CENTRAL BUREAU OF STATISTICS
The Netherlands
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VOLUME MEASUREMENT OF GOVERNMENT OUTPUT
THE DUTCH PRACTICE SINCE REVISION 1987

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The views expressed in this paper are those of the author and do not necessarily reflect the views of the Netherlands Central Bureau of Statistics

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BPA no. :10797-92-HE8
Paper nr.: 249-92-H.E8

August 1992

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Summary

Recently, the Netherlands Central Bureau of Statistics published the first results of a major revision of national accounts statistics. Part of this revision was the introduction of an alternative method to estimate the volume of government output. This paper briefly describes this alternative method and the results of the revision with respect to the volume of government services.

Contents

1. Introduction

In 1992 the Netherlands Central Bureau of Statistics published the first results of a major revision of the national accounts (CBS, 1992). Part of the revision was the implementation of an alternative estimate of the production volume of government. In Kazemier (1991), three alternative methods are described: the output indicator method, the structural determinants method and the deflator method. The last method was adopted and a slightly modified deflator method was implemented. This method is described in section 2.

When implementing this method, some practical problems become evident. Firstly, in constructing estimates of the production volume of government, one can not dispose of all data required. For provisional estimates, some assumptions must be made about missing data. To construct final estimates one has to use provisional data on labour volume growth and output volume growth of government services.

Another complication arises, when government is split up into more than one service category. In that case, separate estimates of all categories distinguished not necessarily sum up to estimates arrived at without disaggregation. The differences can be significant. Further, the volume growth of social charges no longer need to be equal to the volume growth of salaries and wages. This seems a contradiction with the 'rules' of the deflator method, but is not. These topics, and the topic mentioned in the paragraph above are the subjects of section 3. Section 4 summarizes the main conclusions.

2. Method

The gross value added (factor costs) of government services can be split into (1) wages and salaries, (2) social charges and (3) consumption of fixed capital. To compute the volume growth of value added of government services, each component has to be deflated. The deflator method, described in Kazemier (1991), applies to the first two categories.

Founded on Kendrick (1985), who refers to the service sector, it is assumed that also in government services, labour income and wages tend to follow labour productivity. In that case, the ***long run*** wage rate changes can be divided into (1) compensation for inflation and (2) compensation for productivity changes. The latter part also includes changes in the volume of wages and salaries due to changes in the composition of labour, for example because of changes in the average level of education or the average number of years of experience. These kind of changes are assumed to affect labour productivity.

A proxy for the compensation for inflation is the index of basic wage rates according to collective agreements (CAO-wages). However, sometimes changes in CAO-wages are also meant to compensate for increased labour productivity. On the other hand, one may question if the difference between the actual wage rate changes per full-time worker equivalent and the CAO-wage rate changes is only caused by increased labour productivity. Therefore, this index can be considered as a valid deflator of government wages and salaries. The same proxy, multiplied with an index for changes in the charges in social security premiums, can also be used to deflate the total amount of social charges, paid by the government. This means that the ratio between the volume of wages and salaries and the volume of social charges does not change, since a predefined base year.

Before introducing the alternative estimation method, the main users of national accounts statistics were consulted, among others the Central Planning Office, The National Bank and the Ministry of Economic Affairs. Although they shared our doubts on the short term reliability of the resulting growth of labour productivity, their general opinion was in favour of the suggested alternative. They advised the method to be modified in such a way that the

resulting labour productivity component of the annual wage rate change equals the three-years moving average of the original (unmodified) estimates of this component. This led to the next deflator D_t:

$$D_t = \frac{3}{K_t}, \text{ with}$$

$$K_t = \frac{(L_{t-1} / L_t) * (A_t / A_{t-1})}{C_{t-1}} + \frac{1}{C_t} + \frac{(L_{t+1} / L_t) * (A_t / A_{t+1})}{C_{t+1}}; \quad (1)$$

D_t = Modified deflator = Modified chain-index of CAO-wages in year t;
A_t = Chain-index of paid employment in year t;
L_t = Chain-index of the total amount of wages and salaries in year t;
C_t = Original deflator = Chain-index of CAO-wages in year t.

Figure 1 shows the annual volume growth of gross value added of government services according to both the original deflator method and the modified deflator method. The data used are the same as in Kazemier (1991). As can be seen in figure 1, the modified deflator method results in a bit faster but smoother growth of government production volume than the unmodified deflator method.

Figure 1. Gross value added of government services 1981-1989 (pre-revision), estimated using both the unmodified and modified deflator method

3. Implementation

As in many countries, the final estimates of the national accounts in the Netherlands are published several years after date. The gap is about 2½ year. In the mean time provisional accounts are compiled, twice. The first provisional national accounts become available about six month after date; revised but still provisional national accounts 1½ year after date. So, each year t, provisional accounts of year t-1, revised provisional accounts of year t-2 and final national accounts of year t-3 are published.

The compilation of national accounts statistics is organized in three production runs. First, the final accounts of year t-3 are compiled. They are part of the input in the production of the revised provisional accounts of year t-2, which are compiled second. The latter on their turn are input for the provisional accounts of year t-1. As soon as a production run is finished, the results are not altered any more. In general, this order of compilation does not raise any problems. However, for the alternative volume measurement of government output it does. Table 1 shows the availability of data at the moment that the final and (revised) provisional accounts are constructed.

Table 1. The availability of data at different stages in the compilation process of national accounts statistics in the Netherlands

	At te compilation of the accounts of:		
year	t-3 final (1)	t-2 revised provisional (2)	t-1 provisional (3)
t-4	final	final	final
t-3	X	final	final
t-2	provisional	X	revised provisional
t-1	-	-	X
t	-	-	-

Note: t is the current year.

Due to the rather complicated deflator of government wages and salaries (see equation (1) in section 2), for each year under concern one needs data on the previous ***and*** the next year. However, as illustrated in columns 2 and 3 of table 1, for the provisional and revised provisional accounts data on the next year are not available. There are two solutions. The first solution is to construct a price deflator for government services, such that the resulting labour productivity[1] growth equals the ***two-years*** moving average of the unmodified[2] annual growth of labour productivity: years t-3 and t-2 for the revised provisional accounts and t-2 and t-1 for the provisional accounts. The second solution is to assume that the unknown unmodified labour productivity change equals the known unmodified labour productivity change of the year before. The second solution had been chosen.

During the compilation of the final national accounts of year t-3 one can not dispose of the revised provisional estimates of government labour volume and the amount of wages and salaries paid by the government in year t-2, not to mention the final estimates of that year. Only provisional data are available. As a consequence, the final estimate of government labour productivity change does not equal the average of the final unmodified labour productivity change of years t-4, t-3 and t-2.

Equation (1) assumes that the government services are not split up, or more precisely, that a shift in the relative importance of the government services one can distinguish, does not affect the overall average price change of government services.[3] However, in fact it does. Therefore, it might be no surprise that results arrived after disaggregating government services and treating each category separately, differ from those arrived without disaggregation. If a shift occurs from categories with 'lower' price changes to categories with 'higher' price changes, disaggregation leads to a lower average price deflator of wages and salaries, and consequently to a higher estimate of total wage volume. A shift to categories with lower price changes leads to a higher deflator and lower wages volumes.

Since the major revision of the national accounts, referred to in the introduction, government services are split up into four: General administration, Defense, Education and Other government services. Table 2 shows

estimates for 1988 with and without disaggregation. Estimates for the governments services as a whole, based on separate calculations for each of the four service categories, are placed in column 1. Estimates arrived without disaggregation are put in column 2.

Table 2. The volume of gross value added of government services in 1988

	After disaggregation (1)	Without disaggregation (2)	Difference (1) - (2) (3)
1. Wages 1987	35273	35273	
2. Wages 1988	35466	35466	
3. Wages 1988 / wages 1987	0.54%	0.54%	
4. Modified price deflator	*-0.33%*	*-0.28%*	*-0.05%*
5. Volume growth wages	*0.88%*	*0.82%*	*0.06%*
6. · Growth labour productivity	*1.43%*	*1.38%*	*0.05%*
7. · Growth labour volume	-0.54%	-0.54%	
8. Wages 1988 in prices 1987	*35583*	*35562*	*21*
9. Social charges 1987	13633	13633	
10. Social charges 1988	13147	13147	
11. Social charges 1988 in prices 1987	*13750*	*13745*	*5*
12. Volume growth social charges	*0.86%*	*0.82%*	*0.04%*
13. Consumption of fixed capital 1988 in prices 1987	3542	3542	
14. Gross value added of government services 1988 in prices 1989	*52876*	*52849*	*27*

Although the differences between both estimates are small in absolute terms, the relative differences can be quite substantial. The effect of the shifts[4] from Education (with a price deflator D of -0.52%) to General administration (D = -0.39%) and Other government services (D = 0.43) on the average price deflator of wages and salaries is 0.05%.

According to the description of the deflator method, one might expect the volume growth rates of wages and salaries (line 5 in table 2) and social charges (line 12) be equal. This, however, is not the case, although the

differences are small. They can be explained by the same shifts that caused the differences discussed in the paragraphs above, as the ratio between wages and social charges differ between the government service categories distinguished.

Table 3 presents the new estimates of the annual volume growth of gross value added of government services in the Netherlands. These figures can not be compared with those of figure 1 in section 2, as the latter are based on pre-revision data. As result of the introduction of the modified deflator method, the volume of gross value added increases from 1988 to 1991, due to an annual increase of government labour productivity of about 1.5 percent. If the volume measurement of government value added had not been altered, the estimates of government labour productivity would have been almost zero and the average annual growth of government value added would have been -0.5 percent.

Table 3. Annual volume growth of gross value added of government services and the change of government labour volume and labour productivity, 1988-1991

	1988	1989	1990*	1991*
Wages and salaries	0.9%	0.8%	1.3%	0.4%
Social charges	0.9%	0.8%	1.1%	-0.1%
Consumption of fixed capital	2.0%	2.5%	3.4%	2.8%
Total	1.0%	0.9%	1.4%	0.5%
Labour volume	-0.5%	-0.5%	-0.4%	-0.8%
Labour productivity	1.5%	1.5%	1.8%	1.3%

Note: * = provisional.

4. Conclusions

Since the last major revision (CBS, 1992) of the national accounts, a slightly modified deflator method is used to estimate the volume of value added of government services. The price deflator for government wages and salaries is based on the index of basic wage rates according to collective agreements (CAO-wages). This index has been modified in such a way, that the resulting labour productivity component of the annual wage rate change (i.e. the annual wage rate change minus the price deflator for wages and salaries) equals the three-years moving average of this component which would have been arrived at if the unmodified index of CAO-wages was applied. The same deflator multiplied with the index for changes in the charges in social security premiums, is used to deflate the social charges paid by the government.

The overall price change of the wages and salaries paid by the government is not only affected by changes in CAO-wages and labour productivity growth, but is also affected by changes in the composition of government services and changes in the shares if the components. To account for the effects of such changes, government services should be split into several categories. In the Netherlands these categories are General administration, Defense, Education and Other government services. The effects of changes in composition are small, although, if growth rates are low, the effects may still be quite substantial.

The introduction of the deflator method had a large impact on the estimated annual volume growth rates of government value added. If the deflator method had not been applied, the average annual growth rate would have been estimated on about -0.5 percent. Now, the average annual growth rate is about +1.0 percent.

Notes

1. Estimates, obtained using the unmodified deflator method.
2. Here, the labour productivity component of the annual wage rate change is meant. The same applies to the rest of this section when the term 'labour productivity' is used.
3. This can only be the case if the growth rates in all government services distinguished are equal.
4. In 1987 the shares of General administration, Defense, Education and Other government services in total government wages and salaries were: 46.1%, 11.3%, 36.7%, 5.9%. In 1988 these shares were: 46.4%, 11.3%, 36.2%, 6.0%.

Literature

CBS, 1992, Nationale rekeningen 1991, band 2 *[National Accounts 1991, Volume 2]*. (SDU/Uitgeverij/CBS-publikaties, The Hague).

Kazemier, B., 1991, Volume Measurement of Government Output in the Netherlands; Some Alternatives. Paper presented at the 6th meeting of the Voorburg group, October 1991, Oslo. Occasional Paper nr. Na-45. (CBS, Voorburg).

Kendrick, J.W., 1985, Measurement of Output and Productivity in the Service Sector, *In* Inman, R.P. (ed), 1985, Managing the Service Economy; Prospects and Problems. (Cambridge University Press; Cambridge, etc.), pp. 111-123.