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SERVICE PRODUCTION IN HISTORICAL NATIONAL ACCOUNTS

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Constant price calculation of service production is a problematic issue in comtemporary national accounts, and it is far more so in historical series. The indicator method has been suggested as one way of coming to terms with volume calculations. This method is scrutinized, and it is claimed that it does not represent *the* solution for historical matters. Instead, various techniques have to be used for various parts of the total. The methods of deflating service production in five countries' historical national accounts as well as the consequences of using different methods are compared. Most often, existing series are not compatible with those for goods production, which of course has repercussions on attempts to study e.g. productivity. It is concluded that much work has to be done to improve the methodology and to arrive at a common international framework for historical national accounts.

There is a broad consensus on definitions and construction methods of contemporary national accounts (NA). This is due, among other things, to efforts made under the aegis of the UN and other international organization and to work carried out by international scholarly and professional organizations.

Even so, methodological disparities do exist among countries, the deflation techniques being one important example. Base years and length of deflation periods vary. Further, and not least important, volume calculations of government services differ. Input valuation is often used, implying in practice an assumption of zero productivity growth. The OECD countries rely on this assumption, but there are exceptions. Germany and Luxembourg assume an increase in labour productivity of 0.5 percent annually, and Belgium makes an adjustment based on labour productivity "in the rest of the economy." Italy also makes adjustments, which range between 0.3 and 0.5 percent per year.[1] Of course these differences affect comparability between countries, but they are not of such a magnitude as to invalidate inter-country comparisons.

The methodological framework of contemporary NA has to a certain extent been used for historical national accounts (HNA) as well. Successive refinements of the methodology have been made and for many countries estimates have been improved.[2] However, much work remains to be done to improve methodology as well as estimation techniques of HNA, and this is especially true for deflation matters. For some countries the historical GDP series, instead of being deflated by more or less arbitrarily chosen price series for the entire time-span, consists of segments where carefully selected and weighted price series form deflators. Thus, separate weights are used, which change periodically. However, there are several questions in urgent need of penetration, i.a. how should the segments be delimited and what criteria should be used, what weighting procedure should be used within

[1]OECD, 1987, p. 11.
[2]See e.g. Maddison, 1990, p. 96.

a time segment, what type of price or, more generally, deflator subseries should be employed? If it might be possible to reach international consensus on these matters, comparability should benefit considerably.

Since different kinds of deflators normally yield different volume series, the last question is essential. To take one example pertaining to commodity production: In a period of great transformation, e.g. an industrial break-through, the deflators used for manufacturing industry are often biased towards raw material and semi-manufactures. The reason is simply that, in general, it is easier to find information on prices for these categories than for the recently introduced manufactured goods. During a period of the type implied here, the prices of manufactured goods relative to less manufactured often decrease rapidly, and the share of manufactured goods in total production increases very fast. Consequently, an index properly weighted increases less (or—probably not very often—decreases faster) than an index biased towards raw materials and semi-manufactures. Thus, a resulting volume index will rise faster than one calculated using the biased index. Hence, there are good reasons for being cautious when constructing deflators for goods-producing sectors.[3]

In this paper, another problematic issue is discussed, constant price calculations of service production. This is a complicated task in contemporary national accounts and even more so in an historical setting. First, some comments are made on the method of using output indicators instead of or as a complement to traditional measures. This method is sometimes applied to industries lacking information on prices and quantities, first and foremost the government sector. Thereafter, the techniques of deflating service production in five countries' HNA are compared. Some effects of using different methods are also hinted on. Since, in the present paper, the sole intention is to address some tricky problems in handling services in HNA, this is only a sketchy comparison.

I

In the national accounts, services, depending on their character and on the identity of the producers, belong to different production sectors. A distinction is made between services with prices formed by the market mechanism, and services with no market prices, foremost public services. For services with market prices,

[3]In Swedish research, due to this effect, large revision of the performance of industrial production and, hence, GDP were necessary for the period 1895–1910, which was characterized by intensive industrialization. Between these years the cost of living index rose by 24 percent. (See e.g. Johansson, 1967, where this series is used as GDP deflator.) Krantz/Nilsson's, 1975, deflator for manufacturing industry (chapter VII) rose by 20 percent in this period. A recent provisional estimate implied an increase in the deflator for manufacturing industry which was still higher (see Krantz, 1988a). A new and definitive estimate of the deflator, however, gives an increase of only 5 percent due to the fact that considerably more prices for manufactured goods than before were employed, and that these goods were properly weighted (see Ljungberg, 1988, and Schön, 1988. For an analysis of relative price performances see also Ljungberg, 1990, chapters 6–7.) The volume series for Swedish industrial production and, consequently, GDP show a more rapid increase than those relying on the old deflators. For most countries deflators biased towards goods with a relatively low degree of manufacturing are often used, i.e. similar to the older Swedish deflators. Therefore, the international comparability of the new Swedish national account series is adversely affected. Probably, the old volume series are more suitable for international comparisons.

measurement of production is principally made in the same way as for goods production, i.e. total gross output is the sum of prices time quantities, Σpq. This is true for the transport and communication sector where prices are paid for each conveyance of goods or passengers. For goods transports, production in constant prices can be measured by multiplying tonkilometers and income ("price") per tonkilometer. These data can be found for various kinds of goods conveyed by various means of transport. For passenger traffic, number of trips and travel fares or passenger kilometers and prices per passenger kilometer can be used. Naturally, supply of data may involve problems, but these are seldom great enough to make the estimation procedure impossible. There are other services of the Σpq-type as well, for instance haircuts and certain repair activities.

Output of other services, notably government services, cannot be computed in this way. Perhaps quantities may sometimes be found, but no usable prices exist. Publich services, for instance, are paid for indirectly through taxes. The usual way of coming to terms with this problem is to employ input valuation, i.e. the amount of labour (number of employees or working hours) times remuneration (per person or hour) plus some other input costs constitute a measure of total production. This method has important and intricate effects. Output is not measured independently of inputs, and, thus, it cannot be used for productivity studies. In fact, a common and often implicit assumption is that no productivity change occurs at all. Thus, should productivity actually grow, the increase of public service production is underestimated, while the opposite is true for a productivity decrease.

In studies of contemporary issues attempts have been made to find independent service output indicators that render productivity measurement possible. In this paper the intention is not to make an appraisal of these studies *per se*, but to use them as a reference for some short reflections on matters of relevance for the possibility of using indicators in HNA. Attempts to pursue historical systematic research along these lines could indeed be of interest.

Output and productivity estimates for the U.S. government have been made since the 1960s. A large number of indicators are specified and based i.a. on numbers of cases, applications processed, licences issued or other actions taken. These are weighted by labour requirements per unit of output to form measures for the totals in a number of functional categories and for the whole government sector. These indicators are judged to be of fairly good quality, but even so, the estimates are expected to be improved in the future.[4]

In a Swedish research project great efforts were made to estimate "direct" volume indicators on output and productivity changes in the government sector. Table 1 gives some examples of indicators used in that study.[5]

Of course, it can be questioned whether indicators of this type are equivalent to the Σpq-type measures used in calculating output and productivity in the goods

[4]Kendrick, 1991.

[5]See also Murray, 1987, where the methods are summarized and discussed, and the following conclusion is reached: "The interest in these productivity measurements is for obvious reasons great. In the comments on DSFi 1986:13 severe criticism is levelled at the same time as, with some exception, it is emphasized that continuing the research and to make improvements is of great importance, particularly when measurement and estimates of quality is concerned." (p. 83).

TABLE 1

EXAMPLES OF INDICATORS OF SERVICE PRODUCTION

Branch of Production	Output Indicator
Hospital treatment	Number of in-patients
Institutional old age care	Nuimber of bed days
Non-institutional medical care	Number of patients' visits to doctors
Education	Number of pupils times number of hours according to curriculum
	Number of university students beginning new courses
Social welfare	Number of children in day nurseries
	Number of hours worked by trained home-help
Defence	Number of working days in compulsory military service
Police	Number of crimes solved
	Number of patrol hours
Public libraries	Number of loans
Public road administration	Number of vehicle kilometers

Source: DSFi 1986:13, chapter 4.

producing sectors. There, in contrast to public service production, which is politically controlled, prices and other variables reflect market valuations of the commodities. These valuations are made by the potential users on the basis of the character of the commodities including their effects for the users. For instance, a person buying meat or bread has the intention of eating when he is hungry in order to satisfy his hunger. Moreover, he usually wishes to make his meal as pleasant as possible, savourily and socially. Thus, he buys the commodities in view of their taste, scent, appearance, nutritional value etc. In other words as far as possible with regard to his knowledge he considers the quality of the commodities and the effects of using them. In the NA, the direct transaction, i.e. the act of buying and selling the commodity, is registered, but at that very moment the valuation has been made, and the prices formed in the market process. When they function as weights in volume computations it is on this basis.

Prices and quantities of services should, if possible, as in the case of commodities, be measured at the moment of the transaction between producer and consumer. Thus, the measurement should refer to the service "in the shape and with the characteristics, which it has in the transaction moment."[6] Analogous to commodity price formation, it can be presumed that the consumer knows the properties of the service including the effects of using it. Accordingly, the appraisal of the service, which is essential in the price formation is made on the basis of all these issues.

For public services, where no price formation exists things are different. To take an example: When a person "buys" medical care, what is the "product" of which he consider the effects? Medical care has two fundamental components, direct treatment (e.g. surgical operations and medical attendance) and care. The patient wants an appropriate direct treatment, which makes the probability of his recovering as great as possible. Besides, he demands the best possible care not only during the direct treatment and its preparation but also during his recovery. If the number of in-patients in the hospital is defined as output, productivity can

[6]DSFi 1986:13, p. 85.

be increased by shortening the time of hospital care. This could imply a real productivity increase if new treatment methods are used, which result in faster recovery than before. However, it could also mean a deterioration of the quality of the service due to improper care; the patients can, despite a need for more care, be forced to leave the hospital to make room for new patients. Then, the number of in-patients can increase and, according to the measurement procedure employed in the Swedish study, productivity rises. In all probability, the patients do not want these effects.[7]

Thus, the statement "what the consumer wants to achieve is irrelevant for the measurement of the transaction *per se*" is acceptable only in a narrow sense.[8] The patient is expecting a certain result when the transaction takes place and this expectation is based on the quality of the "product". In the process of market price formation this expectation is central, and, if possible should be taken into account when trying to estimate output of government services with the help of indicators. This, admittedly, is not an easy task.

If something differs from what is expected, it is principally the same as saying that the quality has changed, or that the "product" bought is something else than was expected at the outset. Hence, in the case of market priced production there should be a new process of price formation. However, concerning the public sector, "even if there are procedures for considering quality problems, these are often methodologically complicated and difficult from an information point of view and, thus, costly. Therefore, it is not surprising that the quality dimension has rendered relatively scanty attention."[9]

How should the weighting issue be handled for public services where no price weighting is possible? To exemplify by medical services: There are various categories of patients with different diseases, needs of cures, rehabilitations etc., all with different qualities and costs. Hence, all kinds of bed-days, in-patients or whatever measure is used is not identical, which means that in principle the weighting problem should be solved in a way equivalent to the price weighting.[10] Besides, for the whole sector proper weights should be assigned, which can be used together with sectors with Σpq-measures to form a homogenous national product. Other forms of weighting procedures have, however, been suggested and tried, e.g. the one in the U.S. estimates mentioned above. This is probably an avenue for further improvements.

As mentioned, in the Swedish study, attempts were made to estimate productivity change in various parts of the government service production. The outcome was a decrease of productivity in almost all branches. In medical care the annual decrease between 1960 and 1980 was estimated to 3 percent, and in social welfare

[7]Better care and better treatment might perhaps even necessitate an increased number of employees. Still, if it might be possible to make a valid computation—this increase might imply a real productivity increase in the production of these "products", which are not identical with the ones formerly produced. In other words, it could be a question of dissimilar "products" with different qualities, the production of which should be separately treated in total production and productivity measurement.

[8]DSFi 1986, p. 45f.

[9]Hjalmarsson, 1991, p. 23.

[10]In the Swedish study those variables are measured for various parts of hospital care, but the problems mentioned are also relevant within each clinic.

between 1970 and 1980 to 1.6 percent. Education showed an annual decrease of 3.8 percent, and the public libraries of 1.1 percent. These figures can be compared to those estimated for the U.S. There, labour productivity of federal civilian employees by 1.4 percent per year 1967–87. This rate "is close to that for the private business economy."[11] Further, none of the service producing sub-groups listed by Kendrick had a negative productivity growth.[12]

Scholarly work on service indicators has also been pursued in the context of cross-country income comparisons. Marris is optimistic on the possibility of coming to terms with the service measurement issues. In various studies "comparison-resistant services," which are roughly identical with those addressed above, have been given special attention. They are resistant to international comparisons because "their outputs are conceptually difficult to quantify and frequently they are not provided by the market mechanism." However, the measurement issues, according to Marris, appear to be more embarrassing than they actually are, since plausible proxies exist for the output of services. He then alludes to indicators of the same kind as those mentioned above. "The problem is not that the output of these economic activities is not measurable, intrinsically but, rather, that we believe this to be the case."[13] This is in clear contrast to the opinion on comparison-resistant services expressed by Kravis *et al.* that "the scope for improved methods of international comparisons is limited."[14]

In their earlier comparisons Kravis *et al.* assumed that in the production of comparison-resistant services, productivity did not change over time within countries, and, that in countries included in international comparisons, it was identical regardless of their being developed or developing. In later studies, they assumed instead that productivity particularly of medical personnel was lower in developing than in developed countries.[15] In a comparative study Maddison made another assumption implying that productivity in service production be related to that in commodity production. The former was assumed to have a floor level of 25 percent of that in the U.S. in the country where productivity in goods production was lowest. Due to these diverging assumptions Maddison's and Kravis' findings differed considerably. According to the latter, productivity for medical personnel in a number of developing countries was 48 percent of the U.S. level, and for teachers and other civil servants roughly the same. Maddison, on the other hand, arrived at an average productivity in all comparison resistant services of 33 percent of the U.S. level.[16]

It is probable that there is some correlation between productivity in goods sectors and service sectors. Hence, the Maddison method seems to be more plausible than that suggested by Kravis. Of course, it is also more realistic than the method implying no productivity differences at all between developing and developed countries in this respect. Consequently, it is also possible that within

[11]Kendrick, 1991, p. 153.

[12]It is probable that the conclusions of huge productivity decreases in the Swedish study are unwarranted, and they have also been questioned. Still, far-reaching suggestions have been made on this basis, and at least in certain groups, the picture given has turned into conventional wisdom.

[13]Marris, 1984, pp. 54–56.

[14]Quoted from Marris, op. cit. p. 56.

[15]Referred to in Maddison, 1983, p. 32.

[16]Maddison, 1983, p. 32ff.

countries over time productivity in service production has increased. This means that the assumption of unchanged productivity implied in the ordinary methods of calculating the NA leads to an underestimation. On the other hand, it is difficult, but probably not impossible in contemporary accounts, to find clues for quantifying this increase in a way analogous to measurement of production governed by the market mechanism. Anyway, in an economy characterized by economic growth, a productivity increase is more reasonable than the performance shown by the Swedish study reported above, i.e. that productivity decreased considerably over a period of twenty years.

The two national cases cited above as well as the international comparisons (even Maddison's in the relevant paragraphs) pertain to a contemporary period. Even so, the data supply is problematic e.g. for coming to terms with the quality issues. There is also need for special investigations aiming at supplying new information to arrive at sufficiently detailed series. It goes without saying that further back in time the supply of useful data is more limited, even non-existent. Moreover, it is seldom possible to make special investigations of the same kind as in contemporary studies. Consequently, the difficulties in using the indicator method are seriously amplified in the use of HNA. It is an open question whether, in economic-historical studies of (say) the 19th century, it is at all possible to arrive at meaningful results by employing this estimation procedure. Tests should certainly be of great interest, and it would perhaps be possible by special investigations of individual production units, e.g. hospitals, schools and administrative bodies, to get some clues to the performance of a larger branch. Probably, the outcome could then at least be a check of and/or a complement to the ordinary measures. Anyway, also in the future, we have most likely to a great extent to rely on more robust estimates, i.e. of the sort treated in the next paragraph.

II

The difficulties involved in measuring service production in contemporary NA are multiplied in HNA. Not only for indicators of the type discussed above, but also for conventional measures, i.e. input-valued estimates, the source material is often scanty or sometimes missing. Various methods have been suggested to solve these problems, and those employed in HNA constructions for the U.K., Germany, Denmark, Finland and Sweden are summarized in the appendix. All kinds of service production except transport and communications are included, public as well as private, and the time period in this part of the paper is confined to *ca* 1850–1910.[17]

Various principles of deflation can be discerned in these studies:

First, in some cases output is calculated independently of inputs and then separate deflators are used. This is true for trade in most studies. The weak point here, however, is the validity of the output measure, the computation of which is

[17]In a research project at the Department of Economic History, Umeå University, the comparison is extended to a longer time period, and also to goods production. This project is a corollary to an ongoing comparative study of the economic growth of the Nordic countries. On this Nordic project see e.g. Krantz, 1991b.

usually based on commodity production. It is apparent that some form of association exists between commodity production and trade, but *a priori* a total correlation cannot be expected. Thus, it is impossible to know exactly what the constant price series stand for and attempts to compute productivity in trade on the bases of these figures give extremely uncertain results.

Second, in some instances wage and employment figures are used explicitly or implicitly in constructing series in current prices which are then deflated by a consumer price index. Expressed in a simplified formal way the procedure is as follows. Q stands for output, w for wages, e for employment, p for the consumer price index, c for current and f for constant prices.

$$Q_c = \Sigma we.$$

Provided that w is the same for all categories (as is often the case in HNA computations), this can also be written

$$Q_c = w\Sigma e.$$

Output in constant prices is calculated as follows

$$Q_f = Q_c/p = w\Sigma e/p.$$

Then, labour productivity is

$$Q_f/\Sigma e = w\Sigma e/p/\Sigma e = w/p.$$

Hence, since w/p is real wages, an implicit assumption is made that productivity changes are identical with real wage changes. This assumption appears—to say the least—difficult to verify.

Third, for many branches employment series are used to indicate the output performance in constant prices. This is carried out either by directly applying the employment series as indicators or by deflating the current price series, constructed on the basis of wage and employment data, with a wage indicator. This procedure means that an implicit or sometimes explicit assumption is made that no productivity change occurred.

Fourth, explicit assumptions on productivity increases are sometimes included in computations of service production in NA. In the HNA accounted for in the appendix this is found in certain branches, i.a. government services in the U.K. series. Assumptions of this kind are uncertain and, regarding the magnitude, as arbitrary as the common zero productivity change assumption.

Fifth, in some cases, deflator series are constructed for long periods, sometimes for the whole computation period, and they are weighted together using only one base year. Since no consideration is paid to the sometimes fundamental structural changes in these long periods the outcome is often very uncertain. In the most recent computations, i.e. for Finland and Sweden, another procedure is followed. A division of the whole time span into sub-periods with separate deflator constructions is made, and the deflators for these shorter periods are then linked to form series for the entire investigation period.

Sixth, indices constructed for wholly different purposes are often used as deflators, e.g. consumer price and wholesale price indices. Among other things,

in these indices the base years are often determined irrespective of economic considerations concerning e.g. business cycles or long-term changes. The effects of employing such series are seldom touched upon.

The deflation technique has of course an impact on the outcome of the computation, and this impact is sometimes profound. Hence, intertemporal as well as international comparisons are affected by the choice of technique. To assess in detail the influence of different techniques requires extensive experimental work involving comprehensive calculations. This laborious task has not been entered upon here; only some comparisons of existing data are made in Table 2, where the percentage shares of constant price GDP (for Germany NDP) for some sectors and branches are shown. The question is whether dissimilarities between the performances of the shares for the various items of the countries involved can be traced, which may be attributed to different deflation techniques. Thus, it is a question of dissimilarities that cannot be explained by "natural" differences between the countries, e.g. development levels or individual features mirrored by differences in current values. In want of comprehensive experimental calculations and of scrutiny of all source material, this part of the paper is by necessity merely conjectural.

Both similarities and differences between the countries are evident. *The transport sector*, which is added here for the sake of comparison, differs from the other branches included in the table since, in principle, in all countries, deflation has been carried out in the same way as for goods production, i.e. with a Σpq-type of deflator. This is probably the main reason why the changes of the shares take the same direction in all countries. The rise, however, is small for the U.K., compared to the others, one reason probably being that the U.K. was much more developed in the 1850s and thus demanded relatively more transport. In 1910, when the transport shares were roughly similar, the differences between the development levels, though still considerable, had diminished.[18]

Large differences show up in *trade*, *banking*, *insurance* etc., where the German figures throughout are smaller than those for the other countries. In fact they are less than a third of those for the U.K. and about a half or less of the Danish in the latter part of the period. Furthermore, Germany, is characterized by very small changes, the latter being a tendency also for the U.K. The figures for Sweden and Finland are of roughly the same magnitude, and they increase as well if not to the same extent as the Danish. A problem in this context is that this group encompasses very disparate services both concerning items and deflation techniques. As for trade, for all countries some form of goods production deflator was used, but they differ to some extent. These differences are, however, not of such a character as to give birth to expectations of very different paths of the volume series. For banking and insurance, on the other hand, different deflation

[18]According to Maddison, 1991, pp. 6f, the levels of GDP per capita were as follows (U.K. = 100)

	1870	1913
Denmark	60	75
Finland	36	43
Germany	50	65
Sweden	50	61

TABLE 2

SERVICE PRODUCTION: PERCENTAGE SHARES OF THE NATIONAL PRODUCT 1850–1910. CONSTANT PRICES. DENMARK, FINLAND, GERMANY, SWEDEN AND THE U.K.

	Denmark	Finland	Germany	Sweden	U.K.
Transport etc.					
1850	1	—	1	2	—
1861	2	2	1	3	5
1871	3	3	2	3	6
1880	4	4	3	4	6
1890	5	3	4	5	7
1900	6	5	5	6	7
1910	7	6	6	8	8
Trade, banking, insurance, etc.					
1850	8	—	7	9	—
1861	9	10	8	11	28
1871	12	11	8	11	28
1880	15	12	8	12	28
1890	18	13	8	13	28
1900	21	15	9	15	28
1910	23	17	9	16	29
Domestic service					
1850	6	—	10	5	—
1861	5	0.2	9	4	8
1871	5	0.2	7	4	7
1880	5	0.2	6	3	6
1890	4	0.2	4	3	6
1900	4	0.2	3	2	5
1910	3	0.2	3	2	4
Rents					
1850	8	—	3	16	—
1861	9	8	3	14	13
1871	9	8	3	12	11
1880	10	8	4	12	11
1890	8	7	4	11	9
1900	7	6	5	10	9
1910	7	6	5	8	9
Public service					
1850	10	—	13	9	—
1861	5	7	13	7	5
1871	5	6	11	7	4
1880	5	6	11	7	4
1890	6	6	10	6	4
1900	5	5	9	5	4
1910	5	6	9	5	5

Sources: Denmark, Hansen (1974) p. 225ff, Finland, Hjerppe (1989), Appendix of tables, Germany, Hoffman (1965), p. 454f, Sweden, see note 36, the U.K., Feinstein (1972), Tables 5, 8, 9.

Note: (1) The years 1861 and 1871 are chosen due to the limited data supply for Germany. (2) For Germany NDP is used and for the other countries GDP. (3) The orginal German data are expressed in the 1913 price level, the English figures are calculated here in the 1907 price level (using data also from Lewis (1979), Table A3), the Finnish figures are recalculated to the price level of 1913 from the original 1926, the Danish to 1913 from 1929, and the Swedish figures are given in the 1910–12 price level. (4) The Danish share for Public service in 1850 is evidently wrong. For surrounding years it is around 5.

techniques were employed. Series referring to commodity output were used for Denmark, Finland and Germany, but they were rather heterogenous. The Swedish series employ premium rates and wages respectively for insurance and banking, which could render different registered productivity rises for these branches. The U.K. series are built on an assumption of a slight productivity increase. Thus, for the two latter countries we could expect the deflation technique to lead to a lower volume increase than for the other. For the U.K. this is true both for banking and insurance, and for Sweden for banking. Perhaps this is the reason why the U.K. shows only a slight increase in her shares and Sweden a moderately slower one than do Denmark and Finland. This, however, leaves Germany's slow rise unexplained.

In the deflation of *domestic work* zero productivity change is assumed explicitly or implicitly in all countries. Consequently, since most other sectors and branches are charactrized by rising productivity this deflation technique contributes to the downward direction of the shares of domestic work in the national product. This tendency could also be expected from the fact that this branch of prodution belongs to the category "old services" the output of which had a slow increase relative to other branches.[19]

The *rents* share has a downward tendency which is clear for Sweden and the U.K. and somewhat less so for Finland. For Denmark this tendency shows up in the latter part of the period. Germany, on the other hand, exhibits a small but sustained increase during the entire period. Rents of dwellings is a special sector since it comprises the partly imputed yield of the dwellings capital, and therefore the estimates are uncertain. It is not at all sure whether we should expect something corresponding to a productivity increase to take place. Consequently, in an historical perspective a downward tendency is not improbable.

Decreasing shares are typical for *public services* in Germany and Sweden. The figures for the other three countries are more or less stationary. For Denmark, production is deflated in such a way as to imply productivity changes of the second type mentioned above, i.e. productivity increases equal to the rise of the real wages. In the U.K. estimates an explicit assumption of productivity increase was assumed. For Finland, finally, deflation of two segments has been carried out, the major part with a wage index, i.e. in the same way as for Sweden and Germany, and the minor part with a house construction index. Probably, these different techniques contribute to the differences between the tendencies for Denmark, the U.K. and maybe Finland on the one hand and Sweden and Germany on the other.

The comparison above referred to changes in volume shares of historical GDP, but, since the basic issue here concerns deflation procedures, a special comparison of deflators is also appropriate. Here it will comprise only Denmark, Finland and Sweden due to data availability. Is it possible in a simple way to perceive effects of different deflator constructions or are differences between countries due to other factors, e.g. choice of wholly different, perhaps in some cases improper price series? The quality of the series is indeed a most important

[19]For further information, see Krantz, 1988a p. 175ff.

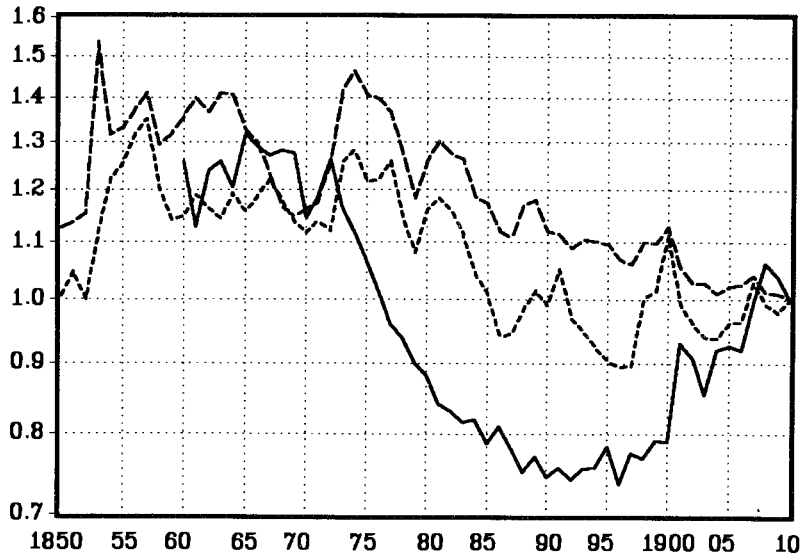

Diagram 1(A). Deflators for Transports and Communications, Denmark, Finland and Sweden, 1850–1910, Index 1910=1 (—— Finland - - - - Denmark – – – Sweden)

aspect which, however, is not discussed here but it should be considered in a more extensive treatment. Since the series refer to countries with diverse levels of economic development and differing production specializations, some differences are of course to be expected between their relative price changes. On the other hand, these countries are neighbours, and they belong to a common cultural

Diagram 1(B). Relative Deflators for Transports and Communications, Finland and Denmark in Relation to Sweden (—— Finland/Sweden - - - - Denmark/Sweden)

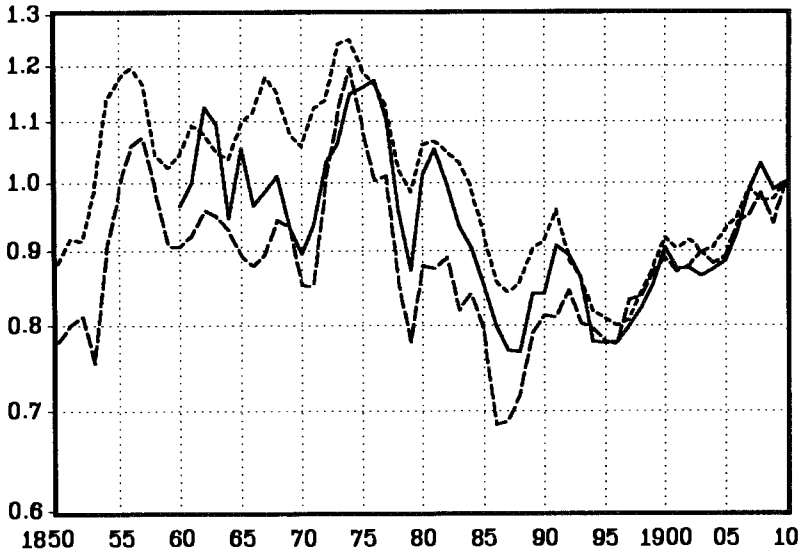

Diagram 2(A). Deflators for Trade, Denmark, Finland and Sweden 1850–1910. Index 1910=1
(—— Finland - - - - Denmark – – – Sweden)

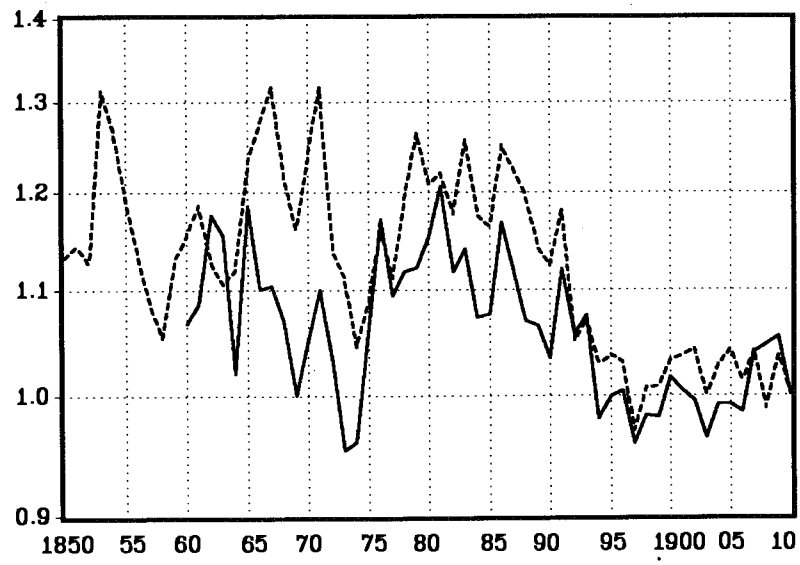

Diagram 2(B). Relative Deflators for Trade. Finland and Denmark in Relation to Sweden
(—— Finland/Sweden - - - - Denmark/Sweden)

(and to a certain degree economic) sphere, the Scandinavian or Nordic countries. Consequently, the differences can be supposed not to be great.[20]

In Diagram 1(A)-(B)deflators for the transport and communication sector are displayed. The main tendencies are similar, and this is especially true for the

[20]The countries differ considerably with respect to total area and it is possible that e.g. income per capita differ more within the larger countries than between them.

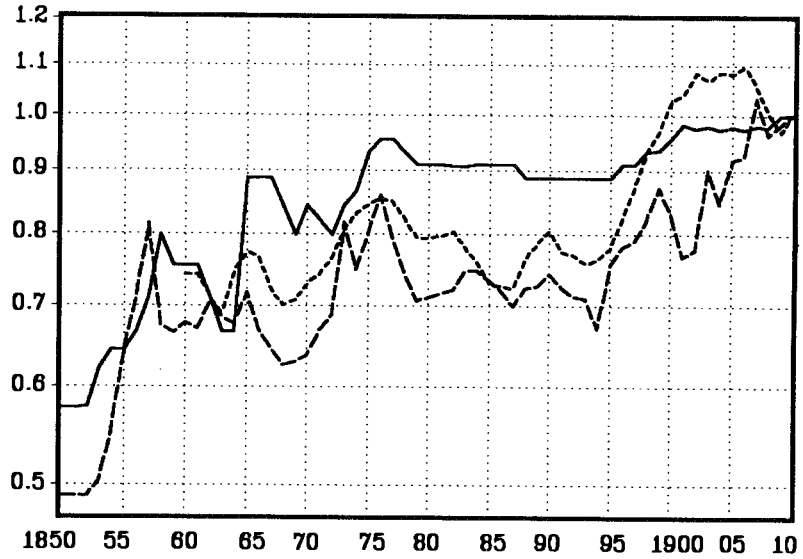

Diagram 3(A). Deflators for Service of Dwellings, Denmark, Finland and Sweden 1850–1910. Index 1910=1 (—— Denmark - - - - Finland – – – Sweden)

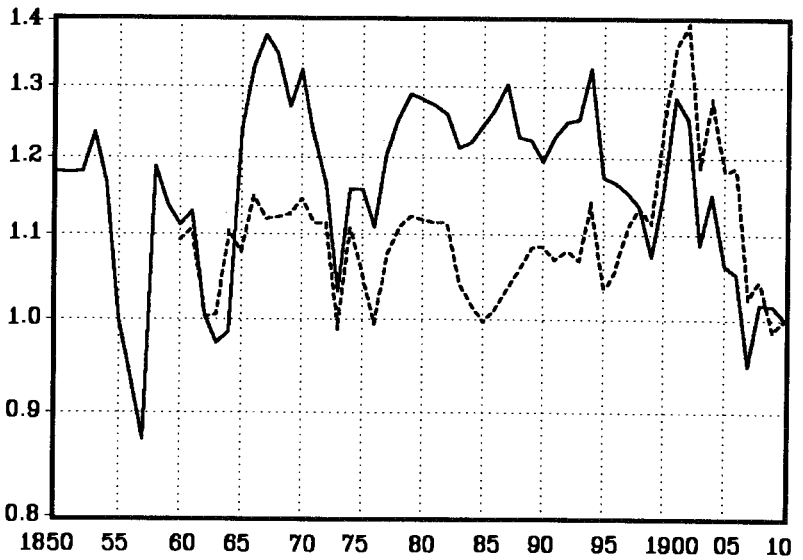

Diagram 3(B). Relative Deflators for Service of Dwellings, Denmark and Finland in Relation to Sweden (—— Denmark/Sweden - - - - Finland/Sweden)

Danish and Swedish series. The Finnish series shows a sharp decrease between 1872 and 1881 and then two short and swift increases, 1900–01 and 1906–08. It is, however, only during the years 1872–74 and 1900–01 that the directions of change are opposite to those for the other countries and drastic enough to cause the strongly different levels in the last quarter of the 19th century.

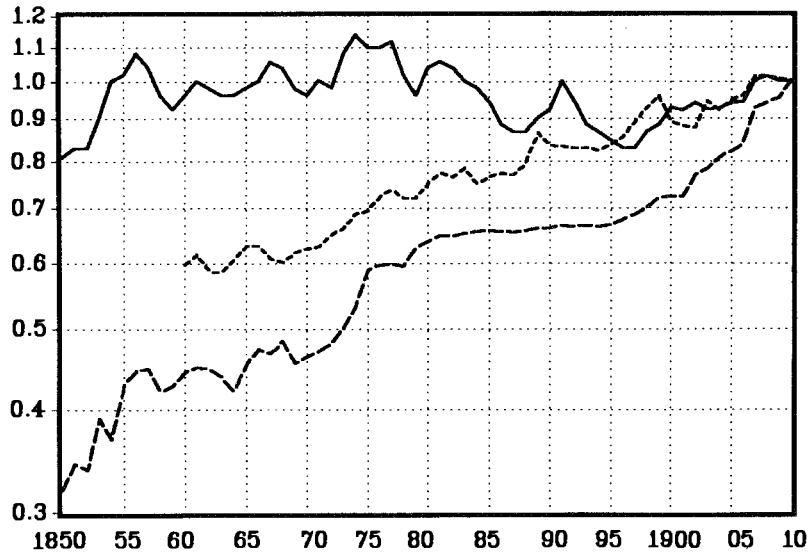

Diagram 4(A). Deflators for Public Services, Denmark, Finland and Sweden 1850–1910. Index 1910=1 (—— Denmark ---- Finland – – – Sweden)

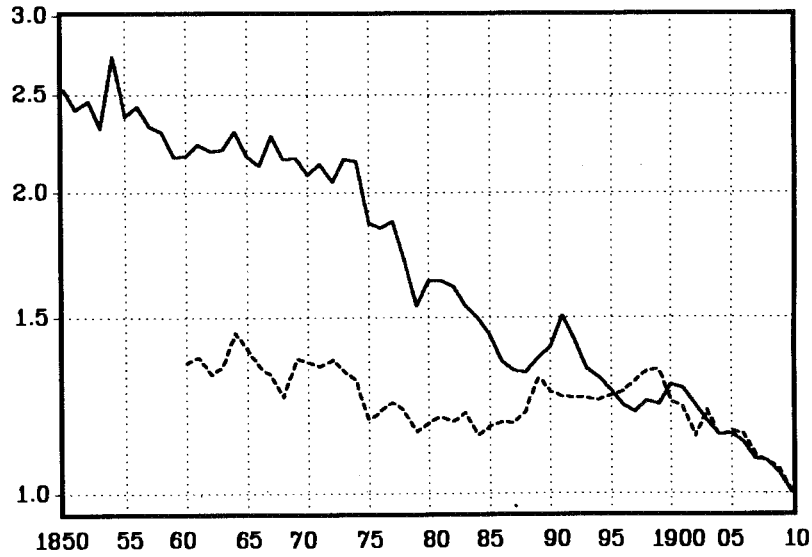

Diagram 4(B). Relative Deflators for Public Services, Denmark and Finland in Relation to Sweden (—— Denmark/Sweden ---- Finland/Sweden)

The trade deflators and rations are illustrated in Diagram 2(A)–(B). As seen in the Appendix, the methods of deflation varied somewhat between the three countries. In Denmark, for the early part of the period, a consumer price index was used and for the rest a wholesale price index. Finland's deflator is based on the prices of the total turnover of goods, which is basically identical to that for

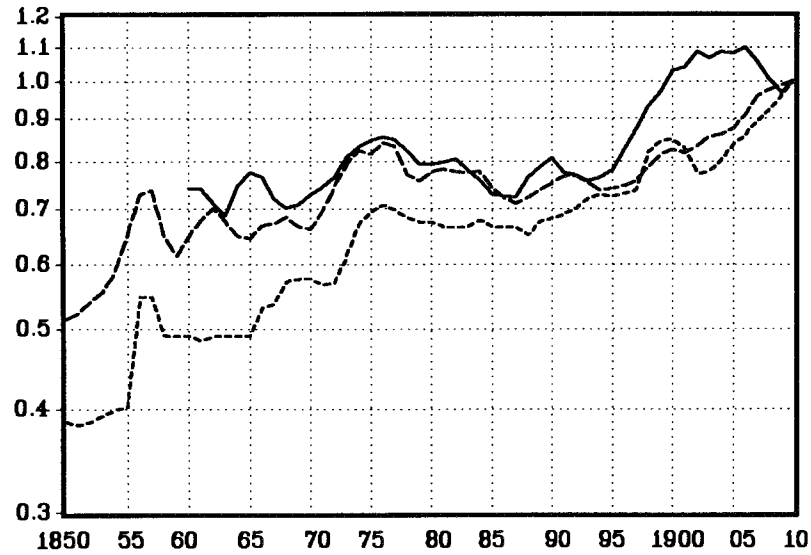

Diagram 5(A). Deflators for Domestic Services, Denmark, Finland and Sweden 1850–1910, Index 1910=1 (—— Finland - - - - Denmark - - - Sweden)

goods production. This method of deflation was used for Sweden as well. Hence, the indices comprise a large part of all commodity prices, which explains the similarities; to a large extent the tendencies in price changes were internationally determined in this period which was characterized mainly by free international trade.

A comparison of the deflators for service of dwellings is made in Diagram 3(A)–(B). There are certain distinct differences between Denmark and Sweden. In the 1850s, the Swedish rise is much steeper than the Danish, which in its turn exhibits a deviant pattern in the 1860s and 1870s with a very accentuated rise followed by a sheer downward movement. In the last part of the period the Danish changes are small in contrast to Sweden. The Swedish and Finnish performances are more similar except for the last ten years.[21]

The greatest differences show up in the public service sector (Diagram 4(A)–(B)) where, as denoted, different techniques were used. Hence the Danish series deviates from the Swedish and Finnish deflators. A downward tendency is apparent in the ratio diagram. The differences between Finland and Sweden are not of the same magnitude but in the last ten years of the period, this ratio moves distinctly downward.

As mentioned, domestic service series (Diagram 5(A)–(B)) were deflated with wage data. The Swedish and Finnish deflator performances are fairly close except for the last years. The Danish series has a slightly steeper rise than the other two. The deflator in this branch is used together with employment data to form series

[21]The rent series do not pertain to whole countries but to parts which are of different character for the respective countries. This has, however, to do with the validity of the series which is not treated here.

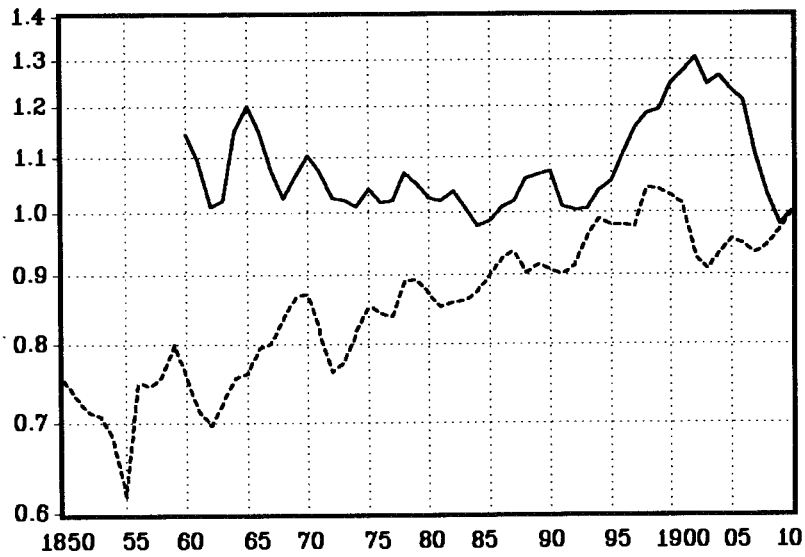

Diagram 5(B). Relative Deflators for Domestic Services, Finland and Sweden in Relation to Sweden (—— Finland/Sweden - - - - Denmark/Sweden)

in current prices. This means that deflation is used to re-establish the changes in the employment series which is thus a volume indicator.

The comparisons carried out here reveal some characteristic differences but the main outcome is that studying deflators for sectors and branches only is not sufficient in order to come to terms with the differences. Sub-deflators, weighting procedures and choice of base years are central, and, further, the construction of current values are essential to comprehend. Needless to say, this is too great a task to address within the framework of a short paper; it requires a big research project.

III

In contemporary NA and to a greater extent in HNA there are serious difficulties in dealing with services (particularly those produced in other sectors than transport and communications). Input-valued services constitute one part of the NA, and another one is market priced production (incl. transport etc.).[22] The two parts are to a certain extent incomparable and even incompatible. Numerous attempts have been made to overcome these incompatibilities, but so far none has been wholly successful. Volume indicators such as the number of in-patients or bed-days in hospital care are open to criticism since quality changes are not satisfactorily considered. Besides, when constructing HNA, it is often difficult or

[22]There is also, foremost in HNA, one category which for computational reasons is dependent on production in other sectors or branches. One example is trade, the production estimate of which, in the computations dealt with here, depends on commodity production.

sometimes impossible to find sufficiently detailed and homogenous indicators of this kind.

Often, the measures in current prices consist of inputs, mainly employment and remuneration data in combination. Other statistics which are more or less directly linked to the activity in question are also used. Then some kind of deflator is employed to arrive at volume values and this procedure is sometimes based on implicit and even unconscious assumptions concerning productivity. Needless to say, this has an impact on the resulting GDP-series and when such series are computed with individual methods for each country the outcome of international comparisons will be distorted.[23]

What can be done in the work with HNA to overcome these difficulties and short-comings? For country studies, the series should be consistently constructed, and if, by employing common techniques, the series can be made internationally comparable, this should certainly be a great leap forward. However, if the purpose is to arrive at estimates equivalent of those regarding goods production, the prospects of satisfactorily coming to terms with the measurement issues in service production are probably not great. Therefore, we have at least for the time being to accept historical GDP as consisting of two qualitatively different parts constructed with separate methods, which, naturally, should be considered in the anlayses of historical change on the basis of these series.

APPENDIX

Service Deflators in Five Countries' Historical National Accounts 1850–1910

Charles Feinstein's (1972) computation of HNA for the U.K. relied heavily on Lewis' GDP estimates as regards services.[24] In most cases Lewis' point of departure was an estimate of production (i.e. value added) for 1907 where number of employees together with wages and salaries were used. In order to estimate time series to be linked to the 1907 production figures i.e. "at 1907 prices" the methods described below were employed. Feinstein also used 1907 as a base year, but his final series were expressed as indices with 1913 = 100.[25]

Distribution: The volume changes were assumed to follow those for the volume of goods available for trading, i.e. the sum of imports, including re-exports, and output of manufacturing, mining and agriculture.

Insurance, banking and finance: The estimates are based on Census of Population data. Ouptut per head is assumed to increase by 0.5 percent per annum, which is motivated by the introduction of the typewriter and other economies in administration.

Rent of dwellings: Here, Deanne and Cole's estimate for 1907 was used, and, to form a time series, the number of houses in existence at Census of Population dates was employed.

[23]In this paper only shares of total GDP have been treated, but growth rates are of course affected as well.

[24]Feinstein, 1972, p. 210, referees to Lewis, W. A., *The Deceleration of British Growth 1873–1913*, mimeographed 1967. These estimates were published in Lewis, 1978. References here are given to this book, pp. 258ff.

[25]Feinstein, 1972, p. 212.

Professional and scientific services: The same procedure as for Insurance, Banking and Finance was applied (see above).

Miscellaneous services (i.e. Lewis' categories: Miscellaneous, Domestic service and Catering): Miscellaneous, see Insurance etc. above. For domestic service and catering the estimates were based on Census of Population data. No allowance was made for increasing productivity "or for the more likely probability that the quality of service fell as relative numbers declined."[26]

Public administration and defence: For civil administration, see Insurance etc. above. The estimates of defence were based on armed services at home and abroad.

In Hoffmann's (1965) HNA for Germany, service production was computed with the help of index series for production volumes in various branches and an estimate of net production in each branch 1913. Thus, these HNA are expressed in 1913 prices.

Trade: Output in 1913 was computed as labour income (number of employees times wages or salaries) plus an estimate of capital income. The volume index was constructed on the basis of production indices in constant prices for a number of commodities. These series were combined using weights pertaining to employment in various branches of the trade sector 1907. These weights were assumed to be valid for 1913 as well.

Banks: The production in 1913 was estimated in the same way as for trade. Series in current prices for different types of banks were taken from various kinds of finance statistics. As deflator, a raw material price index was employed. This index was used due to lack of a wholesale price index which would have been eligible, the motivation being that "Bei steigenden Preisen erhöhen sich auch die Umsätze, ohne dass damit unbedingt die Produktion gesteigen sein muss."[27]

Insurance: Output in 1913 was estimated in the same way as trade. An indicator of production in constant prices was constructed on the basis of data on numbers of insurance agreements, insured etc. for the various branches. The series were combined with employment weights pertaining to 1933, which were, thus, assumed to be valid for 1913 as well.

Hotels and restaurants: The production in 1913 was estimated in the same way as trade. An indicator of production in constant prices was constructed with the help of series for various items used in this branch. They were combined with the help of turnover data for 1950, which were, thus, assumed to be valid for 1913 as well.

Domestic work: Output in 1913 was assumed to be identical with total wages i.e. number of employees times remuneration. An explicit assumption was made of zero productivity change in domestic work which means that employment figures were assumed to indicate production changes in constant prices.

Professional services: The same procedure as in domestic work was employed.

Rent of dwellings: The "production" in 1913 is an estimate of capital income and the volume series is assumed to be indicated by estimates of relevant capital stock in constant prices.

[26]Lewis, 1978, p. 264.
[27]Hoffman, 1965, p. 433.

Public services: The same procedure as in domestic work was employed.

In Svend-Aage Hansen's HNA for Denmark, series in current prices were estimated. These were deflated with separate deflators expressed as indices with 1929 = 100. The volume series are claimed to be expressed in 1929 prices.[28]

Trade: A series in current prices for wholesale trade was estimated on the assumption that this trade corresponds to 10 percent of the sum of foreign trade and industrial production. The series was deflated by a consumer price index up to 1870 and then by a wholesale price index. The retail trade series in current prices was assumed to vary with employment and wages. As deflator a consumer price index was used.

The consumer price index up to and including 1870 was constructed by Hansen. It seems to be a constant base index using weights from 1840 on some seventy items. The weighting system is based on consumption expenditure.[29] The reason for choosing 1840 as a base year is not given. For 1870–1913 an index constructed by Pedersen (1930) is used. This index is based on weights pertaining to a budget for skilled workers in some provincial towns 1879.[30]

The wholesale price index from 1876 onwards was computed on the basis of prices in foreign trade statistics and for 1870–76 "a corresponding index" was constructed by the author.[31]

Finance: Various kinds of accounts material were used for the computation of a series in current prices, which was deflated by the above-mentioned consumer price index.

Hotels, restaurants etc: Information on employment and wages formed the basis for estimating series in current prices, which were deflated in the same way as finance.

Professional services: Scattered information on employment and wages forms the basis of the estimates in current prices. Employment changes were utilized to indicate the performances in constant prices.

Domestic services: Data for employment and wages were combined to form the current price estimate and employment data were supposed to indicate changes in constant prices.

Services of dwellings: The series in current prices was constructed on the basis of average rents and numbers of dwellings taken from the population censuses with interpolations inbetween. The rent series was then untilized as a deflator.

Public services: A data set was extracted from central and local government accounts and as deflator the consumer price index was employed.

[28]Hansen, 1974, pp. 310ff and 316ff.

[29]Hansen, 1974, p. 341f. The weights are found in an unpublished thesis by Thorkild Wedebye, *Forbrugsudvikling og levestandard 1840–1914 (Consumption Performance and Living Standard 1840–1914)*.

[30]Pedersen, 1930, pp. 192 and 313ff. Hansen is not wholly clear as to what index has been used. In Pedersen's table VII, pp. 313f "The value of Budget II" in DKr is given and Hansen has probably computed an index from this series. In Table VIII, p. 315, six sub-indices are provided, but no total. Neither of these series is identical with Hansen's (implicit) index.

[31]Hansen, 1974, p. 317. This index was taken from an official publication from 1922 on Danish foreign trade. 38 commodities are included. A rough weighting was made where 14 commodities were given the weight 1, 12 the weight 2 and 12 the weight 3. (See *Tabelvaerk over vareinførsel og -udførsel* (*Foreign Trade Statistics*) 1922, p. 6* and 11*.)

Recently Finland got a set of new HNA thanks to Riitta Hjerppe.[32] She computed series in current prices which where then deflated with separate deflators. The GDP volume was calculated using Laspeyres indices within successive eleven year periods.[33] Deflators (and other series when expressed as indices) have 1926 = 100. The following computation methods were employed for the service sectors:

Trade: A special deflator was constructed by a combination of a producer price index for agriculture, an import price index and a wholesale price index (see under banking and insurance). The weights used pertain to the trade shares of agricultural products, import goods and industrial goods.

Banking and insurance: Value added in current prices was estimated, and the series were deflated with a wholesale price index.

This index consists of three different parts: for 1860–65 a wholesale price index calculated by Pipping was applied. He used indices for market scale prices for eleven commodities, rye, barley, oats, hay, egg, butter, tallow, fire woods, tar, bar iron, and copper and computed and unweighted price index.[34] For 1865–78 an index constructed by Björqkvist (1953) was employed. It is based on 40 series from the market scales and as weights gross production values for 1878–85 were utilized. Thus, it is a constant base index. Finally, for the period from 1878 onwards another index constructed by Björqkvist was used. This index is based on 192 price series from various sources i.a. the market scales. These prices were weighted separately for a number of sub-periods: 1878–81, 1882–87, 1888–93, 1894–1902, 1903–08 and 1909–13. The weights were calculated as averages for each sub-period for imports and exports respectively to form price indices for goods in these categories and for home-market production. These three price series were then weighted to form a total index.[35]

Private services: Data on the labour force and wages and salaries were combined to form series in current prices. The employment series was used as a volume series.

Rents of dwellings: Volume series were calculated with the help of estimates of the stock of dwellings. They were then inflated with a rental index to arrive at series in current prices.

Central government: The total output was divided into one part consisting of total wages and salaries and one part consisting of rents and depreciation. The first part was deflated with indices for wages and salaries for the government staff and the second with a house construction price index. For 1860–1900 the series were combined with weights from 1890 and for 1900–48 with weights from 1938.

Local government: The procedure was the same as that for central government, but in this case for the period 1860–1948 the two series were combined with weights from 1926.

[32]Hjerppe, 1989. In the English edition of this book the account of methods and sources is scanty. Information has been provided by the author, which is gratefully acknowledged.

[33]Hjerppe, 1989, n. 8, p. 37.

[34]Pipping, 1928, p. 365. Market scale prices were official (negotiated) prices used in Finland and Sweden for tax purposes. See further Krantz, 1988b, p. 16ff, and the literature referred to there.

[35]Björkqvist, 1958, pp. 292ff and 370f. Björkqvist has, alas, made a mistake in his calculations. His point of departure is an index series for each commodity with 1913 = 100. Then, a weighting was made for each sub-period, but the resulting sub-series were not linked correctly, which means that Björkqvist's series for the entire period is flawed.

In the most recent Swedish HNA weighted deflators as detailed as possible for sub-periods with a length of 20–25 years are computed.[36] Within each period Laspeyre indices are calculated meaning that the volumes are of Paasche types. The series are then linked and expressed with 1910/12 = 100. The following methods have been employed:

Trade: The series in current and constant prices are based on series for total goods production.[37]

Banking and insurance: Data from a number of sub-branches were used to estimate series in current prices. As deflators various series for premium rates and wages were employed.

Professional and domestic services: Employment and wage data were utilized to estimate series in current prices. For deflation the wage series were employed.

Services of dwellings: The figures in current prices were taken from Johansson (1967) and as deflator the figures for rents in Myrdal's (1933) cost-of-living-index was used.

Public services: Data from official sources were used. In some instances, especially concerning local government, estimates had to be made. As deflators, wage series were used.

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[36]These calculations are carried out in the structural Economic Programme at the Departments of Economic History, Lund University and (recently) Umeå University. The programme was launched in 1979 and the series for services were accomplished in the mid-80s However, for technical reasons, the book on private services could not be published until the commodity produciton series estimated by Schön had appeared. The service series are available in Krantz, 1986, 1987a, 1987b, 1991a. Series for the manufacturing industry were published by Schön, 1988. Schön's data set on agriculture with ancillaries is not yet published but he supplied the aggregated series necessary of the estimate of private services in Krantz, 1991a. His series on foreign trade have not yet appeared, and, hence, it has unfortunately not been possible to arrive at a complete set of new HNA for Sweden.

[37]Available employment figures for trade in the 19th century are shaky, and, therefore, they were not used in the estimation procedure. However, these figures hint at the same performance as those actually used. See further Krantz, 1991a.

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