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New estimates of Swedish GDP by activity 1665-2010[1]

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Abstract:

This study revises previous estimates of Swedish GDP in 1800-2000, and a completely new series is presented for the period 1665-1800. For manufacturing, home industries are added, which has previously been excluded. The series of agriculture and real estate is significantly improved by using previously unutilized sources. This study substantially upgrades Swedish GDP per capita in the early 19th century. The estimated annual fluctuations of GDP may be more reliable than for any country in the 19th century. The series for 1665-1800 is based on the relation between harvest fluctuations and annual changes in the newly calculated GDP-series for 1800-1850.

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Introduction

Swedish historical national accounts belong to the few in the world that can present detailed annual data by activity back to 1800.[3] Despite of their detailed account of various activities, there are a number of deficiencies in previous estimates of Sweden's historical GDP, which have not utilized all the statistics that is available in the archives. This especially pertains to agriculture before 1865.

For the 18th century no published annual GDP series exist, although Olle Krantz has calculated the level of GDP and GDP per capita for the year 1571.[4] The aim of this paper is aalso to present new annual data of GDP and GDP per capita in volume values for Sweden for the whole period 1665-2010. The main changes after 1800 concern agriculture, manufacturing and real estate.The investigation starts in 1665, since there are certain uncertainties concerning weight and volume measures before that year. For the period 1665-1800, only very rough estimates are provided, which are not based on any disaggregation of the different components of GDP. An estimate based on such disaggregation may provide a somewhat different picture of the economic development in the 18th century than the one presented in this paper.

One question that could be asked is whether the concept of GDP is suitable to apply on the pre-industrial and pre-capitalist period at all. GDP as such is based on price estimates, but in the pre-industrial society most of the production was for self-use and not for the market. However, even though most of pre-industrial production was for self-use, a large part of it was traded, and prices existed for most products and services. One important aspect with indices is that even if they have a low validity, or even if they measure the level of aggregate production inaccurately, if they are measured consistently they could still be quite good indicators of the change in aggregate production.

Although Sweden is a small country, it provides an interesting historical case of a country in the periphery of Europe, but with high-quality statistical data. For example, while Swedish Industrial Statistics has been published annually since 1858, the British Census of Production was published from 1907, and then only every second year.[5] The annual Swedish official agricultural statistics goes back to 1802, and annual population data has been gathered since 1749. Even for USA, the pre-1839

[3] Edvinsson, *Growth, Accumulation, Crisis*; Krantz and Schön, *Swedish historical national accounts*.
[4] Krantz, *En skattning av svensk BNP 1571*.
[5] Prado, *Aspiring*, p. 89.

period has been labelled a "statistical dark age" since the first comprehensive census of agriculture and manufacture collected economic data for 1839.[6]

Recent attempts have been made to extend the GDP series backwards to the whole Early Modern Period and Middle Ages,[7] a move that was initiated by Angus Maddison. However, to make such attempts meaningful we also need reliable estimates for the early 19th century. Otherwise, such linked series will only reproduce the deficiencies of the later estimates. Recently Gregory Clark remarked that: "*All the numbers Maddison estimates for the years before 1820 are fictions, as real as the relics peddled around Europe in the Middle Ages. Many of the numbers for the years 1820, 1870, and 1913 are equally fictive.*"[8] Given this state of historical national accounting for earlier periods, it is vital to improve on the numbers for the few countries that are based on extensive empirical sources, not least in order to bring more light to the statistical dark age of other countries.

In an article from 1979, Lars Sandberg dubbed 19th century Sweden – being the most literate country in Europe with comparably developed financial and administrative institutions – an 'impoverished sophisticate':[9] "*Around 1850 Sweden had a stock of human capital wildly disproportionate to its very low income level. This situation contributed significantly to the speed of the growth spurt that occurred between that time and World War I… From being one of the very poorest countries in Europe in the middle of the nineteenth century, Sweden has been transformed into the richest. The basis for this affluence was laid before World War I. Among European countries Sweden had the highest rate of growth of per capita GNP and the second highest rate of growth of total GNP during any of the periods between 1860, 1863, or 1870 and 1913.*"

Angus Maddison considered that the recent estimates of Swedish GDP were too low for the early 19th century.[10] In his international comparison he preferred an older series from the late 1980s, which was provided to him by Olle Krantz, but was never published by the latter since it contained some errors. That series put Swedish GDP per capita at a higher level than the recently published series. Maddison showed great interest in attempting to explain the anomalism of Swedish historical national

[6] Rhode and Sutch, "Estimates."
[7] See, for example, Broadberry et al., *British economic growth*.
[8] Clark, "Contours."
[9] Sandberg, "The Case of the Impoverished Sophisticate."
[10] Private correspondence with Angus Maddison in 2005-2006.

accounts, but a few months before his death, one of the last revisions he made to his international data was to use the GDP series in Edvinsson, *Growth, Accumulation, Crisis*.[11] Since he had only limited access to Swedish primary data and had to rely on Swedish scholars, Maddison was not able by himself to resolve the paradox of the 'impoverished sophisticate'. This paper is, in part, inspired by Maddison's endeavour to revolve this paradox.

One problem is that several activities are not included in previous Swedish historical national accounts. Especially the exclusion of home industries overestimates the economic growth in the 19th century.

Basically the recent Swedish GDP series for the early 19th century assumes that no butter was produced, and that the per capita production of textiles was only around 300 grams per year. This would mean that the population was at the brink of perishing from starvation and cold. However, no demographic catastrophes occurred in Sweden during the 19th century, such as the Great Famine in Ireland. The death rates in the 1820s were about at the same level as in France, Prussia and Holland.[12] Comparisons of probate inventories 1750-1850 show that peasants in Sweden were not poorer than, for example, in France and Canada.[13]

Previous estimates of agricultural production in 1800-1950 are based on the study of Lennart Schön.[14] Schön registers the vegetable production for the year of consumption, instead of the year of the harvest (i.e. the preceding year), since it avoids the complication of consumption and production being separated by each other by one year. In contrast, the method used in modern national accounts is to register harvests for the year of production. Furthermore, for the period before 1861, to calculate annual harvest fluctuations Schön uses real wages as an indicator, which is unsatisfactory, considering that detailed empirical material on yield ratios exists in Swedish archives and published sources.

Estimating real estate, mainly services of dwellings, has posed significant problems in earlier studies, and various estimates on long-term trends differ.

[11] Maddison, "Background Note."
[12] af Forsel, *Statistik*, pp. 68-70.
[13] Hallén, *Överflöd*, p. 170.
[14] Schön, *Jordbruk*, p. 56. Edvinsson, *Growth, Accumulation, Crisis* and Krantz and Schön, *Swedish historical national accounts* follow the same method.

This paper attempts to remedy some of the deficiencies in Swedish historical national accounts. The ambition is to present reliable estimates both on long-term trends and annual fluctuations. Home industries are added, and new series are constructed for agriculture and real estate. The GDP-series 1800-1970 is recalculated which significantly upgrades the GDP per capita for the early 19th century, while the mid-20th century estimates are actually decreased somewhat. Since harvests are registered for the year of production, the annual fluctuations of GDP is also substantially different for the 19th century – when agriculture dominated the economy – compared to previous studies. In light of the new evidence, Sweden's economic growth and industrialisation process is reinterpreted.

This preliminary estimates of GDP for 1665-1800 is based on the relation between harvest fluctuations and annual changes in the newly calculated GDP-series for 1800-1850. Appendix 1 presents the new series for the whole period 1665-2010.

Angus Maddison makes a guess that GDP per capita in Western Europe (including Sweden) on average grew by 0.13 percent per year in 1000-1500, 0.14 per year in 1500-1600, 0.15 per year in 1600-1700 and 0.15 per year in 1700-1820. This would imply that GDP per capita increased by 156 percent between year 1000 and 1700, and by another 20 percent in 1700-1820.[15] His guesses are most probably gross exaggerations, and have been criticized by amongst others Olle Krantz.[16] The consumption of foodstuffs in terms of, for instance, calorie consumption, probably did not increase significantly, while other sectors were most probably too small to make such contribution to GDP per capita growth as assumed by Angus Maddison.

Revising the GDP series for Sweden

The history of constructing historical national accounts for Sweden is in itself interesting.[17] Later studies build on previous ones, and also tend to reproduce some of the earlier methods and deficiencies. *National Income of Sweden 1861-1930*, published in 1937, is the earliest work on

[15] Maddison, *The World Economy: A Millennial Perspective*: p. 46.
[16] See Krantz, *En skattning av svensk BNP 1571*.
[17] Bohlin, "Swedish historical national accounts."

constructing Swedish historical national accounts,[18] and is also a pioneering work from an international perspective.

During the last three decades, further progress has been made. In the early 1980s, the project *Swedish Historical National Accounts* (SHNA) was initiated, and resulted in eight volumes covering different types of activities. The main aggregated series and an analysis of Swedish economic growth and structural change were planned to be published separately, but these plans were not materialised until 2007. In the meantime, a GDP series was presented in 2005 in Edvinsson, *Growth, Accumulation, Crisis*, which utilized the data collected by SHNA, but also applied more updated methods and classifications.

In the SHNA project, the data are based on older classifications and methods. For example, data from Statistics Sweden after 1950 are used to extrapolate the estimates of SHNA prior to 1950 *forward*. In Edvinsson, *Growth, Accumulation, Crisis*, the opposite method is applied and the estimates of SHNA are used to extrapolate the modern data *backward*, a method that is also used in the present study. In Edvinsson, *Growth, Accumulation, Crisis*, some significant improvements are also made, for example, by including more types of private services and estimating a new real estate series based on the stock of residential buildings.

This study calculates GDP by activity, which for Sweden probably yields best results. The new GDP series in the present study follows the methods and classifications in Edvinsson, *Growth, Accumulation, Crisis*, which is labelled as the "old series". The same deflation technique is also applied. A Fisher volume annual chain index is calculated as the geometric mean of the Laspeyres and Paasche annual chain indices. Although from a theoretical point of view, double deflation is the preferable technique, this method is problematic to use on older material, since data on the quantities and prices of intermediate consumption is uncertain before 1950. Instead, the deflation technique of constant value added share is applied in a first step. In the next step, the volume values are corrected for long-term changes in the value added share of each type of activity.

[18] Lindahl, Dahlgren and Kock, *National Income*.

Revising agricultural production 1800-1950

Agriculture is divided between arable, animal and horticultural production, while ancillaries also include forestry, hunting and fishing. In international historical national accounts and business cycle research, much focus has been given to manufacturing. For example, Joseph Davis uses industrial production to establish a business cycle chronology for the USA back to 1790, since he thinks that GDP is less trustworthy.[19] However, in an agrarian economy harvests dominated economic activity, directly as well as indirectly. To judge annual fluctuations of the aggregate economy before the 20th century, reliable estimates of agriculture – especially of arable output – are required. Unfortunately, for this period, official statistics on national harvest fluctuations are missing for most countries. For example, even the very detailed Dutch historical national accounts have to rely on a few regions and farms to interpolate annual harvests in the first half of the 19th century.[20]

Vegetable production

For arable production, the present study makes four main changes to earlier Swedish historical national accounts: 1) harvests are registered for the year of production; 2) the estimated level of forage is reduced for the earlier years; 3) harvest fluctuations before 1865 are calculated from direct observations of yield ratios; 4) additional plants are included. Arable production that is included in the present study are wheat, rye, barley, oats, dredge, peas, beans, vetch, potatoes, sugar beets, oil plants, textile plants and tobacco. Other types of arable only made a negligible contribution.

The method of previous Swedish historical national accounts to present vegetable production for the year of consumption implies that bad or good harvests in one year are having a negative or positive effect on GDP per capita in the subsequent year, which is also the year that was mostly affected by the bad or good harvest. Although this is not necessary a wrong method, Statistics Sweden, which presents GDP series from 1950 onwards, registers harvest for the year of production. This implies that two different methods have hitherto been applied in Swedish historical national accounts, one for the period up to the 1950s, and one for the period afterwards. Internationally agricultural production has

[19] Davis, "An improved annual chronology."
[20] Horlings et al., *Dutch GNP*, pp. 27.

been registered for the production year, and this is also recommended by the international guidelines.[21] For this reasons a recalculation have been made so that all vegetables are registered for the year of production instead of the year of consumption (however, animal produce is registered for the same year as in previous historical national accounts).

The official statistics on Swedish agricultural production started to be collected in 1802.[22] The clergymen were obliged to provide data on agricultural production, cultivated area, the planting of seeds and livestock. However, it was very difficult for the clergymen to get correct data since the farmers feared that such investigations would lead to larger tax burdens. It is estimated that the reported figures over production, cultivated area and the planting of seeds were roughly half of the actual figures.[23] The statistics improved gradually, but it was not until around 1900 that the underestimation was eliminated.[24] Lennart Schön also upgrades vegetable production for his series, which is a major improvement to previous studies. Even so, in several preliminary studies on agricultural production in Sweden during the 19th century Carl-Johan Gadd shows that Schön still underestimates vegetable production in the first half of the 19th century, mainly because forage – which is deducted of harvests – is overestimated.[25] For example, *National Income of Sweden* basically assumes that a constant share of harvests was used for forage,[26] an assumption that is reproduced by Schön. An official investigation on the conditions in agriculture 1858 shows that the share of forage in gross harvests was at a quite low level.[27] The present study makes rough adjustments downwards.[28] In

[21] United Nations et. al., *System*, p. 112.
[22] Official statistics can be found in Lindahl, Dahlgren and Kock, *National Income*, part two, pp. 28-54, Board of Trade (Sweden), *N) Jordbruk*, and Statistics Sweden, *Historisk statistik för Sverige. D. 2*, pp. 45-52.
[23] Hannerberg, *Svenskt agrarsamhälle*, pp. 29-31.
[24] Gadd, *Den agrara revolutionen*, pp. 331-333.
[25] Gadd, *Den agrara revolutionen*, Gadd, "Underskattningsproblemet," and Gadd, "Swedish agricultural production."
[26] Lindahl, Dahlgren and Kock, *National Income*, part two, pp. 17-23.
[27] Finanskomiteń, *Sveriges ekonomiska och finansiella utveckling*, table XXXI. For 1858, the latter investigation estimate forage to only 23 percent of total supply of grains (deducted of seeds).
[28] For 1803-1820, the present study assumes that, on average, 2.6 percent of the total supply of wheat was used as forage, 2.7 percent of rye, 21 percent of barley, 39 percent of oats, 66 percent of dredge, 29 percent of peas and 29 percent of potatoes. This is gradually increased for later periods, especially after 1861, which roughly corresponds to the assumptions in Lindahl, Dahlgren and Kock, *National Income* by 1911. To estimate the net product (harvests less forage and seeds), the next year's forage and seeds are deducted from the current year's harvest, since it is the current year's harvest that is used as forage and seeds the next year.

addition, the upgrading of arable output in the 19th century is adjusted somewhat compared to Schön, by taking into account that it was different for various grains.[29]

Figure 1 compares the nominal value ratio of forage to the supply of arable output in Sweden and Holland in the period 1807-1913. For Sweden, two estimates are provided, the present study and *National Income of Sweden*, respectively. It shows that the assumed reduction of forage seems to be reasonable when compared to such an advanced country as Holland. For the period before 1890s, the Swedish ratio is even somewhat higher than the corresponding ratio for Holland. Considering the large change in Holland, the previous assumption by Swedish historical national accounts of a long-term stable trend of this ratio for the 19th century, seems unrealistic. The reduction of fodder for cattle implies that the estimated level of net arable production (harvests less seeds and forage) is increased significantly for the early 19th century.

[Figure 1 here]

The most time-consuming revision to Schön's series of agricultural production concerns yield ratios. Schön uses fluctuations in real wages as an indicator of harvest fluctuations, with adjustments for long-term trends.[30] This is a problematic method, since changes in real wages and harvests did not necessarily follow each other, even if there was a certain correlation. Instead, the present study uses hand-written accounts of 24 County governors on yield ratios for various grains in the period 1820-

[29] Previous research shows that the underestimation of oats and potatoes was most likely higher (Gadd, *Järn*, p. 324), and these grains are, therefore, upgraded by a higher ratio in the present study. In 1865, official data on seeds of grains are upgraded by 23 percent (oats by 5 percent larger amount, or 29 percent, and other grains by 19 percent) and potatoes by 55 percent. By 1911, no upgrading is made for the seeds of various grains, while potatoes are upgraded by 26 percent (see Lindahl, Dahlgren and Kock, *National Income*, p. 22). In official statistics (see Board of Trade (Sweden), *N) Jordbruk*), there is a discrepancy between the increase in total cultivated area and the area of reclaimed land. While the former also reflects improvements in statistics, the latter, which is at a much lower level, probably better reflects the actual growth of the cultivated area. To estimate how much seeds should be upgraded between 1865 and 1911, this discrepancy is used as an indicator for interpolation. For the period before 1865, the official data on seeds are gradually increased further. In 1802-1820, seeds of wheat are upgraded by 66 percent, rye by 64 percent, barley by 52 percent, peas by 60 percent, oats by 95 percent, dredge by 78 percent, and potatoes by 207 percent.

[30] Schön, *Jordbruk*.

1865 to construct a new series.[31] For the period 1802-1820 annual fluctuations in yield ratios reported by local clergymen are used.[32] Even if the latter underestimate absolute levels, the annual fluctuations should be fairly reasonable. The development of seeds before 1865 is more difficult to estimate, but annual fluctuations are predominantly correlated with yield ratios.

The new series of vegetable production also includes oil, textile and tobacco plants, which has previously been excluded in historical national accounts.[33] These plants only accounted for around four percent of net arable production in the 1860s and less than one percent in the 1930s. However, during the 1940s oil plants expanded dramatically, accounting for 29 percent of the total value of arable production in 1950. This implies that previous historical national accounts have underestimated the growth of agriculture during the 1940s, especially during the second half of this decade.

In his computation of vegetable production Schön argues that he uses new price data from Lennart Jörberg (up to 1914) that improves the calculation compared to *National Income of Sweden*.[34] Schön's new price data decreases the nominal value by 5 percent in 1860. However, Jörberg's data are prices per unit of volume, while the prices in *National Income of Sweden* are per unit of weight. Taking this into account the grain prices of Jörberg and *National Income of Sweden* are almost identical. Since the weight of grains per volume unit increased between the 1860s and 1910s, this implies that the price per volume unit increased faster than the price per unit of weight. The present study follows *National Income of Sweden* and uses the price per unit of weight, which further increases the nominal value of grains compared to Schön for the 1860s.

The new series on horticulture roughly follows previous estimates for long-term trends. However, since annual fluctuations in previous estimates are based on fluctuations in arable output, the new series on the latter also changes the estimated value of horticulture for individual years.

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[31] The National Archives (Riksarkivet), Magasinet till Kungl. Maj:t; The National Archives (Riksarkivet), Statskontoret, kansliet, E3N, vol. 1-15. Summaries of some of these reports have also been published in various forms (mainly in *Post- och Inrikes Tidningar*).
[32] For the period 1800-1802, Edvinsson, "Swedish harvests," is used.
[33] Based on Statistics Sweden, *Historisk statistik för Sverige. D. 2*, Board of Trade (Sweden), *N) Jordbruk*, and Statistics Sweden, *Statistisk årsbok*. For 1824-1866, the estimates in Schön, *Från hantverk*, p. 205, on linen production is used for backward extrapolation of textile plants. When no other information exists, harvests of oil, textile and tobacco plants are assumed to follow the grain harvests.
[34] Schön, *Jordbruk*, p. 60.

Animal produce

For animal produce a completely new series is calculated for 1800-1950,[35] which affects long-term trends as well as short-term fluctuations. Previous historical national accounts are largely based on *National Income of Sweden* for 1861-1930. Compared to the previous estimates the following changes are the most important:

1. In previous historical national accounts production per animal (mainly meat per slaughtered animal) has for some periods been assumed to be constant. In the present study, adjustments have been made in this respect for the period before 1913, by following various indicators, mainly relative prices of livestock to animal produce.[36] The production per animal has been adjusted downwards for earlier periods, although the estimated milk per cow calculated in *National Income of Sweden* is not changed.[37]

2. By comparing inventories of the estates and official agricultural statistics during the 19th century, Carl-Johan Gadd concludes that the latter have significantly underestimated the livestock. This has previously not been taken into account by historical national accounts. This adjustment partly counteracts the adjustment made to the assumed production per animal. The adjustment upwards is smaller for cattle and horses,[38] and larger for smaller animals.[39]

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[35] The following animal produce is estimated: meat from cows, bulls, oxen, calves, sheep, goats, horses, pigs, reindeer and fowl, and milk, eggs and wool.

[36] Price data is based on Jörberg, *A History*. The present study assumes that the carcass weight of cows increased from 70 kg in 1805 to 197 kg in 1913 (interpolation between those years is based on the price ratio of cows to milk), of bulls, oxen and horses in proportion with cows, and of calves from 20 kg in 1805 and linearly increasing to 28 kg in 1913 (see Gadd, *Järn*, p.138, and Lindahl, Dahlgren and Kock, *National Income*, part two, p. 82). The carcass weight of pigs is assumed to follow the price ratio of pigs to pork (smoothed series), which increased by 147 percent between 1805 and 1913. The carcass weight of sheep and goats (including lambs and kids) is assumed to be constant up to 1861, and then followed the price ratio of sheep to beef, which increased by 24 percent 1861-1913. The price ratio of hens to eggs does not increase during the period 1861-1913, and, therefore, no adjustment is made concerning the productivity of hens.

[37] Lindahl, Dahlgren and Kock, *National Income*, part two, pp. 118-124, estimate the quantity of milk per cow to 1800 kg in 1913 and to 830 in 1861. Jan-Åke Staffansson (*Svenskt smör*, pp. 43-82) argues that the estimated milk per cow in the 1860s is overestimated in Lindahl, Dahlgren and Kock, *National Income*. However, Lennart Schön (1995, p. 60) argues convincingly against this view. Schön's view is confirmed when investigating the long-term movements in the price ratio of cows to milk, which follows the assumption of Lindahl, Dahlgren and Kock, *National Income* rather than that of Jan-Åke Staffansson. The definition of a cow is here used according to the one in official statistics from 1913, which includes only heifers that have calved. See also Morell, *Jordbruket*, p. 355, for an overview of the Swedish debate.

[38] According to data collected by Gadd (*Järn*, pp. 335-337) for Skaraborg county, inventories of the estates display a 22 percent higher number of horses and cattle than official statistics in 1805, and 13 percent higher in 1861. According to Carin Israelsson (*Kor*, p. 87) official statistics probably overestimated the number of cows in large agricultural units, but underestimated them for small units. The official statistics shows a significant increase in the number of horses, cows and young cattle and calves between 1911 and 1913, which could be considered an improvement in measurement. In Lindahl, Dahlgren and Kock, *National Income*, p. 63, while the

3. A new series of wool production is computed, which in previous historical national accounts have been excluded. Wool production accounted for around five percent of total animal produce in the 1860s, which decreased to less than a half percent in the 1940s.[40]

4. Between 1805 and 1861 the increase in animal produce is calculated based on official data on stocks of animals, adjusted for their underestimation by these official sources and the estimated growth of production per animal between the two years.[41] For interpolation between the two years the growth of per capita forage is used as an indicator (and gross harvests for extrapolation back to 1800). This method is similar to the one used by Schön, but since forage is estimated from new data on harvests, annual fluctuations differ substantially.

5. The adjustments made in the present study imply that the price deflator of animal produce is changed. While *National Income of Sweden* and Schön uses the price per animal to calculate deflators, the present study uses the price per weight unit, implying that the price index of animal produce of the present study displays a slower growth. This implies that while in 1861-1930 the volume growth of

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calculations of milk production based on the number of cows is upgraded by 12 percent, this is not implemented for production of livestock (slaughter, net export and changes in livestock). In this study, the data of *National Income* on production of horses, cows and young cattle and calves are increased by 12 percent for the whole period 1861-1912. For 1805, the official statistics on horses and cattle is increased by 15 percent. The ratio of sheep and goats to cows and horses and the ratio of pigs to cows and horses is increased by the same amount in 1805 as in 1861.

[39] Various studies on inventories of the estates in 1810-1880 (Gadd, *Järn*, pp. 334-335; Larsson, *Fäbodväsendet*, pp. 169-176; Dahlström, *Betesmarker*, p. 309; Peterson, *Jordbrukets omvandling*, pp. 65-82; Jonsson, *Jordmagnater*, p. 123; Isacson, *Ekonomisk tillväxt*, pp. 55, 129, 154-6) display ratios of the number of sheep, goats and pigs to the number of cows and horses by anything from nil to more than 100 percent above official statistics. To this background, compared to official statistics in 1805 and 1861, the present study increases the ratio of sheep and goats to cows and horses by 25 percent and the ratio of pigs to cows and horses by 50 percent (which is slightly below the average of various studies when compared to official data). This increase is decreased linearly up to 1930, when official data on sheep, goats, and pigs is assumed to have reflected actual conditions. Fowl production is increased by the same amount as pig production in 1861-1930.

[40] The wool production per adult sheep at the beginning of the year is set to 4 kg per year from 1913, while before that year wool per sheep is assumed to follow the price ratio of sheep to wool. The actual number of sheep, including lambs, could be substantially higher during the year, so the actual assumed production per sheep would be less. This implies that wool production per adult sheep is assumed to have been 1.2 kg in 1840. In comparison, Gunilla Peterson (*Jordbrukets omvandling*, pp. 92-93) shows that in 1822-1865 wool production varied from 0.5 to 3.4 kg per sheep and year, while Lennart Schön estimates the average wool production to 1.06 kg per sheep and year in 1820-1870.

[41] There was a significant growth in milk per cow before 1861, which the present study assumes to have followed the price ratio of cows to milk, which increased by 34 percent between 1805 and 1861. This would imply an average production of 621 kg milk per cow in 1805, which accords quite well with previous research (see Gadd, *Järn*, 1983, p. 137). Between 1805 and 1861 fowl production is assumed to have followed milk production. Although hens were unusual before the 1860s, geese were common in the early 19th century, but were replaced by hens during the course of the century (Peterson, *Jordbrukets omvandling*, pp. 83-85; Morell, *Jordbruket*, p. 256).

animal produce is about the same as in previous studies, the nominal value in the 1860s and earlier is upgraded significantly.

6. A new series of animal production is also calculated for the period 1930-1950.[42]

Trends and fluctuations

Figure 2 presents the development of per capita harvests for various grains in 1802-1955. It clearly shows that the long term trend and volatility was quite stable over time, while composition changed.

The correlation between the annual changes in net harvests (excluding seeds and forage) according to the present study and Schön's series[43] for the period 1800-1861 is +0.63. Henceforth, although Schön's method yields reasonable results when no other information exists, it is far superior to use direct empirical data on harvests if such can be collected. In contrast, the correlation between the annual changes in animal produce according to the present study and Schön is only +0.26.

[Figure 2 here]

Figure 3 summarises the development of per capita agricultural production (excluding ancillaries) in the reference prices of 1800. It shows that the per capita level was basically stagnant up to the mid-19th century. However, even if the present study substantially upgrades agriculture for the first half of the 19th century, it still assumes a significant per capita growth in 1850-1950. In this period, it was animal production and horticulture that expanded, while per capita arable production even declined somewhat.

[Figure 3 here]

[42] Calculations are based on the number of livestock (Statistics Sweden, *Historisk statistik för Sverige. D. 2*).
[43] Schön, *Jordbruk*, p. 61.

Adding home industries to Swedish GDP before 1950

The most important change to manufacturing in this study is the addition of home industries. The calculation of manufacturing in recent Swedish historical national accounts goes back to a study by Lennart Schön.[44] Schön deals with home industries as well, but hitherto they have not been included in GDP.

Internationally, historical national accounts often approximate the size of manufacturing in the 19th century by following the input of raw materials, which indirectly implies that home industries are included (or, at least, the growth rate is not distorted by the relative decline of home industries).[45] The low urbanisation rate in Sweden before 1850 is, to some extent, explained by climatic factors. Home industries were more important in Sweden than in other European countries to the south, not least since the long winter season implied that the rural population could only pursue agriculture for part of the year.[46] Thus the data on manufacturing in previous Swedish historical national accounts is underestimated compared to many other countries.

According to modern international guidelines of national accounts, 2008 SNA, while services produced for own use by households are excluded from GDP, all goods produced for own use should be included, which is of particular importance for developing countries. Previous Swedish historical national accounts are, therefore, not in line with modern guidelines. Some of the activities that fall within the production boundary according to 2008 SNA are: threshing, production and preservation of meat and fish products, production of leather, dairy products and baskets, pottery, weaving and tailoring, and the making of furniture.[47] Previous Swedish historical national accounts are also inconsistent. For example, while threshing is included, dairy products are excluded.[48]

Schön makes a preliminary estimate of the share of total home industries in textile- and metal industries from the 1820s to the 1860s, based on the input of raw materials.[49] Guesstimating the size of

[44] Schön *Industri*.
[45] See, for example, Bourguignon and Maurice, *The French economy*, p. 266, for France, Grytten, "The gross domestic product," p. 249, for Norway, and Horlings et al., *Dutch GNP*, pp. 37-45, for Netherlands.
[46] Hemslöjdskommittén, *Hemslöjdskommitténs betänkande*, pp. 15-16.
[47] United Nations et. al., *System*, p. 99.
[48] Schön *Industri*, p. 15.
[49] See also Schön, *Från hantverk*, and Schön, "Järnet."

woodcraft and leather processing,[50] he concludes that home industries accounted for around one third of output in manufacturing and handicrafts during the 1820s as recorded by the Swedish historical accounts, but only for one sixth during the 1860s. This guesstimate, however, excludes the home production of food items. Despite these calculations, in his final series of manufacturing and handicrafts, home industries are excluded. Schön argues that parts of home industries are included in the series of unpaid domestic labour. However, since this series is not included in GDP, home industries are also excluded from the final estimate of economic growth in the project of SHNA.

This study follows Schön's method to estimate the contribution of home industries from the intermediate consumption of raw materials, which can be calculated from outputs of agriculture and mining, and international trade.

Food industries

This study presents a new series of food industries mainly based on the total supply of vegetables and animal produce (gross output less intermediate consumption in agriculture, plus import less export), which is disaggregated between various activities.[51]

The volume and nominal growth in slaughter and meat processing industry follow production and prices of slaughter animals.[52] The volume and nominal growth in bakeries and mills follow the volume and price changes in the intermediate consumption of grains in milling.[53] For dairies, the production of butter and cheese outside the industrial statistics is added for the period 1913-1948,[54] while before 1913 total dairy production is assumed to have followed milk production. The value of other food industries is basically unchanged from 1861 compared to earlier historical national accounts.[55] For the

[50] Schön, *Industri*, p. 14.
[51] The deflators are mostly based on Jörberg, *A History*, Lindahl, Dahlgren and Kock, *National Income*, Ljungberg, *Deflatorer*, and Ljungberg, *Priser*.
[52] This does not take into account that slaughter and animal produce is not the same, since production also includes changes in the animal stock. However, these two series should be highly correlated with each other.
[53] The input of grains for milling in year t is calculated as (where the subscript denote the year):
$\text{Gross output}_{t-1} - \text{Export}_t + \text{Import}_t - \text{Seeds}_t + \text{Forage}_t - \text{Input breweries}_t + \text{Input spirit industries}_t$
This calculation implies that milling of grains are assumed to be related to the previous year's harvest. Input in breweries are based on Schön, *Industri*, and input in spirit industries on Key-Åberg, *Af Kungl. Maj:t*.
[54] For 1913-1948 total cheese and butter production is assumed to have followed milk production. The difference between total and factory cheese and butter production is then added to the series of dairy production according to Schön (see Board of Trade (Sweden), *Industri*).
[55] Based on Ljungberg, *Deflatorer*, and Board of Trade (Sweden), *D) Fabriker*.

period before 1861 the supply of grains and animal produce is used as indicators to interpolate the production of various food industries. The value added shares of various food industries is, for simplicity, assumed to be constant during the whole period 1800-1950.

Home crafts

One of the few direct studies of home craft covers the year 1911,[56] which shows that the home craft was roughly equally divided between market sales and own use. While the value of gross output of home craft for markets sales was 0.9 percent of the value in manufacturing and handicrafts (excluding food industries), home craft for own use was at 0.8 percent.[57] Textile production stood for 64 percent of home craft, wood products for 20 percent, metal products for 11 percent and leather products for 5 percent. However, the investigation of 1911 emphasises that while the value of home craft for market sales is probably realistically estimated, the value of home crafts for own use is most likely significantly underestimated. The same conclusion is drawn in the present study.

There are also accounts of how time was spent during various months of the year in the countryside. One such study for northern Sweden presents the seasonal work cycle for two areas in the 18th century.[58] It shows that, while women spent from one fourth to one third of their working time with textile production, men spent around one tenth of their working time with various crafts.

The present study calculates the production in home crafts mainly from the intermediate consumption of raw materials.[59]

To calculate home production of textiles the present study uses a similar method as Schön in an earlier study covering the period 1826-1871.[60] Official statistics provides data on the quantities of

[56] Hemslöjdskommittén, *Hemslöjdskommitténs betänkande*, pp. 16-19.
[57] Compared to Schön, *Industri*.
[58] Medelius, "Berättelserna," pp. 16-17. See also Krantz, *Husligt arbete*, pp. 52-53.
[59] The intermediate consumption of raw materials calculated by deducting intermediate consumption of raw materials in factories and handicrafts from the total supply of raw materials. The total supply is calculated as the gross output plus net import of these raw materials. Foreign trade is based on Statistics Sweden, *Historisk statistik för Sverige. D. 3*, Board of Trade (Sweden), *F) Utrikes handel och sjöfart*, Board of Trade (Sweden), *F) Handel*, and Board of Trade (Sweden), *Handel*.
[60] Schön, *Från hantverk*.

factory production of wool, linen and cotton products.[61] Intermediate consumption of raw materials in weaving (in tons) is computed by deducting the intermediate consumption in factories (estimated from the assumed input per output based on later industrial statistics) from total supply of raw materials. This, in turn, provides a rough approximation of textile production of home industries. In addition, home spinning is also added based on a similar methodology as for weaving.[62] Since the present study upgrades the production of wool and linen compared to earlier official statistics, home production of textiles is upgraded compared to Schön.[63] To calculate nominal values, an index is constructed based on prices of cotton, and wool and linen yarns, which is used to reflate the volume series.[64] Although home industry of textiles were of lower quality, their price also included a trade margin, implying that their price per unit of weight was probably higher than the corresponding price of factory textiles (which were more of wholesale prices).[65] The value added shares are separately estimated for home

[61] Based on Schön, *Från hantverk*, Board of Trade (Sweden), *D) Fabriker*, Board of Trade (Sweden), *Industri*. Weaving is presented in tons only from 1896. To estimate the weight of textures, 1896 is used as a benchmark year, and the annual changes in the volume values (nominal values deflated by a price index of textiles) is used for backward extrapolation. The spinning of wool by wool cloth factories are not recorded by the industrial statistics up to 1895 (Board of Trade (Sweden), *D) Fabriker* [1898], p. v). The spinning of these factories up to 1895 is estimated based on the data for 1896.

[62] Since the spinning and weaving within handicrafts were negligible it is not necessary to consider their impact. Textile handicrafts were mainly directed towards clothing.
Up to 1813, it is assumed that Sweden accounted for 85 percent of the total import to Sweden-Finland. Production data is from the present study (see above).
According to Schön (*Från hantverk*, p. 26), there was a 10 percent loss of raw materials in the production process. The estimated ratio of input of wool and linen and output of wool and linen yarn is based on data of inputs and outputs in industrial statistics for 1935-1939. This would also include certain losses of raw materials. The weight of wool garn is higher than the weight of wool input, since the production of wool garn also includes other types of products. Following Schön, no home production of cotton yarn is assumed from 1838 onwards. In the present study, it is, furthermore, assumed that there was a 5 percent weight loss when yarn was transformed to textures. The estimated production of yarn and is assumed to consume half of the supply of inputs the preceding year and half of the supply the present year. The home production of wool yarn is assumed to be nil from 1914 onwards, of linen yarn nil from 1916 onwards, and of linen and wool textures nil from 1941 onwards.
For the period 1800-1827, the total production of textiles is first assumed to follow the total supply of wool, linen and cotton. Deducting the production of manufacturing and handicrafts yields a residual. The volume value of home production is finally calculated as the average of the present and preceding year's residual (to take into account that inputs to home industries were not immediately consumed in the production process).

[63] For example, for 1838-1840 home weaving is estimated at a 33 percent higher level than according to Schön, *Från hantverk*, while including home spinning implies an estimate 110 percent above Schön's for home textile industries.

[64] Based on Jörberg, *A History*, Ljungberg, *Priser*, and Schön, *Industri*, pp. 203-204. The prices in Jörberg, *A History*, is used as a benchmark. Yarn prices are used to estimate the prices of home textiles, based on the geometric average price ratios of textiles to yarns per unit of weight according to industrial statistics in 1896-1914.

[65] On average, in 1896-1914 the price of linen garn was reported at a 42 percent higher level and the price of wool garn at a 25 percent higher level in Jörberg, *A History*, compared to the industrial statistics. However, compared to the prices presented in Jörberg, *A History*, the value per ton of home production is, in the present study, assumed to be 10 percent lower for wool products, and 23 percent lower for linen products, mainly because home production used raw materials of lower quality (see Schön, *Från hantverk*, pp. 29-30).

spinning and home weaving of cotton, wool and linen textiles, and assumed to be constant for the whole period of investigation.[66]

Other types of textile production are divided between male (mainly production of baskets and nets) and female (mainly clothing) activities. For the period before 1911, the volume of other types of female textile production is assumed to follow weaving and spinning.

The total value of weaving and spinning is estimated at a 171 percent higher level than according to the survey from 1911, an expected discrepancy. The home production of other textiles, and leather, wood and metal goods, is also increased by the same amount for this year, which is used as a benchmark. The value added shares of these activities are separately estimated and set equal to the estimate of the study from 1911. For other textiles, leathers and metal products it is assumed that the volume value of home industries were constant in 1911-1950.

Estimating the size of intermediate consumption of raw materials in woodcrafts and other male textile activities is particularly problematic. For these two types of activities a benchmark is constructed for the year 1825. It is based on the average time spent on these activities among men according to the account of the work cycle in northern Sweden for the 18th century (which was around four percent for wood craft and three percent for other male textile activities), the average wage of male agricultural workers,[67] and the size of male labour force in the countryside.[68] For other years, the volume value is estimated based on various techniques of inter- and extrapolations.[69]

Up to 1911, the home production of leather and metal industries, respectively, is calculated similarly as for textile products, by estimating the total size of leather and bar iron supply (production

[66] The value added share in home spinning is assumed to be 56 percent, in accordance with Hemslöjdskommittén, *Hemslöjdskommitténs betänkande*, p. 18. The value added shares in home weaving is based on the value ratio per unit of weight between textiles and yarns of wool, linen and cotton, respectively, in factory production, with an assumed loss of five percent.

[67] Based on Jörberg, *A History*.

[68] Based on Statistics Sweden, *Minnesskrift*, p. 122.

[69] For the period 1825 to 1911, the volume value of other male textile activities is assumed to be linearly decreasing, while before 1825, it is assumed to follow population. For wood industries, the consumption of wood by households according to Schön (*Jordbruk*, pp. 95-99), is used as an indicator. For the two benchmark years 1825 and 1911, the input of woods can be calculated based on the assumed value added share, which implies that the input of home wood craft was the equivalent of 18 percent of household wood consumption in 1825, and five percent in 1911. For the period between 1825 and 1911, this ratio is assumed to have decreased linearly, while before 1825 the ratio is assumed to have been the same as in 1825, while after 1911 it is assumed to be the same as in 1911. Half of the input of a current year is assumed to be used the same year, and half the consecutive year.

plus net import), respectively, and the intermediate consumption of leather[70] and bar iron[71], respectively, in factories and handicrafts.[72] The estimated series implies that for 1911, the value of leather products of home industries was only three percent of total gross output of leather products in manufacturing and handicrafts, but 22 percent in 1900 and 315 percent in 1800, which is at a much higher level than Schön's earlier guesstimate. However, the estimated size of metal products is about the same as Schön's conjectures.[73]

Part of the production of home industries was used as intermediate consumption in agriculture and ancillaries,[74] implying a somewhat lower value added in agriculture. Furthermore, since Swedish historical national accounts estimate the size of forestry by its different uses,[75] the inclusion of home woodcraft increases the size of forestry somewhat.[76]

Trends and upgrading

Figure 4 presents the per capita volume value for four types of home crafts in the period 1800-1911. It shows that, at least up to 1890, most home crafts did not decline in volume terms. The per capita production of metal crafts was even at a significantly higher level in the 1880s than in the beginning of

[70] Compared to Schön (*Industri*), rubber industries are deducted from leather production, and reclassified into chemical, petroleum, rubber and plastic product industries, in accordance with later national accounts (Edvinsson, 2005, p. 81). The total production of unprocessed hides is estimated based on the total slaughter weight of sheep and goats, cattle, calves, and horses, the net import of unprocessed hides, and the relation between the supply of unprocessed hides (production plus net import) and input of unprocessed hides in 1935-1955 according to industrial statistics. The weight of produced leather is estimated at 45 percent of the weight of unprocessed hides, which was the average in 1935-40 according to official industrial statistics (the ratio was lower from 1941). The value of the input of leather in leather factories except tanneries (mostly shoe production) is estimated at 28 percent of gross output (based on industrial statistics for 1950), while the corresponding ratio for home industries it is set to 61 percent (gross output less value added), and for handicrafts to 38 percent (calculated residual for 1911).

[71] The production of bar iron is based on Schön, *Industri*, Board of Trade (Sweden), *C) Bergshandteringen*, and Board of Trade (Sweden), *Bergshantering*, while foreign trade is from Board of Trade (Sweden), *F) Utrikes handel och sjöfart*, and Board of Trade (Sweden), *F) Handel*. For the period before 1911, the input of bar iron in factories and handicrafts is assumed to follow the volume value of its gross output.

[72] The value added share of home production of these products is set equal to the estimate of the investigation of 1911, which was 39 percent for leather products and 58 percent for metal products.

[73] Schön, "Järnet."

[74] The assumption in this study is that 40 percent of home production of baskets, nets, etc was used as intermediate consumption in agriculture, 10 percent of leather products, 20 percent of wood products and 25 percent of metal products. See also Schön, *Industri*, pp. 179-185.

[75] Schön, *Jordbruk*, pp. 64-69.

[76] For the period 1800-1890, all of the input in home woodcraft is added to forestry, while by 1950 it is assumed that all of the input in home wood craft was included in previous estimates of forestry. Between 1890 and 1950 the share of the input that is assumed to have been excluded in previous estimates of forestry is linearly decreased.

the century. It was around 1890 that most home crafts started to decline. However, their relative decline started earlier since factory production expanded substantially.

[Figure 4 here]

Figure 5 presents the nominal ratio of new to old series of the gross output of various manufacturing activities, reflecting the addition of home industries. It shows how important home industries were in the 19th century. For textile and leather products, home industries accounted for around 80 percent of gross output up to the 1830s, while handicrafts accounted for most of the rest. It was during the second half of the 19th century that home industries decreased their share, although for food processing home industries still played an important role in the early 20th century. Henceforth, some of the growth of manufacturing that has been discussed for Sweden during the 19th century is spurious, and can be explained by a structural transformation taking place from home industries to factory production.

[Figure 5 here]

Changes to real estate and other activities

The most important revision outside of agriculture and manufacturing concerns real estate, which is one of the most problematic activities to approximate. The main component of real estate is services of dwellings. Within Swedish historical national accounts, different attempts have been made, but they have hitherto been unsatisfactory. The problem also stems from deficiencies in the official estimates of Statistics Sweden for the period 1950-1970. The revision to services of dwellings that is presented in this study also implies a recalculation of building and construction for the period before 1938.

Previous estimates of services of dwellings have underestimated both the volume growth and the growth in the rent index for the decades before 1970. For example, according to official statistics, the volume value of services of dwellings increased by a factor of 2.22 between 1945 and 1970.[77]

[77] Based on Krantz and Nilsson, *Swedish National Product*, pp. 173-174.

Considering that the number of rooms, according to housing censuses, increased by a factor of 1.81 between those two years, this would imply only a 22 percent increase in the quality per room. This was in a period of rapidly improving qualities of dwellings. For the period before 1950, some of the earlier historical national accounts roughly follow the number of rooms as an indicator for volume growth. While the number of rooms is a quantity, quantity and volume value must not be confused. The volume value must also include qualitative improvements of rooms.

In Edvinsson, *Growth, Accumulation, Crisis*, another method is suggested, which is to calculate services of dwellings from the net capital stocks of residential buildings, which in turn is based on past residential investments. This method partly takes into account the qualitative improvements per room produced, since it can be assumed that room quality is related to the volume value of residential buildings per room. Following Edvinsson, this method is also applied by Krantz and Schön.[78] For various reasons, the estimated growth in the volume of residential buildings is not completely satisfactory in both these studies, and the method is only consistently applied to the period before 1950. The present study assumes that the volume value of services of dwellings followed the net capital stock of residential buildings for the whole period up to 1970.

In the present study, the volume and nominal values of residential investment in 1861-1950 are based on Östen Johansson's study.[79] For the period 1861-1938, an adjustment is made to Johansson's assumption of quality improvements, which decreases its growth somewhat. For the period 1840-1861 certain qualitative improvements is assumed to have occurred as well.[80]

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[78] Krantz and Schön, *Swedish historical national accounts*, calculate the value of investment in private services based on Pettersson, *Byggnads- och anläggningsverksamhet*, up to 1860, but they use Östen Johansson's values from 1861, which implies that the values up to 1860 are not consistent with the ones from 1861.

[79] Johansson, *Byggnads- och anläggningsverksamheten*.

[80] Östen Johansson assumes that the cost to produce one room (including kitchen) increased from 216 SEK in 1861 to 3759 SEK in 1938. In comparison, the cost-of-building index only increased by a factor of 4.46 in the same time period. Johansson draws the conclusion that the difference can be explained by a 3.74-fold increase in the quality per room. However, Östen Johansson's estimate of the cost of a room in 1861 is probably too low. Using two estimates of actual cost of building, the cost is set to 269 SEK. This is based on costs of building three extra rooms in Stockholm 1806 (Pursche, *Byggmästareämbetet*, p. 258), and a cottage consisting of two rooms in Gotland 1863 (http://www.tjelvar.se/batsman/bt-9.htm). The cost in 1861 is calculated by taking into account differences in price levels (using Jörberg, *A History*). This would imply a 3-fold increase in the quality of a room instead of a 3.7-fold increase over the period 1861-1938.
Another problem is Östen Johansson's interpolation of the index of the cost per room between 1861-1938. As he explains (Johansson, *Byggnads- och anläggningsverksamheten*, p. 25, my translation from Swedish): "*The cost-of-building index has, therefore, been corrected by lowering the index number… for the year 1861 to around 6 (1938=100), i.e. by 73 percent. The percentage deduction for later years has bee lowered linearly to zero for the*

For the period up to 1861 previous historical national accounts have utilized Lars Pettersson's study on building and construction.[81] However, his study is based on tax records for a few benchmark years, and these are quite unreliable when attempting to approximate residential stocks and investments. For example, Pettersson has to make the assumption that half of the taxed value of rural properties consisted of building, while fire insurance data shows that this proportion was probably less than a third.[82] Furthermore, it is very difficult to deduce how large part of rural buildings was used for living and how large part was used in agricultural production (mainly keeping animals). The present study instead uses movements in population as an indicator of fluctuations in construction of new apartments, which are linked up to the estimated residential investments from 1861 onwards. Even if that is a very crude method, it seems more reliable than the one applied by Pettersson.

All in all, the changed series of residential investments implies an upgrading of the net stock of residential buildings for the first half of the 19th century, which also upgrades the volume value of real estate for this period.

In Edvinsson, *Growth, Accumulation, Crisis* nominal levels are calculated by reflating the volume series by a rent index. For some periods, the rent index is adjusted to the development of the cost-of-building index. However, such a conduct is problematic. The present study instead computes nominal values directly, and adjusts the rent index accordingly. In the first step, the nominal value of the gross output of dwellings (equal to total rents) is estimated for three benchmark years – 1910, 1945 and

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year 1938; thus the quality improvement of apartments has been assumed to occur at a constant rate during the whole period."
He then uses the new index to reflate the quantity series of the number of rooms to arrive at nominal values, but uses the old cost-of-living index to deflate the nominal values into a volume series (which takes into account the quality improvement of rooms). Although the latter is a reasonable conduct, his method of linear interpolation to calculate costs per room is unsatisfactory, since it is not the growth rate that is interpolated but the percentage relative the level in 1938. Therefore, it does not assume a constant growth rate of the quality per room. Instead, it basically implies that the quality increased by more than three percent per annum in the beginning of the period (early 1860s), but less than one percent per annum at the end of the period (mid 1930s). In reality, it is more likely that the quality improvement either occurred at a constant rate throughout the period or that it was somewhat higher in the 20th century. The present study instead uses the change in the ratio of towns in total population to interpolate the growth rate of quality improvement of rooms between 1861 and 1938. The same method is used back to 1840, while before 1840 the quality of rooms is assumed to be constant (the urbanisation ratio roughly stayed the same between 1800 and 1840). This method implies that between 1840 and 1861 the quality per room increased by 19 percent.

[81] Pettersson, *Byggnads- och anläggningsverksamhet*.

[82] In 1858, the estimated market value of rural buildings was 505 mn SEK (Finanskomiteń, *Sveriges ekonomiska och finansiella utveckling*, table XXXI). The total market value of rural properties was at least three times higher.

1970.[83] For 1910, empirical data only exist on rents in various locations,[84] but Östen Johansson provides the number of apartments. The investigation shows that previous studies have significantly underestimated nominal growth between 1945 and 1970, and that rents increased much faster than according to the official rent index.[85] The output of other types of real estate roughly follows Edvinsson, *Growth, Accumulation, Crisis*.

A comparison of actual rents between 1910 and 1945 shows an increase in the nominal value of total rents by a factor of around four-and-a-half. This yields roughly the same result as the method of reflating the volume series of residential buildings by the rent index. The last method is, therefore, applied for the whole period before 1945, although the computed series is linked up to the lower values calculated for 1945.

[Figure 6 here]

In Figure 6, the new estimates of the nominal value added of real estate (services of dwellings and other types of real estate) is compared to the corresponding numbers in Edvinsson, *Growth, Accumulation, Crisis* and Krantz and Schön, *Swedish historical national accounts*, respectively. Since

[83] Swedish Social Welfare Board, *Bostäder*, and Statistics Sweden, *Folk- och bostadsräkningen 1970*. The investigation of 1945 and 1970 is based on the housing censuses, which also provide data on rents of apartments of various sizes, qualities and geographical locations.

[84] Based on 119 towns and other locations presented in Swedish Social Welfare Board, *Livsmedels- och bostadspriser*.

[85] A comparison of the housing censuses of 1945 and 1970 shows that the nominal value of rents (which includes a fictitious market rent on owner-occupied apartments, or apartments rented out at a reduced rate) increased by a factor of 11.1. This is a much higher growth than indicated by all previous historical national accounts. This could be compared with the increase in the rent index by a factor of 2.46 and the 3-fold increase in the net stock of residential buildings, which together would amount to an increase in the nominal value by a factor of 7.38. Thus the actual nominal value increased 51 percent faster than expected between 1945-1970. To abridge this discrepancy we could either assume a faster volume or price level growth (or both).
Between 1945 and 1970 the rent per room increased from 204 SEK to 1252 SEK (including fictitious rents), an increase by a factor of 6.14, which could be compared to the increase in the rent index by a factor of 2.46. Part of the increase in the rent per room could be explained by quality improvement. However, part of the increase can also be explained by the changing geographic structure of rooms, which is not necessarily a quality improvement per se. Rent in the countryside increased much faster than in towns (especially Stockholm). Assuming that the all rooms in 1945 had the highest quality that was measured at the time would imply an average rent of 316 SEK per room. Assuming that the average quality of rooms in 1970 was of the same quality as the highest measured quality rooms in 1945, would thus imply an average price increase by a factor of 3.96, i.e. a much faster price increase than according to the official rent index. The conclusion from this is that growth of the rent index is underestimated rather than the growth of the volume of residential buildings.
To arrive at a nominal growth by a factor of 11.1 between 1945 and 1970, the price index of services of dwellings is assumed to grow 1.65 percent faster per annum than the official rent index, or by a factor of 3.71 altogether in this 25-year period (which is still below the 3.96 estimated above).

a new series of residential buildings is used, real estate is upgraded for the 19th century. However, for parts of the 20th century it is significantly downgraded. For the early 19th century the estimate of Krantz and Schön seems to be suspiciously low. Henceforth, while the present study assumes a faster nominal growth of real estate in 1945-1970 than in previous studies, it assumes a much slower nominal growth for the period 1850-1945. From 1970, the present study puts real estate at the same level as in Edvinsson, *Growth, Accumulation, Crisis*. For some reasons, Krantz and Schön put real estate at a 36 percent higher level in 1970-2000 than in the present study, which is not supported by modern national account data.

The new calculations also affect the estimated size of the gross output of building and construction activities. The main change concerns residential investments, which is upgraded for the earlier periods, and repairs and maintenance of dwellings, which is downgraded.[86]

The changes to other types of activities are minor, and affect shipping in early 19th century and trade before 1950. For shipping, a new freight index is used for the period 1800-1825.[87] For trade, a correction is made, by also including pharmacies, which have accidentally been excluded in Edvinsson, *Growth, Accumulation, and Crisis.*

Reinterpreting the Swedish economic growth 1800-2000

Figure 7 summarises the volume and nominal ratios of the new GDP series compared to Edvinsson, *Growth, Accumulation, Crisis* (the "old" series) The upgrading of GDP is largest for the earlier years, while it declines during the course of the 19th century. For the period 1800-20, the nominal value of the new series is, on average, 36 percent above the old series; while for the period 1880-1900 it is only 5 percent higher. The volume ratio is somewhat lower for this century, since the new series assumes a somewhat lower inflation rate. For the period 1800-1820, while the nominal value added of agriculture is upgraded by 34 percent, the nominal value added of manufacturing is upgraded by as much as 172

[86] From 1938 there are direct empirical data on repairs and maintenance, which is presented in Johansson, *Byggnads och anläggningsverksamheten*, pp. 26. For the period before 1938, Johansson uses the gross output of services of dwellings for extrapolation backwards. However, this gross output significantly underestimates nominal growth. The present study uses the new series of services of dwellings to estimate a new series of repairs and maintenance as well, which significantly lowers the values especially for the 19th century.
[87] Based on North, "The Role of Transportation," p. 235, and Harley, "Ocean Freight Rates," pp. 873-874.

percent. However, since agriculture had a much larger weight in the overall economy, the upgrading of manufacturing and agriculture, respectively, contributes about equally to the upgrading of the GDP, while the upgrading of real estate only makes a minor contribution.

For the 20th century the new series even lowers the estimated level of GDP, which depends on the higher estimated volume growth rate of agriculture in the 1940s and higher estimated nominal growth rate of real estate in 1945-1970.

[Figure 7 here]

The revised series especially affects the annual fluctuations of GDP before 1890. As can be seen from Figure 7, the ratio between the new and old GDP series fluctuated sharply up to the late 19th century. The main reason for this occurrence is the recalculation of vegetable production from the consumption to the harvest year, which manly impacts on the agrarian period when harvests dominated the fluctuations of GDP. While the correlation between the logarithmic changes in volume GDP of the old and new series, respectively, was only +0.12, and insignificant, for the period 1800-1890, it was +0.94 for the period 1890-1950.

In previous growth research, Sweden has been presented as a star performer in 1870-1970 (according to Olle Krantz, it was more exactly in 1890-1950), with only Japan showing a higher per capita growth.[88] The present study does not overturn this picture. For this period, the present study reduces average per growth from 2.3 to 2.2 percent per annum, which is still faster than in other countries, except for Japan.

It is rather economic growth in earlier periods that is revised. Previously, Swedish historical national accounts have shown a modest GDP per capita growth in the first half of the 19th century.[89] Jan Bohlin even concludes that the "research by Lennart Schön and others has indicated that the industrialisation process and economic growth were already well underway in the first half of the nineteenth century", and that this overturns an older interpretation that "the Swedish industrialisation

[88] Krantz, "Economic Growth," p. 1.
[89] See Schön, *En modern svensk ekonomisk historia*, pp. 57-61.

process took off in the latter half of the nineteenth century, stimulated by export demand".[90] The new GDP series supports the older interpretation that in the terms of per capita production, Swedish economy was stagnant up to the mid-19th century. While according to Krantz and Schön, *Swedish historical national accounts*, GDP per capita grew by 0.6 percent per annum between 1800/05 and 1845/50, and by 0.4 percent according to Edvinsson, *Growth, Accumulation, Crisis*, it grew only by 0.2 percent according to the present study. For the period 1845/50 to 1930/35 the per capita growth rate is reduced from 1.8 to 1.5 percent compared to Edvinsson, *Growth, Accumulation, Crisis*, while for the period 1930/35 to 1970/75 it is increased from 2.9 to 3.1 percent per annum.

In previous research, the early industrialisation of Sweden has been considered as almost synonymous with an increase in the relative size of industrial (non-agriculture) goods production.[91] However, this view may be modified by the present study, similarly as Nicholas Crafts has reinterpreted the British industrial revolution as a more drawn-out process.[92] Figure 8 displays the share of industrial goods production in nominal GDP in 1800-2000. While according to the old series the share increased from 16 to 25 percent between 1800 and 1890, it increased only from 25 to 28 percent according to the new series. This puts the Swedish industrial revolution in a new perspective. The main consequence of this revolution was not a relative increase of industrial goods production, but the relative decline of agriculture and a social transformation from household production (whether for own use or market oriented) to the factory system. The most significant increase in the relative size of industrial goods production, instead, took place at a later stage, between 1890 and 1950.

[Figure 8 here]

Figure 9 compares the volume GDP per capita in 1820 in Sweden according to various estimates with other countries/regions according to Maddison's estimates.[93] Krantz and Schön put Swedish GDP per capita at only 685 (1990 International Geary-Khamis) dollars, nearly half of the value for

[90] Bohlin, "Swedish historical national accounts," pp. 73-74.
[91] See Schön, *En modern svensk ekonomisk historia*, pp. 78-79.
[92] Crafts, "British Economic Growth."
[93] Maddison, "Historical Statistics of the World Economy: 1-2008 AD."

neighbouring Denmark. Maddison in 2010 opted for the estimate in Edvinsson, *Growth, Accumulation, Crisis*, "*as the downward momentum of the Krantz and Schön estimate seemed excessive*". However, even the latest estimate by Maddison puts Swedish GDP per capita at 819 dollars, far below most other Western European countries. The present study upgrades the Swedish GDP per capita to 1076 dollars, which was still below Maddison's previously preferred estimate in 2007. In comparison, the average GDP per capita in Western Europe excluding UK and Netherlands was 1087 dollars. The new GDP series implies that Sweden did not belong to the poorest West European countries.

By 1850 Sweden's relative position had weakened somewhat. Despite the fast per capita growth in 1890-1913, looking at the whole period 1820-1913, the per capita growth in Sweden was actually lower than the average in Western Europe, while according to the previous historical national accounts it was fastest in Europe after Switzerland. Lars Sandberg's view (quoted earlier) that the basis for Sweden's later affluence was laid before World War I may, therefore, be questioned.

[Figure 9 here]

Volume values that are extrapolated from the benchmark of 1990 back to 1820 are prone to various deflation problems, and could only be viewed as very rough comparisons of countries. Volume values are also difficult to decompose. Current purchasing power parities can be computed, but these are difficult to assess especially for services. Another way to compare various countries is to look at current values, based on market exchange rates, which is more straightforward.

Table 1 presents the nominal GDP per capita for Sweden, Holland, UK (which includes Ireland), Norway and Denmark in 1835, which is decomposed by activity. These five countries have sufficiently reliable and detailed data to allow such decomposition.[94] To facilitate comparison, all values have been transformed into British pounds based on the market exchange rate of various

[94] For USA, data only exist from the expenditure side, while GDP by activity from France and Belgium does not seem to be sufficiently reliable.

currencies. This, of course, does not take into account differences in price levels, but it should give a rough idea of how reasonable various estimates are when compared internationally.

[Table 1 here]

Table 1 illustrates why the upward revision of the Swedish nominal GDP does not produce exaggerated numbers when viewed in international comparison. In fact, nominal Swedish GDP per capita would still be smaller than for the other countries. GDP per capita in 1835 was £13.8 in Holland and UK, £8.7 in Denmark, and £7.3 in Norway and Sweden. The old Swedish series would put GDP per capita at only £5.8, which seems quite low.

In 1835, the per capita agricultural value added was at about the same level in Sweden, Norway, UK and Holland, while Denmark expectably had a somewhat higher agrarian production. The upgrading of agriculture still puts Swedish per capita agrarian production below the level in the other four countries. The high GDP per capita in Netherlands and UK can be entirely explained by the large size of industrial goods production and various services. Four fifths of the difference between Holland and Sweden can be explained by food, textile and leather industries, trade and water transports. Although food, textile and leather industries are upgraded significantly for Sweden, the new series still puts per capita food industry production at less than half of Holland's level, and per capita textile and leather production at less than one third. The size of Swedish per capita industrial goods production in 1835 was 19 percent lower than in Denmark according to the new series.

GDP 1665-1800

Before the industrial revolution, the aggregate economic fluctuations were strongly correlated with harvest fluctuations. Harvest affected other activities, often with a lag by one year, especially animal produce, food and leather industries, and trade. The volatility of harvests was also higher than for other types of activities. Thus a reliable series of harvest may be used to estimate fluctuations in pre-industrial GDP.

Table 2 presents a regression for the period 1800-1850 where the annual logarithmic change in volume per capita GDP is the dependent variable, and the annual logarithmic changes in per capita harvests the current year and the preceding year are the two independent variables. The R-value of the regression is as high as 0.96, implying that over 90 percent of the variance in the fluctuations of GDP per capita can be explained by the model.

[Table 2 here]

The regression coefficients in Table 2 are, therefore, applied to the whole period 1665-1800 to arrive at an annual volume GDP per capita series spanning this time period. Per capita harvest in this period is based on a previous study that utilizes data on subjective harvest estimates, tithes and grain prices.[95] The constant is set to zero, which basically assumes a stagnant economy in per capita terms. This assumption has strong support in previous research.[96] For example, real wages in the late 1660s was at a higher level than in the early 19th century, although at a lower level than in the mid-19th century.[97]

Appendix 1 presents the new series of GDP and GDP per capita. The nominal values are calculated by reflating the volume values by the Consumer Price Index. It also presents a series of nominal GDP per capita in British pounds based on the exchange rate between the Swedish and British currencies. As a comparison, Gregory King calculated the income per capita in England and Wales to £7.9 in 1688.[98] Appendix 1 shows that the Swedish GDP per capita in that year was £4.75. In comparison, the daily wage rate in Stockholm for a male worker was, on average, 12 English pence (based on the exchange rate between English and Swedish currency) in 1665-1688, which was about at the same

[95] Edvinsson, "Swedish harvests." Some minor changes have been made to this series for the present study.
[96] See Edvinsson, "Swedish harvests," for an overview of the discussion.
[97] Söderberg, "Long-term trends," p. 473.
[98] Maddison, *Contours*, p. 269.

level as for a building worker in England.[99] This indicates that the estimated Swedish GDP per capita was probably not too high for the 17th century.

Reliability

Assessing the reliability of historical national accounts is difficult. For UK historical GDP, Feinstein has applied a reliability grade, ranging from A to D, which has later also been applied on the Dutch historical national accounts.[100] This is a subjective scale. The margin of error is ± 1 to 5 percent for grade A (firm figures), ± 5 to 15 percent for grade B (good estimates), ± 15 to 25 percent for grade C (rough estimates), and ± 25 to 50 percent for grade D (conjectures). Table 3 applies these reliability grades for the estimated valued added of various activities according to the present study.

Based on the reliability of various activities, an assessment of the reliability of aggregate GDP can also be made. Table 3 presents how large part of GDP could be classified as belonging to various reliability grades. Assuming that the margin of error of various activities are perfectly correlated with each other, the margin of error of GDP is simply the weighted average of the margin of errors of the various activities, which is presented in the table.[101] However, such perfect correlation is unrealistic, and it can be assumed that some of the errors are evened out. Table 3, therefore, also presents the margin of error of GDP based on the assumption of zero correlation between the margins of errors of various activities.[102] The actual margin of error of GDP can be assumed to lie somewhere between those two estimates. Henceforth, the more detailed historical national accounts, the more reliable will they tend to be. For the present study, this would imply that the margin of error is around 10-15 percent for the period 1802-1865 (grade B/C), around 8-10 percent for 1866-1910 (grade B), around 5-7 percent for 1911-1950 (grade A/B), and around 3-4 percent for 1951-1970 (grade A). For the period

[99] Based on "Long-term trends," and Clark, "English prices."
[100] Feinstein, *National income*, pp. 20-22, and Horlings et al., *Dutch GNP*, p. 106.
[101] For the estimate of the aggregate margin of error, the margin of error of the various activities is assumed to equal 3 percent for grade A, 10 percent for grade B, 20 percent for grade C, and 35 percent for grade D.
[102] When the margin of errors of the individual activities are uncorrelated, the margin of error of GDP can be calculated as (where i is an activity, ME_{GDP} the margin of error of GDP, ME_{GDP} the margin of error of activity i, and c_i the value share of activity i in total GDP):

$$ME_{GDP} = \sqrt{\sum_i \left(c_i ME_i\right)^2} \; ; \; \sum_i c_i = 1$$

1800-1802 it is estimated at around 15 percent (grade B/C), and for the period 1665-1800 at around 15-25 percent (grade C).

The Dutch and Swedish historical national accounts could probably be viewed as the most detailed of all countries for the 19th century. For the period 1800-1913, the reliability of the Swedish GDP series is probably at least as good as for the Dutch series. However, the annual fluctuations of GDP is probably more reliable for Sweden than for Netherlands, given the detailed coverage of yield ratios and that harvest fluctuations dominated aggregate economic fluctuations in Sweden during the 19th century. For the 19th century, or at least the first half of this century, the annual fluctuations in Swedish GDP presented in the present study may, therefore, be more reliable than for any other country.

[Table 3 here]

Concluding discussion

If we are to understand the early economic growth and the industrial revolution, we need to compare the economic leaders of the late Early Modern Period – UK and Holland – with other countries. How far ahead were UK and Holland in the early 19th century? This question could only be answered if we also have reliable historical national accounts for less developed countries.

Swedish historical national accounts belong to the most detailed in the world. Annual estimates for various types of activities exist back to 1800. In comparison, the Dutch accounts presents detailed annual data only from 1807 onwards.[103] However, as shown in this study, there are a number of deficiencies in previous Swedish historical national accounts. The previous estimates of Swedish GDP are not fully internationally comparable, and GDP per capita is underestimated for the early 19th century. There is a vast statistical material that has not been utilized.

This study provides new estimates of Swedish GDP, mainly by calculating new series for agriculture, manufacturing, building and construction, and real estate. Especially for manufacturing and real estate, the present study deviates significantly from previous estimates. There is, of course,

[103] Horlings et al., *Dutch GNP*.

much room for additional improvements of the Swedish historical national accounts, and it is possible that the addition of more activities could further upgrade Swedish GDP in the early 19th century. Nonetheless, the revisions presented in this paper remedies some of the most serious deficiencies, and renders the new GDP series comparable with other countries and modern national accounts.

For the period before 1860, the reliability of the GDP series for Sweden presented in this study may be considered, along with the Dutch series, as belonging to the ones of the highest international quality. It can provide a model for the construction and improvements of historical national accounts for other countries in this period, and shed some light to the statistical Dark Age of other countries. For the period 1860-1950, the Swedish GDP series is of internationally high standard as well, especially for the World War years. For the 19th century, the most reliable annual series of the Swedish historical national accounts is the harvest series. In the agrarian economy, harvests largely determined the fluctuations in the aggregate economy, making the present GDP series also quite reliable at an aggregated level for annual fluctuations, maybe the most reliable of all countries for that period.

It must be emphasised that the subjectively assessed margin of errors only pertains to the reliability, and not to validity. Reliability can be measured given that we know what we want to measure. Validity – for example, concerning which activities should be included in GDP or what deflation technique to use – cannot be measured in terms of a margin of error, since there is no error per se, for example, in applying a definition that deviates from international standards (and the international standards are also changing through time). The revisions to previous estimates of Swedish GDP concerns not only reliability. For example, while the present study substantially improves the reliability for agriculture and real estate, for manufacturing it is only validity that is improved (in terms of making them better conform to international standards), while the reliability is actually decreased somewhat, since the value added of home industries is less reliable than the value added of factories and handicrafts. The reclassification of harvests to the year of production is also a matter of improved validity.

The present study reinterprets Swedish economic performance through time and in comparison with other countries. It shows that Sweden was less exceptional, and more similar to other West European countries, than previously assumed.

It is especially Sweden's relative position in the early 19th century that is revised. The paradox of the 'impoverished sophisticate' is partly a statistical illusion, since home industries have previously been excluded and agriculture output was underestimated. Compared to other West European countries, partly due to climatic factors, Sweden was less urbanised and had a larger rural sector, but this rural sector must not be underestimated. While Sweden's GDP per capita then was below the average in Western Europe, it did not belong to the poorest countries, which supports Maddison's initial scepticism towards estimates showing very low income levels for Sweden in that period. Although Sweden had a stock of human capital and administrative skills in advance of its per capita production, institutions and economic well-being were not 'wildly disproportionate' to each other as advocated by the theory of the 'impoverished sophisticate'.

Swedish economic growth is revised downwards up to the 1930s, although the present study still supports the view that Swedish experienced faster economic growth in 1870-1970 than in most other countries. The industrial revolution came late too Sweden, and the relative production per inhabitant decreased compared to other European countries in the decades following 1820. The relatively advanced level of the stock of human and institutional capital in 1850 partly reflected past conditions. It was not until 1890 that Sweden started to catch up with the rest of West European countries, but as late as in 1913 Sweden GDP per capita was below the average in Western Europe. The basis of Sweden's post-war affluence was not laid before the First World War. It was rather because Sweden avoided participation in the two World Wars, that its relative position climbed between 1913 and 1950.

Although the series for 1665-1800 is a very crude estimate, it must be remembered that also modern national accounts could be quite unreliable, especially for individual components. Long-term trends are also difficult to estimate for the modern period due to quality improvements.

It is difficult to estimate the long term trends in the GDP per capita in the pre-industrial era. On the one hand, it can be assumed that technological advance, for example in transportation, contributed to a certain increase in the GDP per capita over time. However, in the agrarian society technological improvements that led to improved standards also tended to increase population, which in turn led to increased pressure on the natural resources, which at a later phase depressed GDP per capita.

Henceforth, technological improvement in an agrarian society rather tended to lead to increases in population, which can be contrasted to the industrial society, where technological improvement takes the main form of an increase in per capita production.

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Table 1: Nominal GDP per capita in 1835 and its composition in five countries in British pounds.

	UK	Holland	Denmark	Norway	Sweden, present study	Sweden, previous study
Agriculture and ancillaries	**3.23**	**3.14**	**3.84**	**3.18**	**3.13**	**2.79**
Agriculture	3.23	3.11	3.57	2.11	2.56	2.29
Vegetable	1.54	1.59	1.50	1.09	1.61	1.39
Animal produce	1.69	1.53	2.07	1.02	0.96	0.89
Forestry		0.00	0.15	0.58	0.54	0.48
Fishing		0.02	0.12	0.49	0.02	0.03
Industrial goods production	**4.92**	**4.06**	**2.36**	**1.22**	**1.92**	**1.00**
Mining and minerals		0.09	0.29	0.11	0.16	0.16
Manufacturing and crafts		3.49	1.81	0.78	1.45	0.54
Food		1.20			0.54	0.15
Textile and leather		2.03			0.60	0.21
Other manufacturing and crafts		0.26			0.31	0.18
Building and construction		0.48	0.26	0.33	0.31	0.30
Services	**5.63**	**6.63**	**2.47**	**2.91**	**2.22**	**2.03**
Commerce		2.53	0.55	0.41	0.40	0.41
Trade		2.26	0.46	0.41	0.36	0.38
Catering and hotels		0.27	0.09		0.04	0.04
Transports and communications		1.82	0.16	0.56	0.34	0.34
Water transport		1.44	0.10	0.43	0.12	0.12
Other transport		0.35	0.04	0.13	0.20	0.20
Communications		0.03	0.02		0.01	0.01
Finance and real estate		0.83	0.76	0.78	0.54	0.33
Finance		0.14	0.09		0.03	0.03
Real estate		0.70	0.66	0.78	0.50	0.29
Other private services		0.77	0.40	0.80	0.56	0.56
Domestic servants		0.45	0.23		0.48	0.48
Other services		0.32	0.17		0.09	0.09
Public sector, including education		0.68	0.61	0.36	0.38	0.38
GDP per capita, current pounds	**13.78**	**13.82**	**8.68**	**7.31**	**7.27**	**5.82**
GDP per capita, 1990 International Geary-Khamis dollars	1906	2131	1377	881	1049	901

Sources: Sweden: the present study and Edvinsson, *Growth, Accumulation, Crisis*; Holland: Horlings et al., *Dutch GNP*; Denmark: Hansen, *Økonomisk vækst*; Norway: Grytten, "The gross domestic product"; UK: Deane, "New Estimates," and Broadberry et al., *British economic growth*; exchange rates: Lobell "Foreign exchange rates," and Klovland "Historical exchange rate data"; volume values: Maddison, "Historical Statistics of the World Economy: 1-2008 AD."

Table 2: Regression for the period 1800-1850 where the annual logarithmic change in volume per capita GDP is the dependent variable, and the annual logarithmic changes in per capita harvests the current year and the preceding year are the two independent variables.

Variable	**Coefficient**	**Beta coefficient**	**t-value**	**Signifi-cance**
Constant	0.26		1.44	
Annual logarithmic changes in per capita harvests	0.29	1.00	23.2	0.000
Annual logarithmic changes in per capita harvests lagged by one year	0.16	0.54	12.6	0.000

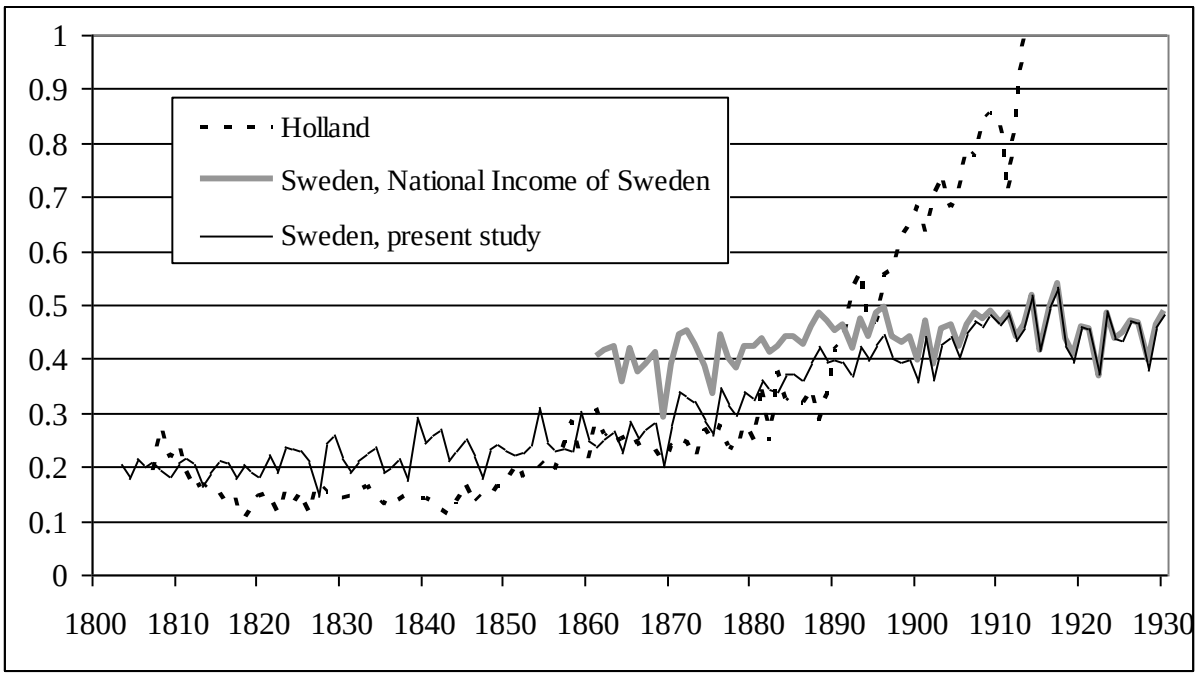
Model summary: $R = 0.96$; $R^2 = 0.92$; adjusted $R^2 = 0.92$; degrees of freedom: 47; significance: 0.000.

Table 3: Subjectively estimated reliability of various series according to the scale used by Feinstein for historical national accounts.

	1802-1865	1866-1910	1911-1950	1951-1970
Agriculture and ancillaries	**B/C**	**B**	**B**	**A**
Arables	B	B	A	A
Animal produce	C	B	B	A
Hortuculture	D	D	C	B
Forestry	D	C	B	A
Fishing	D	C	C	B
Industrial goods production	**B/C**	**B**	**A**	**A**
Mining and minerals	B	A	A	A
Food industries	C	B	B	B
Textile and leather industries	C	B	A	A
Wood and paper industries	D	B	A	A
Engeenering	D	B	A	A
Other manufacturing activities	C	B	A	A
Building and construction	D	C	B	B
Services	**B/C**	**B**	**B**	**A/B**
Trade	D	C	C	B
Catering and hotels	C	C	B	A
Transports and communications	C	B	B	A
Finance	B	B	B	A
Real estate	C	C	B	B
Domestic servants	B	B	B	B
Other private services	C	C	B	B
Public sector	C	B	B	A
GDP	**B/C**	**B**	**A/B**	**A**
Percent of which A	0	2	29	65
Percent of which B	30	62	61	35
Percent of which C	49	34	10	0
Percent of which D	22	1	0	0
Margin of error (percent) if perfect correlation between errors of sub-activities	20	14	9	5
Margin of error (percent) if no correlation between errors of sub-activities	6	4	3	2

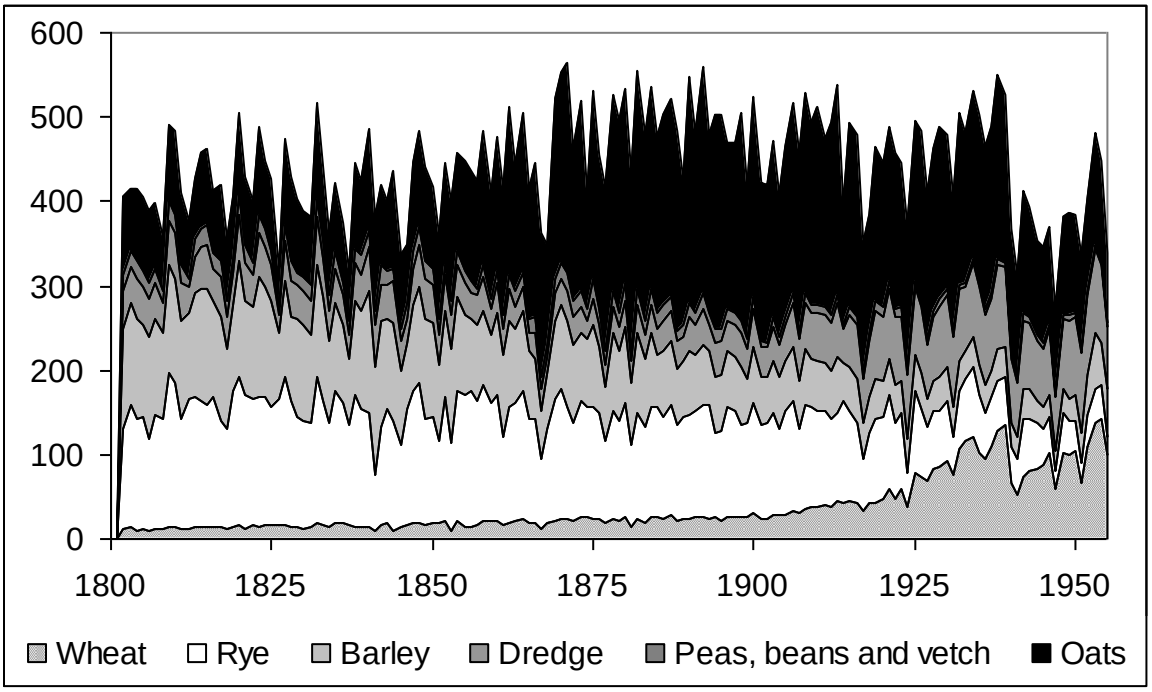
Source: The reliability grades A to D are described in Feinstein, *National income*, pp. 20-22.

Figure 1: The value ratio of forage to the supply of arables (excluding seeds) in 1803-1930 in Holland and Sweden according to various estimates.



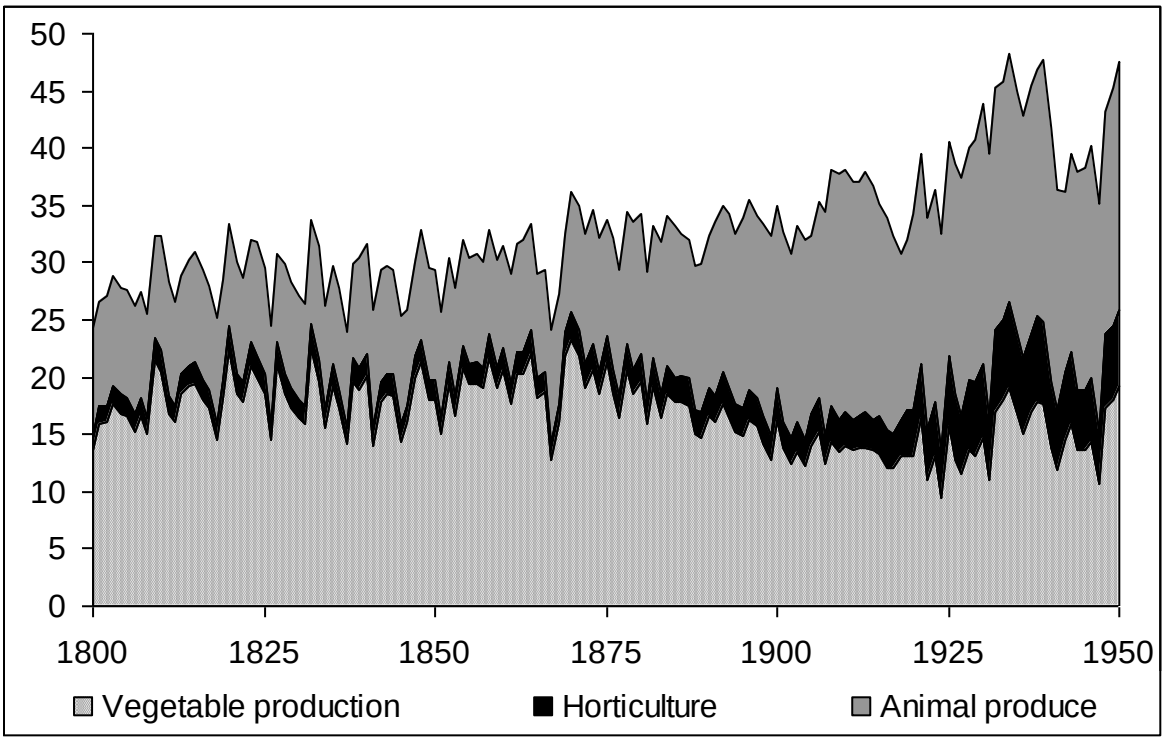
Sources: The present study; Lindahl, Dahlgren and Kock, *National Income*; Horlings et al., *Dutch GNP*, pp. 121-123.

Figure 2: The per capita gross harvest (including forage and seeds) in tons of various grains 1802-1955.



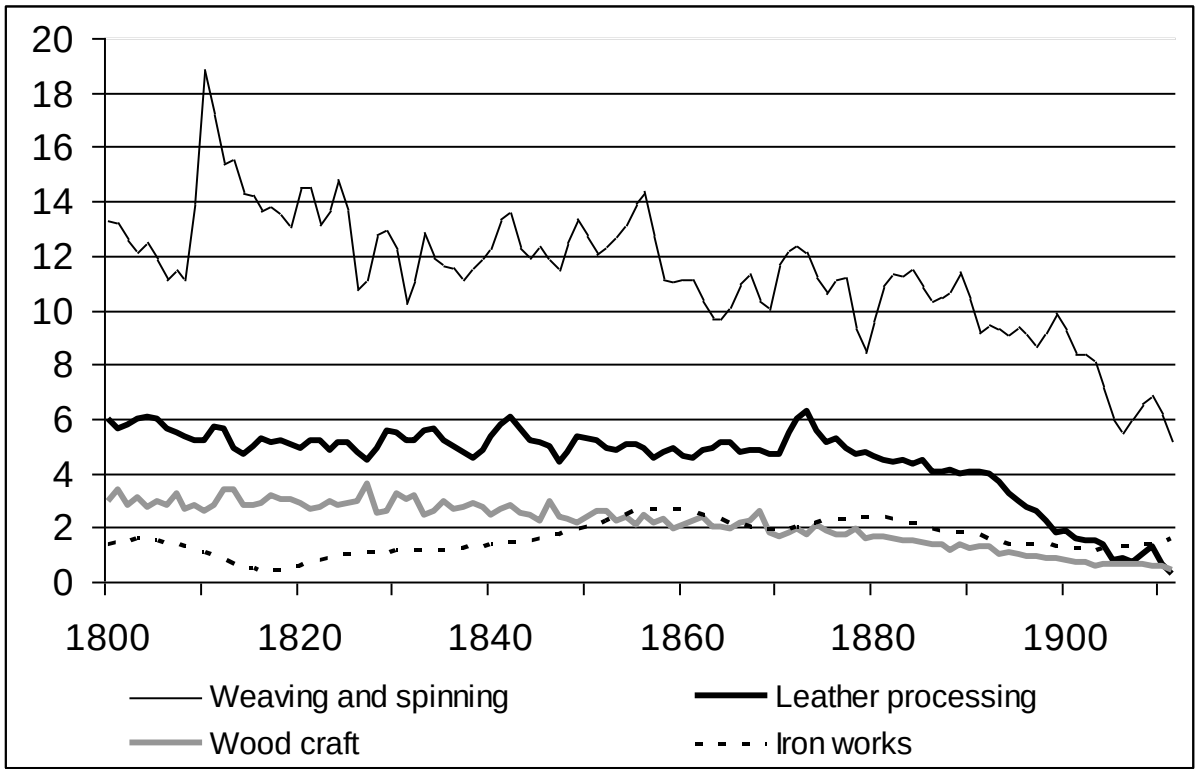
Sources: See the main text.

Figure 3: The per capita gross production of agriculture (excluding forage and seeds) in 1800-1950 in the reference prices of 1800 (SEK).



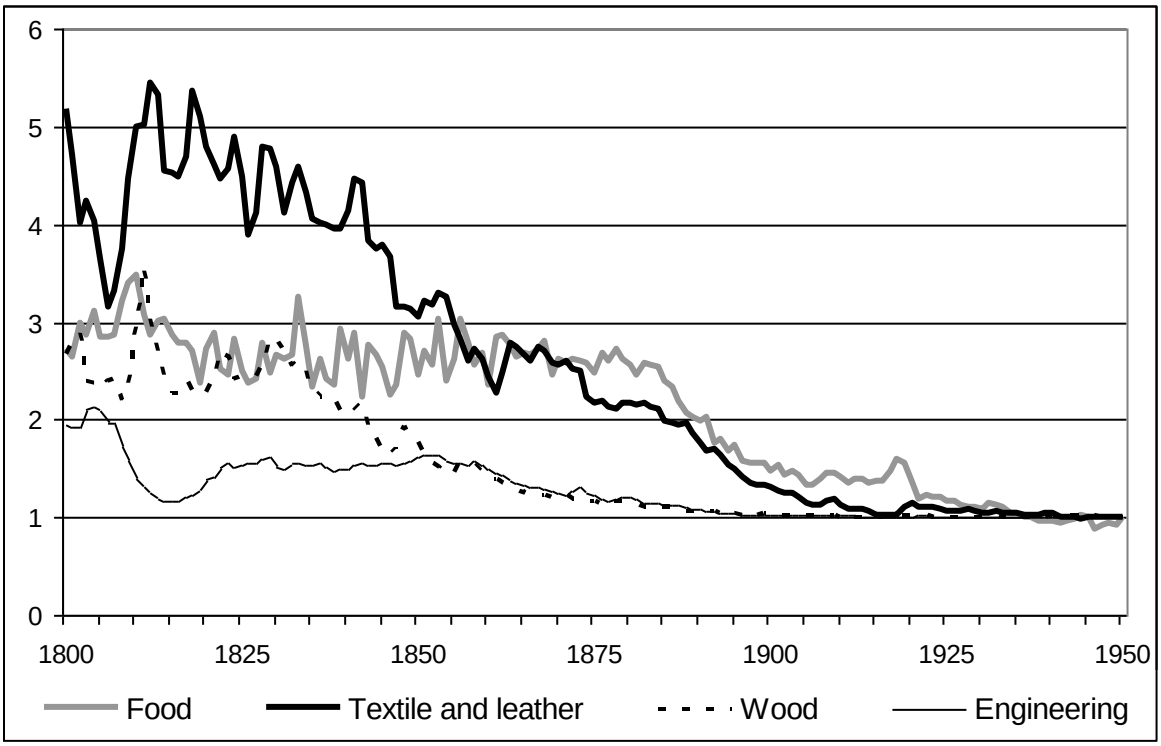
Sources: See the main text.

Figure 4: Per capita volume value of various home industries 1800-1911 (reference prices of 1800, SEK) previously excluded by Swedish historical national accounts.



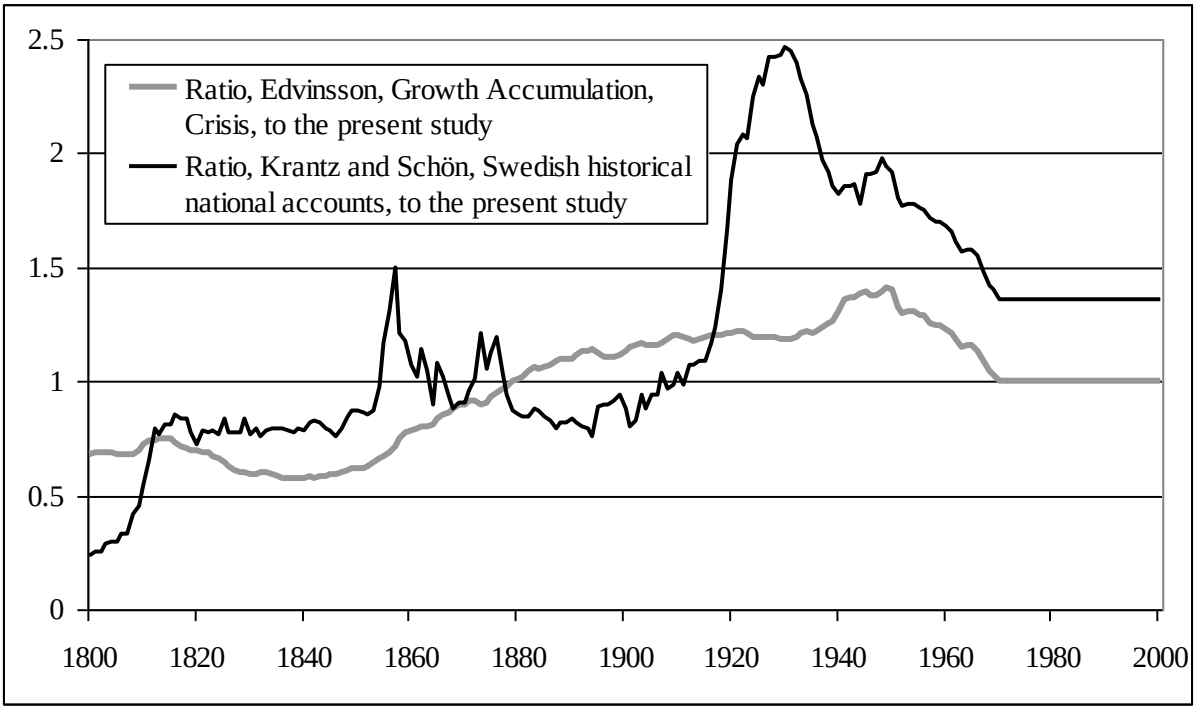
Sources: See the main text.

Figure 5: The ratio of new to old series of gross output for four types of manufacturing activities.



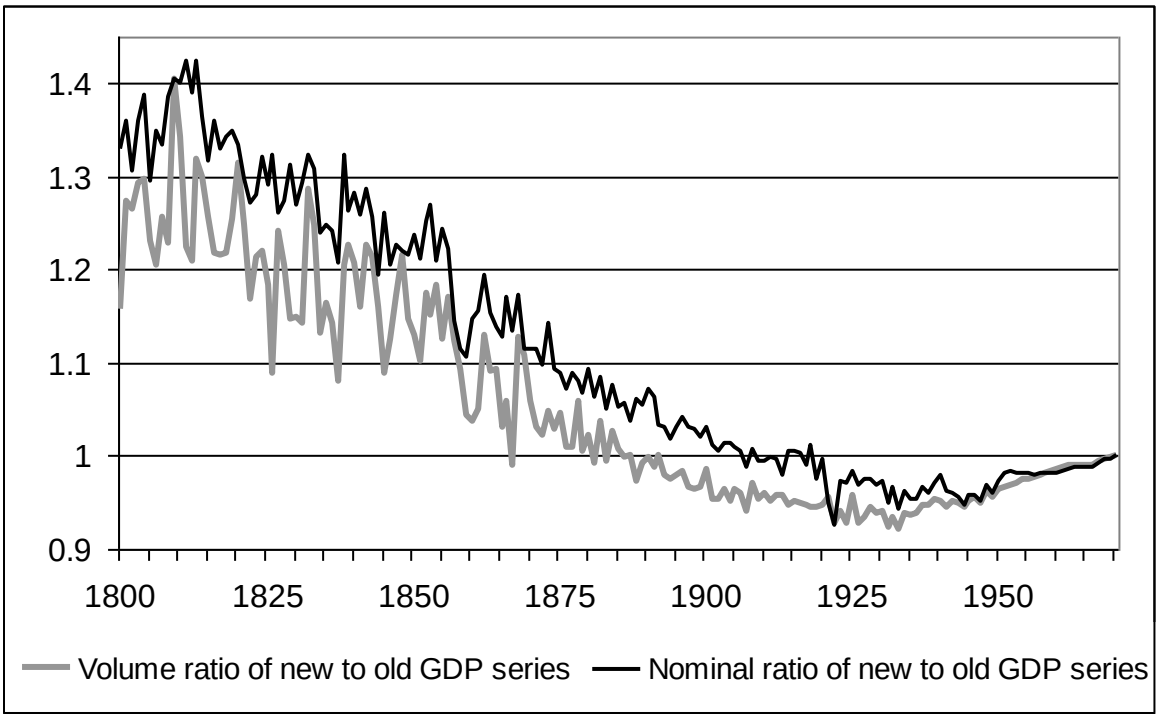
Sources: Edvinsson, *Growth, Accumulation, Crisis* and the present study.

Figure 6: The ratio of the new estimate of value added in real estate to the estimates of Edvinsson, *Growth, Accumulation, Crisis* and Krantz and Schön, *Swedish historical national accounts*, respectively.



Sources: Edvinsson, *Growth, Accumulation, Crisis*, Krantz and Schön, *Swedish historical national accounts*, and the present study.

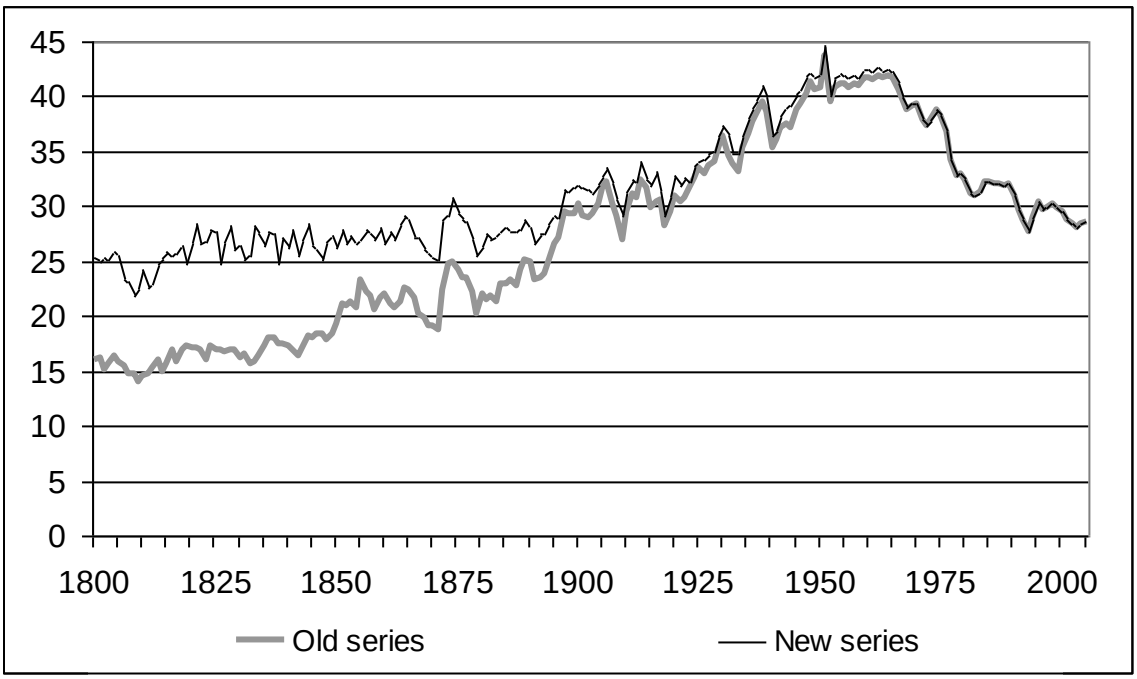
Figure 7: The ratio of new to old GDP series 1800-1970.



Comment: The volume ratio is based on the reference prices of 2000.

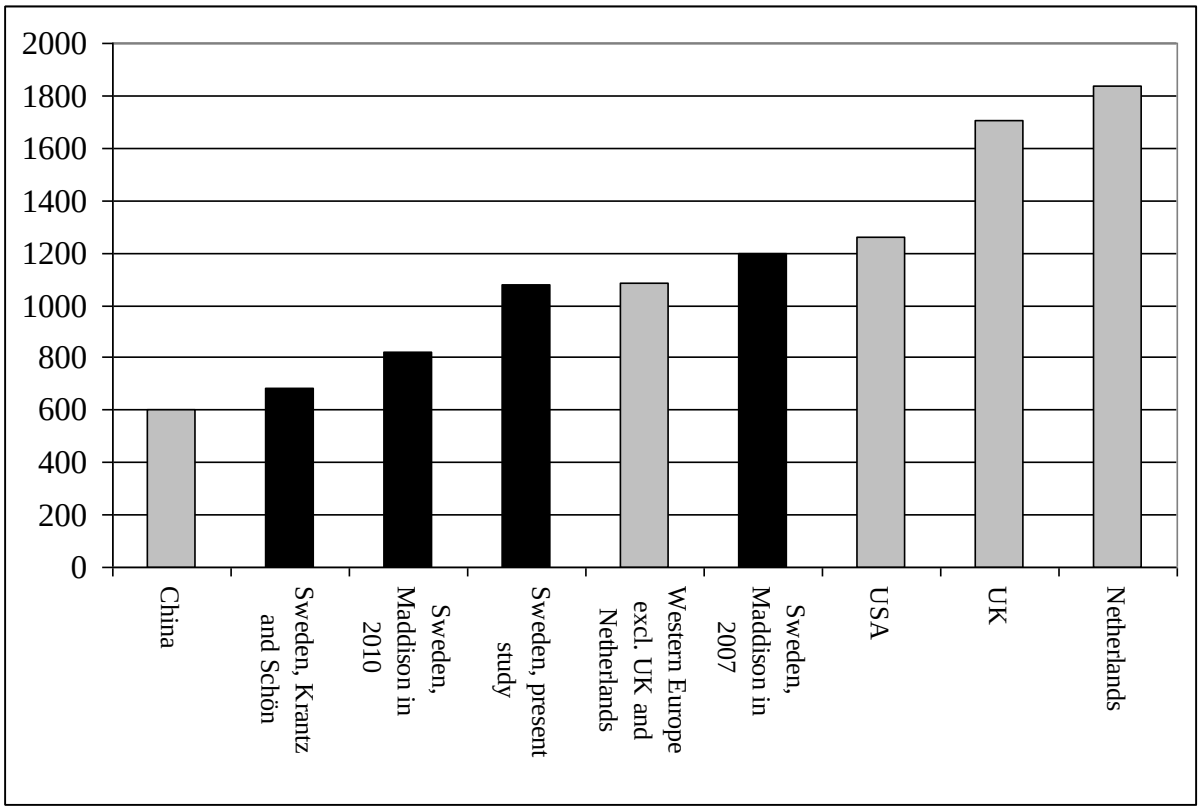
Sources: See the main text. The old series is from Edvinsson, *Growth, Accumulation, Crisis*.

Figure 8: The nominal share of industrial goods production (manufacturing and building) in GDP according to old and new series (in percent).



Sources: See the main text. The old series is from Edvinsson, *Growth, Accumulation, Crisis*.

Figure 9: Volume GDP per capita in 1820 in 1990 International Geary-Khamis dollars in various countries/regions (gray) and according to various estimates of Swedish historical national accounts (black).



Sources: The present study, Krantz and Schön, *Swedish historical national accounts*, Maddison, "Historical Statistics for the World Economy: 1-2003 AD," and Maddison, "Historical Statistics of the World Economy: 1-2008 AD".

Appendix 1: GDP and GDP per capita in Sweden (within present borders) 1665-2010.

	GDP/capita, in 1990 International Geary-Khamis dollars		GDP/capita in current prices		Popu-lation, mid-year	Nominal GDP, mn daler kopparmynt to 1776, then mn SEK***	Volume GDP growth (per cent)
	Present study	Previous study	Daler koppar-mynt to 1776, then SEK***	British pounds			
1665	1024		149	6.68	1273193	190	
1666	1021		144	6.73	1282537	185	0.50
1667	1025		146	6.58	1285580	187	0.57
1668	1065		129	5.52	1284429	165	3.82
1669	1062		137	5.99	1288515	177	0.03
1670	1062		127	5.47	1299887	165	0.91
1671	1059		126	5.42	1315192	166	0.91
1672	1012		140	6.19	1325328	186	-3.72
1673	988		121	5.57	1329684	162	-2.08
1674	934		162	7.41	1331992	216	-5.23
1675	963		162	6.86	1315593	213	1.79
1676	1026		157	6.35	1288576	202	4.34
1677	978		174	6.48	1274357	222	-5.70
1678	964		166	6.12	1269800	210	-1.78
1679	1000		157	5.89	1264028	198	3.29
1680	1049		135	4.45	1263733	170	4.83
1681	1060		132	4.51	1275776	168	2.04
1682	1057		127	4.64	1292894	164	1.07
1683	1050		126	4.69	1311116	166	0.68
1684	988		160	5.94	1328834	213	-4.58
1685	1041		130	4.79	1342352	175	6.40
1686	1051		126	4.70	1354892	171	1.88
1687	1021		129	4.65	1369989	176	-1.73
1688	973		131	4.75	1386452	182	-3.55
1689	989		127	4.85	1402648	178	2.85
1690	1011		133	5.20	1412603	188	2.93
1691	1031		130	5.06	1410113	183	1.74
1692	1028		138	5.29	1406945	194	-0.44
1693	940		175	6.99	1409851	246	-8.37
1694	978		171	7.03	1409555	241	4.01
1695	970		127	5.63	1411900	179	-0.74
1696	905		161	6.23	1417220	229	-6.27
1697	861		182	6.15	1409800	257	-5.34
1698	889		197	6.95	1394481	274	2.05
1699	983		175	6.69	1394139	244	10.53
1700	1036		169	6.18	1405907	238	6.29
1701	1030		149	5.47	1417843	212	0.25
1702	994		159	6.12	1434477	228	-2.29
1703	988		156	5.86	1452540	227	0.66
1704	1021		139	5.17	1467741	205	4.35
1705	986		147	5.34	1478478	218	-2.72
1706	958		141	5.09	1483177	209	-2.51
1707	942		163	5.77	1492784	244	-0.99

1708	918	167	5.95	1507113	251	-1.60
1709	846	217	7.75	1506572	326	-7.94
1710	928	155	5.51	1461916	226	6.42
1711	1015	156	5.60	1404427	219	5.14
1712	1018	165	5.83	1394784	230	-0.45
1713	1038	162	5.66	1415574	229	3.48
1714	976	192	6.89	1436823	276	-4.54
1715	997	182	6.43	1457379	265	3.65
1716	988	219	7.21	1473979	322	0.22
1717	947	315	7.83	1477122	465	-3.94
1718	952	311	4.93	1479506	461	0.67
1719	910	381	8.82	1486074	567	-4.03
1720	990	256	6.62	1491963	383	9.23
1721	1013	257	6.63	1508931	387	3.50
1722	994	207	5.17	1527021	316	-0.65
1723	950	193	5.02	1542920	297	-3.41
1724	950	188	5.01	1560893	293	1.14
1725	974	191	5.30	1577596	301	3.60
1726	918	196	5.38	1594300	312	-4.75
1727	941	203	5.39	1608394	327	3.38
1728	988	191	5.03	1617377	309	5.62
1729	1019	185	4.91	1625663	301	3.61
1730	1019	183	4.96	1635979	299	0.71
1731	1025	174	4.65	1648143	287	1.27
1732	1034	177	4.70	1661507	295	1.72
1733	1014	187	4.94	1674492	314	-1.14
1734	1006	179	4.54	1686194	302	-0.15
1735	992	184	4.68	1697457	312	-0.72
1736	979	189	4.85	1703611	322	-0.95
1737	1010	176	4.52	1703031	300	3.20
1738	1035	173	4.45	1709037	296	2.76
1739	965	178	4.48	1720889	306	-6.07
1740	922	199	5.02	1719696	343	-4.51
1741	918	220	5.54	1709135	376	-1.11
1742	962	215	5.17	1694779	364	3.95
1743	979	211	4.93	1674298	353	0.52
1744	1006	208	4.52	1675400	348	2.88
1745	954	218	4.68	1699232	370	-3.81
1746	920	219	5.21	1719898	377	-2.41
1747	952	240	5.05	1734761	416	4.32
1748	943	256	5.25	1748350	447	-0.10
1749	990	250	5.28	1760106	440	5.63
1750	1055	255	5.80	1772683	453	7.40
1751	1003	256	6.00	1791373	458	-3.92
1752	982	250	6.21	1809403	453	-1.16
1753	1014	252	6.40	1827255	461	4.32
1754	1000	261	6.42	1847433	481	-0.28
1755	964	268	6.46	1866016	500	-2.71
1756	914	283	6.34	1882213	532	-4.29
1757	892	298	5.96	1891206	563	-2.02
1758	969	324	5.68	1893217	614	8.80
1759	1034	326	5.79	1899645	619	7.02
1760	1051	345	5.12	1915532	661	2.53
1761	1027	392	5.44	1933734	757	-1.30

1762	938		498	5.43	1945805	969	-8.14
1763	931		536	6.28	1950798	1045	-0.49
1764	944		574	6.19	1959202	1125	1.81
1765	977		557	5.97	1971500	1097	4.11
1766	1013		513	6.54	1984468	1017	4.47
1767	998		411	6.72	2000900	822	-0.66
1768	949		343	7.38	2015114	691	-4.33
1769	987		352	8.25	2025512	714	4.56
1770	1004		400	6.26	2036524	814	2.33
1771	913		447	6.90	2046623	915	-8.66
1772	905		465	6.40	2041437	949	-1.14
1773	978		463	5.34	2004531	929	6.19
1774	1049		437	5.39	1988673	869	6.40
1775	982		479	6.51	2010501	964	-5.36
1776	994		485*	6.75	2031042	985*	2.29
			27**			55**	
1777	1019		28	7.26	2049203	58	3.38
1778	1001		29	7.29	2065206	60	-0.99
1779	1022		29	7.06	2081444	61	2.86
1780	985		28	6.88	2103904	60	-2.55
1781	912		28	7.30	2125584	59	-6.44
1782	943		29	7.66	2136945	62	3.93
1783	915		29	7.53	2142278	63	-2.71
1784	967		28	6.32	2144391	60	5.80
1785	954		30	6.53	2147492	64	-1.19
1786	940		30	6.95	2156583	64	-1.08
1787	1012		30	7.26	2170896	66	8.34
1788	993		31	7.43	2185570	69	-1.20
1789	987		32	6.84	2190860	70	-0.38
1790	1034		34	6.48	2188347	73	4.71
1791	1033		33	6.80	2195013	73	0.19
1792	1002		34	7.52	2215790	76	-2.10
1793	1006		36	7.04	2240105	81	1.48
1794	993		41	8.69	2261878	93	-0.31
1795	1020		44	11.01	2277010	101	3.40
1796	1051		45	11.03	2290944	104	3.69
1797	1027		46	9.76	2311777	105	-1.43
1798	965		46	9.49	2333496	108	-5.15
1799	955		53	10.90	2350602	125	-0.34
1800	932	806	62	10.93	2352143	146	-2.33
1801	978	770	65	10.78	2351124	153	4.97
1802	1003	795	64	10.08	2363568	151	3.03
1803	1023	794	63	9.41	2380403	150	2.78
1804	1011	783	63	9.07	2396204	151	-0.52
1805	996	812	63	9.39	2412909	153	-0.80
1806	973	810	71	10.49	2425384	171	-1.86
1807	978	781	73	10.23	2434160	178	0.87
1808	922	753	84	12.35	2433588	205	-5.73
1809	1021	729	93	13.30	2410788	223	9.67
1810	1077	802	99	10.99	2395226	237	4.83
1811	1011	825	108	11.21	2403855	260	-5.77
1812	963	797	126	12.92	2415078	304	-4.26
1813	1001	761	134	12.50	2421363	325	4.22
1814	1025	792	133	11.72	2431084	323	2.80

1815	1043	832	128	9.98	2451617	314	2.58
1816	1024	843	136	8.27	2481222	336	-0.61
1817	991	817	135	9.11	2509434	339	-2.16
1818	952	784	136	9.41	2533896	343	-3.00
1819	979	784	140	8.24	2554084	358	3.66
1820	1071	818	137	7.33	2573210	354	10.27
1821	1063	853	125	6.97	2597747	325	0.12
1822	1020	874	121	6.75	2628532	318	-2.88
1823	1060	873	122	6.66	2667587	324	5.46
1824	1096	899	124	6.68	2707888	335	5.01
1825	1057	892	124	7.07	2748975	341	-2.17
1826	973	892	131	6.94	2788038	364	-6.60
1827	1030	831	131	6.72	2816299	370	6.97
1828	1059	880	124	6.89	2837237	352	3.55
1829	1028	895	127	7.13	2854948	362	-2.34
1830	1001	870	129	6.84	2875580	370	-1.91
1831	991	868	138	6.99	2894553	399	-0.33
1832	1084	844	144	6.80	2911900	418	10.00
1833	1104	886	137	6.60	2940915	402	2.86
1834	1022	902	130	6.81	2971074	386	-6.47
1835	1049	901	134	7.28	3004172	404	3.85
1836	1044	912	136	7.54	3042350	413	0.70
1837	984	911	134	7.21	3067758	410	-4.91
1838	1050	872	148	7.96	3083215	456	7.25
1839	1100	898	150	8.41	3098350	466	5.25
1840	1116	925	149	8.28	3122631	466	2.23
1841	1058	912	146	8.02	3155977	461	-4.18
1842	1074	876	151	8.11	3189924	481	2.58
1843	1084	896	146	7.81	3221669	471	2.03
1844	1085	938	136	7.40	3255826	442	1.15
1845	1044	959	141	7.76	3295769	464	-2.64
1846	1039	923	147	8.12	3329705	491	0.57
1847	1097	938	157	8.69	3352486	526	6.25
1848	1174	968	157	8.43	3379717	529	7.89
1849	1157	1007	152	8.18	3419300	519	-0.29
1850	1152	1018	157	8.61	3461852	543	0.86
1851	1111	1007	157	8.77	3499552	550	-2.52
1852	1156	984	165	9.14	3528508	582	4.93
1853	1141	993	174	9.87	3551844	619	-0.72
1854	1189	1006	186	10.58	3585650	669	5.27
1855	1196	1065	214	11.98	3624530	776	1.66
1856	1221	1044	236	13.09	3656965	864	2.97
1857	1198	1067	231	12.87	3680287	850	-1.27
1858	1219	1117	205	11.42	3710847	762	2.65
1859	1223	1172	198	11.19	3760892	746	1.69
1860	1239	1194	212	11.96	3823562	812	2.99
1861	1243	1183	220	12.18	3888427	857	1.98
1862	1247	1103	223	12.46	3941544	878	1.68
1863	1289	1183	224	12.54	3994131	894	4.82
1864	1317	1206	217	12.14	4046243	878	3.49
1865	1283	1244	212	11.82	4092042	866	-1.50
1866	1278	1207	218	12.09	4137344	900	0.75
1867	1211	1224	220	12.24	4178142	921	-4.33
1868	1229	1093	220	12.15	4184365	919	1.62

1869	1327	1201	224	12.36	4165912	931	7.52
1870	1434	1358	237	13.22	4163638	988	7.95
1871	1447	1406	247	13.84	4186313	1035	1.51
1872	1476	1444	275	15.41	4227231	1164	3.00
1873	1522	1450	321	17.81	4274126	1372	4.27
1874	1522	1478	327	18.02	4319711	1412	1.00
1875	1517	1452	317	17.40	4362375	1381	0.71
1876	1552	1538	325	17.90	4406441	1433	3.32
1877	1518	1504	321	17.62	4457043	1429	-1.06
1878	1536	1452	294	16.12	4508140	1325	2.33
1879	1527	1521	280	15.39	4555321	1274	0.46
1880	1555	1520	296	16.30	4572280	1353	2.19
1881	1554	1564	301	16.53	4568955	1376	-0.13
1882	1605	1548	310	17.00	4575679	1418	3.45
1883	1647	1657	311	17.06	4591339	1427	2.96
1884	1668	1625	309	16.99	4623976	1431	2.01
1885	1688	1674	298	16.36	4663569	1390	2.01
1886	1664	1664	278	15.32	4699947	1309	-0.63
1887	1650	1649	264	14.51	4726037	1247	-0.27
1888	1679	1725	282	15.53	4741574	1338	2.08
1889	1723	1733	296	16.27	4761315	1409	3.01
1890	1767	1768	309	16.99	4779692	1478	2.96
1891	1812	1835	324	17.83	4793858	1553	2.85
1892	1826	1825	319	17.58	4804808	1533	1.02
1893	1836	1874	315	17.33	4815500	1516	0.78
1894	1839	1887	308	16.98	4848605	1493	0.81
1895	1924	1963	324	17.85	4896167	1589	5.69
1896	2015	2049	340	18.72	4940867	1680	5.68
1897	2051	2121	362	19.97	4986044	1806	2.71
1898	2096	2175	386	21.20	5036205	1943	3.23
1899	2155	2232	413	22.67	5080131	2100	3.71
1900	2176	2205	423	23.20	5116884	2165	1.68
1901	2141	2247	409	22.49	5155798	2106	-0.86
1902	2134	2238	402	22.12	5186977	2087	0.28
1903	2229	2313	435	23.91	5210009	2267	4.92
1904	2278	2393	441	24.24	5241014	2311	2.81
1905	2282	2365	449	24.69	5277821	2370	0.88
1906	2442	2543	498	27.33	5315928	2647	7.80
1907	2530	2689	535	29.27	5357345	2866	4.40
1908	2542	2621	538	29.55	5403594	2907	1.35
1909	2494	2616	527	28.94	5452970	2873	-0.99
1910	2662	2774	562	30.88	5499374	3093	7.64
1911	2675	2813	569	31.25	5542066	3152	1.25
1912	2778	2899	602	33.05	5582955	3361	4.64
1913	2942	3072	642	35.20	5621361	3609	6.64
1914	2936	3099	660	35.83	5659058	3733	0.44
1915	2972	3126	758	41.39	5696149	4319	1.88
1916	3096	3264	948	57.09	5735109	5435	4.90
1917	2858	3021	1087	73.67	5779166	6284	-6.97
1918	2666	2819	1475	101.02	5807345	8565	-6.26
1919	2776	2936	1746	100.16	5830420	10178	4.53
1920	2946	3109	1955	109.10	5875693	11487	6.95
1921	2694	2819	1420	82.92	5929350	8418	-7.74
1922	2880	3103	1188	70.16	5970895	7093	7.69

1923	3056	3247	1182	68.57	5996633	7085	6.55
1924	3157	3406	1217	73.17	6020919	7327	3.73
1925	3271	3412	1255	69.77	6044834	7587	4.03
1926	3410	3672	1255	69.16	6063956	7612	4.58
1927	3531	3779	1271	70.10	6081142	7728	3.83
1928	3667	3883	1311	72.19	6096550	7992	4.12
1929	3885	4144	1364	75.25	6112630	8339	6.22
1930	4049	4304	1373	75.83	6131126	8420	4.53
1931	3916	4245	1257	69.96	6152310	7734	-2.95
1932	3824	4098	1195	62.92	6176389	7380	-1.94
1933	3871	4205	1185	61.71	6200956	7347	1.62
1934	4257	4531	1300	67.02	6222319	8090	10.35
1935	4464	4766	1382	71.24	6241792	8627	5.20
1936	4682	4988	1470	75.78	6258692	9201	5.15
1937	4917	5194	1625	83.78	6275799	10200	5.31
1938	5080	5369	1691	87.11	6297455	10647	3.68
1939	5468	5734	1864	101	6325739	11791	8.12
1940	4927	5178	1982	117	6356350	12597	-9.46
1941	4794	5072	2160	127	6388929	13800	-2.18
1942	4907	5155	2344	138	6432285	15080	3.04
1943	5070	5341	2502	148	6490433	16239	4.26
1944	5139	5438	2555	151	6559982	16758	2.44
1945	5193	5452	2639	156	6635439	17509	2.22
1946	5723	5991	2942	187	6718567	19768	11.58
1947	6023	6348	3238	223	6802753	22029	6.56
1948	6159	6395	3555	245	6883342	24467	3.48
1949	6273	6567	3644	251	6955467	25342	2.91
1950	6523	6765	4031	278	7013950	28276	4.85
1951	6747	6976	5022	346	7070227	35508	4.27
1952	6758	6971	5560	383	7124626	39611	0.94
1953	6840	7040	5536	381	7171431	39703	1.88
1954	7146	7336	5839	402	7213459	42119	5.09
1955	7296	7474	6214	429	7262335	45130	2.78
1956	7531	7699	6750	466	7314511	49371	3.97
1957	7740	7894	7192	496	7363759	52962	3.47
1958	7899	8041	7439	513	7409115	55116	2.69
1959	8220	8353	7791	536	7446231	58013	4.58
1960	8662	8788	8459	583	7480374	63275	5.86
1961	9117	9233	9234	637	7519965	69442	5.81
1962	9494	9597	10004	690	7561563	75648	4.71
1963	9912	10017	10686	735	7604292	81257	5.00
1964	10505	10614	11923	828	7661279	91343	6.78
1965	10927	11040	13104	908	7733756	101342	5.00
1966	11172	11271	14036	972	7807717	109586	3.22
1967	11546	11617	15199	1073	7867892	119583	4.14
1968	11994	12031	16151	1305	7911960	127784	4.46
1969	12508	12534	17313	1400	7967648	137947	5.02
1970	13011	13005	19020	1529	8042657	152975	5.00
1971	13226	13221	20637	1652	8098179	167126	2.36
1972	13530	13526	22118	1862	8122144	179643	2.60
1973	14013	14011	24612	2296	8136775	200265	3.76
1974	14480	14479	29028	2788	8160544	236884	3.63
1975	14569	14568	33700	3655	8192551	276086	1.01
1976	14819	14819	37928	4819	8222299	311851	2.09

1977	14553	14553	40833	5215	8251633	336939	-1.44
1978	14492	14492	45124	5199	8275772	373436	-0.13
1979	14923	14923	50694	5571	8293718	420438	3.20
1980	15009	15009	57162	5803	8310470	475040	0.78
1981	14902	14902	62175	6090	8320485	517326	-0.59
1982	15069	15069	68452	6251	8325258	569881	1.18
1983	15330	15330	76193	6546	8329028	634618	1.78
1984	15797	15797	85014	7701	8336595	708723	3.14
1985	16042	16042	91446	8246	8350376	763610	1.72
1986	16435	16435	100397	9598	8369819	840304	2.69
1987	16897	16897	107694	10365	8397783	904392	3.15
1988	17290	17290	117116	10814	8436456	988046	2.80
1989	17702	17702	129072	12211	8492894	1096193	3.07
1990	17781	17781	139750	13259	8558774	1196088	1.23
1991	17430	17430	145670	13652	8617333	1255284	-1.30
1992	16989	16989	146412	14326	8668033	1269103	-1.96
1993	16590	16590	146443	12549	8718521	1276770	-1.78
1994	17058	17058	154401	13074	8780673	1355746	3.56
1995	17584	17584	166341	14786	8826932	1468283	3.63
1996	17816	17816	170723	16306	8840997	1509366	1.48
1997	18354	18354	177510	14201	8846062	1570262	3.08
1998	19065	19065	184215	13998	8850973	1630486	3.93
1999	19908	19908	192432	14393	8857873	1704541	4.51
2000	20701	20701	204450	14762	8872103	1813900	4.15
2001	20906	20906	211370	14215	8895950	1880334	1.26
2002	21355		219225	15046	8924944	1956568	2.48
2003	21773		227459	17245	8958212	2037627	2.34
2004	22606		236902	17614	8993513	2130578	4.23
2005	23227		245570	18097	9029554	2217386	3.16
2006	24090		259634	19133	9080445	2357589	4.30
2007	24704		273605	20237	9148026	2502943	3.31
2008	24412		279093	23104	9219564	2573116	-0.41
2009	22960		267628		9298419	2488518	-5.14
2010	23738		278247		9381330	2610325	4.31

* Daler kopparmynt
** SEK (riksdaler)
***SEK – riksdaler (specie) 1777-1788, riksdaler riksgälds 1789-1855, riksdaler riksmynt 1855-1873, krona 1873 onwards
Sources: For GDP see the main text. For exchange rates between Swedish and UK currencies, see Edvinsson, "Foreign exchange rates," Lobell "Foreign exchange rates," and Bohlin, "From appreciation to depreciation." The population data is described in Edvinsson, "Swedish harvests."

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