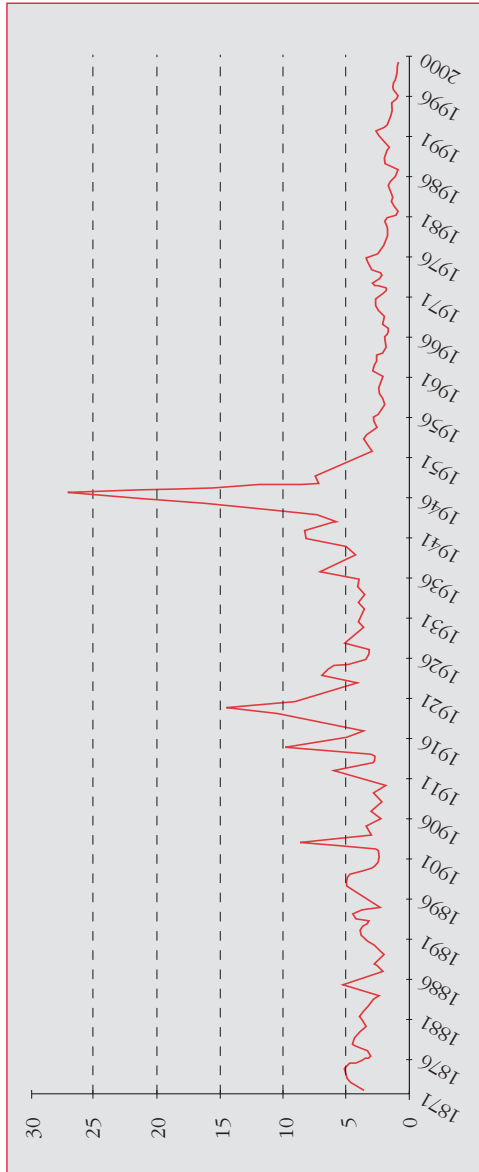
4. Gross fixed capital formation (GFCF) and the investment rate

In this section we aggregate the available information on the historical series for gross fixed capital formation of the Western European countries to arrive at a new — Western Europe wide — estimate of GFCF. It is statistically less robust than the GDP as it is poorly documented for some countries and for the war periods (see the appendix on “Sources and methods”). Even so, we think that there is still much to learn.

Graph 13 provides the GFCF estimate in 1990 Geary-Khamis international dollars for the period 1830–2000°. *Prima facie*, there are not so many differences compared to the GDP or the per capita GDP series. Major breaks are the same, as are the major continuities so, the Western Europe series for GFCF seems reasonable. The long nineteenth century (up to 1913) provided steady growth. The ‘trans-war’ years (1914–1945) showed strong fluctuations. The Golden Age (1948–1973) registered GFCF growth at rates higher than before World War I. The 1974 oil crisis meant a turn in investment trends, and so on. It is nice to

Graph 12.

Standard deviation of per capita GDP growth rates for 15 Western European countries, 1871–2000



Sources: See graphs 8 and 9.

see particular details, such as the jump in investment in the 1830s, probably related to the first British railway boom, the investment cycle centred on the 1847 peak, or the 1894–1901 cycle, and many other episodes, all easy to distinguish and continuing through to recent years.

The major news comes from graph 14. It displays the Western Europe investment rate, i.e. the GFCF series divided by GDP. In our reading of the graph, the major break is the change in levels of investment effort after World War II. There are two clear-cut periods, before and after World War II.

Looking at the first century, many things appear to happen. In the first place, the Western European investment rate started, by 1830, at roughly 5%. It should be remembered that this was the level indicated by Rostow (1961) as the critical investment effort for a 'take-off' to occur. In very few years, from the early 1830s to the 1846 and 1847 peak values, the Western European investment rate jumps to the 10% level. For some fifty years it was to remain dramatically higher than the 1830 level, fluctuating between 7.4 and 10.7%. As far as we know, the jump is to be explained by the huge railway investment effort all across Western European countries. Investment rising up to a 9–10% range was a major success for Western European economies as it allowed them to build extensive railway networks and many factories, carry out public works and land improvements, as well as construct private buildings. The chronology is very much the one advocated by early scholars of nineteenth century industrialisation, and by all the classic works of the period. From the early 1830s to the mid-1840s, an investment revolution took place in Europe that has left its footprints all over

Table 2**Standard deviations
in growth rates (%)**

Period	Au	Be	De	Fi	Fr	Ge	Gr	Ir		It	Ne	No	Po	Sp	Swe	Swi	UK	WE	WE*
1831–1870	---	---	3.2	---	4.8	---	9.1	---		---	1.7	3.9	---	---	3.5	---	2.6	1.9	1.5
1871–1913	2.3	1.3	1.8	3.1	4.4	1.7	9.0	3.0		1.6	3.2	1.9	3.5	4.8	3.1	4.7	2.2	1.3	0.8
1914–1950	13.5	7.2	6.3	6.9	12.5	13.1	14.3	2.2		9.4	13.9	6.2	6.4	5.4	4.5	6.1	4.4	4.6	4.5
1951–2000	2.5	2.0	2.3	3.1	1.8	2.7	3.5	2.9		2.3	2.2	1.6	3.4	3.2	2.4	2.5	1.8	0.6	0.5
1881–1913	2.2	1.0	1.5	3.2	3.2	1.7	9.9	---		1.4	2.6	1.7	3.8	3.6	3.0	4.0	2.3	1.4	0.6
1922–1939	6.8	3.6	3.5	4.2	6.3	8.1	6.7	2.3		3.9	3.9	4.0	7.4	6.8	3.5	3.8	3.3	1.2	1.0
1951–1980	2.6	2.1	2.6	2.9	1.6	2.6	3.6	2.2		2.3	2.4	1.4	3.9	3.5	2.5	2.7	1.9	0.5	0.4

Note: WE* is Western Europe without Greece.

Sources: See graph 12.

Table 3**Coefficients of variation
of growth rates (in %)**

Period	Au	Be	De	Fi	Fr	Ge	Gr	Ir		It	Ne	No	Po	Sp	Swe	Swi	UK	WE	WE*
1831–1870	---	0.9	2.9	---	3.9	4.1	4.0	---		---	2.1	3.0	---	5.7	3.1	4.6	1.7	0.4	0.4
1871–1913	1.6	1.2	1.1	2.1	2.9	1.2	2.8	---		1.6	3.4	1.4	7.1	3.5	1.6	2.7	2.1	0.4	0.3
1914–1950	9.7	7.5	3.6	3.2	6.9	10.8	7.3	2.0		7.3	7.4	2.6	4.1	16.8	1.8	2.7	4.3	0.7	0.7
1951–2000	0.7	0.7	0.9	1.0	0.6	0.9	0.9	0.8		0.7	0.8	0.5	0.9	0.8	1.1	1.4	0.9	0.3	0.2
1881–1913	1.4	1.0	0.8	1.7	2.0	1.0	2.9	---		1.2	2.9	1.1	5.8	4.8	1.3	2.3	2.1	0.4	0.2
1922–1939	2.5	2.6	1.4	1.2	2.3	2.3	2.8	2.2		2.0	3.0	1.2	3.9	-12.0	0.9	1.6	1.7	0.3	0.2
1951–1980	0.6	0.6	1.0	0.8	0.4	0.6	0.7	0.7		0.5	0.8	0.4	0.9	0.7	1.0	1.1	0.9	0.2	0.2

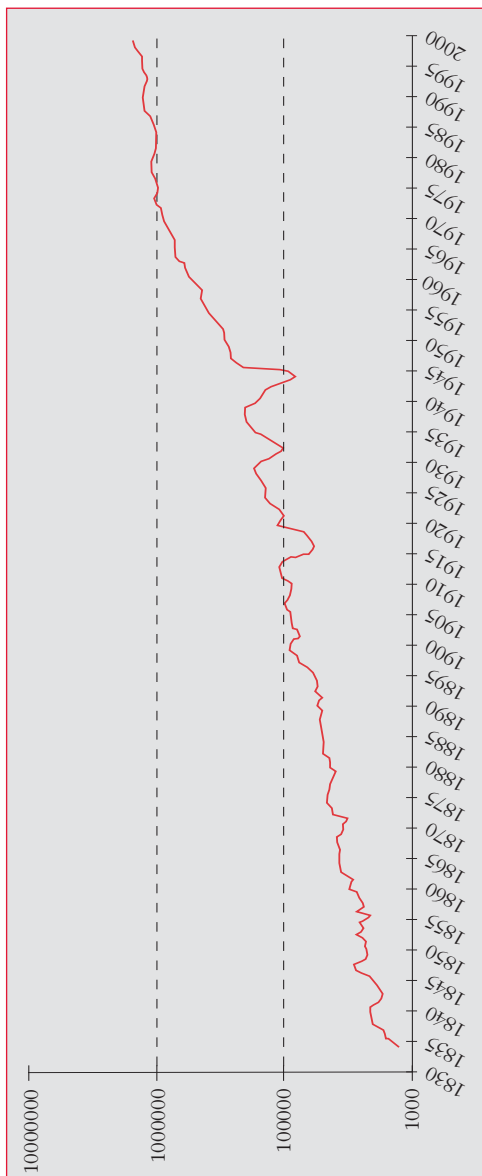
Note: WE* is Western Europe without Greece.

Sources: See graph 12.

the economic map and in much of economic history. It is comforting to see that all our historical national accounting efforts fully capture the main facts recorded by previous generations of economic historians. It is also satisfying to perceive the smooth increasing trend in investment rate from the late 1830s to the mid-1890s. Within this long, sixty-year period the central part, from 1862 to 1877, is clearly visible, and fits nicely with the well-known efforts to diffuse the railways across Western Europe.

The next major break in the series can be seen at the end of the nineteenth century. From 1894 to 1899 the investment rate increases from 8.9 to 13.0. Interestingly enough, this investment boom was to remain. Investment levels continued in the range of 10.6 to 13.0% until the outbreak of World War I. This new increase can be easily related to the second technological revolution: electrification, mainly, but also new urban development, the start of motorization, the launching of new industries, and so on. The 'belle époque' years or the 'Edwardian era' was a distinctive period in European history when

Graph 13. Gross Fixed Capital Formation, Western Europe, 1830–2000 (in 1990 international G-K million \$)



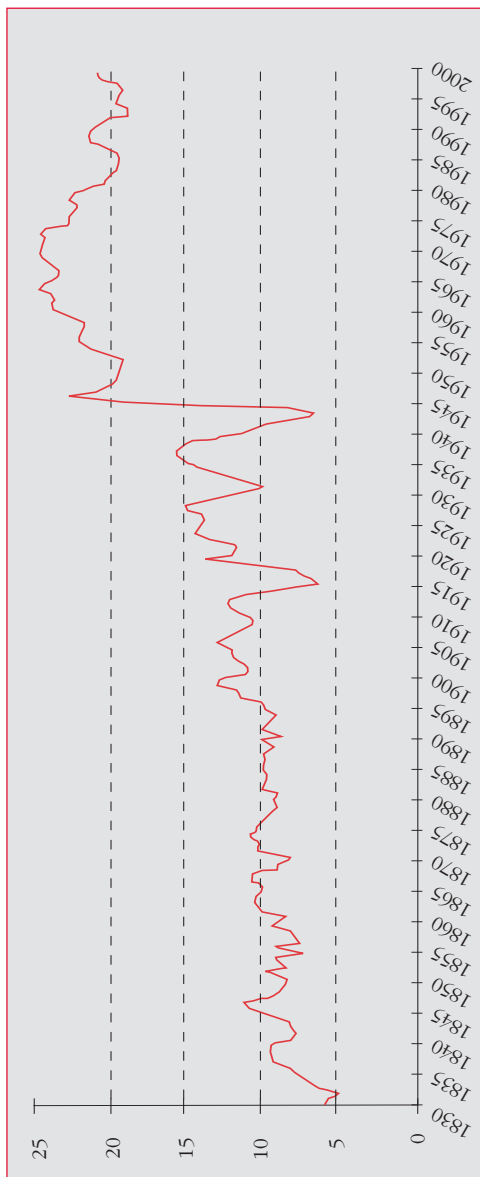
Source: See Appendix.

investment efforts were clearly higher than before. In this context a number of countries ‘took off’.¹⁰ The increase in the investment rate is visible in many national figures¹¹. It can also be related to a time of historically low interest rates and to exceptionally high rates of profit.¹² Of course, the gold standard, working to complete satisfaction for everybody, was instrumental in this sustained economic success.¹³

As can be expected, World War I put an end to this evolution. The investment rate fell as low as 6.3% (as in 1833, more than eighty years before). This might well be a maximum, as the countries suffering the most during the war do not have data on this variable. World War II brought a similar experience, with investment rate reaching the same depths as for World War I and for a similar length of time. The interwar years were of strong, but delayed recovery. The heights of 1899 and 1906 (13.0%) were surpassed in 1920 and from 1924 until 1930, reaching a high of 14.9 by 1929. The subsequent Great Depression, for all the harm it brought, was not as destructive as the world wars. The investment rate felt a lot, but only to 9.9%, and recovery pushed it up again to 15.6 by 1937. Looking at graph 14, there appears to be an increasing trend at work from the late nineteenth century to the late nineteen thirties. But had this trend continued it would have produced our current investment rates, not the extraordinary post-war rates.

Indeed, investment efforts after World War II were by all means extraordinary. By 1947 the investment rate had reached 22.7%. The equivalent, earlier experience was in 1920, with a high of 13.7. The investment reaction was quicker after World War II than after World War I, and it was much stronger. Investment efforts by 1947 were more than 50% higher than the highest pre-

Graph 14. Investment rate (GFCF/GDP), Western Europe, 1830–2000 (%)



Source: See Appendix.

war rates. In 1920 they were almost the same. The exceptional 1947 experience did not last longer than that of 1920. Investment rate fell the following year, but did not decline back to normal levels. The investment rate from 1948 to 1953 remained at an astonishingly high 19%, or more. To everybody's surprise what came next was not an investment crisis but a further investment boom. The 19.1% rate of 1953 increased to 24.5% in 1964, and it remained around the level of 24% until 1974! The European economic miracle really did exist, and it was founded on allocating resources to gross fixed capital formation. After 1974, investment rates went down quite quickly. By 1986 they were at the same early 1950s level: 19%. A lower level was reached in 1994, at 18.7, the lowest level since World War II. Compared to the interwar years, these are still very high rates. They only seem low when compared to the achievements of the Golden Age.

5. Foreign trade and openness

We have been unable to gather sufficient foreign trade data (value of imports plus value of exports in 1990 Geary-Khamis dollars) for Western Europe before 1850. But the Western European foreign trade series is quite robust even at the very beginning (see the appendix on "Sources and methods"). What we can see in graph 15 is substantive enough. The 1850–1913 period experienced sustained growth with three different sub-periods: from 1850 to the mid-1870s, high growth; from mid-1870s to early 1890s, slow growth; and from then to 1913, growth acceleration, without reaching the rates of the third quarter of the nineteenth century. The 'trans-war' period is definitely a period of foreign trade reduction. This happened during the wars,

but also during the Great Depression. The years of World War I reconstruction and Great Depression recovery are disappointing at providing more foreign trade. By 1945, at the end of World War II, foreign trade was more than forty percent below its 1913 value. From 1945 onwards, foreign trade grew almost without deceleration until the late 1970s. The 1980s and early 1990s were years of deceleration, stagnation and, eventually, crisis. Growth resumed after 1993. All in all, the pre-1913 period was one of foreign trade expansion; the period 1913–1945 was one of foreign trade contraction; and afterwards the dominant trend was expansive again.

This account of foreign trade growth does not fully show how intense the commitment of Western European countries was to foreign trade. This is better presented in graph 16, on Western European openness.¹⁴ The three major periods identified in graph 15 are still there, but amplified and nuanced. The series start with an openness degree of 16.9% in 1850. This ratio doubled to 34% during the next three decades from 1850 to 1882. It was the era of diffusion of free-trade policies and of commercial treaties. The level reached by 1882 stagnated — or even slightly declined — for twenty years. By the turn of the century openness increased again, rising to a high of 40.9% in 1913. This ratio was only surpassed in 1974, more than sixty years later. For the thirty years following 1913 the trend was deeply downwards, to the trough of 15.3% in 1942. There were some reversals in the downward path: in 1920, but a protectionist reaction and an economic depression made 1920 truly exceptional; in 1924, when Western Europe seemed, for a while, to return back to normal; and once again in 1937, for a very short-lived economic boom. In general, before World War II,

and all over the 1930s, openness was very low — around 20%.

Recovery after World War II was important, but nothing compared to what happened with investment ratios. The 1945 starting point of 18.8% — in the range of the early 1850s — was to be easily surpassed and within a few years — by 1951 — the rate jumped to 34.7%. That level was unsustainable, only lasting one year. From 1952 to 1967 the values ranged between 28 and 32%, below what was usual between 1880 and 1930. So, the Golden Age, when investment ratios were astonishingly high, occurred in a Western Europe where average openness was at relatively low levels — the same as in the late 1860s or the worst moments of the 1920s. We feel that this contrast is highly relevant as it reveals the asymmetry between the two major explanatory factors of the Western European Golden Age.

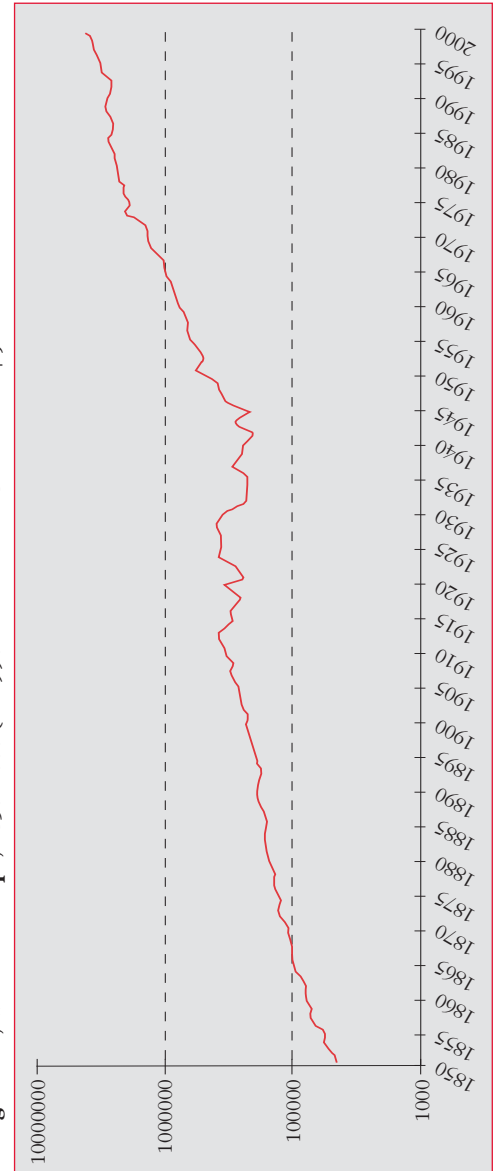
The increase in openness of Western Europe made important advances only from the late 1960s to the mid-1980s, jumping to 48.6% from 30.2. The reasons for this are quite varied. The early steps should be related to the completion of the elimination of internal tariffs within the European Economic Community, in association with the impact of the GATT (General Agreement on Tariffs and Trade) Kennedy rounds and EFTA (European Free Trade Association) trade liberalization. The shocks of the oil crises also had an effect on this trend. It seems that openness was increasing during the 1970s, but a part of this increase was due to oil price movements, just as it happened, inversely, in 1986. So, if we cancel out the effect of the oil crises, what we get is an increase in openness lasting until the late 1980s. It is difficult to identify the impact of the progressive merger of the EFTA and EEC in 1973, with the U.K. and Denmark

entering the EEC. Greece and Ireland should have had a small impact in overall figures. More noticeable should have been the entrance of Spain and Portugal in 1986, as well as the European Union enlargement to include Austria, Finland and Sweden in 1995. Meanwhile, the early 1990s crises, related to German unification, the fall of East European socialist regimes and the dissolution of the Soviet Union, but also to the Gulf war, brought a reversal to the increase in openness. Once this turmoil was over, openness grew again, increasing from 39% in 1993 to 53% in 2000. The overall post-World War II trend is one of increasing openness, but the chronology is much less straightforward than to be expected.

6. Alternative growth engines

Foreign trade openness is widely accepted as a major growth engine. Most studies on productivity growth insist in the importance of openness as a mechanism to improve resource allocation and as determinant of growth performance. The same can be said of capital formation. The former represents the Smithsian tradition, the latter, the Ricardian. In principle, both can be in motion simultaneously. But we don't see this happening in our Western European series. There are a number of interpretations of long term European economic development based on the degree of openness, and a similar number of others based on the intensity of technological change embodied in capital formation. This interpretative tension is the most important for the Golden Age.¹⁶

Graph 15. Foreign trade, Western Europe, 1850–2000 (in 1990 international G-K million \$)

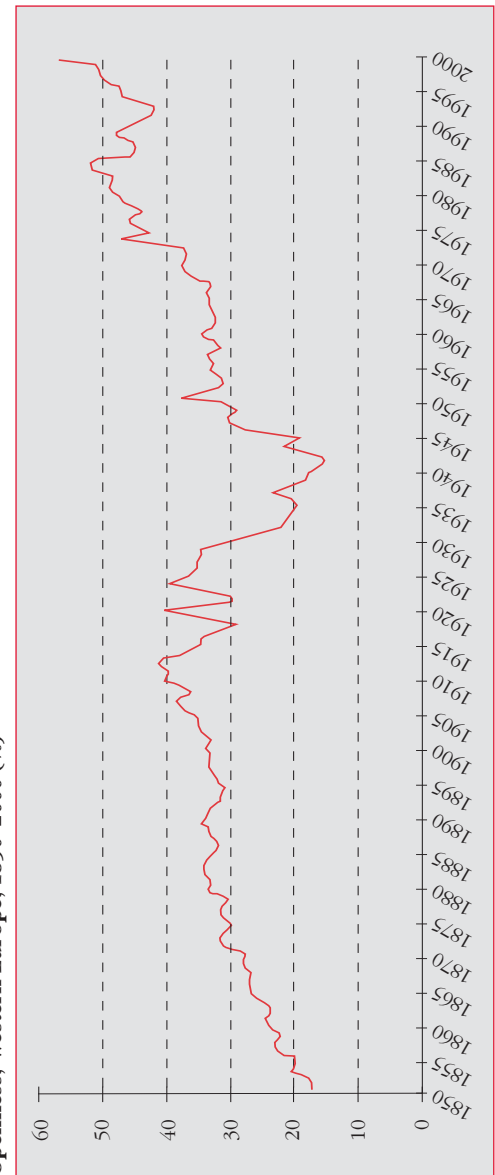


Sources: Appendix

The sense of trade-off between foreign trade and investment is assessed in graph 17. We have divided foreign trade by gross fixed capital formation (GFCF). Our aim is to compare the relative growth of both variables. As they are competing factors in the explanation of European growth, it is worth to look at their relative behaviour. During most of the second half of the nineteenth century the trend was increasing: that is, foreign trade was growing quicker than investment. The trend was reversed in the 1890s, but it resumed again in the 1900s. By 1913 it was no different to the trend up to 1880. The interwar period contributed to a steep reversal in the trend. The ratio, quite stable for decades at the 300–350% level, fell dramatically to less than 150%. GFCF was growing much quicker than foreign trade — indeed, the latter was declining in absolute terms. The low levels reached by the late 1930s remained as they were until the late 1960s and early 1970s. The Western European system of relatively closed economies started to switch back after its historical low of 1964 to a more open system. From then until the mid-1980s the dominating trend was one of expansion — a doubling of the ratio — meaning that foreign trade was a more dynamic force than investment. The upward trend is unclear for the last decade and a half of the series, although it seems that, from a long-term perspective, expanding forces are still predominant. Interestingly enough, the ratio by 2000 is quite similar to that of almost a century and a half ago — 1855 or 1860 (or 1899 or the mid-1920s).

Indeed, graph 17 displays the different growth regimes in Western European late modern history. Openness was the prime growth engine in the third quarter of the nineteenth century and in the last quarter of the twentieth. Domestic investment

Graph 16. Openness, Western Europe, 1850–2000 (%)



Sources: See Appendix.

efforts dominated in the interwar period. The first globalization period and the Golden Age were more balanced, but at very different openness and investment levels. The years from 1880 to 1913 were of balanced growth at a high openness and a relatively low investment effort rates, while the Golden Age was balanced at low openness and high investment effort rates. This last feature of our data is very much at odds with the literature stressing the importance of trade liberalization and increasing openness in explaining Western European growth miracle.¹⁷ Our data provide a new perspective on the relative importance of growth factors.

7. Prices and stability

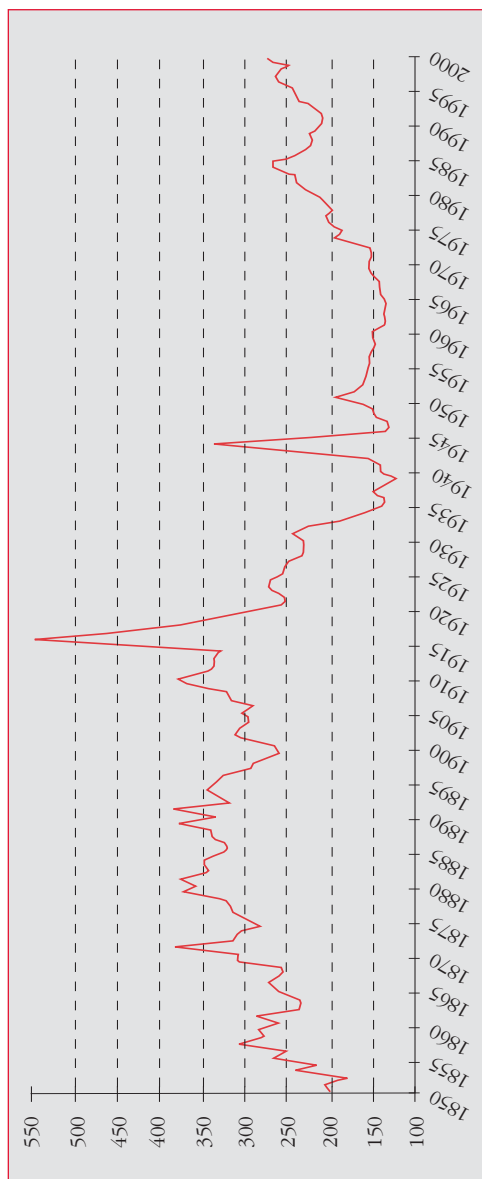
We now turn to macroeconomic stability. Openness and investment were two major explanatory factors of growth performance. Price stability stands for the preconditions for economic growth. The last generations of economists have insisted time and again on the importance of a number of preconditions for economic growth. In this respect, price stability is of paramount importance. The European experience has been mentioned repeatedly as a paradigm of the ‘Pandora box’ that can be opened if prices are out of control. Nevertheless, while we have some ideas on the European growth performance, we know almost nothing, Europe wide, on price stability.

It is difficult to present a Western European price index without experiencing a sense of fear, but we decided that it was, nevertheless, an exercise very much worth the effort (see graph 18). We have been able to start the pan-western European consumer price index as early as 1840. One can see the usual long period of price

stability during the nineteenth century and early twentieth century, the price revolution of World War I and its immediate aftermath, with peak prices being reached in 1923, only to stabilize in 1924. The rest of the interwar years show quite stable prices, but with a clear cyclical pattern, dominated by a downward price trend or deflation. It is worth to underline that these deflation years, from 1929 to mid 1930s, were exceptional. There is no other comparable deflationary period. During World War II prices start to rise again, reaching very high levels in the immediate post-war years, i.e. by 1948. A long period of low price increases start then, which lasts some 25 years. Around the early 1970s, and more clearly during the oil crisis, prices accelerate again. The years of double-digit inflation last a decade or so, after which prices decelerate. The major periods are clearly established and they correspond to well-known stages in European economic policy.

Graph 19 focuses on the inflation rate. It is worth emphasising that the inflation rate, just as it happened with the GDP growth rate, became increasingly less volatile as the nineteenth century proceeded. The variance seems to be very much reduced after the mid-1890s. In its simplicity, this is an outstanding fact. Western Europe still experienced high output and price fluctuations in the 1840s and 1850s, while during the ‘belle époque’, both fluctuations were much smaller and both in the positive range. It is impossible to exaggerate the importance of these progressive improvements and of the economic working smoothness behind them. From the first half of the nineteenth century to the early twentieth century we witness a continuous improvement in the basics of economic performance. There was nothing that could suggest what came next.

Graph 17. Foreign Trade / Gross Fixed Capital Formation, Western Europe, 1850–2000 (%)



Sources: See graphs 13 and 15.

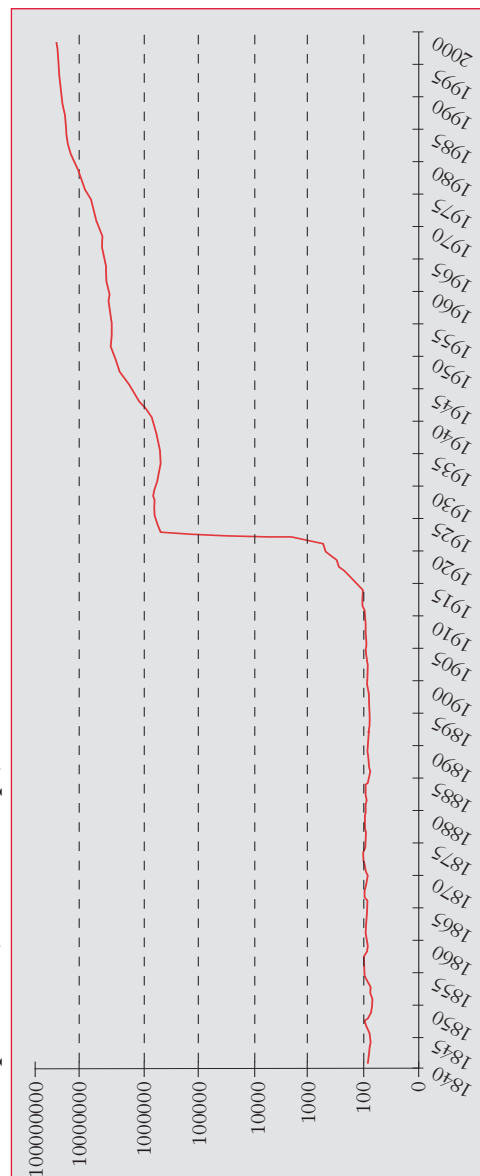
Indeed, what happened next is the closest picture of a revolution — or, to be more exact, a discontinuity — that we can get in an economic history graph. The price regime changed dramatically, expanding violently up to the moment of its final collapse. The whole episode took no more than one decade, from 1914 to 1924. Afterwards we can perceive how tough the efforts were to keep monetary policy under control, causing a clear deflationary trend from 1926 to 1932. After 1932, inflation was quite symmetrical to the previous deflation, but the outbreak of World War II changed the system again and a new wave of high inflation started in 1940 that was to last almost another decade until its end in 1949. This inflation-deflation cycle was less violent than that of 1914–1924, but extraordinary enough. With the exception of the Korean War years, inflation was again under control from 1954 to the late 1960s. The difference was that deflation was carefully avoided. From the mid-1960s onward prices underwent a modest acceleration. The inflationary period that followed the oil crisis — thirteen years long — lasted a bit longer than the previous price crisis, but it was definitely smoother. Once the highs were over after 1981 the trend again tended toward inflation reduction, but avoiding deflation. The creation of the euro was designed to create price stability in the future, and it seems to have delivered it.

The weight of the two hyperinflations recorded among Western European countries — Germany and Austria — dominates the whole long term and short term perspectives on Western European prices and inflation rates. We display an alternative measure in graphs 20 and 21, that exclude Germany and Austria, thus limiting our focus to the countries without a hyperinflation experience. What we can immediately assess is

how important hyperinflation was. Excluding these two countries changes dramatically the overall view of long and short term price stability across Western Europe. Another important difference is that World War II and the immediate post-war years appear to be as inflationary as World War I and more than its immediate aftermath. There were a number of countries — France, Greece, Italy — that had important inflations after World War II. These were not comparable with 1923–1924 hyperinflations, but we cannot forget them at all.

Were there other structural breaks in Western European inflation experience? The evolution of standard deviation can be an interesting way to look at it. Graph 22 displays the standard deviation of inflation rates of all the countries and of all but the two with hyperinflation experiences. We can confirm how important the high inflation periods were as moments of maximum diversity in macroeconomic management among Western European countries. But for the two major inflationary shocks, the rest seems as unimpressive as interesting. Inflation dispersion was increasingly reduced from mid-nineteenth century to the end of the century. Dispersion was even smaller in the 1960s, under the fixed exchange rate Bretton Woods regime, than at any previous point in time. The inflation experience of the stagflation years was comparable, in terms of dispersion of national experiences, to the mid-nineteenth century. The control of inflation rates since 1980 was simultaneous in an increasing number of countries, up to the point of providing, by the end of the twentieth century, the smallest dispersion of the whole century and a half under consideration.

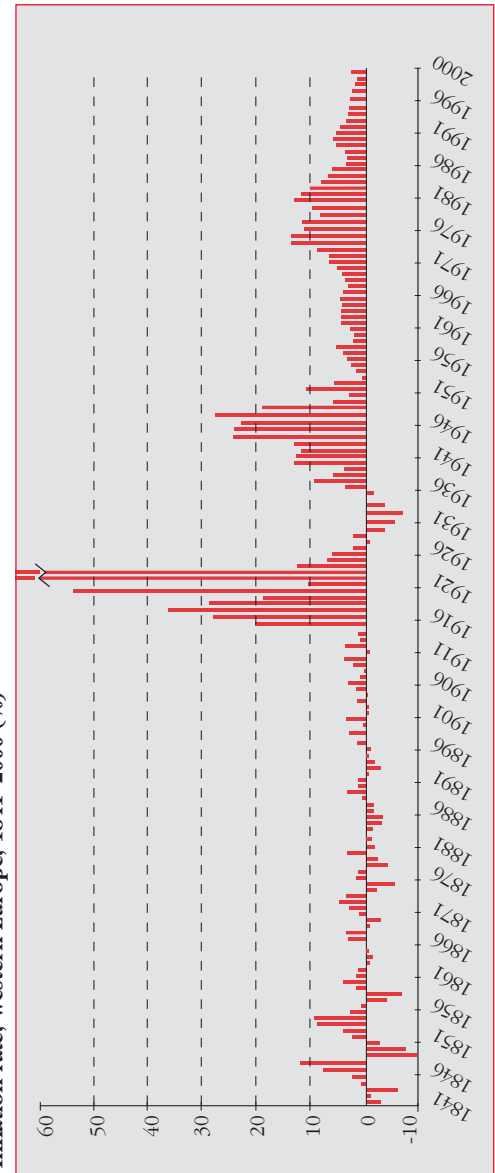
Graph 18. Consumer price index, Western Europe, 1840–2000 (1913=100).



Sources: See Appendix.

Graph 23 is based on the same data as graph 22, but we have eliminated the two major inflationary periods and consider all the countries. The picture is extremely interesting as we can focus on a much smaller range of standard deviations. We can see how dispersion rates were increasingly reduced as well as volatility, from 1840s to 1880. Since 1881 there is a regime change with dispersion going down suddenly and volatility, too. We have been checking our series and have been unable to detect any change in the underlying data. The change seems real and not a figment of the data. An obvious explanation for the sudden reduction in volatility is the quite rapid diffusion of the gold standard.¹⁸ But the sudden invasion of cheap grain from overseas might also be a reason.¹⁹ Dispersion and volatility increases again in the twenty years up World War I. While the 1880s appear as a moment of Western European inflation integration, the story up to the 1950s seems just the contrary, with dispersion and disintegration increasing. Even without considering the abnormal experiences of the high inflation periods, the trend is towards more dispersion and more volatility. This trend changes suddenly with convertibility and fixed exchange rates after 1958 and up to 1973. The story that comes afterwards is well known but what we ignored was its historical perspective.²⁰ The stagflation years were, in long term perspective, of relative high dispersion inflation rates, but of relative low volatility. The monetary integration of the 1990s was extraordinary, also in a long term perspective, for both its smooth reduction of dispersion rates and its absence of volatility.²¹

Graph 19.
Inflation rate, Western Europe, 1841–2000 (%)



Sources: See graph 18.

Concluding remarks

In this *opuscle* we present new aggregated macroeconomic data for Western Europe. Even with this very simple and straightforward approach we are able to identify some major phases and turning points, and some under-researched episodes. We also provide evidence for some widespread assumptions that now have a quantitative foundation. We summarize a few key facts and issues:

a) Two per cent GDP growth rates per year in Western Europe can be traced back as early as since 1830.

b) The long nineteenth century provided reduced volatility in output and prices while delivering stable growth rates and stable inflation rates.

c) A lot of convergence was at work among the most developed North-Western European economies since the mid-nineteenth century.

d) There were no major intraregional Western Europe wide convergence trends before World War II. But they became very intense from 1947 onwards, reaching, in the last quarter of the twentieth century, standard deviations well below the historical averages.

e) Investment rates experienced an epochal rise after World War II.

f) Notwithstanding the emphasis on economic integration as a driver of economic growth in the literature on European integration developments, openness has increased much less than investment rates during the post World War II years.

Graph 20. Consumer price index, Western Europe (excluding Austria and Germany), 1840–2000 (1913=100)



Sources: see Appendix.

g) Convergence in inflation rates has been difficult to achieve. Still, there have been at least three major episodes of inflation convergence: the 1880s, the 1960s and the 1990s.

h) Western Europe economic performance underwent some major, dramatic, breaking points during the first half of the twentieth century. GDP and population series display the most obvious examples. Hyperinflation after World War I is the largest one, statistically speaking. We tend, too often, to forget about it.

Appendix: Sources and Methods

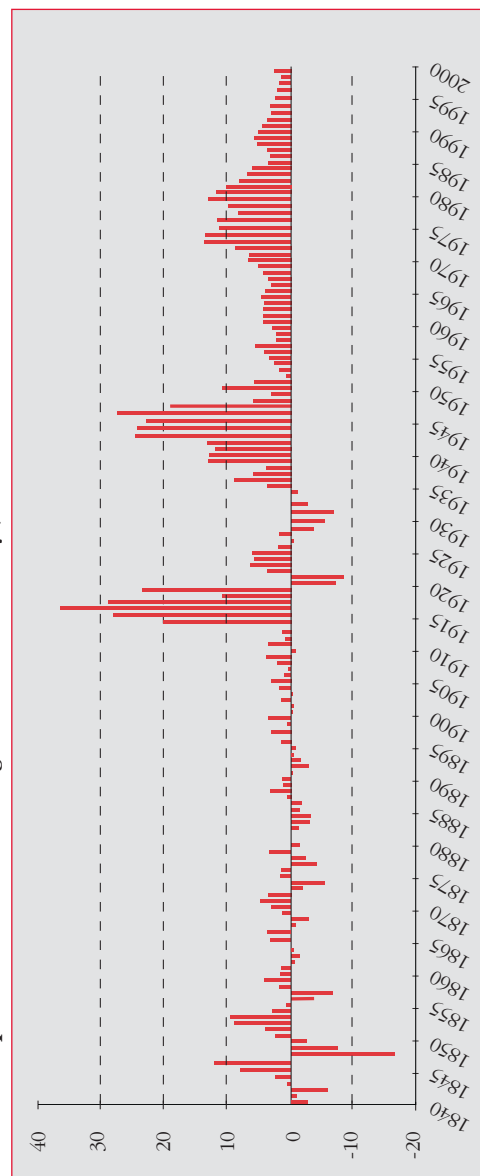
GDP and population

The fundamental source for GDP and population data is Angus Maddison (2003). We have checked his last updates at his webpage: <http://www.ggdc.net/maddison/>. The GDP is made comparable according to Maddison's criteria: 1990 international (Geary-Khamis) US dollars. This procedure allows for a substantial, although limited, correction of price effects. For 1830–1870 population data, when no annual data was available we interpolated a geometric trend. When more recent GDP estimates do exist or when they start earlier than those of Maddison, we have relied on those. We have used 1913 current values as the base year for switching to a common *numéraire*. Unless otherwise stated we have relied on Mitchell (1992) until 1979, and IMF, *International Financial Statistics*, thereafter.

Exceptions to the sources summarized in the previous paragraph are:

Austria: 1870–1913, Schulze (2000).

Graph 21. Western Europe inflation rate (excluding Austria and Germany), 1841–2000 (%)



Sources: See graph 20.

Belgium: 1846–1870, Gadisseur (1973).
Finland: 1860–1960, Hjerppe (1996).
France: 1830–1913, Toutain (1997).
Germany: 1850–1901, Burhop and Wolff (2005); 1913–1949, Ritschl and Spoerer (1997). Population and GDP of the former German Democratic Republic for 1870–1945 have been estimated according to the proportion that it represented in 1936 within nowadays Germany (Maddison, 2003).
Greece: 1833–1939, Kostelenos (2001).
Italy: 1861–1913, Fenoaltea (2005).
Netherlands: 1830–1913, Smits, Horlings and van Zanden (2000).
Norway: Grytten (2004).
Portugal: 1865–1910, Lains (2003); 1910–1958, Batista, Martins, Pinheiro & Reis (1997).
Spain: 1850–2000, Prados de la Escosura (2003)
Sweden: Krantz (2001)

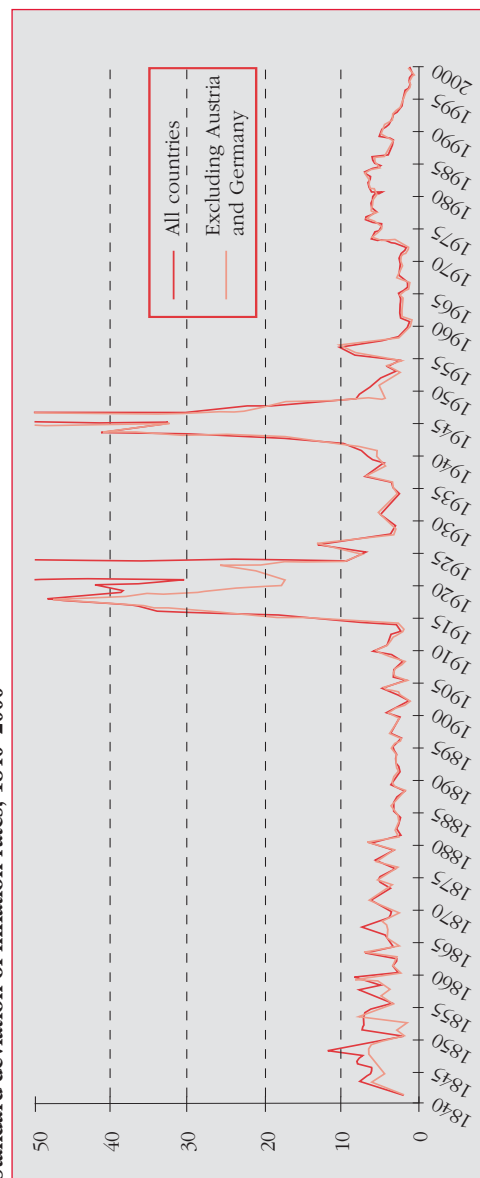
We would like to stress that we have adhered to Maddison’s 2003 criteria of working with current frontier state units. This introduces some problems in cases of major frontier changes, e.g. in Germany and France and in the United Kingdom and Ireland.

The kind of GDP data that have been estimated used to come from the value added approach. In a few cases the approach used has been from the income side or from the expenditure side. The countries with the best data have explored two of these three approaches.

GDP per capita

The series has been calculated by dividing the sum of the GDP for all the European Union countries by their total population.

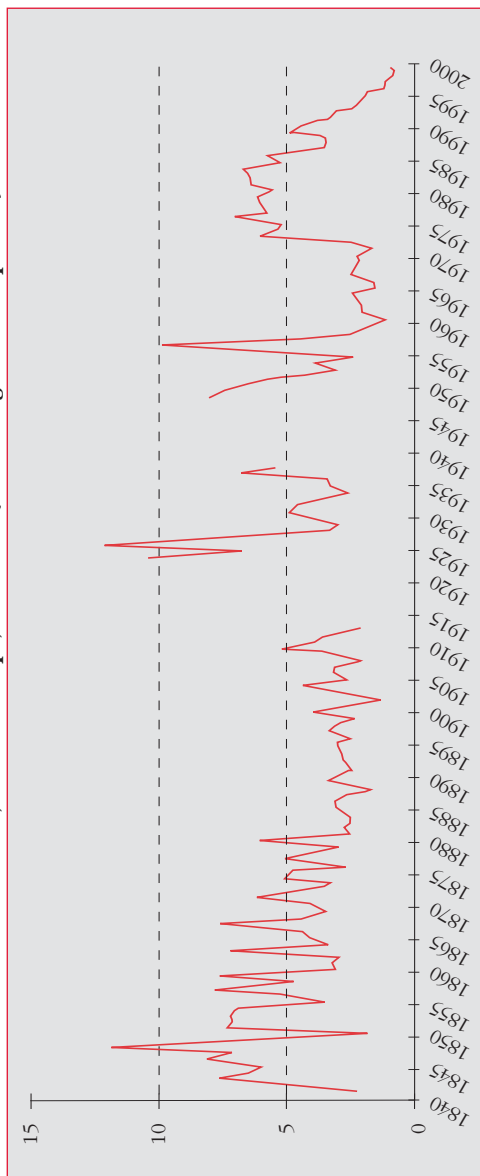
Graph 22. Standard deviation of inflation rates, 1840–2000



Source: Our own calculation with data from the Appendix.

Gráfica 23.

Standard deviation of inflation rates, Western Europe, 1840–2000 (without high inflation periods)



Source: Our own calculation with data from the Appendix.

Gross fixed capital formation (GFCF)

The major shortcoming is the fact that for some long periods the available national series are of *net* capital formation. Another, less important, shortcoming is that some series include inventories. An additional problem concerns prices. We have decided to calculate investment rates based on the current GDP and GFCF values as the deflators of each of them are less reliable than their current values. But there are a few cases for which we have only constant prices. All these particular cases are indicated in the following list. Unless otherwise stated, the source is Mitchell (1992) until 1979, and IMF, *International Financial Statistics*, thereafter. The investment values at 1990 international dollars come out of multiplying the investment rate series by the GDP series. The investment ratio has been calculated by dividing the sum of national GFCF series by their total GDP.

Austria: Inventories included.

Belgium: 1959–1988, calculation made on Gross National Product.

Finland: 1860–1960, Hjerppe (1996).

France: 1830–1938, our own calculation based on Toutain (1997). For 1922–1938, the series were at constant prices.

Germany: 1850–1913, net investment rate, calculated from Net National Product, and including inventories. 1921–1939, Ritschl and Spoerer (1997), including inventories for the sake of continuity with the pre-war series.

Netherlands: 1830–1913, Smits, Horlings and van Zanden (2000). 1921–1939, net investment, including inventories but excluding public investment (a very exceptional case), and compared with Net National Product.

Spain: 1850–2000, Prados de la Escosura (2003).

Foreign Trade

Export (fob) and import (cif) data, as well as GDP, all in current values, come from Mitchell (1992) until 1979, and from IMF, *International Financial Statistics*, for 1980–2000.

The way to estimate a foreign trade aggregate figure for European Union countries has been the same method that we have followed for GFCF. The sum of exports and imports in current values has been divided by GDP in current values to obtain a ratio that we have applied to the GDP 1990 international dollars series. Once they are switched to a common *numéraire*, national foreign trade value series can be added to obtain the total value of EU countries' foreign trade. As with GFCF, a problem can be that GDP series may only exist at constant prices. In these cases we have proceeded as follows:

Belgium: We have used the 1913 based wholesale price index as a GDP deflator, thus obtaining nominal GDP for 1850–1913. We did the same for 1914–1948 with 1914-based price indices, linked with the 1929 based series, according to 1948 current values. All the data come from Mitchell (1992).

Portugal: 1865–1910, GDP data in constant terms from Lains (2003), switched to current values according to the Nunes, Mata and Valério (1989) price index.

Other sources used have been:

Finland: 1860–1960, Hjerpe (1996).

Netherlands: 1830–1913, Smits, Horlings and van Zanden (2000).

Portugal: 1910–1958, Batista, Martins, Pinheiro and Reis (1997).

Spain: 1850–2000, Tena (2005).

Prices:

They are consumer price indices. As a general criteria we have relied on Maddison (1991) for 1870–1979. For 1979–2000, we relied on IMF data. The years 1840–1870 come from Mitchell (1992). The aggregation has been done according to GDP weight. The weighting schemes used have been 1870 (until 1873), 1913 (1873–1918), 1929 (1918–1946) and 1970 (from 1946 onwards). The major problems have been:

Austria and Belgium: Both were excluded from the 1914 calculation as there is a break in the series between 1913 and 1914 (two different price series without any link between them).

Portugal: 1865–1929, Nunes, Mata and Valério (1989).

Spain: Maluquer de Motes (2005).

Notes

(1) Earlier versions with varying geographical scope were presented at a UPF seminar (October, 2004), at the CEPR meeting on “The Long Run Growth and Development of the World Economy: Measurement and Theory” (Venice, April, 2005), at the CSGR, CSGI and UNU-CRIS meeting on “Regionalization and the Taming of Globalization” (Warwick, October 2005), at the Conference on “American Exceptionalism Revisited. In Celebration of Historical Statistics of the United States, Millennial Edition” (Riverside, CA, May 2006), and at the session 103 on “New experiences with historical national accounting: methodologies and analysis”, of the International Economic History Association Congress (Helsinki, August, 2006). We thank the sharp comments received from all the participants and from our discussants at Venice – Albrecht Ritschl –, Warwick – Steve Broadberry –, Riverside – Jean-Laurent Rosenthal –, and at Helsinki – Leandro Prados de la Escosura. Special thanks to Kevin O’Rourke insightful comments and to an anonymous referee report, as well as to the editor of the series. Of course, all remaining errors are of our exclusive responsibility.

(2) Kuznets (1966).

(3) From Maddison (1982) to Maddison (2003).

(4) Bairoch (1976).

(5) Only Luxembourg is missing. The EU at 15 lasted from the accession of Austria, Finland and Sweden in 1995 until the accession of 10, mainly former Communist countries, in 2004. The other EU-15 countries were Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and United Kingdom.

(6) There is annual GDP data available since 1818 for Denmark, 1815 for France, 1812 for the Netherlands and 1800 for Sweden.

(7) Maddison (2007).

(8) We rely on Maddison (2003) that differs from his previous data in choosing current borders and not constant borders.

(9) On the use of 1990 Geary-Khamis international dollars, see the Appendix and Maddison (2001).

(10) Rostow (1978).

(11) The authors are currently working with the European national investment data. Part of this is forthcoming as a chapter in Broadberry and O’Rourke, eds, *An Economic History of Modern Europe*, Cambridge U.P.

(12) Homer and Sylla (2005); Dimson, Marsh and Staunton (2002).

(13) Eichengreen and Flandreau (1997).

(14) $[(X+M)/GDP]$, where X : exports, and M : imports. Our measure is gross of intra-European trade.

(15) Maddison (1987 and 1991); Crafts and Toniolo (1996).

(16) Eichengreen (1996).

(17) Eichengreen (1996), for instance.

(18) Eichengreen and Flandreau (1996).

(19) O’Rourke and Williamson (1999); Federico (2005).

(20) Woodward (1999).

(21) Rhode and Toniolo (2006).

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