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## **MEASURING PUBLIC SECTOR PRODUCTIVITY**

**20th Annual Meeting of Senior Budget Officials  
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*The views expressed in this paper are those of the authors and do not necessarily represent the views of their respective organisations.*

## OVERVIEW

1. The past two decades have seen the introduction of significant public management reforms in Member countries. A key objective of many of these reforms has been to increase public sector efficiency (productivity).

2. Measuring productivity is generally performed by comparing the ratio of inputs to outputs. Fewer inputs producing the same outputs indicates productivity growth. The same inputs producing greater outputs indicates productivity growth. In the public sector, this has not been feasible. Due to the complex non-market nature of many government services, outputs have traditionally not been identified and measured.

3. As a result, “output” in the public sector is determined by simply summing all costs at current price values and then deflating them. There is a serious deficiency in this approach as there is an implicit assumption that there is no change in productivity. As one of the accompanying papers notes, consider a clerical process such as writing cheques. If this process is automated, so that the cheques are printed by computer rather than hand written, then fewer clerks will be employed. As a result, the volume of output would be recorded as having fallen. However, the same number of cheques are being written. No productivity growth is recognised.

4. There is an abundance of anecdotal evidence indicating that productivity in the public sector has grown as a result of the various public management reforms introduced. Such improvements have, however, not been officially recorded. The increased use of output-based budgeting and management systems in Member countries offers a basis to rectify this in the near term.

5. Improved measurement of public sector productivity will allow parliament, ministers and government officials to:

- Monitor the benefits of public management reforms;
- Monitor and evaluate the performance of individual ministries and agencies;
- Identify areas where future reforms are needed; and
- Contribute to the budget formulation process by establishing annual levels of expected efficiency gains.

6. The statistics community has also shown a strong interest in the improved measurement of public sector productivity, especially as a means to improve the accuracy of the national accounts (GDP estimates). In Europe, for example, there is a co-ordinated effort by the national statistics offices in this area.

7. In response to this “co-incidence of interest”, the OECD held an expert’s meeting earlier this year where public management officials and national statistical officials jointly met to discuss the possible next steps in this area. The major conclusions of the meeting were as follows:

- Identifying appropriate output indicators and measures is the key obstacle to measuring productivity in the public sector;
- At this stage, available information is not sufficient to facilitate uniform and comparative studies of public sector productivity in Member countries;
- There is a general commonality of interest and needs between public management officials and statistical officials in this area; and
- The OECD can make a significant contribution to the development of output indicators and measures to be used for both national accounts and public management purposes.

8. Specifically, the OECD is in a unique position to establish principles and examples for the identification of appropriate output indicators and measures. Such a general framework -- based on the experiences of Member countries with significant experience in this field -- would serve as a means to overcome the key obstacle for measuring public sector productivity and therefore accelerate the move to uniform and comparative studies in this area.

9. The case studies presented at the expert's meeting are attached.

## AUSTRALIA

*by Ken Tallis  
Australian Bureau of Statistics*

### **Introduction**

10. In recent years, there has been heightened interest in monitoring the performance (especially the productivity) of government service provision in Australia.

11. In 1993, the Council of Australian Governments (COAG) established a review of service provision. Under the COAG umbrella, the Commonwealth and eight State and Territory governments have set up working groups to develop measures of efficiency and effectiveness for more than a dozen classes of government services. A major emphasis of this work is making performance comparisons between States, with a view to encouraging the spread of best practice.

12. The central budgeting agencies of Commonwealth and State governments have, to varying degrees, developed measures of the outputs and outcomes of government services. Major emphases of this work include monitoring the performance of individual government agencies and of individual service delivery units within agencies.

13. The Australian Bureau of Statistics (ABS) is most interested in measuring trends in aggregate productivity. The ABS publishes annual indexes of labour productivity, capital productivity and multifactor productivity for the "market sector" as an adjunct to the Australian national accounts. At present, the accounts do not include acceptable measures of output for health and community services, education, government administration and defence, personal services and property and business services. Our aggregate productivity estimates exclude these industries, and this reduces their analytical usefulness. To remedy this deficiency, the ABS is engaged in a three-year project to develop new output and productivity measures for the non-market sector, including general government.

14. Most of the ABS's work adopts a classical national accounts view of productivity. We have, however, examined some data sets developed through the COAG working groups; we have also done some work using other techniques (such as data envelopment analysis and stochastic frontier analysis) that are being used by some government departments in Australia.

### ***The National Accounts (Aggregated) View of Productivity***

15. Like many other national statistical agencies, the ABS measures aggregate market sector productivity as the ratio of output to input. The most comprehensive measure we publish at present is multifactor productivity (MFP) -- the ratio of output volume to a combined volume index for labour and capital.

16. Even for the market sector, our MFP measures have some weaknesses, and the ABS has addressed or plans to address these by:

- Taking account of the differential quality of labour inputs. At present, the ABS uses aggregate hours worked as its measure of labour input. The US Bureau of Labour Statistics has assisted us with planning this work.
- Deriving an index of capital inputs from our estimates of the productive capital stock. This follows the methods worked out at the Canberra Group meetings on capital measurement. In the past, the ABS has used an average of gross and net capital stock as its measure of capital input.
- Extending our suite of price indexes for the outputs of service industries.
- Constructing chain volume indexes for outputs.
- Deriving industry-by-industry and economy-wide MFP measures from input-output tables. Formerly, the ABS compiled its national accounts using a "three-stovepipes approach" -- independent estimates of GDP were compiled from data on incomes, expenditures and industry products. Since late 1998, the ABS has compiled its accounts using an "input-output approach". Supply and use tables now provide the unified framework for measuring outputs and inputs in current-price and volume terms, and for our complex data confrontation and balancing processes. Once we have established a time series on the new basis, we shall be able to develop more comprehensive and more defensible productivity series.

17. The major remaining weakness of our MFP estimates is their exclusion of many services, especially the services provided by general government. Although measuring the inputs to government services presents appreciable difficulties, the biggest obstacle to our measuring general government productivity is the difficulty of obtaining defensible measures of output.

### **Progress on Improving the Measurement of General Government Output and Productivity**

18. At present in the Australian national accounts, the output of non-market industries is measured by reference to the inputs they use. For example, annual estimates of the output of government health services are derived by summing deflated estimates of wages, salaries and supplements and volume estimates of the consumption of fixed capital. Quarterly output estimates are derived by interpolating the annual output estimates using quarterly estimates of hours worked. Except for the effect of certain compositional changes in the inputs, this estimation method implies that no productivity change can be recorded for non-market industries.

19. The ABS is trying to develop output measures that are independent of the input measures for some of the most significant services.

- During 1997, experimental output and productivity measures were developed for government **health** services. Attachment 1 summarises the data sources and methods used to construct these measures. The results were put to peer review in 1998 and, during the first half of 1999, the ABS is assessing whether these new measures can be brought into the national accounts.
- During 1998, similar measures were developed for **education** services. Attachment 2 summarises the sources and methods. During the second half of 1999, the ABS will assess whether these new measures can be brought into the national accounts.
- During 1999, measures are being developed for **crime and justice** services, including police, corrective institutions and the courts.

20. Later, we may turn our attention to other services such as welfare and public administration. We believe there is some prospect of measuring services that are consumed by individuals. Caseload counts,

possibly weighted according to differential servicing costs, may be a good starting point for services such as the administration of social security payments, the processing of taxation returns and the like. We see less prospect of measuring services that are collectively consumed, such as defence or policy advising -- but even for these, we acknowledge that some statistical agencies have found proxy output measures that they believe are usable.

### General Approach to Government Output Measurement

21. For all the government service "industries" that we have investigated so far, we have adopted much the same approach:

22. First, to devise at least a rough **model of the services, providers, clients and funders** in the industry. In some cases, we have been fortunate to find a ready-made model that serves our purposes. For example, we were able to use the National Health Information Model [NHIM] developed by the Australian Institute of Health and Welfare and some collaborating agencies.

23. Second, to **map the industry-specific model to the SNA93 framework**. This entails, for example, deciding which services lie within the production boundary and to which institutional sectors the various service providers belong. In this step, some aspects of services that are important to people in the industry may be shorn off. For example, health policy makers are very interested in the effectiveness of services, which they generally interpret as outcomes (changes in the health status of the client population). For national accounting purposes, however, the ABS is interested in the outputs of services, not the outcomes. We return to this issue below.

24. Third, to **decompose the services into broadly homogeneous classes**. Often, these classes corresponded (at the higher levels of aggregation, anyway) to the types of institutions that deliver the services. For example, health services were first decomposed into acute hospital services, nursing home services, medical practitioners' services, and so on. There were generally several further levels of decomposition -- so, for example, hospital services were broken up into inpatient and outpatient services, education and research; then inpatient services were broken up into diagnosis-related groups. One hazard of this segment-by-segment approach is that the output and productivity measures we ultimately compile may be blind to systemic (that is, across-segment) influences. This hazard is more acute when (as in Australia during the 1980s and 1990s) the balance of institutional responsibilities for delivering services is changing or institutional boundaries are becoming blurred. It is most acute when we are unable to obtain satisfactory (non-overlapping and exhaustive) output measures for the segments.

25. Fourth, to **seek indicators of the volume of services** of each class. For the most part, we have relied on administrative by-product data compiled by central budgeting agencies or regulatory authorities or bodies responsible for processing client payments and subsidies. Happily, the recent efforts of COAG and other working groups have established data sets that national accountants will be able to use from now on. We would, of course, prefer data sets that have been compiled on a consistent basis for a long run of years. Generally, the Australian datasets with which we are working have been compiled for the late 1980s and the 1990s at most. Thinner data sets (covering a narrower range of services, or using coarser classifications) are available for earlier years.

26. Fifth, to **seek weighting data** that would help us aggregate the volume indicators. For most government services, we do not have price data to use as weights. Often, however, cost data are available. For example, we have weighted together the hospital casemix data using DRG weights, which reflect the differential cost of servicing patients with different illnesses; and we have weighted together the numbers of university students using the fees levied for different courses.

27. Sixth, to **construct output volume indexes**. In general, the steps outlined so far gives us aggregate measures of output up to the level of the broad institution (say, all hospitals or all nursing homes). Beyond that level, we might use cost shares or other weights to aggregate to the level of the industry (say, all health service providers). Where possible, we construct chain volume indexes. In some cases, however, the weighting data are not of sufficient quality -- so, for example, we are using a single set of DRG weights for the early 1990s, and shall construct a chain index from the mid-1990s onward.

28. Seventh, to **submit the output volume measures to quality review**. As the ABS has developed experimental output measures for each government service, the measures have been submitted to a peer review panel of administrators and researchers. Reviewers are asked to address such questions as:

- whether our output measure has captured a wide enough range of services to be considered "representative";
- whether we have made best use of (and steered clear of the flaws and hazards in) the available datasets;
- whether our segment-by-segment approach has failed to capture important systemic influences on output and productivity; and
- whether the output trends (and the implied productivity trends) are plausible.

29. Eighth, to **assess whether the experimental output measures can be incorporated in the national accounts**. The assessment of our peer reviewers is that the experimental estimates derived for government health services, for example, are the best that can be constructed using data that are currently available. That is not sufficient, of course, to justify their incorporation in the national accounts. The best available estimates for government might still degrade our aggregate output and productivity estimates. Many of the data issues outlined above bear on this assessment. But for us the major question is, "Have our experimental output measures failed to capture significant changes in the quality of government services?" We return to this question below.

30. Ninth, where we judge it appropriate, to **incorporate the new output measures in the national accounts**. This is a complex task, especially now that the ABS is using an input-output approach to compile its NIEP accounts. The experimental work outlined above yields indexes of output volume. To incorporate them fully into the supply and use tables that now underlie our national accounts we must, for example, have regard to the effects on current-price as well as constant-price measures, value-added as well as gross output, the use of (demand for) services as well as their supply, and inputs as well as outputs. The ABS is working through these implications for government health services during the first half of 1999.

### **Some Alternative (Disaggregated) Views of Productivity**

31. Some other Australian researchers and policy agencies are using the same aggregated MFP approach as the ABS. But other approaches to measuring productivity (and allied notions such as efficiency) are also gaining popularity.

32. Some government departments, for example, are using data envelopment analysis (DEA) to analyse and benchmark the efficiency of their service delivery units. DEA is a linear programming method that: draws an efficiency frontier around a set of delivery unit data; identifies the units that lie on the frontier; and, for each delivery unit, identifies efficient peers that might provide models of best practice. A somewhat similar technique is stochastic frontier analysis (SFA), which has the advantage of supporting statistical testing of hypotheses and testing of the significance of parameter values.

33. As an adjunct to its work on public hospitals, the ABS has applied the DEA and SFA techniques to a set of unit record data for Australian private hospitals. One of our aims has been to acquaint ourselves with the analytical methods being used by influential members of our user community. Another has been to cast light on the ways that data and methods can affect our findings about service sector productivity, and especially to:

- explore the differences in assumptions that underlie the competing techniques and the differences in results about productivity trends and patterns that they yield;
- test the assumptions (relating to homogeneity of the service industry, economies of scale, etc.) that underlie standard methods for analysing aggregate productivity; and
- understand the sometimes subtle ways in which the characteristics of available datasets (and our selection of data from within those datasets) can affect our findings.

### **Policy and Other Applications**

34. The Australian work on measuring government productivity has been applied (or, when the new measures are established, may be applied) in the following ways among others:

- a) Monitoring economy-wide productivity, and especially tracking the changes in productivity that may have flowed from the major efforts at microeconomic and administrative reform in Australia, especially during the 1980s and 1990s. The ABS's work will support this policy application.
- b) Comparing the productivity of general government services with other parts of the Australian economy. Comparisons might be made with the rest of the economy in aggregate or with "parallel" services in the market sector. The ABS's work will support this policy application.
- c) Comparing the productivity of government service provision between Australian States. The COAG work is supporting this policy application. It is, however, built on ensembles of efficiency and effectiveness indicators, and thus does not lend itself to unitary or summary measures of productivity in one State as compared with another. Although, in principle, our approach might be applied to this sort of comparison and some of our data sources can be dissected by State, we have no plans at present to develop State estimates of output or MFP.
- d) Comparing the productivity of individual service delivery units. Some government agencies have established systems for analysing, say, the efficiency (and, in some cases, the productivity) of individual motor vehicle registries or other transaction processing offices. However, no comprehensive program has been established by any State, still less by all the States. In general, these analyses rely on non-parametric techniques such as DEA, although it would be feasible to apply MFP techniques as well. The major aim of such analyses is to identify service delivery units displaying best practice, so that other units can learn from them.
- e) Adjusting ("indexing") transfer payments. In Australia, as in many other countries, large amounts of money are transferred between governments (and between agencies within governments) to support the provision of services. In the past, once the size of the transfer payment was established in some base period, subsequent years' amounts may have been indexed by, say, a general measure of inflation or a wage index. Major changes have been foreshadowed for the ways in which the size of transfer payments is determined. Service-specific price indexes may be used. Some governments would like to apply productivity-adjusted price indexes (to take account of the fact that, if a delivery agency can achieve a productivity gain, it will require a smaller amount of money than before to deliver the same quantum of services). So far, the

indexed amounts have been reduced by an exogenously imposed "efficiency dividend", to reflect a productivity gain that the service delivery agency should be able to achieve. But in the future, there may emerge a demand for estimated productivity-adjustment factors, reflecting the productivity gain that agencies of such-and-such a type have actually achieved. This policy application is likely to draw heavily on the ABS's measurement work.

### **Outstanding Problems and Future Research**

35. Further research could profitably be devoted to almost every aspect of productivity measurement mentioned so far. One question is specially prominent for us, namely: *Have we failed to detect significant changes in the **quality** of general government services?*

36. In co-operation with colleagues in other agencies, the ABS is pursuing methods for gauging the extent to which our output volume estimates (and hence our productivity estimates) may be biased and, where possible, for adjusting our estimates to take account of quality change.

37. As an illustration, our experimental output measure for inpatient care in hospitals recognises quality change to the extent that it is captured by changes in the mix of services (that is, changes in the proportions of patients classified to our 667 DRGs). But it misses most quality changes that may be occurring within DRGs (such as a change in the quality of a hip replacement or an angioplasty) if these changes have not, for example, already been encapsulated in the cost weights.

38. Several recent government initiatives aim to monitor changes in the quality of health service provision in Australia. For example, the *First National Report on Health Sector Performance Indicators* foreshadowed the development of quality-of-care and patient-satisfaction indicators as part of the National Hospitals Outcome Program. This is a "top-down approach". Even when these indicators become available, we shall face the methodological question of how to bind them to our output volume indexes.

39. Others are researching the measurement of quality change in health care, taking a "bottom-up approach" examining in detail the changing effectiveness of treatments for particular conditions, such as cardiovascular disease. The ABS is planning to apply such methods to Australian data. Clearly, it will take many years before such a research program can address an appreciable proportion of our 667 DRGs -- but, even in the short term, it may give us some guidance about the extent to which the output volume estimates may be biased downward (owing to their not having taken adequate account of quality change).

## **Attachment 1**

### **Experimental Output Measures -- Government Health Services**

Experimental output measures have been developed for most major segments of the health services industry, including acute care hospitals, psychiatric hospitals, nursing homes, medical and dental services, and other health services. Although the main focus of the project was government health services, similar methods have been applied to some private services. In the main, the experimental estimates relate to just the 1990s.

#### **Public Acute Care Hospitals**

The richest data are available for the public acute care hospitals segment of government health services.

Broadly, the output of hospitals is composed of inpatient care, outpatient care, education (of medical workers and the community) and research. The experimental estimates include only the two patient care components, but recent work on measuring the output of the education industry suggests ways of tackling the other two components.

Our preferred output measure for hospital inpatient care is based on the National Hospital Morbidity (Casemix) Database, which provides data on the number and cost of 667 different treatments (the "diagnosis related groups", or DRGs).

According to our experimental output index, growth in patient services during the early 1990s was quite strong - appreciably stronger than the overall output growth for the Health and community services industry suggested by the input-based measures in the national accounts.

Our preferred output index for inpatient care rises by an average of around 7 per cent a year during this period; this contrasts with an average rise of just over 2 per cent a year in the present national accounts estimate for health and community services. The difference between these growth rates may be due to the following (or other) factors:

- There may have been a rise in productivity which the input-based national accounts estimates of output have failed to capture.
- Other segments of the health and community services industry (eg, private hospitals, medical practitioners or welfare services) may have been growing more slowly than public acute care hospitals.

#### **Other Segments of Health Services**

The ABS has also developed measures for the following segments of health services. Among the most important are:

**Nursing homes.** The preferred output measure is a cost-weighted index of bed-days calculated across five classes of clients (graded according to the level of care they require). The basic data are collated by the Department of Health and Aged Care.

**Medical practitioners.** The preferred output measure is a cost-weighted index calculated across a hundred or so classes of consultations. The basic data are collated by medical insurance authorities.

**Psychiatric hospitals.** The preferred output measure is a cost-weighted index of patient-days calculated across a dozen classes of services. The basic data are collated by the Australian Institute of Health and Welfare.

**Attachment 2**  
**Experimental Output Measures -- Government Education Services**

Experimental output measures have been developed for most major segments of government education, including pre-schools, primary and secondary schools, post-school vocational training and universities. In the main, the experimental estimates relate to just the 1990s. The experimental measures all rely on administrative by-product data collected by Commonwealth and State education authorities.

For schools, the basic measure of output is the number of full-time equivalent enrolments. For post-school vocational training, it is the number of course hours. For universities, the measure of output is a weighted index of the number of students, calculated across three categories of courses; the weights are the course fees levied on students, which broadly reflect the cost of providing the courses.

Here, as in many other government services, the major issue is the degree to which our estimates may be biased by our failing to take adequate account of quality change. The ABS is examining indicators of quality change such as scores obtained in common tests of literacy and numeracy for school children, or the rates of course progression for post-secondary students. In many cases, we have only very short time series of such quality indicators. But even when we have more data, we shall face the problem of how to bind the quality measures to our basic measure of output volume.

## FINLAND

*by Anne Aaltonen  
Statistics Finland*

### **The Project on Measuring General Government Productivity**

40. The aim of the project is to develop a system for measuring and monitoring productivity in the government sector by using index theory and output indicator methods. Both the central and local governments are included in the measurement of general government productivity but they are treated separately because of the different nature of the services they produce. A further reason for the separate treatment is that the data for the two sub-sectors are handled differently. Statistics Finland has been developing statistics on the production and productivity of central government for a couple of years. Productivity statistics of local government services have been developed for a year and a half.

41. The main purpose of the project is to develop statistics on productivity, but it obviously generates benefits for the government agencies themselves as well. It is essential for the project that a central government agency defines its output and production costs of the final outputs. Developing statistics and monitoring system has an indirect effect on the information systems of organisations by specifying the concepts, definitions and classifications needed. Data acquisition and a feedback system where changes in the growth rates of output, input and productivity are reported to each unit encourage them to define output indicators that best represent the services produced.

42. The total number of central government organisations from which input and output data are collected has been about 120 annually. These units cover about 70 to 80 per cent of the compensation of employees in the central government. Up to now, the activities of the (policy-making) ministries, the Parliament, and certain other activities (administration of foreign affairs, for example) have been excluded from measurement. The units covered by measurement represent various kinds of economic activities, such as public administration, defence, and research and development.

43. The 1997 experimental calculations for central government cover about 40 per cent of the units measured by wages and social security expenditure based on national accounts, i.e. 56 units out of 117. The definition of outputs is advanced in Finland. The whole output is defined and measured for 37 units out of 56. However, some parts of the definitions of output indicators need to be made more accurate for the purposes of output measurement.

44. Output indicators should cover the whole output. In order for the measurement of output to be sufficiently reliable when quantity indicators are used, the measurement indicators should at least cover the most important and essential final products of the total output. Over 70 per cent of the output were defined in 90 per cent of the units included in the calculations.

45. The coverage of central government productivity measurements is growing slowly because the units are developing their own cost data and making more accurate output definitions at the same time. The main problem in compiling output indices is the lack of information on the weights of the final product.

46. The growth rate of aggregate central government outputs cannot be interpreted as the change in the output of the total central government. Rather, it must be considered as an average weighted change of

the output of all the units that have been measured. This is because of the fact that the measured outputs are only final from the perspective of each unit. The outputs are not final from the perspective of the central government sector because some of the final products are used by other units of central government.

47. The productivity calculations for local governments cover education, social care and libraries. The 1996 measurement of local government covers over 50 per cent of the services measured by wages and social security expenditure based on the *Statistics on Municipalities Economy*. Health care productivity is not included in local government productivity calculations. If we succeed in adjusting health care to the calculations, the coverage would be 80 per cent.

48. Data on the inputs and outputs of local government authorities is collected annually by Statistics Finland for its *Statistics on Municipalities Economy*. Data is collected for a total of about 60 function groups. Depending on the function, one or more output indicators are used for each function.

## Method

49. Multifactor productivity is approximated by cost efficiency in real terms and is measured as the ratio of output changes to the changes in labour costs and other expenditure (inputs). Multifactor productivity is a much more relevant productivity measure than labour productivity. Quality changes have not been taken into account in the measurement of changes in output and productivity as of now.

50. We use the index approach for measurement. The index used is the chained *Törnqvist Index* which has a flexible formula and flexible weighting structure. It suits the measurement because the structure of the production may vary. In general, public organisations produce a variety services that would be impossible to add up in physical terms. By using the *Törnqvist Index*, the growth rates of different quantities can be combined. Another advantage of using chained the *Törnqvist Index* is that changing weights allow the output mix (“output quality”) to change from period to period. The measurement of productivity growth is carried out by comparing two consecutive time periods (years).

51. Central government productivity measurement is implemented from the point of micro economics. Proceeding from the micro level to the macro level means that input, output and productivity indices are compiled for each unit. The aggregation of the changes of inputs and outputs is compiled by weighting the growth rates of each unit by their shares of wage and social security expenditure based on national accounts. Final results cannot be characterised as representative of the total central government. Rather, they must be viewed simply as reflecting the trends of the organisations that have been measured.

52. In the local government sector, measurement is implemented from the municipal level, not the unit level. At first, any changes in the outputs and inputs of all municipalities and joint municipal authorities (i.e. coalitions of municipalities) are measured. In all authorities, productivity is measured one function at a time. Functional output, input and productivity indices are aggregated by weighting each stage/level.

## Defining and Measuring Outputs

53. The objective now is to separate the changes in the volume of outputs from the volume of inputs in order to have measures by which the real productivity of government services can be estimated.

54. To be able to define the output of collective services, the point of departure for the definition should be the production itself. The definition of final products can be derived from the tasks and activities

of the organisation carrying out the function. Output is what is produced. Output indicators should be selected so that they truly describe the final output and not, for example, the outcome. Outcome is the impact from different kinds of activities. The objective is to measure those services actually received by external customers, i.e. customers outside the organisation.

55. Central government services, most of which are collective services, are very diversified. That is why the final output and the output indicators have to be specified by each agency itself.

56. Central government data collections (and the measurements carried out) indicate that final products and output indicators are definable for most of the government sector. The output and productivity of most collective services appear to be measurable.

57. Classification of the final products is vitally important. Output should always be divided into sub-groups composed of homogenous final products and there should be one indicator for the measurement of each type of final product. For example, some of the indicators of non-market services used in Finland should be defined more homogeneously and in greater detail than has been done so far.

58. If the quality of a final product changes slightly, the measured quantity needs to be corrected by the change in the quality. Large changes in quality lead to the changes in the structure of the output. If the quality of a certain final product changes notably, the said product will become a new one due to the changes in its quality. To a certain extent, output and productivity measures compiled for government units may also include changes in the quality of output. This is due to the application of an index formula with a flexible weighting structure.

59. In order for quality changes to be incorporated in productivity statistics, the measurement at the unit level has to be oriented towards the quality of the final products. Appropriate and generally accepted quality indicators should be defined and information on quality changes should be systematically available.

60. According to the results of the measurement of central government, most of the examined public services have changes in the (volume of) output that differs from the growth rate in the volume of input. An output indicator method is therefore needed to accurately capture growth in productivity.

61. The growth rates of central government output varied between -20 and +20 per cent in 1997. Changes in output of local government services vary less than the outputs of central government. Between municipalities, the growth rates varied much more. The results indicate that the growth rates of output (and productivity) vary extensively between different government agencies, municipalities and local government functions. The quantities of final products may also fluctuate widely from year to year. The variation in the growth rates of output is perhaps due mostly to the changes in the demand for the services. In central government services, the growth rates of outputs *vary* more than those of inputs -- which were between -10 and +10 per cent in 1997. It is not so evident in the case of local government services. The differences between the services or between the municipalities may be even greater.

62. Before making any conclusion about the growth rates of productivity we should be aware of the output indicators used in the calculations. The output indicators used are not necessarily the best ones for measuring productivity and, therefore, one should be careful when interpreting the results. It is not evident how accurately some output indicators actually depict the volume of service production. Furthermore, the productivity calculations should cover at least 5 years before making any conclusions.

## Summary Results

63. General government productivity shows a decline in 1995. In 1996 and 1997, productivity shows an increase annually. Due to the diversity of the units included in the measurement, no conclusions can be drawn about the development of central government productivity. As regards local government, the time periods are comparable. (Table 1)

**Table 1: Growth rates of productivity, 1994-1997, per cent**

	1994-1995	1995-1996	1996-1997
<b>Central government</b>	-0.5	0.8	1.9
<b>Local government</b>	-2.0	1.3	

64. Productivity growth rates of general government should be available at least five years before reliable conclusion can be drawn about the trend in productivity. The fourth productivity calculations for central government and the third productivity calculations for local government will be available during 1999.

65. In the past few years, growth in the aggregate output in central government (weighted average of the growth rates in the outputs of the units) has been positive in the activities. According to the results, the use of total input has also increased, however less than the quantity (volume) of output. Accordingly, the total productivity of the measured part of Finnish central government has shown positive growth in the last two years. (Table 2)

**Table 2: Some aggregate growth rates in central government, 1995-1997, per cent**

The weighted average of the growth in	1995	1996	1997
output		+4.9	+4.2
labour input		-1.7	+4.2
total input		+4.1	+2.3
labour productivity	+3.0	+6.8	0.0
total productivity	-0.5	+0.8	+1.9

66. Local government productivity decreased by -2.0 per cent in 1995. Local government productivity decreased in all sectors in 1995. Local government productivity increased by 1,3 per cent in 1996. Educational services accounted for 55 per cent, social services 43 per cent, and libraries 2 per cent of the productivity calculations. (Table 3)

**Table 3: Some aggregate growth rates of local government, 1994-1996, per cent**

The weighted average of the growth in	1995 (1994=100)	1996 (1995=100)
output	+1.7	+4.2
total input	+3.7	+2.9
productivity	-2.0	+1.3

67. In all services, the trend was better in 1996 than in 1995. According to the results, both outputs and inputs have been increasing between 1994 and 1996 in the activities under consideration. However, the growth rates of outputs and inputs differ, thereby causing variation in productivity. The outputs and inputs of educational, library and social services increased by small percentages in 1994-1996. The output of social services was an exception to this upward trend. In 1995, there was no changes in output of social services and in 1996 the inputs went up more than in 1995. Growth rates of productivity may vary significantly from year to the next. (Table 4)

**Table 4: Changes in local government productivity, output and input, 1994-1996, per cent**

<b>Local government Changes in</b>	<b>1995 (1994=100)</b>	<b>1996 (1995=100)</b>
<b>Productivity</b>		
Education	-0.5	+3.1
Libraries	-0.6	+2.4
Social Services	-3.8	+0.2
<b>Output</b>		
Education	+3.1	+4.3
Libraries	+1.1	+2.9
Social Services	0.0	+4.2
<b>Input</b>		
Education	+3.6	+1.1
Libraries	+1.6	+0.5
Social Services	+4.0	+5.1

68. The measurement of educational services include comprehensive schools, upper secondary schools, vocational training and other adult training (vocational institutes). Teaching hours are used as the indicator describing the final output of educational services. About 99 per cent of all the operational costs of educational services are measured.

69. Number of visitors during the year is used as the indicator describing the final output of libraries. Libraries are the most common cultural service function provided by Finnish municipalities.

70. The coverage of the measurement is more than 90 per cent of the social services functions. The measured social services include children's day care, inpatient care of the elderly, home help services, inpatient care of disabled people, community care of elderly, community care of disabled people, guided work of disabled people and inpatient care of children and young people. For example, children's day care covers 3 different functions, which are full-time care, part-time care and full-time family care. Community care of elderly and disabled people covers 4 different functions, i.e. service housing for the elderly, part-time care of elderly, service housing for disabled people and special education for disabled people. These activities are weighted together by their unit costs.

71. Demand for the services is influenced by increases in the migration and the ageing of the population. Changes in legislation also affect productivity through changes in the demand of services. For example, in 1996 it became an obligation for municipalities to arrange day care for all children under 7 years of age. Networking and organisational co-operation have increased productivity in the educational services sector. Radical economic changes have also forced local public sector authorities to intensify the

production of services. In 1995, local public authorities were forced to layoff significant numbers of staff. These changes may decrease productivity in the short term in all authorities.

72. Increasing productivity by structural changes have also been tried, i.e. community care of the elderly and the disabled versus inpatient care. Structural changes, such as increases in community care to compensate for reductions in inpatient care may cause temporary falls in productivity in the social services sector. It means that for example the inpatient care of elderly become more heavier and while the growth rate of output is decreasing it does not mean that the growth rate of input will be decreasing too. Changes mentioned above may also change the structure of the patients. It depends on the output indicator if these changes are included in the growth rates of output. This is also a quality issue.

73. For most social and educational services there are two alternative output indicators available. Growth rates of output on social services and on education differ depending on the output indicator used. It is important to use the output indicators which best represent the service production because different output indicators describe different factors. In respect of social services, the number of day-care days would describe the output better than the number of customers. In education, the number of teaching hours would describe the service production better than the number of pupils. (*Table 5*)

74. Health care services are not yet included in the local government productivity measurements due to the absence of applicable output indicators. At the moment, expenditures corresponding to final outputs are not definable. In Finland, the structure of the health care services has changed enormously in the 1990s. Productivity of health care services remained slightly positive between 1994 and 1996. A very tentative productivity measurement shows that the growth rate of productivity was +0.4 per cent in 1995 and +0.2 per cent in 1996. Number of bed days, or number of visits, are used as output indicators in the calculations.

75. The main direction of internal migration in Finland has been towards the large and urbanised municipalities of the densely populated areas in the south of the country. The increasing growth rates of outputs have not led to increased growth rates of productivity. There are, of course, some exceptions to this. The growth rates of productivity in educational services are shown below. (*Table 6*)

*Table 5: Output growth measured by alternative indicators, 1995 and 1996, per cent*

Municipalities	1995 (1994=100)		1996 (1995=100)	
	Changes in output Day or day and night	Number of customer	Changes in output Day or day and night	Number of customer
Children's day care	-1.3	+4.5	+12.0	+12.6
Inpatient care of elderly	+0.4	-1.4	-2.1	-2.3
Inpatient care of disabled people	-11.3	+0.7	-9.9	-19.0
Inpatient care of both children and young people	-4.0	-5.3	+1.6	+6.3
<b>Joint municipal authorities</b>				
Inpatient care of elderly	-1.6	-2.3	-1.1	0.0
Inpatient care of disabled people	-4.3	-11.4	-2.8	-3.2

**Table 6: Growth rates of output, input and productivity in education according to statistical groupings of municipalities, 1996, per cent**

***Output Growth:***

<b>Municipalities</b>	<b>Urban municipalities</b>	<b>Semi-urban municipalities</b>	<b>Rural municipalities</b>
Education	4.2	1.3	0.0
Comprehensive school	2.1	1.4	0.1
Upper secondary school	2.5	0.0	0.0
Vocational education	10.8	2.3	-9.8
Vocational institutes	6.6	2.7	2.7

***Input growth:***

<b>Municipalities</b>	<b>Urban municipalities</b>	<b>Semi-urban municipalities</b>	<b>Rural municipalities</b>
Education	3.2	-0.8	-1.0
Comprehensive school	1.0	-1.3	-1.1
Upper secondary school	2.4	0.7	0.2
Vocational education	10.0	1.4	-4.8
Vocational institutes	5.2	2.4	-0.5

***Productivity growth:***

<b>Municipalities</b>	<b>Urban municipalities</b>	<b>Semi-urban municipalities</b>	<b>Rural municipalities</b>
Education	0.9	2.1	1.0
Comprehensive school	1.1	2.7	1.1
Upper secondary school	0.1	-0.7	-0.2
Vocational education	0.8	0.9	-5.2
Vocational institutes	1.4	0.3	3.3

## THE NETHERLANDS

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### 1. Introduction

76. In 1992, Statistics Netherlands 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 change of government services. In Kazemier (1991) three alternative methods are described: the output indicator method, the structural determinants method and the deflator method.

77. In the output indicator method the government output volume is estimated from production indicators like the number of fires extinguished, number of crimes resolved and the number of people on social benefits. The structural determinants method is an econometric method in which a *Cobb-Douglas* production function is estimated. It is assumed that the variables that affect the parameters of the *Cobb-Douglas* production function are sector independent and that differences in labour productivity between sectors can be explained by differences in the mix of those variables. The deflator method is described in the next section. It turned out that all three methods yielded almost the same results. The last method was adopted and a slightly modified deflator method was implemented.

78. When implementing this method, some practical problems became evident. First, in compiling estimates of the production volume change of government services, one can not dispose of all data required. Another complication arises, when government is split up into more than one service category. In that case, separate estimates for all categories distinguished do not necessarily add up to the estimates arrived at without disaggregation. The differences can be significant. Furthermore, the volume growth of various 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 that is not the case. These topics are the subjects of section 3. Section 4 summarises the main conclusions.

### 2. The Deflator Method

79. 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 below applies to the first two categories. A more detailed description of this method can be found in Kazemier (1991).

80. Founded on Kendrick (1985), who refers to the service sector, it is assumed that in government services as well, labour income and wages rise in line with labour productivity. In that case, the **long run** wage rate change per full-time worker equivalent can be divided into (1) compensation for inflation and (2) compensation for productivity changes. The latter part also includes changes in the 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 types of changes are assumed to affect labour productivity.

81. A proxy for the compensation for inflation is the change in 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 whether 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. Nevertheless, the CAO-wage rate is considered as a valid deflator of government wages and salaries. The same proxy, multiplied with an index for changes in social security premiums, can also be used to deflate the total amount of social charges, paid by the government.

82. In short, it is assumed that the change in the total amount of wages and salaries paid by government can be decomposed into three factors: a change in the number of employees, changes due to collective agreements as a proxy for the compensation for inflation, and changes due to changes in labour productivity:

$$L_t = A_t \times C_t \times P_t \quad [1]$$

$L_t$ : Chain-index (/100) of the total amount of wages and salaries in year  $t$

$A_t$ : Chain-index (/100) of paid employment in year  $t$

$C_t$ : Chain-index (/100) of CAO-wage rates in year  $t$

$P_t$ : Chain-index (/100) of labour productivity in year  $t$ .

83. Before introducing this alternative estimation method, the main users of the national accounts statistics were consulted. Their general opinion was in favour of the suggested alternative. They advised, however, to modify the method in such a way that the resulting labour productivity change component of the annual wage rate change equal the three-years moving average of the original (unmodified) estimate of this component. So they advised to use a deflator  $\overline{C}_t$ , such that

$$L_t = A_t \times \overline{C}_t \times \overline{P}_t \quad [2]$$

$$\text{with } \overline{P}_t = \frac{(P_{t-1} + P_t + P_{t+1})}{3} \quad [3]$$

Rearranging [2] and replacing  $\overline{P}_t$  by [3] gives

$$\overline{C}_t = \frac{L_t}{A_t} \times \frac{3}{(P_{t-1} + P_t + P_{t+1})} \quad [4]$$

From [1] it can be derived that

$$P_t = \frac{L_t}{A_t} \times \frac{1}{C_t} \quad [5]$$

Now, by replacing  $P_{t-1}$ ,  $P_t$  and  $P_{t+1}$  in [4] by expression [5] the new deflator  $\overline{C}_t$  can be written as a kind of “weighted harmonic moving average” of the original deflator:

$$\overline{C}_t = \frac{3}{\left(\frac{A_t}{L_t} \times \frac{L_{t-1}}{A_{t-1}}\right) \times \frac{1}{C_{t-1}} + \frac{1}{C_t} + \left(\frac{A_t}{L_t} \times \frac{L_{t+1}}{A_{t+1}}\right) \times \frac{1}{C_{t+1}}} \quad [6]$$

### 3. Implementation

84. As in many countries, the final estimates of the national accounts in the Netherlands are published several years later. In the Netherlands, the gap is about 2½ year. In the meantime, provisional accounts are compiled. The first provisional national accounts become available after about six months, revised -- but still provisional -- national accounts become available after 1½ year. 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.

85. The compilation of national accounts statistics is organised in three stages. 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 subsequently compiled. The latter in turn are input for the provisional accounts of year  $t-1$ . As soon as a stage is finalised, 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:**  
**Availability of data at different stages in compiling national accounts statistics**

Year	At the compilation of the accounts of:		
	$t-3$	$t-2$	$t-1$
	Final	Revised provisional	Provisional
$t-4$	Final	Final	Final
$t-3$	×	Final	Final
$t-2$	Provisional	×	Revised provisional
$t-1$	-	-	×
$T$	-	-	-

Note:  $t$  is the current year

86. Due to the rather complicated deflator of government wages and salaries (see equation [6] in section 2), for each year under consideration one needs data for 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 growth equals the **two-years** moving average of the unmodified 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 has been chosen.

87. 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 for that year. Only provisional data are available. As a consequence, the final estimate of government labour productivity change does not necessarily equal the average of the final unmodified labour productivity change of years  $t-4$ ,  $t-3$  and  $t-2$ .

88. In equation [6] it is assumed that the production activity government services is not subdivided, or more precisely, that a shift in the shares of each of the government services distinguished, does not affect the overall average price change of government services. However, in fact it does. Therefore, it will 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 labour input volume change. A shift to categories with lower price changes leads to a higher deflator and lower labour input volume change.

89. Since the major revision of the national accounts, referred to in the introduction, government services are split into four subcategories: “General administration”, “Defense”, “Education” and “Other government services”. Table 2 shows estimates for 1993 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 without disaggregation are in column 2.

**Table 2:**  
**Volume of gross value added of government services in 1993**

		After disaggregation (1)	Without disaggregation (2)	Difference (2) – (1) (3)
1.	Wages 1992	45888	45888	
2.	Wages 1993	47726	47726	
3.	Wages growth (index) (L)	104.00	104.00	
4.	Modified price deflator (index) ( $\bar{C}$ )	<i>102.52</i>	<i>102.64</i>	<i>0.12</i>
5.	Labour input volume growth (index) ( $L / \bar{C}$ )	<i>101.45</i>	<i>101.33</i>	<i>-0.12</i>
6.	Labour productivity growth (index) ( $\bar{P}$ )	<i>101.42</i>	<i>101.30</i>	<i>-0.12</i>
7.	Employment growth (index) (A)	100.03	100.03	
8.	Wages 1993 (prices 1992)	<i>46552</i>	<i>46497</i>	<i>-55</i>
9.	Social charges 1992	10311	10311	
10.	Social charges 1993	10896	10896	
11.	Social charges 1993 (prices 1992)	<i>10425</i>	<i>10448</i>	<i>22</i>
12.	Social charges volume growth (index)	<i>101.11</i>	<i>101.33</i>	<i>0.22</i>
13.	Consumption of fixed capital 1993 (prices 1992)	4755	4755	
14.	Gross value added of government services 1993 (prices 1992)	<i>61732</i>	<i>61699</i>	<i>-33</i>

90. Although the differences between both estimates are small in absolute terms, the relative differences can be quite substantial. The effect of the small changes in the relative shares from “Education” (price-index = 102,00) and “Defense” (price-index = 101,36) to “General administration”

(price-index = 102.38) and “Other government services” (price-index = 108,35), on the average price-index of wages and salaries is 0.12.<sup>1</sup>

91. According to the description of the deflator method, one might expect that the volume growth rates of wages and salaries (line 5 in table 2) and social charges (line 12) are the same. 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 among 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.

**Table 3:**  
**Annual volume growth rates of gross value added of government services and change of government labour volume and labour productivity 1988-1995**

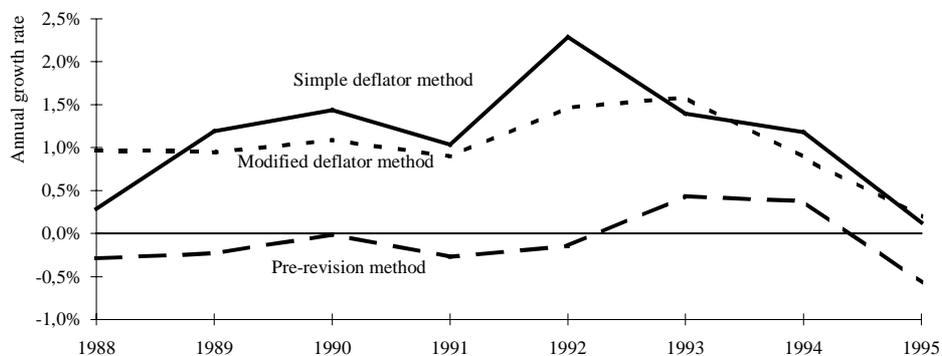
	Wages and Salaries	Social charges	Consumption of fixed capital	Gross value added	Employment	Labour productivity
<b>1988</b>	0.9%	0.9%	2.3%	1.0%	-0.5%	1.3%
<b>1989</b>	0.8%	0.8%	2.5%	0.9%	-0.5%	1.3%
<b>1990</b>	1.0%	0.9%	2.9%	1.1%	-0.4%	1.4%
<b>1991</b>	0.8%	0.4%	3.2%	0.9%	-0.7%	1.5%
<b>1992</b>	1.4%	1.1%	3.2%	1.5%	-0.6%	2.0%
<b>1993</b>	1.4%	1.1%	4.1%	1.6%	0.0%	1.4%
<b>1994*</b>	1.0%	0.3%	1.1%	0.9%	0.1%	0.9%
<b>1995*</b>	0.0%	-0.1%	3.1%	0.2%	-1.0%	1.0%

\* Provisional

92. 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 -0.4 per cent. Time series of government value added growth rates, calculated using the pre-revision method, the simple deflator method and the currently used modified deflator method are presented in figure 1.

<sup>1</sup> In 1992 the shares of “General administration”, “Defense”, “Education” and “Other government services” in total government wages and salaries were 47.1, 10.9, 35.9 and 6.1 per cent respectively. In 1993 these shares were 47.3, 10.4, 35.5 and 6.8 per cent.

**Figure 1**  
**Government gross value added growth according to three different deflation methods, 1988-1995**



#### 4. Conclusions

93. Since the major revision of 1987 of the national accounts (CBS, 1992), a new method is used to estimate the volume change of the value added of government services. The price deflator for government wages and salaries is based on the change in the index of basic wage rates according to collective agreements (CAO-wages). The same deflator multiplied with the index for changes in the social security premium rates is used to deflate the social charges paid by the government.

94. The overall price change of wages and salaries paid by the government is affected not only by changes in CAO-wages and labour productivity growth, but also by changes in the composition of government services. 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 compositional changes are small, although, if growth rates are low, the effects may be quite substantial in relative terms.

95. 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 at  $-0.4$  per cent. According to the revised method, the average annual growth rate was  $+1.0$  per cent.

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## SWEDEN

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### Background

96. Today Sweden has an unusually large public sector, in comparison with other industrialised countries. This was not so in 1960, when the public sector in Sweden was of a size comparable to that of other industrialised countries. Since then the public sector has grown (expenditure as share of GNP) from 31 per cent in 1960 to 70 per cent in 1994 and 67 per cent in 1996<sup>2</sup>. Keeping in mind that GNP during that time has more than doubled means that resources allocated to the public sector have grown tremendously. It ought to be of great interest to know whether output, in terms of services, has increased to the same degree. We all know that the services from the public sector have increased, and some people would be content with knowing that. The crucial question is whether services have expanded on par with resources or not: that is the question of productivity, which is of interest to anyone who is interested in efficiency.

97. Limiting ourselves to the output of services and leaving aside transfer payments, leaves roughly one third of public expenditures, making up 28 per cent of GNP in 1992 (26 per cent in 1996). This is definitely more than in all other western countries. Denmark's and Finland's public consumption each made up 25 per cent of GNP, Great Britain's 22, Germany's 18 and Switzerland's 14 to mention some examples.

98. It is out of these resources, that amount to one fourth of the economic activity in Sweden, that we are interested in what is coming out. Between 1960 and 1990 these resources increased by 300 per cent.

99. It has for some time been said that it is much more important to economise on transfer payments, than on public consumption, since transfer payments make up the larger share of public expenditures. However, this is counted *gross*. Then transfers make up two thirds and public consumption one third of public expenditures. If instead transfer payments are counted *net* the relation is almost reversed<sup>3</sup>. This strengthens the case for economising on public consumption and paying close attention to productivity.

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<sup>2</sup> These figures over-state the size of the public sector in Sweden at present in relation to other countries. In Sweden most benefits are taxed, unlike in other countries. Also, part of the interest payments on the central government debt should be netted against interest incomes on state pension funds. The table below gives comparable figures on the size of the government sector in Sweden and some other countries.

<sup>3</sup> Social Security in Sweden - How to reform the system, The Expert Group on Public Finance, 1994, p 151.

**Net public expenditures at factor prices in Sweden and some other countries  
(1990, per cent of GNP)**

Sweden	53,1
Denmark	53,9
Norway	45,9
The Netherlands	53,4
United Kingdom	45,4
West Germany	49,5

Source:

Nettokostnader för transfereringar i Sverige och några andra länder,  
Ds 1994:133, p. 36.

### Debate

100. In 1986 the first comprehensive report on productivity in the public sector of Sweden appeared. The report was based on empirical investigations and measurements of productivity in 70 per cent of the public sector, including both the local, regional and central levels. For the most part it extended measurements as far back as 1960 and covered the period up to 1980.

101. A very intense debate followed. The validity and the reliability of the measures taken was questioned. Philosophical questions were put, for example whether it should be at all possible to measure productivity in a non-market organisation. Largely it was a debate between economists, trade unionists and managers of the public authorities that had been scrutinised. On the whole the political parties refrained from taking part in the discussion, perhaps because the results had not yet become established truths and even were criticised by influential bodies like the National Audit Office.

102. No one at that time seemed to be interested in asking the question why the study had been undertaken, neither why the study had not been undertaken long before. The purpose of the study was to complement the national accounts and investigate whether it would be possible to challenge the assumption of zero productivity change in the public sector. Some countries postulated 0,5-2 per cent increase in productivity in the public sector. Many, like Sweden, postulated 0 per cent change, evaluating outputs on the basis of inputs.

103. Productivity may be measured for many reasons and with different purposes. However, productivity measures do not in themselves provide answers to the following questions:

1. the value, profitability or meaningfulness of the public services;
2. who was to blame or to hail for the results (the manager, the personnel, the politicians or..?);
3. what had caused the results (computerisation, reorganisation, personnel training, smarter or less smart work procedures or...?); or
4. what was going to happen in the future regarding productivity.

Much of the criticism of the study was that it didn't answer these questions.

104. The second comprehensive report on public sector productivity appeared in 1994. It covered roughly the same portion of the public sector. The second report caused much less debate, most likely because of the financial crisis in the public sector at that time and an accepted need to economise. The

report had been commissioned by the same expert group but was also asked for by the Ministry of Finance to be used in its long-term economic planning.

105. Although these studies from the outset had the limited purpose of complementing the national accounts, time has shown that the results nevertheless have been valuable when it comes to analyzing the above questions. Ironically, though, and despite the fact that the results strongly influence the estimated growth of GNP, national accounts still look the same and have not up to this day been complemented with information on the volume of output. In this respect Sweden shares the company of all other countries - no other country has yet based its accounts of public consumption on measures of output.

106. The importance of the reports turned out to be their impact on other issues.

107. During the study it appeared to the investigators that the impact of productivity change on the size of the public sector, tax rate and public debt was quite significant. That this insight was not present from the outset and was not the driving motive to undertake the study may seem curious, since the impact should have been obvious, especially with regard to such a large public sector as that of Sweden. However, in large private sectors of the economy productivity seldom changes by more than one or two per cent per year, and that may at first sight seem pretty harmless. What dawned on the investigators was that the cumulative effect over several years turned out to be quite substantial.

108. Productivity assessment has become of interest in still another context, namely that of the central government budget process and the control of agencies. From 1985 and onwards efforts have been made to introduce a different kind of budget process.<sup>4</sup> The heart of the new budget process is that of performance. Fundamentally the budget process looks the same: agencies are given yearly appropriations. But the spirit of the budget process is now to look at results in relation to funds instead of at funds only. Consequently, performance monitoring is of crucial importance. From 1992 and onwards all central government agencies over a period of three years have been required to deliver annual reports. In an annual report the agency is supposed to state its results in relation to set goals and targets. Productivity is very much to be the focus.

109. The development of annual reports for central government agencies started in the late 1980s with some agencies producing annual reports on a trial basis. The efforts to develop annual reports could relate to the productivity measurements that had at that time been developed for a number of central government agencies in the course of the first productivity study. Results of this first study pertaining to the central government were published in 1985 and were built upon separate studies of agencies making up 30 per cent of the central government sector. In 1986 studies pertaining to three other complete sectors of the central government were added. These included the national road network, defence and university education.

110. Experiences from these studies demonstrated that it was indeed possible to measure outputs and productivity for a large number of agencies in a meaningful and telling way. This had been disputed for many years, since the previous effort in connection with the introduction of planning, programming and budgeting systems in the late 1960s and early 1970s. That introduction had in the middle of the 1970s ended with the conclusion that it wasn't meaningful to measure productivity, since without measures of the impact of output, productivity measures could be quite misleading. Suppose the impact was in the negative, it was suggested, the more that was being produced, the more harm was caused. Of what use would a measure of productivity then be? It was considered, that without measures of impact taken into account in the measures of output, it would be meaningless or even misleading and dangerous to measure outputs.

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<sup>4</sup> See OECD, *Budgeting in Sweden*, PUMA/SBO(98)5/REV1.

111. Of course, in principle these arguments are as valid today as they were then. Why then have productivity measurements started to get accepted?

112. An answer of a speculative kind points to a change of perspective on the different roles of the administration and the politicians. Accompanying the stress on performance and results is an emphasis on political control of the administration. In the wake of government programs that had become much more expensive than intended and had not produced the results that were expected there was a strong urge by the politicians to take command. At the same time it was quite obvious that the agencies could not be ruled by tighter regulations but instead needed more discretion. The only solution at hand was for politicians to decentralise powers and deregulate the use of the purse by the agencies and instead control the size of their purses, the aims, outcomes and even the outputs of their operations more closely. This has led to an acceptance of a division of powers whereby politicians decide what to produce and agencies how to do it. This is an exaggerated way of phrasing the changed perspective on the roles of politicians and administration but it expresses a tendency away from a situation in which politicians and administration were jointly responsible for both what and how. Until politicians say something else, what is being produced is meaningful and valuable and relevant to measure.

113. Another reason why measures of productivity have started to get accepted could be the insight that government programs in general have been very stable over time. Of course, before attempting to measure productivity, one should be reasonably sure that the program is sound and that the outputs are meaningful and contribute in a positive way to policy goals. From 1960 and onward the government production of services very much has had the same content -- education, health services, defence, police, courts, prisons, etc. -- although substantially expanded. Questioning the validity of productivity measurements by challenging the meaningfulness of the production of services that have been produced for decades does not seem credible any longer.

114. Lastly and perhaps most importantly, the insight that the public sector could not command more of society's resources but instead ought to diminish its demands had been around for many years. It called for increased efficiency. In the middle of the 1990s, the economic crisis made this insight imperative. It also helped to shape a readiness to accept various economic key indicators.

### **Developing productivity measures for the public sector**

115. Of course, to the Ministry of Finance the most important use, to which productivity measurements could be put, would be assessments of efficiency, i.e. how efficient resources are being employed in various parts of the public sector. How well do the productivity measurements fit this purpose?

116. Basically productivity is a very simple concept<sup>5</sup>. It is the relation between output and input. The difficulty lies in the definition and measurement of the various elements that go into the productivity measure, such as outputs, quality, weights, resources or costs and prices of resources. This is especially difficult in the public sector where outputs not are marketed, which means both that it is not always obvious what is the output and that there are no self-evident weights by which to aggregate different outputs.

117. What we're after is a descriptive measure of productivity and not a measure of technological progress, the production function or something the like. That means that the interpretation of the results

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<sup>5</sup> See *Productivity Trends in the Public Sector in Sweden*, The Expert Group on Public Finance, Ministry of Finance, 1996.

must be based on a separate analysis. What we get is a measure of the combined outputs in relation to the combined inputs. Whether changes in that measure indicate economies of scale, increasing or decreasing slack in production, technological advance or something else is left to further analysis.

118. Notwithstanding the descriptive ambition there are principles of measurement that must be decided upon, principles that should be guided by the intended use of the measurements. As mentioned above, the purpose from the outset was to complement the national accounts on the public sector. Consequently the principles of the national accounts were followed in Sweden. In short these principles state that:

- a) final output should be measured;
- b) broad areas of the public sector should be covered;
- c) measures should be relevant in a consumer perspective;
- d) measures should be adjusted for important changes in quality;
- e) inputs should comprise total costs and include labour costs (including wage taxes), purchases of goods and services, rents and capital costs (depreciation but not interests);
- f) weights, by which to add outputs, should reflect consumer evaluation; and
- g) prices, by which costs in nominal prices should be deflated, should be market prices.

119. How well do these principles fit the purpose of monitoring efficiency in the public sector? They fit reasonably well.

120. Efficiency, it is said, encompasses two elements: doing the right thing and doing things right. Productivity measures "doing things right", i.e. production efficiency. Assessing "doing the right thing" requires completely different methods. However, measured in a way that is relevant to policy, productivity will tell something about the price of achieving the policy goals. Productivity change will tell about efficiency increases or decreases if it may be assumed that "the right things" are being produced and that that is what is being measured. As to the first assumption, as mentioned above, the stability in programs and outputs lends support. As to the second assumption, it is up to the analysts that perform these measurements to convince the sceptics that they are in fact measuring "the right things".

121. Measuring final output from a consumer point of view means that productivity will be relevant in relation to policy goals as long as policy goals coincide with consumer valuations. To judge -- on the basis of stated policy goals -- whether they coincide with consumer valuations or not is, however, not easy. But it is reasonable to assume that consumer valuations will be of greatest importance in most areas, such as education, old-age care, health care, meteorological services etc. It is more questionable what role policies attach to consumer valuations in areas such as the police, tax collection and defence. In such areas final outputs must be defined in such a way as to capture those services which ultimately give rise to the intended policy impact. For example: combating crime is a goal for the police, and crime investigation is an activity which aims at reaching this goal. Only the cases solved will contribute towards the goal. Those investigated but not solved do not. Consequently only the number of crimes investigated and solved should be counted as output of the police and those not solved are disregarded<sup>6</sup>.

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<sup>6</sup> There are other outputs of the police, representing services that contribute to other policy goals or that constitute direct services to the general public. For example, patrolling is seen as outputs contributing to the safety of the general public.

122. Measuring final outputs means that the productive efficiency of complete operations -- like schools, meteorological services, social security administration, universities -- is what is being measured. The productive efficiency of internal operations, like that of office space, computer operations, personnel administration, etc., or of separate departments within government agencies, are not measured separately. The efficiency of separate departments contributes to the productive efficiency of the complete operation.

123. Measuring output for broad areas means that the productive efficiency of policy areas is what is being measured, i.e. the school system, the health care system, the police etc. and not that of individual schools, hospitals and police districts. I.e. productivity is measured on a fairly aggregated level.

124. Adjustments for quality change are handled in the same way as within the national accounts. In principle the methods by which to handle quality change in productivity indices are the same as for handling quality change in price indices. What is a qualitative change is judged from a consumer or policy impact perspective. The basic method is to adjust output on the basis of the cost increase associated with quality increase.

125. Weights should be chosen so as to reflect consumer valuations or policy impact. Consumer valuations are very difficult to measure, since there are no market prices for most public services. Policy impact may occasionally be measured but is difficult to compare between policy areas. Therefore, relative unit costs are used as weights. This is based on the following reasoning. First, it seems reasonable to assume that there is some correspondence between unit costs of various outputs and the political valuation of these outputs. Second, unit costs of a particular year serve as a yardstick to measure the cost of output against in other years. Interpreted via the first line of reasoning, productivity measures should be directly relevant for policy efficiency. Interpreted via the second line of reasoning, the relevance of the productivity measures would be limited to production efficiency.

126. Production efficiency can be defined more or less encompassing. Following the standard of the Systems of National Accounts, production efficiency is defined to include cost minimisation given the market prices of the factors of production. It also encompasses all kinds of resource consumption and factor use, i.e. not only labour, but also capital and purchased goods and services. Output is related to the resource costs of production at fixed prices.

### **Organisation of the Productivity Studies**

127. The studies were carried out by a steering group attached to the Expert Group on Public Finances, which is a standing committee of the Ministry of Finance. From the outset the Systems of National Accounts (SNA) was chosen as a standard. The work was characterised as a research project and headed by qualified economists. All of this contributed to the success. The steering group co-ordinated the various sector studies to be consistent and comparable (similar price indices, the same ambitions to adjust for quality, the same way to handle capital costs, etc.). The SNA standard saved the work from long discussions on methods and engaged a prime data supplier, namely Statistics Sweden, from the outset. The research character made it easier for various bodies -- ministries, agencies, Statistics Sweden -- to contribute to and accept the studies. The backing of the expert group implied an interest of the Ministry of Finance which also promoted co-operation.

128. The second round of studies were performed by *Statskontoret*, the agency for administrative development, in co-operation with Statistics Sweden, again on the assignment of the Expert Group. This time the studies could be performed more routinely and with the explicit ambition to develop methods of measurements, especially the treatment of quality. A large part of the work was carried out by Statistics Sweden using their own databases. Their work concerned local government service production, such as

schools, health, old-age care, theatres and museums. Central government agencies were involved in supplying data but calculations and analyses were carried out and co-ordinated by *Statskontoret*.

129. A prerequisite of these studies has been that in general only existing data would be used. This is self-evident considering the huge task of covering the complete public sector. This has not, however, ruled out work to increase the quality of that data, calculate weights and in a few instances to undertake the collection of completely new information.

130. Hopefully, in future Statistics Sweden will continue to do local governments on a regular basis, while agencies will contribute calculations and analyses as part of their annual reports. The role of *Statskontoret* could be reduced to co-ordination, aggregation and methodological development of the productivity studies of the central government. Agencies have started to develop productivity measures in their annual reports, very much in line with the SNA standards. Therefore, it will in the near future become more easy to collect, adjust and aggregate data from the agencies.

PUMA/SBO(99)6

## UNITED KINGDOM

*by David Caplan and Andy Milne  
Office for National Statistics*

131. Office for National Statistics (ONS) has adopted a halfway house approach to implementing the measures of general government productivity. We have currently changed about half of estimates of constant price General Government Final Consumption in money terms.

132. The article begins with a description of the issues and looks at approaches to handling these. It then explains the methods used in the UK's published National Accounts data set (*Blue Book 1998*) and describes the impact on published data. Finally there is a discussion of the areas where research was less successful and the possible direction of future research.

### **Non-market output**

133. The European System of Accounts (ESA) defines non-market output as "output that is provided free, or at prices that are not economically significant, to other units". Economically significant is further defined to mean that any sums recovered through sales cover less than half of the production costs. In the UK this definition covers a range of services, mostly provided by central or local government, including health, education, defence and public administration.

134. For goods and services sold in the market place, the value of output can be measured by looking at the prices paid by the purchasers. For non-market production such an approach is impossible, as there may be no price, and a convention is needed to value the output. The approach adopted by national accountants is to use the costs of production as a measure of the value of output. The costs which are included are the compensation of the employees producing the output, the value of goods and services purchased to produce the output (the intermediate consumption) and a charge for the depreciation of capital items (capital consumption).

135. As well as measuring the value of output, measures of the volume are also required. Historically, these have been estimated by calculating the volume of inputs used in the productive process. So, an estimate is made of the volume of labour, intermediate consumption and capital consumption to get a total volume figure.

136. There is a serious deficiency in this approach as there is an implicit assumption that there is no change in labour productivity. For example, consider a clerical process such as writing cheques. If this process is automated, so that the cheques are printed by computer rather than hand written, then fewer clerks will be employed. In terms of the national accounts, the volume of output would be recorded as having fallen as the decline in the volume of labour used will not be offset by the increases in intermediate or capital consumption. However, the same number of cheques are being written.

### **The need for, and the opportunity to, change**

137. In recent years there has been growing concern that the implicit assumption of no change in productivity was unreasonable. Changes in the structure of the delivery of government services and the

introduction of market mechanisms were designed to deliver significant improvements in productivity. Such improvements were not being recorded in the national accounts.

138. Changes in the public sector were accompanied by an increase in the scope of performance and output measurement. Such measures could be adapted to form direct measures of output for the national accounts. Further, the development of accrual accounting within central government was also expected to deliver a range of measures which would have a national accounts application.

139. ONS is committed to producing national accounts compatible with the 1995 ESA. The ESA recommends that, where possible, direct measures of the output of non-market services should be used in preference to input measures. Additionally, at the European level, there is a co-ordinated attempt to improve estimates of GDP at constant prices. In particular, a classification of methods is being developed. Methods will be described as either **preferred** (A methods), **acceptable** (B methods) or **unacceptable** (C methods). It is likely, that for some categories of production, input methods will be unacceptable.

140. As a result of these drivers, and the belief that new measures could be adopted, ONS allocated resources to develop new measures of public sector output. This was not the first time that such a project had been established. However, it was thought more likely to succeed than others. Previous attempts had failed, partly because they had attempted to find a perfect solution. The ethos of this project was to adopt methods which were deemed acceptable for elements of market output and apply them for non-market production. In particular, the idea of using a “proxy” measure of output was to be used. A proxy does not necessarily measure the output but measures something which can reasonably be thought to move in a similar way to output. For example, the output of part of the banking sector is measured by looking at the number of transactions. This figure does not directly measure output but is thought to reflect changes in output.

### **The approach**

141. The ONS approach was based on the idea that it is better to measure the right thing approximately than the wrong thing precisely. This implies that any new indicators would not necessarily be perfect or beyond criticism, but would be more appropriate than the existing input approach. In particular, the approach of using output “proxies”, used for market output, was considered.

142. The approach adopted was to split the non-market sector according to the classification of the functions of government (COFOG). This provided a basis for analysis. Initial research focused on the areas of health, education, social services and defence. For each of these categories, it was necessary to try to define the output and how it could be measured. It would not be necessary to produce indicators covering all of the output - it would be sufficient if the indicators covered most of the production.

### **The distinction between inputs, activities, outputs and outcomes**

143. Within any productive process, there is a chain of events which leads to certain results. Take, for example, the provision of health services. **Inputs** are the resources used in the productive process. These include the time of the medical and non-medical staff and any goods and services used up in the delivery of services. These resources are used in **activities** such as carrying out consultations, prescribing drugs or doing operations. These generate **output** which is health care. Finally, there is usually an **outcome** such as a healthier person ready to contribute to society. It is sometimes difficult to distinguish between an outcome and an output for example. However it is an important distinction for the measurement of economic activity. The international guidance is clear that the measures of output should be used rather than outcome. The ESA says:

*In the context of the economic accounts, it is of prime importance to adopt the principle that the production and consumption of non-market services, like the production and consumption of goods and market services, must be defined in terms of the actual flows of these goods and services and not in terms of final results obtained from their use. As these results depend on several other factors as well, it is not possible to measure, for example, the volume of teaching services by the rise in the level of education, or the volume of health services by the improvement in the health of the population.*

144. In practice, it may be impossible to measure an output. In such cases it may be necessary to measure activities, or activities which can reasonably be taken as proxies for output.

145. For the purpose of analysis, government services will be broken down into three types. Each type presents a different set of problems in terms of output measurement. The following sections explain these problems. These are followed by a description of the methods used for those services for which output measurement has been incorporated in the published accounts namely: health, education, and social security.

### **Services consumed by individuals**

146. Services consumed by individuals include education, health and some personal social services. Typically, as well as non-market production, there is a small but significant market sector producing the services. There is, therefore, a private sector analogue for most of these cases. For example, in education, the volume estimates included in consumers' expenditure are constructed by deflating the total expenditure on fees by a price index for private education. This implies that the volume of the service included in the market sector is measured by the number of pupils in private education. Similar arguments can hold for health, where measures would be the volume of operations or GP visits. At least in theory the same approach can be adopted for the non-market services.

### **Government administrative services**

147. These services include, for example, running the tax system, administering social security and providing advice to ministers. In this situation, government is primarily operating a service for itself. In these cases, it can sometimes be relatively straightforward to define a unit of output. For example, the Inland Revenue collects a range of information on the number and type of cases handled. The Department of Social Security knows the numbers of new claimants and recipients of each benefit. In other cases it is harder to identify the unit of output. Examples include Civil Servants providing policy advice to Ministers, fraud investigation and providing statistical services. However, the problem is no greater than that for private sector services, such as consultancy or legal advice, where there is also no consistent unit of output.

### **Public goods and collective services**

148. It is difficult to measure services consumed collectively. This is recognised in the SNA which suggests that further research is necessary. Measuring defence output is a good example. There is no obvious unit of output. The normal measures of success in the production of defence services are measures of outcomes. In New Zealand, a defence capability index has been compiled but it is not clear how this relates to measures of output. A Finnish output measure focuses on the number of conscripts trained and other activity measures. The ESA suggests that it may be necessary to carry on using input based measures for these services. As yet no real progress has been made with any of the collective services.

### ***Health services***

149. An output measure for health services is now incorporated in the published estimates of GDP. Health services can be broken down into Family Health Services (FHS) or primary care and Hospital and Community Health Services (HCHS) or secondary care. For HCHS, there is a long established indicator of activities known as the Cost Weighted Activity Index. This measures a number of different types of activities and produces an index by weighting together according to the relative costs of the activities. Separate indices are available for the different territorial areas within the UK. Although this is not strictly an output measure, it is believed to be an improvement on the previous input based methodology and is now being used as a measure of output in the GDP estimates.

150. FHS covers services delivered by family doctors, opticians, pharmacists and dentists. For each of these an indicator of output or activity has been found. These include the number of consultations with General Practitioners, the number of NHS sight tests, the number of prescriptions dispensed and the number of adult courses of NHS dental treatment. Again separate data is used for England, Wales, Scotland and Northern Ireland.

151. The separate indices for both HCHS and FHS are weighted together using weights derived from the expenditure on each type of service in a base year.

### ***Education***

152. Educational services are about the delivery of education. For the national accounts we are interested in the volume of educational services produced. The unit of output of education is, therefore, the number of hours spent in education by pupils, adjusted for the quality of the education received.

153. There is only incomplete information on the numbers of hours spent in class by pupils. It has been assumed that the average number of hours in a school or University year does not change over time. Therefore, the number of pupils and students is a reasonable proxy for the volume of output of education.

154. Data is available on pupil and student numbers in nursery schools, primary schools, secondary schools, further education, special education and the number of undergraduates and postgraduates in higher education. These numbers can be converted into index numbers and weighted together according to the expenditure on the form of education in the base period.

155. There is a key issue with education in that there is significant evidence that educational standards have been rising over a number of years. This is demonstrated by, amongst other indicators, increases in the average point score of pupils taking GCSE exams at aged 16. A number of factors may have led to this increase in standards. However, there is evidence that the quality of teaching is rising. For this reason, it was felt necessary to adjust the educational output series for quality change. There is no single way to do this and certainly no method is infallible. Using information on GCSE points scores and by assuming that changes result from quality increases over the 11 years of compulsory education, it was decided to add a quality factor of 0.25 per cent for schools for each year. No adjustment was made for higher education where the evidence is less clear with suggestions that there is a declining proportion of students completing courses.

### ***Social security***

156. The number of claims for different types of benefits was chosen as the unit of output although the number in receipt of benefits could equally well have been chosen. Data on the number of benefit claims

is compiled by the Department of Social Security and ONS publishes the number of people claiming Jobseeker's Allowance. Information on the 12 largest benefits has been used with indices compiled for each one. These are weighted together using the administration cost associated with each benefit.

157. At present, this indicator excludes the output of those collecting social security contributions and administering the Child Support Agency. Further, no adjustment has been made for quality.

### **Incorporation in the data and impact**

158. Data for the areas of health, education and social security has been incorporated in the national accounts starting from 1986. No adjustments have been made for estimates prior to 1986 nor for data for other types of non-market output.

159. The new data impacts only on estimates at constant prices as there is no change to the methods at current prices. In the output analysis, it affects series on public administration, health and education. In expenditure, most of the impact is in the final consumption of general government. However, there is also an effect in the final consumption of non-profit institutions serving households which include further and higher education institutions. The overall impact of the data is approximately equal in both the expenditure and output analyses. Any difference is the result of differences in the approaches adopted before the introduction of this new method.

160. Unfortunately, it has proved impossible to carry out a full analysis of the impact of this new approach. This is because there was no separate constant price analysis of expenditure by COFOG group on the previous basis. And the output analysis included market and non-market activities indistinguishably. Further, the introduction of this approach coincided with the rebasing of the national accounts and the introduction of the new ESA. However, a simple analysis at the whole economy level has been carried out as shown at Table 1. This suggested that the new data has added an average of 0.04 per cent to the growth rate in GDP over the period 1986 to 1997. There is considerable variation over the period - the largest addition to growth is around 0.5 per cent and one year the impact was a reduction of 0.3 per cent. The volatility of the series results from rapid changes in demand for services. For example, the decline in 1995 partly reflects a decline in the number of new claims for certain benefits which may not have immediately been reflected in staffing levels. The increase in 1991 reflects increases in output of all three of the components.

### **Other areas**

161. Defence was investigated thoroughly during the course of this project. Unfortunately, little or no progress was made. An examination of the measures in published reports of Defence Agencies provided few examples of output indicators. Most of the measures were about performance rather than the amount of production. Further work is clearly required in this area.

162. Research was also carried out in personal social services. Although measures of output were identified, there were problems in obtaining suitable time series of data. With the support of the Department of Health this gap is expected to be filled.

163. Further research in the area of non-market output is still required. There is currently much interest in this subject in the international national accounting community with projects in a number of countries and work being co-ordinated by Eurostat. Areas of interest include the measurement of output of public goods and the measurement of quality. With this work, together with increased provision of output

measures by UK government bodies, there will be significant scope for introduction of further new measures of non-market output in the UK national accounts.

### **How the data has been received**

164. The main driver for this work was to improve the quality of the UK's national accounts estimates. The results have been well received for their smoothness and ease of use. The estimates of expenditure and the index of government output are now compiled on a consistent basis. The historic data is smooth and accurate. However, many of our estimates rely on a financial year totals. and this has caused us difficulties in estimating recent quarters. For example Health only has 30 per cent of its data currently coming to us on a quarterly basis while we have to estimate the current financial data based on Treasury or Department of Health forecasts for 1998-99 for the other 70 per cent.

165. There has been no talk of return to the old methods of estimating government output. There has been encouragement for us to put more resources into developing the remain areas of government output.

166. The outputs have attracted a lot of interest from "policy" people. In recent periods there have been money allocated by the Treasury for Education and Health and our estimates have reflected the growth in output for these series. There has been some confusion how these results have been interpreted since the Treasury has considered the results as productivity improvements rather than an increase in output.

167. At current prices the government sector has detailed information both for estimates of central (CG) and local government (LG). Our old deflation methods reflected this, but the new productivity methods do not contain detailed splits of CG and LG.

168. The introduction of the UK accounts on an ESA95 basis (for general government in the UK this had a downwards effect) coupled with our inability to compare the old and new series in detail was criticised.

169. There is some concern as to the movement of activity indices over time. For example advances in health care can be very dramatic and may weaken the accuracy of the data. The whole issue of how comprehensive the coverage of the indicators are needs to be re-examined at regular intervals.

170. The "quality" of the service that is provided is one of the issues that could be contentious. For instance are we treating higher education correctly in terms of quality adjustment when there has been a proportionate increase in students not completing their courses? Should we not have a negative adjustment reflecting this even though it is an outcome rather than an output?

171. The next steps for the UK will be to concentrate on the remaining half of the constant price system to build on the work so far.