Economic Growth and Purchasing Power Parities

in the Nordic Countries 1830-1910

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Abstract

The present paper examines new estimates of GDP for the five Nordic countries 1830-1910 in terms of economic growth and purchasing power parities. It concludes that significant economic growth took place during the period. The long-run growth was surprisingly even. However, up to the 1870s this growth was strongest in Norway. From then on Sweden had fastest growth, when Norway experienced relative decline. PPP calculations of GDPs show that Denmark was best off of Nordic countries in the entire period. Norway was number two to the end of the nineteenth century, and then over taken by Sweden in the early 1900s. Finland and Iceland obtained similar levels 1870-1910.

Historical national accounts

During the last decades Scandinavian economic historians have been in the forefront in constructing historical national accounts (HNA). Olle Krantz pioneered a Nordic project in 1994. The aim was to reach at common standards for the construction and presentation of HNA for the Nordic countries. By adopting common standards one will be able to carry out both cross-country and cross-period comparisons. The Finnish historical national accounts, constructed by Riitta Hjerppe, in many ways served as a standard for the other Nordic countries (Hjerppe 1989). By adopting modern standards with historical alterations the standards for the Nordic Historical National Accounts (NHNA) are closely related to the United Nations System of National Accounts from 1993 (SNA 93) and the European System of Accounts 1995 (ESA 95) established by the Commission of the European Union and Eurostat.

As result of the ongoing Nordic project, new series of HNA for the Nordic countries have been published. Gudmundur Jonsson has constructed a HNA for Iceland (HNI) 1870-1945 (Jonsson 1999, pp. 7-25). Fritz Hodne and Ola Honningdal Grytten have established preliminary series of key macro economic indicators in a HNA for Norway (HNN) 1830-1865 (Hodne and Grytten 2000, pp. 85-96). Riitta Hjerppe has revised her HNA for Finland (HNF) from 1860 onwards (Hjerppe 1996). Olle Krantz has revised the preliminary Swedish HNA figures (HNS) from 1800 onwards (Krantz 2001).

Purpose of paper

Revised GDP figures for the four Nordic countries Finland, Iceland, Norway and Sweden along with second generation HNA for Denmark (HND), first published in 1974, enable us to make relevant comparisons of GDP development in the Nordic countries. By calculating purchasing power parities (PPP) for the countries we also arrive at relevant comparisons of the level of GDP.

Thus, in the present article NHNA series of GDP are presented both as volume indices and as PPP-calculations 1830-1910. These new estimates shed light on both the pace of economic growth and the relative levels of GDP in the Nordic countries during the nineteenth century up till 1910.

GDP per capita

As already mentioned, we now have new or revised NHNA for all Nordic countries except for Denmark. It is, however, possible to use the second generation HNA for Denmark (HND), calculated by Svend Aage Hansen, covering the period from 1818 onwards (Hansen 1974, pp. 201-271). Admittedly, the reliability of these figures has been questioned. But the documentation of Hansen's figures is not inferior to e.g. Statistics Norway's HNN from 1865 onwards. The number of observations in his dataset is in fact higher than those used in calculating HNA for several countries (Hansen 1974, pp. 299-345). Despite the Danish figures need revisions and better documentation; they still serve as a valid indicator of economic development in Denmark during the nineteenth century.

Chart 1. GDP per capita in the Nordic countries 1830-1910.

Volume indices, semi-logarithmic scale, 1870=ln(100).
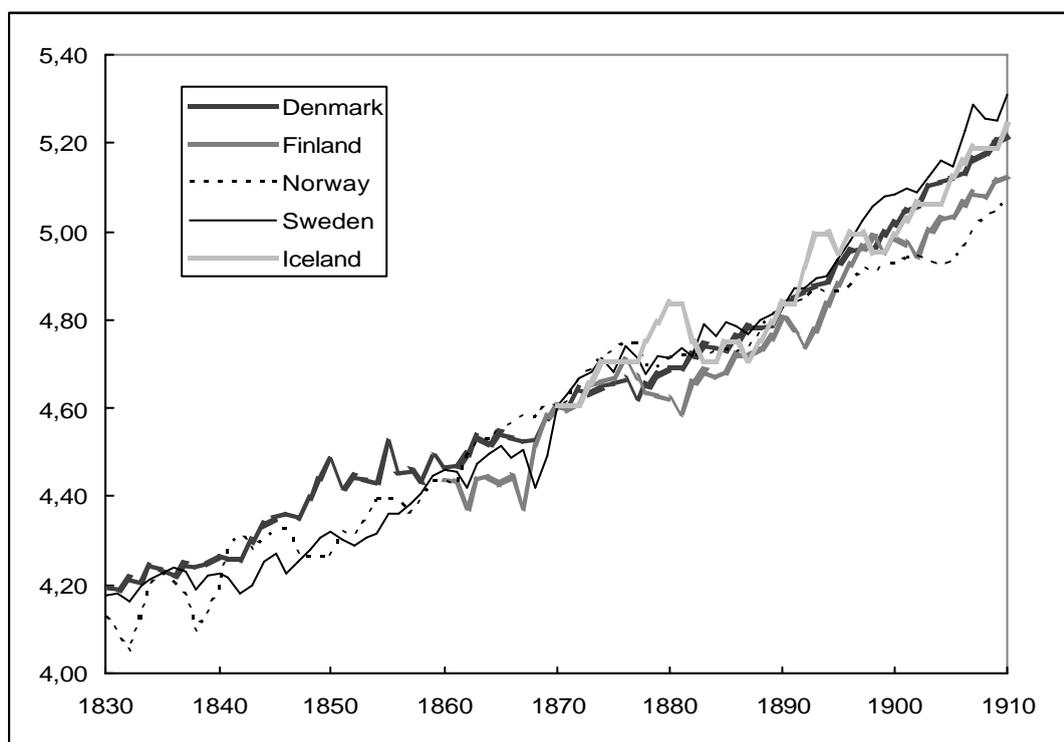
Sources, Crafts 1983a, p. 389, OECD 2001, 18-21, Hansen 1974, pp. 229-230, Krantz 2001, pp. 24-27, Hodne and Grytten, pp. 306-307, Hjerppe 1996, pp. 91-92 and Jonsson 1999, p. 21.

Volume indices of GDP per capita for the Nordic countries are reported in a semi-logarithmic graph in chart 1 above. 1970 is the reference year (1970=100). The

figures for Denmark, Sweden and Norway start in 1830. As for Finland and Iceland, they start in 1860 and 1870 respectively.

According to the chart long-term economic growth seemed to be reasonable stable in the Nordic countries 1830-1910. However, still there were national differences. Swedish growth was definitely relatively low during the first decades, and high during the last decades of the period, when it was the opposite situation for Norway. To be able to conclude on relative national growth phases 1830-1910 we need to split the series into sub-periods.

We will take a closer look at four periods. We first examine two periods prior to 1870; 1830-1850 and 1850-1870. Thereafter, we take a closer look at two periods after 1970; 1870-1890 and 1890-1910. The first of these four periods was basically characterised by the old agrarian economy. The second was characterised by the first moderate wave of industrialisation. The third is known by the so-called long depression 1873-1896, when European economies were hit by several recessions and deflation. The fourth period of investigation was characterised by a relatively strong wave of modernisation and industrialisation.

GDP per capita for Denmark, Norway and Sweden 1830-1870 are shown in chart 2 below. Due to lack of coverage Finland and Iceland are not included in the graph. Also in chart 2 are GDP per capita reported as natural logarithms, with 1830 as reference year.

The graph clearly reveals the highest growth rates in Denmark, 1830-1850. As for the years 1850-1870, Norway saw the most impressive growth rates. According to the statistics, Sweden had the most stable growth during both periods. Annual growth rates are reported in table 1 below.

Chart 2. GDP per capita for Denmark, Norway and Sweden 1830-1870.
Volume indices, semi-logarithmic scale, 1830=ln(100).
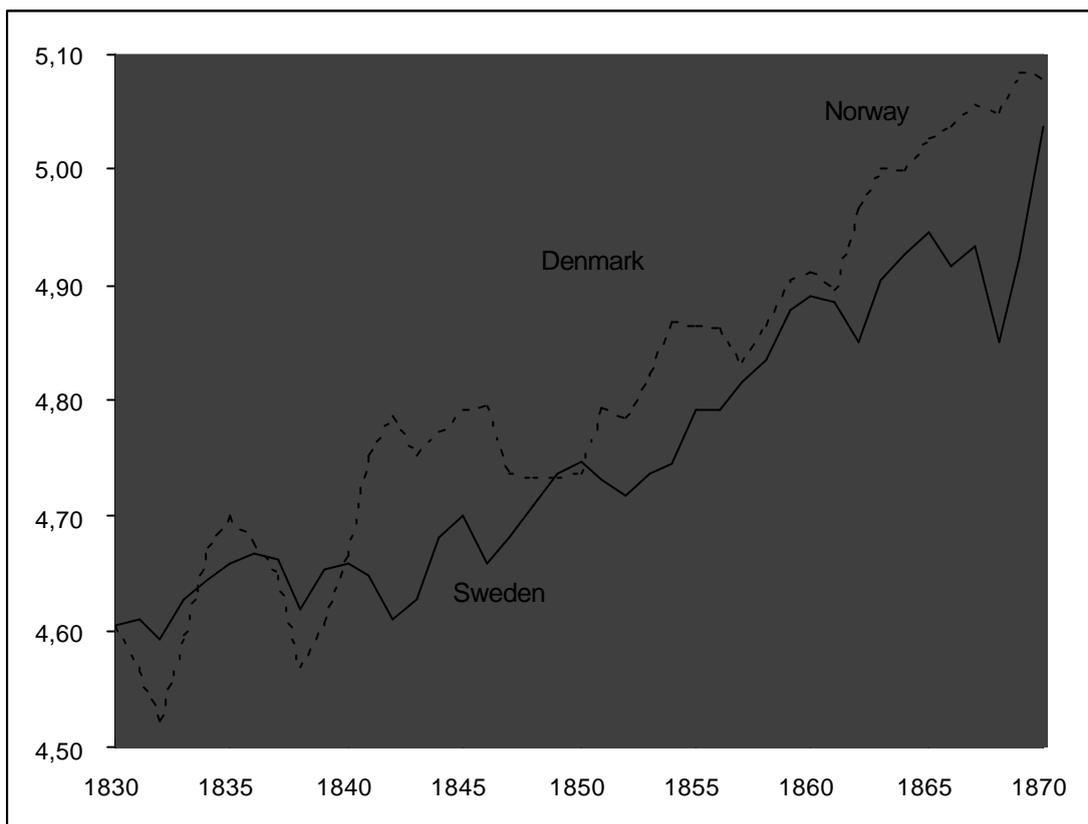
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Chart 3 reports GDP per capita for all five Nordic countries as volume indices, 1870-1910. Also in this graph we use a semi-logarithmic scale. Here the per capita GDP data are calculated as natural logarithms. Finally, 1870 is chosen as our reference year.

The chart clearly reveals that GDP for Iceland was more volatile than for the other countries. This is hardly a surprise, given the Icelandic dependency of fish. Despite significant annual movements for all five countries, the long-term growth rates up to 1890 were surprisingly similar. Thereafter, Sweden was the winner up to 1910, with Iceland and Denmark as the runner-ups. Evidently, Norway lost ground to the other Nordic countries.

Chart 3. GDP per capita for Denmark, Norway and Sweden 1870-1910.

Volume indices, semi-logarithmic scale, 1870=ln(100).
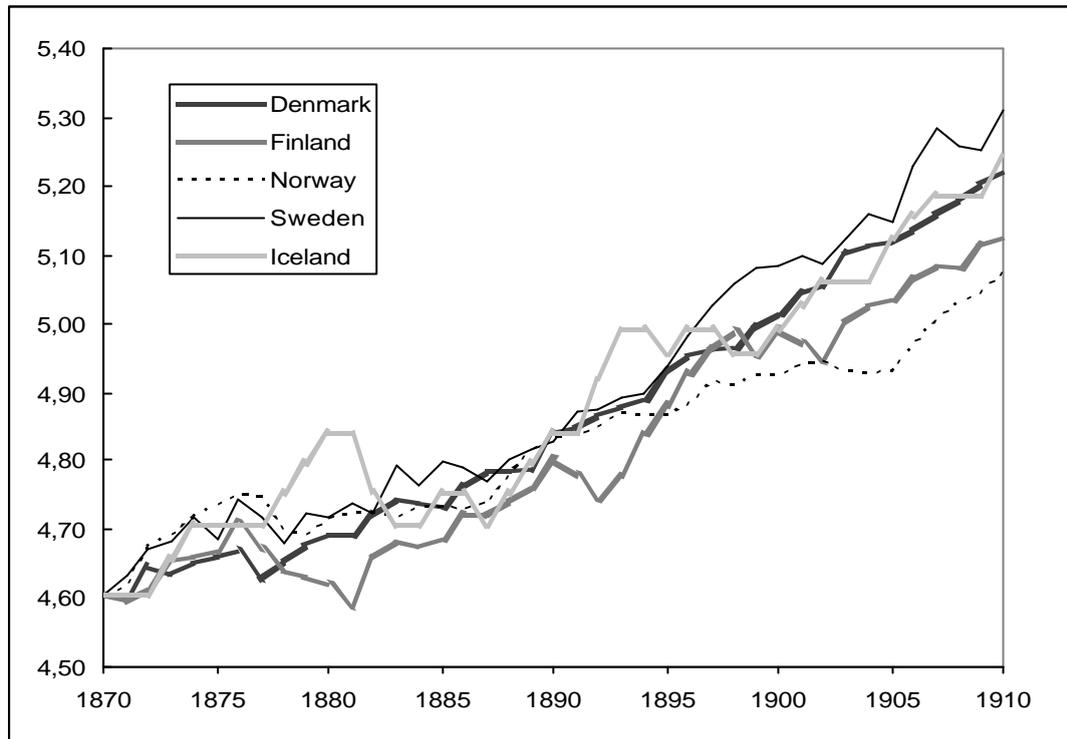
Sources, Crafts 1983a, p. 389, OECD 2001, 18-21, Hansen 1974, pp. 229-230, Krantz 2001, pp. 24-27, Hodne and Grytten, pp. 306-307, Hjerppe 1996, pp. 91-92 and Jonsson 1999, p. 21.

Growth rates

Annual growth rates for the examined periods are given in table 1. The table reports trend calculations. These are estimated log-linear growth rates, according to equation (1). They are calculated by running log-linear regressions, where y denotes GDP per capita, t denotes year, β_0 is the intercept, β_1 the regression coefficient and u the disturbance term. The estimated regression coefficients report growth rates. Annual growth rates are reported as percentages in the table.

(1)
$$y = \beta_0 e^{\beta_1 t} + u$$

Table 1. Annual growth rates estimated by log-linear regressions, in per cent.

	Sweden	Norway	Denmark	Finland	Iceland
1830-1850	0.50	1.03	1.23		
1850-1870	1.26	1.67	0.68		
1830-1870	0.95	1.24	1.01		
1870-1890	0.90	0.68	1.03	0.68	0.80
1890-1910	2.36	1.04	1.98	1.78	1.73
1870-1910	1.67	0.98	1.58	1.38	1.46
1830-1910	1.42	1.19	1.22		

Sources, Hansen 1974, pp. 229-230, Krantz 2001, pp. 24-27, Hodne and Grytten, pp. 306-307, Hjerppe 1996, pp. 91-92 and Jonsson 1999, p. 21.

The growth rates reported in table 1 reveals that Denmark had the highest rate of growth in the first period 1830-1850, followed by Norway. The Swedish growth in this period was modest. Thereafter, Norway experienced an impressive growth in GDP per capita in the second period 1850-1870. The growth can basically be explained by success in the Norwegian export sector. Fisheries, forestry and shipping services made up about 90 per cent of Norwegian exports during the period.

From 1850 onwards all these three industries experienced significant increase in demand, in particular the merchant fleet. By being a low cost international shipping power closely related to the United Kingdom, Norway benefited from the repeal of the British Navigation Act in 1850. The repeal allowed third countries, not involved in the particular trade, to take cargo between British and non-British ports. During the 20-year period 1850-1870 the export volume of the Norwegian merchant fleet stepped up by about 600 per cent. Exports of fish, wood and timber increased with more than 300 and 100 per cent respectively (Brautaset 2002, pp. 101, 145 and 188).

With an exception for Denmark, the growth rates fell in 1870-1890 relative to 1850-1870. This can basically be explained by the international depression 1873-1896, when all Nordic countries experienced shifting years of growth and recession from the middle of the 1870s to the end of the 1880s. Denmark and Sweden did better than the others during this period, when Finland and Norway lost ground. During the last

period of our examination, all countries experienced strong growth, except for Norway. Sweden accounted for an impressive annual growth rate of 2.36 per cent, due to rapid industrialisation and growth in exports (Schön 2001, pp. 180-221). Denmark, Finland and Iceland had growth rates of 1.98, 1.78 and 1.73 respectively. As for Norway, they barely passed one per cent annual growth. Important reasons for the low growth in Norway seem to have been the late transition from sail to steam in the merchant fleet, late industrialisation, and a financial crash 1899-1905 (Hanisch 1996, pp. 53-84). Denmark profited from its efficient and competitive agriculture, Sweden and Finland from their competitive forestry and pulp and paper industry (Jörberg 1970). Iceland did well in their most important industry, i.e. fishing (Jonsson 1999, p. 23).

Due to the rapid Swedish growth 1890-1910, and their relatively moderate depression in the 1870s and 1880s, they had the highest growth rate both in the 40-year period 1870-1910 and the entire period under examination, 1830-1910. Due to the slowdown in Norway 1870-1910, its over all growth 1830-1910 was similar to that of Denmark. As for Finland and Iceland, their performances were close to the Nordic average, 1870-1910.

Existing PPP calculations

In 1976 Paul Bairoch published purchasing power parity estimates of GDP for 19 European countries for every decade 1830-1973. Denmark, Finland, Norway and Sweden were included in his figures. According to his calculations Norway was by far the wealthiest during the nineteenth century, but was bypassed by Denmark towards 1913. Sweden and Finland were significantly poorer. GDP per capita in PPP for Denmark was reported to 73 per cent of that for Norway. The shares for Finland and Sweden were 60 and 56 per cent respectively (Bairoch 1976, p. 307).

Bairoch's PPP-calculations have been heavily criticised, and can hardly be defended against a critical examination. Both his PPP calculations and his data of historical GDP figures have been questioned, also his reluctance in using figures produced by national economic historians. Two years before Bairoch published his figures, Olle Krantz and Carl-Axel Nilsson presented PPP calculations for Denmark, Norway and Sweden. By adjusting historical national accounts with purchasing power equivalents they were able to compare GDP per capita in PPP for the three countries. They

concluded that Denmark was at the top in 1873. Norway's GDP per capita ratio to Denmark was 0.9 and Sweden's 0.576. This means that GDP per capita in PPP for Norway was 90 per cent of that for Denmark. As for Sweden, it was only 57.6 per cent. In 1927 Denmark was still the wealthiest Scandinavian nation, but Sweden was closing the gap, accounting for 81.4 per cent of the Danish figures. Norway's ratio had fallen to 78.6 per cent according to Krantz and Nilsson (Krantz and Nilsson 1974, pp. 52-69). Their figures also indicate Swedish backwardness. Given that Swedish entrepreneurs were in the forefront of the industrial and financial expansion in the Nordic countries 1870-1910, this seems dubious. Thus, Krantz and Nilsson's figures from 1974 should be questioned. The GDP figures for Sweden used in their analysis were probably far too low, and have later been revised upwards (Krantz 2001, pp. 12-27).

Based on new and better data, Nicholas Crafts in 1983 and 1984 presented new calculations of per capita GDP expressed in PPP for 17 European countries. Craft's estimates have so far been "a final say" in this matter, in the way that they by many economic historians are taken as the most representative figures. Craft gives figures for Denmark, Finland, Norway and Sweden by decade 1860-1910. His figures conclude that Denmark was best off of the Scandinavian countries in the entire period, with Norway as the runner up until 1900. Thereafter Sweden took over Norway's position, closing the gap to Denmark. Finland was placed as number four during the entire period (Crafts 1983a, p. 389 and 1983b, p. 440).

In 1999 Gudmundur Jonsson published PPP estimates for all five Nordic countries. Assuming that Angus Maddison's estimates of GDP per capita in 1990 Geary-Khamis 1990-dollars give a representative picture of the PPPs between the Nordic countries, Jonsson presented GDP per capita in 1990-dollars for 1870, 1913, 1929, 1938, 1945 and 1950. There are several problems in doing this. In the first place, Maddison adjusted his Swedish figures previous to 1913 significantly upwards. Secondly, the Norwegian figures are adjusted significantly downwards. Thus, the figures for these two countries are not representative for the actual situation. However, the estimates for Iceland, calculated by Jonsson are more reliable. According to these figures the Icelandic GDP per capita in PPP was close to the Finish level both in 1870 and in

1913. Compared to Denmark the Icelandic GDP per capita in PPP was 52 per cent in 1870 and 55 per cent in 1913 (Jonsson 1999, pp. 18-19).

Crafts estimates are based on PPP calculations for 1970 made by Kravis and associates (Kravis 1978, pp. 215-242 and 1978). Crafts extrapolated these PPPs backwards by adopting volume indices of GDP per capita. For 1910 he arrived at GDP per capita for the UK at 1,302 US Dollars of 1970. The corresponding figures for The Nordic countries were 1,050 for Denmark, 763 for Sweden, 706 for Norway and 561 for Finland (Crafts 1983a, p. 389). Like Bairoch and Krantz and Nilsson, Crafts did not present figures for Iceland.

However, based on new PPP-calculations for all Nordic countries, inclusive of Iceland, it is possible to estimate Iceland's GDP per capita in PPP in 1970. This is done by taking OECD's PPP calculations for the 1990s and extrapolate backwards by GDP per capita volume indices (OECD 2001, pp. 18-21). We then find PPP of GDP per capita for Iceland in 1970 to have been 83 per cent of that for Sweden in 1970. By extrapolating with the same volume indices back to 1910, we arrive at GDP figures for Iceland in US dollars of 1970. According to this operation, PPP of the Icelandic GDP per capita for 1910 mounted to about 80 per cent of the Swedish, i.e. 610 US 1970-dollars.

Estimation procedure for new PPP

To be able to construct new PPP series of GDP per capita for all five Nordic countries till 1910, we use Crafts' numbers for 1910 with the addition of the new figures for Iceland, as starting point. By using new GDP per capita data from the recently published HNI, HNF, HNN and HNS along with the second generation HND, we arrive at new and annual series of GDP per capita in 1970 US dollars and prices.

Like Crafts, Bairoch, Krantz and Nilsson, we use a simplified procedure to reach at these numbers. The procedure is first to find the purchasing power equivalents of a reference year. We then obtain ratios, which indicate the real relation between GDP per capita of the countries. We use Crafts' ratios for 1910. These ratios are multiplied by volume indices of per capita GDP for each country. The resulting figures express the ratio of the per capita products of the countries during the remaining years under

investigation. The procedure implies that the ratio of any year is determined by the purchasing power equivalents of the reference year, by changes in the relative prices of the countries, and by per capita income ratios at current prices during the years of comparisons. To sum up, the procedure is to convert purchasing power equivalents for the reference year into purchasing power equivalents for the years of comparisons, with the help of price changes.

The procedure can be more precisely described in a mathematical expression. First the GDP ratios for the years of comparison are found by using:

$$(2) \qquad (y^a_{tf}/y^a_{0f})/(y^b_{tf}/y^b_{0f}) = (y^a_{tf}/y^b_{tf})(y^b_{0f}/y^a_{0f})$$

Here y denotes GDP per capita, a and b two countries, t year of investigation, 0 reference year. The GDP ratios for the year of reference in current prices can be expressed as:

$$(3) \qquad y^a_{0c}/y^b_{0c}$$

The ratio of the purchasing power equivalents, E, are:

$$(4) \qquad E^a/E^b$$

Expression (3) multiplied with expression (4) gives the real ratios between the countries under investigation during the year of reference. By multiplying this ratio with expression (1) we arrive at the ratios between the countries during the years of comparisons:

$$(5) \qquad (y^a_{tf}/y^b_{tf})(y^b_{0f}/y^a_{0f})(y^a_{0c}/y^b_{0c})(E^a/E^b)$$

By reformulating expression (5) we arrive at:

$$(6) \qquad (y^a_{0c}/y^a_{0f})/(y^b_{0c}/y^b_{0f})(y^a_{tf}/y^b_{tf})(E^a/E^b)$$

In expression (6) the first part, i.e. $(y^a_{0c}/y^a_{of})/(y^b_{0c}/y^b_{0f})$, refers to changes in price relations of the countries between the year of comparison and year of reference. Then (y^a_{tf}/y^b_{tf}) refers to the ratios between the per capita GDP of the countries in the years of comparisons at current and at fixed prices. Finally, (E^a/E^b) are the ratios of purchasing power equivalents during the year of reference.

New PPP-estimates

Annual estimates of GDP per capita in PPP for the Nordic countries are reported in chart 4 below.

Chart 4. GDP per capita in PPP for the Nordic countries 1830-1910, 1970 US dollars.
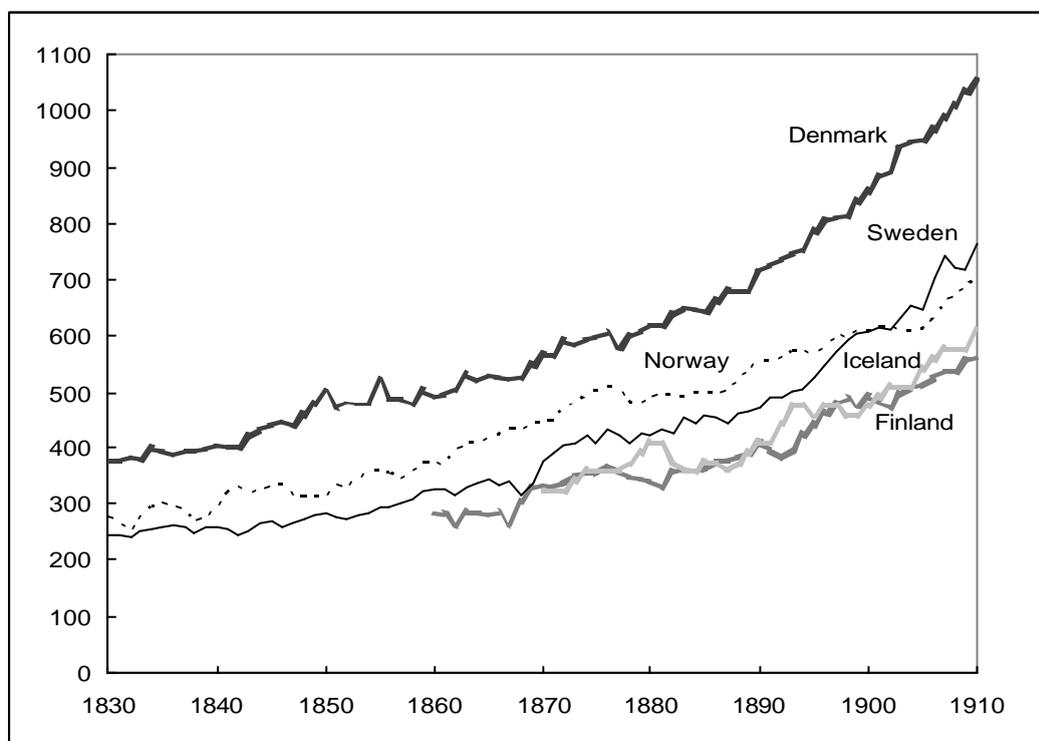
Sources, Crafts 1983a, p. 389, OECD 2001, 18-21, Hansen 1974, pp. 229-230, Krantz 2001, pp. 24-27, Hodne and Grytten, pp. 306-307, Hjerppe 1996, pp. 91-92 and Jonsson 1999, p. 21.

Chart 4 confirms that Denmark was the wealthiest of the Nordic countries during the entire period 1830-1910. Norway was number two until the turn of the century. During the Norwegian financial crisis during the first years of the early 1900s, Sweden was leaving Norway behind.

Around 1870 Finland, Iceland and Sweden were at the same level. However, due to a milder depression in the late 1870s and 1880s and higher rate of industrialisation,

Sweden's economic growth was significantly faster than that for both Iceland and Finland.

Chart 5. GDP per capita in PPP for the Nordic countries 1830-1910, 1970 US dollars. All figures as ratios to Denmark (Denmark = 1.0).
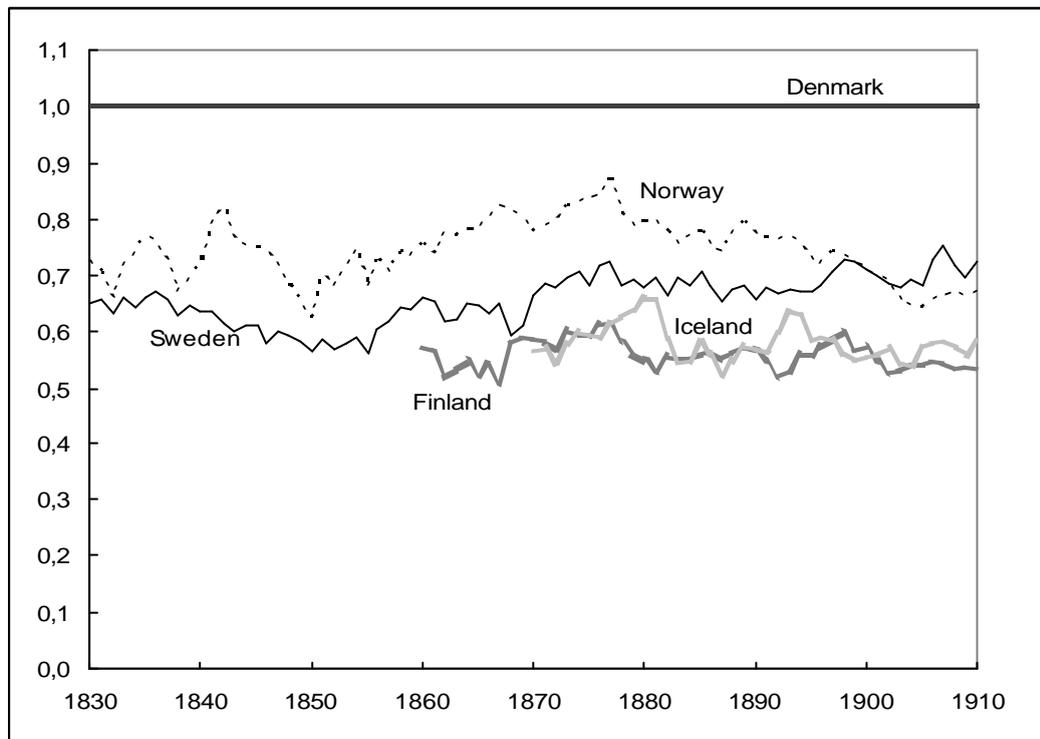

Sources, Crafts 1983a, p. 389, OECD 2001, 18-21, Hansen 1974, pp. 229-230, Krantz 2001, pp. 24-27, Hodne and Grytten, pp. 306-307, Hjerppe 1996, pp. 91-92 and Jonsson 1999, p. 21.

Chart 5 shows GDP per capita in PPPs for Finland, Iceland, Norway and Sweden as annual ratios to Denmark. (Denmark equals 1.0). The numbers are reported in table 2 at the end of the article. By studying the figures, those searching for convergence in the way of a catch-up effect, will be disappointed. Admittedly, Norway closed the gap up to Denmark significantly from 1850 onwards to the late 1870s. In 1850 Norway's GDP per capita in PPP accounted for 62.5 per cent of that for Denmark. In 1877 it reached 87.4 per cent. However, thereafter a significant divergence took place between the two countries up to 1910. Swedish GDP per capita in PPP accounted for less than 60 per cent of the Danish in the early 1850s and more than 75 per cent in 1907. Finland accounted for 50-60 per cent of Denmark almost every year 1860-1910, and Iceland about the same from 1870, despite more volatile figures.

Exchange rate adjusted GDP

To check the reliability of the new estimates presented here, we can look at GDP per capita in the Nordic countries relative to their exchange rates. For Denmark, Norway and Sweden this is almost a straightforward task, since they operated the Scandinavian Currency Union with the same par rate of their kroners from 1877 onwards. All three currencies were at par values in 1910, and mutually official means of payments in all three countries. Given that exchange rates reflect price differences, we get an indication of their PPPs by looking at nominal GDP per capita figures. The Danish figures, constructed on the basis of old standards and definitions, do not include the same number of services as the Swedish and the Norwegian. Thus, ten per cent is added to the Danish GDP per capita. Since the Norwegian investment figures are more generously estimated than those for Sweden and Denmark, seven per cent are subtracted. These adjustments make the figures more comparable with international HNA-figures (Bjerke 1965, pp. 62-63).

Doing this we arrive at comparable GDP per capita figures for the three countries in 1910. According to these, the Norwegian and Swedish GDP per capita was 71 respectively 75 per cent of the Danish. According to the estimates presented above, the rates were 67 and 73 per cent respectively. Thus, the two approaches give fairly similar results. In consequence, we conclude that the new annual estimates seem reliable for our purpose.

Conclusions

Based on new and revised historical national accounts, this article has examined trends in economic growth for the Nordic countries. The data enable us to compare growth in Denmark, Norway and Sweden from 1830, including Finland from 1860 and Iceland from 1870. The overall rates of growth for Denmark, Norway and Sweden were surprisingly similar. During sub-periods, however, they differed significantly. One of the most striking examples is the impressive Norwegian growth from 1850 to the 1870s, followed by a relative stagnation up to 1910. Another example is Sweden's relative fall from the late 1830s to the 1850s, and thereafter an impressive growth rate till 1910. Despite annual variations Finland and Iceland were close up to the Nordic average from 1860 and 1870 respectively.

The paper also gives new PPP calculations of GDP per capita for the Nordic countries for the period 1830-1910. Estimates of GDP per capita relative to exchange rates confirm that the new annual PPP-figures seem reliable. Not surprisingly, Denmark was best off during the entire period, followed by Norway, which closed huge parts of the gap up to the late 1870s. Due to the following relative stagnation in Norway, Sweden took over as number two during the first decade of the 1900s. The population of Finland and Iceland had the lowest standards of living according to these calculations, as their per capita GDP in PPP for most years moved between 50 and 60 per cent of that for Denmark. This also implies that they were well under Norway and Sweden for most years covered in this analysis.

Table 2. GDP per capita in PPP for the Nordic countries.

All numbers in 1970-US dollars.

	Denmark	Finland	Iceland	Norway	Sweden
1830	377			274	245
1831	374			264	246
1832	383			253	242
1833	379			272	251
1834	396			294	254
1835	391			302	258
1836	387			295	260
1837	394			287	259
1838	393			265	248
1839	396			275	257
1840	404			292	258
1841	401			318	256
1842	400			329	246
1843	417			318	251
1844	432			325	264
1845	440			331	269
1846	444			332	258
1847	439			313	264
1848	458			312	271
1849	479			312	279
1850	500			313	282
1851	472			331	278
1852	482			328	274
1853	479			342	279
1854	476			356	281
1855	523			356	295
1856	487			355	295
1857	487			345	302
1858	478			356	308
1859	503			370	322
1860	493	282		373	325
1861	496	280		367	324
1862	505	263		393	313
1863	529	282		408	330
1864	519	284		407	337
1865	532	279		418	344
1866	527	284		422	334
1867	522	263		430	340
1868	526	305		428	313
1869	550	325		443	336

Table 2 continued

	Denmark	Finland	Iceland	Norway	Sweden
1870	567	334	322	441	377
1871	566	330	322	446	388
1872	591	336	322	472	402
1873	584	351	339	480	407
1874	594	353	356	493	421
1875	599	355	356	502	408
1876	604	370	356	509	433
1877	580	356	356	507	421
1878	596	345	373	483	406
1879	609	342	390	481	423
1880	619	339	407	492	421
1881	618	327	407	495	430
1882	636	353	373	495	423
1883	651	360	356	493	454
1884	648	357	356	499	441
1885	644	361	373	500	456
1886	663	374	373	499	452
1887	678	374	356	503	444
1888	678	382	373	524	459
1889	681	389	390	542	465
1890	715	406	407	554	471
1891	724	397	407	555	492
1892	736	383	441	561	493
1893	745	396	474	573	503
1894	753	422	474	571	505
1895	785	439	458	571	527
1896	804	461	474	579	549
1897	812	477	474	601	575
1898	813	489	458	597	593
1899	837	473	458	607	606
1900	855	491	474	608	608
1901	880	481	491	616	616
1902	891	469	508	619	610
1903	933	496	508	610	633
1904	943	509	508	609	655
1905	948	513	542	611	648
1906	964	528	559	633	703
1907	988	539	576	658	743
1908	1007	537	576	676	723
1909	1032	555	576	684	719
1910	1050	561	610	706	763

Sources, Crafts 1983a, p. 389, OECD 2001, 18-21, Hansen 1974, pp. 229-230, Krantz 2001, pp. 24-27, Hodne and Grytten, pp. 306-307, Hjerppe 1996, pp. 91-92 and Jonsson 1999, p. 21.

References

Bairoch, P. (1976). Europe's Gross National Product 1800-1975, *Journal of European Economic History* **5**, pp. 273-340.

Bjerke, J. (1965). *National Accounts 1865-1960*, NOS XII. 163. Oslo: Statistics Norway.

Brautaset, C. (2002). *Norwegian Exports 1830-1865: In Perspective of Historical National Accounts.* Bergen: Norwegian School of Economics and Business Administration.

Crafts, N.F.R (1983a). Gross National Product in Europe 1870-1910: Some New Estimates, *Explorations in Economic History* **20**, pp, 387-481.

Crafts, N.F.R (1983b). Patterns of Development in Nineteenth Century Europe, *Oxford Economic Papers* **46**, pp. 438-458.

Hanisch, T. (1996). *Om valget av det gode samfunn: Artikler om økonomi og historie.* Kristiansand: Norwegian Academic Press.

Hansen, S. (1974). *Økonomisk vækst i Danmark* **2**. Copenhagen: Akademisk Forlag.
Hjeppe, R. (1989). *The Finnish Economy 1860-1985: Growth and Structural Change. Helsinki.* Bank of Finland/Government Printing Centre.

Hjerppe, R. (1996). *Finland's Historical National Accounts 1860-1994: Calculation Methods and Statistical Tables.* Jyväskylä: Jyväskylä University.

Hodne, Fritz and Ola Honningdal Grytten, *Norsk økonomi i det 19. århundre.* Bergen: Fagbokforlaget.

Jonsson, G. (1999). The Gross Domestic Product of Iceland, 1870-1945, *Nordic Historical National Accounts*, Ed Ola Honningdal Grytten. Bergen: Fagbokforlaget, pp. 7-25.

Jörberg, L. (1970). The Industrial Revolution in Scandinavia 1850-1914, *The Fontana Economic History of Europe* **4**. London: Fontana.

Krantz, O (2001). *Swedish Historical National Accounts 1800-1998: Aggregated Output Series*. Umeå: Umeå University.

Krantz, O. and Nilsson, C. (1974). Relative Income Levels in the Scandinavian Countries, *Economy and History* **17**, pp. 52-69.

Kravis, I.B. *et al* (1978). Real GDP per Captia for More Than One Hundred Countries, *Economic Journal* **88**, pp. 215-242.

Kravis, I.B. *et al* (1982). *World Product and Income.* Baltimore: John Hopkins University Press.

Maddison, A. (1995). *Monitoring the World Economy 1820-1992*. Paris: OECD. OECD (2001), *Historical Statistics 1970-1999*. Paris: OECD.

Schön, L. (2001). *En modern svensk ekonomisk historia: tilväxt och omvandling under två sekel*. Stockholm: SNS Förlag.